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RECORD OF DECISION

WESTINGHOUSE SUPERFUND SITE
Sunnyvale, California

U.S. Environmental Protection Agency
Region IX

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Sunnyvale, California

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PART I. DECLARATION

1.0 SITE NAME AND LOCATION

Westinghouse Electric Corporation
401 E. Hendy Avenue
Sunnyvale, California

EPA ID# CAD001864081

2.0 STATEMENT OF BASIS AND PURPOSE

This Record of Decision ("ROD") presents the selected remedial action for the Westinghouse Electric Corporation Superfund site ("Westinghouse") in Sunnyvale, California.

This document was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. § 9601 et seq., and, to the extent practicable, in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. § 300 et seq., ("NCP"). The attached administrative record index (Attachment B) identifies the documents upon which the selection of the remedial action is based.

The State of California, through the California Regional Water Quality Control Board, concurs with the selected remedy.

3.0 ASSESSMENT OF THE SITE

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

4.0 DESCRIPTION OF THE REMEDY

The selected remedy, which addresses the primary risks posed by both soil contamination (which can be characterized as a principal threat at this site) and shallow groundwater contamination (which includes a detected, dense, non-aqueous phase liquid in the source area that may also be characterized as a principal threat), consists of the following components:

(1) Permanent **containment**, by means of groundwater extraction, of contaminated groundwater in the source area where dense, non-aqueous phase liquids ("DNAPLs") are detected, using extraction;

(2) **Restoration** of contaminated groundwater, using **extraction**, to the CDHS Action Level for 1,3-Dichlorobenzene, the proposed MCL for 1,2,4-Trichlorobenzene and the federal and state maximum contaminant levels ("MCLs"), with the exception of the standard for polychlorinated biphenyls ("PCB") in the onsite source area where DNAPL occurs;

(3) **Treatment** of the extracted groundwater to meet all applicable or relevant and appropriate ("ARARs") identified in this ROD for this discharge, prior to **discharge** to the onsite storm sewer, unless an evaluation indicates that an alternative "end-use" for the treated effluent (such as use for facility process water) can be practicably implemented;

(4) **Removal** of contaminated soil containing greater than 25 parts per million PCB to a depth of eight feet (approximately 400 cubic yards);

(5) Offsite **incineration** of excavated soils at a federally permitted facility;

(6) **Institutional controls**, such as land use restrictions, to prevent well construction (for water supply purposes) in source areas that remain contaminated. Excavation below the eight feet where soil has been removed will be restricted. Restrictions will also preclude excavation, other than temporary subsurface work in the upper eight feet and will require complete restoration of any disturbed fill or the asphalt cap once any such temporary work was completed;

(7) A requirement that EPA receive **notification** of any future intention to cease operations in, abandon, demolish, or perform construction in (including partial demolition or construction) Building 21 (see facility map, Figure 2);

(8) Permanent and ongoing **monitoring** of the affected aquifers to verify that the extraction system is effective in capturing and reducing chemical concentrations and extent of the aqueous phase plume and in containing aqueous phase contamination in the DNAPL source area.

The process steps for treatment of extracted groundwater may include phase separation (offsite incineration of any product phase recovered), either membrane or carbon filtration, ultraviolet/chemical-oxidation, air stripping, and a carbon polish. The components of the system will be determined during the project design and will be subject to modification during operation, based upon the actual flow rates and chemistry of the extracted groundwater (both of which may vary significantly over time). Destruction of groundwater contaminants will be accomplished through (1) offsite incineration of any separated product phase, (2) offsite incineration of spent filtration membranes and/or spent carbon and (3) ultraviolet/chemical-oxidation.

5.0 STATUTORY DETERMINATIONS

5.1 Protectiveness

The selected remedy is protective of human health and the environment. Protection is achieved at this industrial site, and in the aquifers extending beyond the Westinghouse property, in the following ways:

(1) The contaminated groundwater outside of the source area will be restored to health-based standards, thus preventing potential exposures, should these shallow aquifers ever be used for water supply purposes.

(2) Hydraulic containment of the source area will prevent pollutant migration and further contamination of the shallow aquifers, which are potential drinking water supplies. This containment will be combined with a deed restriction to prevent construction of supply wells in the source area where dense non-aqueous phase liquid has been detected.

(3) The extracted groundwater will be treated, prior to on-site discharge, to meet all ARARs identified for such discharges.

(4) Contaminated soil containing greater than 25 parts per million PCB, which represents a 10^{-6} risk in an industrial setting, will be removed to a depth of eight feet, thereby preventing potential exposure at the surface, or in the shallow subsurface (e.g., utility line workers).

(5) The removed soil, spent filtration membranes and spent carbon will be incinerated offsite, destroying the contamination and thereby preventing any further possibility of exposure to those contaminants.

(6) Land use restrictions will prevent excavation, and therefore exposure, in the area where contaminated soils remain at depths greater than eight feet. Excavation in the upper eight feet of the area where contaminated soils have been removed will be restricted to temporary subsurface work and will require that any disturbance to the fill or the asphalt cap must be restored once such temporary work is completed.

(7) Land use restrictions will also prevent any residential development in the source area, in order to reduce further any risk of exposure due to contact with soil contamination.

5.2 Applicable or Relevant and Appropriate Requirements

The selected response actions comply with federal and state requirements that are legally applicable, or relevant and appropriate, with the exception of the federal maximum contaminant level for PCB in the source area. A waiver of this standard (which is a "relevant and appropriate" standard) is justified in this case based upon EPA's determination that it is technically impracticable to meet it. This determination is made pursuant to CERCLA §121(d)(4)(c) and is based on the following: (1) the presence of spatially discontinuous, dense, non-aqueous phase PCB (Aroclor 1260) liquids in significant amounts; the heterogeneity of the subsurface combined with low permeabilities; and the characteristics of PCB (low solubility, high tendency to partition onto organic materials and high viscosity). EPA has determined that it is technically impracticable to meet the federal maximum contaminant level for PCB in the DNAPL source area and that this source area must be permanently contained.

5.3 Reduction of Toxicity, Mobility or Volume Through Treatment

Soil containing greater than 25 parts per million PCB will be excavated to a depth of eight feet and incinerated offsite, thereby reducing the toxicity, mobility and volume of site contamination by permanently destroying the PCBs with a treatment technology.

Toxicity, mobility and volume of groundwater contaminants will also be reduced as extracted groundwater is treated by the combination of phase separation (product phase will be incinerated), filtration (filters will be incinerated) and ultraviolet/chemical-oxidation (chemical destruction) steps.

The use of these treatment technologies as an integral part of the cleanup plan for both soil and groundwater demonstrates that the cleanup plan satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

5.4 Use of Permanent Solutions, Alternative Treatment or Resource Recovery Technologies

While some hazardous substances will remain on the Westinghouse property, contaminated soil that is removed will be incinerated rather than land disposed. The treatment technologies that are being applied to extracted groundwater will also destroy contaminants (incineration and ultraviolet/chemical-oxidation). The selection of these treatment technologies for soil and groundwater demonstrate that where it is practicable, the selected remedy includes permanent solutions.

Because removal or treatment of dense non-aqueous phase liquids at this site is considered technically impracticable, the remedy requires long-term containment of the source area. Because this remedy will result in hazardous substances remaining onsite above health-based levels, a review will be conducted within five years after commencement of the remedial action, and every five years thereafter, to ensure that the remedy continues to provide adequate protection of human health and the environment.

5.5 Cost Effectiveness

The remedy is cost effective because maximum protection is achieved for the estimated cost of performance. The analysis contained in the Feasibility Study and this ROD demonstrates that additional remedial action and the cost associated with that action would not achieve a measurable reduction in risk, but that less effort and a lower cost would result in a measurably higher risk at the site.

for Daniel W. McGovern
Regional Administrator

10/16/91
Date

PART II. DECISION SUMMARY

This Decision Summary provides an overview of the problems posed by the Westinghouse Superfund site. It also includes a description of the remedial alternatives considered, and the analysis of those alternatives against criteria set forth in the National Contingency Plan (NCP). This Decision Summary explains the rationale for the remedy selection and how the selected remedy satisfies the statutory requirements of CERCLA.

1.0 SITE NAME, LOCATION, AND DESCRIPTION

1.1 Site Name and Location

Westinghouse Electric Corporation
401 E. Hendy Avenue
Sunnyvale, California

1.2 Site Description

The Westinghouse Sunnyvale Plant is a heavy industrial facility which currently manufactures steam generators, marine propulsion systems and missile-launching systems for the U.S. Department of Defense. Headquartered in Pittsburgh, Pennsylvania, Westinghouse purchased the original plant property in Sunnyvale in 1947 and continued adding adjacent property until 1956. The property currently constitutes 75 acres and generally lies between Hendy Avenue, California Avenue, Fair Oaks Avenue, and N. Sunnyvale Avenue. A parking area across the street on California Avenue is also currently part of the plant property.

1.3 Topography

The facility is located in the Santa Clara Valley, approximately five miles northeast of the Santa Cruz Mountains and five miles south of San Francisco Bay. The regional topography slopes gently downward north-north-east toward the Bay.

1.4 Land Use

The area around the site was used primarily for agricultural purposes before it was developed. Since the 1950s and 1960s, it has been developed for light industrial, commercial, or residential use and was substantially landscaped or paved. Natural surface drainage features were straightened and leveed as part of the creation of the urban storm sewer drainage system.

While the site itself is zoned for industrial use, it is generally surrounded by residential properties. Some of these parcels abut the site, and others are as near as across a street (100 feet).

1.5 Location and Facility Layout

Figure 1 shows the location of the site in Sunnyvale. Figure 2 shows the locations of buildings at the current 75-acre property. Two below-grade, 566,000-gallon reservoirs in the southeast and northeast portions of the site provide water for fire protection at the facility.

1.6 Hydrogeology

The subsurface in the area of the Westinghouse site consists of alluvial sands and gravels with silt and clay layers. The hydrogeology of this area is characterized by a high degree of heterogeneity.

There are two shallow water-bearing units that have been affected by contamination in the Reservoir 2 area of the Westinghouse site. They have been designated as the A aquifer and the B aquifer and are separated by a less permeable feature that is known as the A/B aquitard. One or more water-bearing sands may occur within a particular aquifer zone.

The A aquifer extends from the water table at approximately 25 feet below ground surface to a depth of 45 to 50 feet below ground surface (Figure 3). The B1 aquifer zone occurs between approximately 50 to 70 feet below ground surface, and is separated from the A aquifer zone by the five to eight foot thick A/B aquitard.

The B aquifer zone is separated from the underlying C and deeper aquifers by the B/C aquitard. The B/C aquitard is reported to be approximately 50 to 100 feet thick and exists at depths ranging from 100 to 150 feet below ground surface.

There is currently no known potable use of water from the A and B aquifer zones on the Westinghouse property or in the surrounding area. Municipal and industrial water supplies are drawn from below the B/C aquitard.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 Background on Contamination Problems at Westinghouse

In the mid-1950s, Westinghouse manufactured transformers in the southeast portion of the site near the Reservoir 2 area in Building 21 (Figure 2). The transformers contained Inerteen and mineral oil as thermal insulating fluids. Inerteen is a dense, non-aqueous phase liquid ("DNAPL") which consists of approximately 60 percent PCB Aroclor 1260 and 40 percent trichlorobenzene ("TCB"). Minor amounts of monochlorobenzene ("CB") and dichlorobenzene ("DCB") are also associated with Inerteen.

The storage and use of transformer fluids (Inerteen) and mineral oil resulted in contamination of soils and leakage into shallow groundwater (the A and B aquifers) in the Reservoir 2 area. Additionally, general handling practices and the onsite use of Inerteen as a weed killer resulted in the release of PCB into shallow soils along portions of the facility fenceline, in the northwest yard, in the northeast yard, and along the railroad tracks adjacent to Building 61.

In 1981, responding to the general public concern expressed regarding PCB, Westinghouse conducted a study to determine the nature and extent of PCB in the soils on site. Extensive shallow soil contamination was discovered, and in 1984 and 1985, under California Regional Water Quality Control Board Orders, Westinghouse removed the PCB contaminated soils along fencelines and railroad spurs.

The early 1980 investigations highlighted the area around Reservoir 2 as a more serious problem demanding further investigation. Deep vadose-zone soils and groundwater were affected by release of transformer fluids stored and handled in this area. In the course of the continuing investigations in the Reservoir 2 Area, sampling revealed evidence of fuel hydrocarbon leakage to soils and shallow groundwater from two underground fuel tanks. One of these tanks has been removed and the remaining fuel tank is not in use.

2.2 Regulatory and Enforcement History

From the time PCB contamination was reported in 1981, both the California Water Quality Control Board ("the Board") and the California Department of Health Services ("CDHS") were involved in overseeing the investigation and cleanup work done by Westinghouse at this facility. As mentioned above, Westinghouse conducted shallow soil removal actions in 1984 and 1985 under Board Orders.

The site was proposed for listing on the National Priority List on October 15, 1984, and final listing occurred on June 1, 1986. A Potential Responsible Party ("PRP") search was conducted in 1986, and the findings reported in a final document dated August 8, 1986. The Board took the lead agency oversight role until December of 1987. At that time the Board requested, due to resource and staffing limitations, that EPA assume the lead agency role.

EPA took over the lead, and issued General and Special Notice Letters on January 2, 1988 and March 31, 1988, respectively. An Administrative Order on Consent for the Remedial Investigation and Feasibility Study ("RI/FS") was signed on August 24, 1988.

For the next two and one-half years investigations were conducted in a phased approach until sufficient information was available to propose a remedy. The draft RI/FS report was submitted in November of 1990, and the final report was completed on June 11, 1991.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

When EPA assumed the lead-agency oversight role from the Board and began negotiations with Westinghouse to conduct the RI/FS work, a Community Relations Plan was developed for the Westinghouse site. The first fact sheet announcing EPA's takeover of the lead and the upcoming investigations was hand delivered to residents surrounding the Westinghouse property and mailed to City officials and local groups identified in the Community Relations Plan in December 1988. The fact sheet generated little interest in the community.

Fact sheets were mailed to the community again in December 1990 and in June 1991. These fact sheets included information concerning the status of site investigations, the upcoming remedy selection process, and the availability of the Administrative Record in the City of Sunnyvale Public Library. The two fact sheets were mailed to approximately 10,000 households and businesses in an effort to reach as many community members as possible.

The June 1991 fact sheet presented the Proposed Plan and announced the public comment period of July 1 to August 29, 1991 (60 days), as well as the public hearing on the Proposed Plan on August 7, 1991. A press announcement in the Peninsula Times Tribune on June 30, 1991 and July 1, 1991 also contained this information, and on the day of the public hearing, a local television station announced the event.

The Proposed Plan public hearing was well attended (approximately 150 people attended), local news channels picked up the story, and many comments were received from many residents (approximately thirty) in the neighborhood near the Westinghouse site. These residents have since formed a neighborhood association with the focus of staying informed about Westinghouse cleanup issues and having a voice in the decision-making process.

4.0 SUMMARY OF SITE CHARACTERISTICS

4.1 Hydrogeology

The study area is underlain by alternating, discontinuous gravels, sands, silts and clays typical of the alluvial overbank and estuarine deposits of the region. The soils underlying the study area have highly variable percentages of clay, silt, sand, and gravel, and stratigraphic contacts between soil types vary from sharp to gradational. The coarse alluvial materials (sand and gravel) form a series of water-bearing units or aquifers, and the interlayered fine grained deposits (silt and clay) act as confining layers or aquitards which restrict vertical movement of groundwater between adjacent aquifers.

Aquifer zones in the vicinity of the facility are generally identified and correlated, with the shallowest water-bearing zone designated as the A aquifer zone. The A aquifer zone is underlain by the B aquifer zone, which has been divided into the B1, B2, and B3 aquifer zones. The approximate depths below ground surface at which these aquifer zones occur in the vicinity of the Westinghouse facility are as follows: A, 0 to 50 feet; B1, 50 to 70 feet; B2, 75 to 90 feet; and B3, 90 to 115 feet. One or more water-bearing sands may occur within a particular aquifer zone.

Geologic cross sections through the Reservoir 2 area subsurface have been prepared as part of the Remedial Investigation, and the analysis of these indicate that the aquifer and aquitard materials can be laterally discontinuous. However, the A/B aquitard appears to be continuous under much of the Reservoir 2 area.

The regional groundwater flow is generally northward. In the A aquifer, the gradient, which flows to the northwest, is relatively flat and is estimated to be between 0.0005 to 0.010 ft/ft. Over most of the study area, groundwater in the B aquifer flows toward the north-northeast with a shallow hydraulic gradient of approximately 0.0014 ft/ft. Velocities have been estimated at 2.6 to 522 feet per year in the A aquifer, and from .7 to 73 feet per year in the B aquifer.

The main feature on the A aquifer groundwater elevation maps that have been prepared as a part of the Remedial Investigation is a groundwater mound centered to the north and northwest of Reservoir 2 (Figure 3). The presence of the groundwater mound is allegedly due to leakage from underground water piping associated with the pump house for the reservoir. Previous attempts to locate the source of the pipeline leakage and correct it were unsuccessful and additional studies to determine its source are ongoing. If the source cannot be eliminated, the presence of the mound will have to be factored in to the design of the extraction system.

4.2 Contaminant Source Areas

Since the shallow soil removal, completed in 1984 and 1985, and EPA's subsequent take-over of the lead agency role in oversight of the work, the investigation has focused on the remaining contamination in the southeast corner of the site where soils and shallow groundwater have been affected. Approximately 65 monitoring wells have been constructed to date, and numerous soil borings drilled. Figure 4 depicts the site monitoring well locations.

4.2.1 PCB and Chlorinated Benzenes

Westinghouse stored Inerteen, a dense, non-aqueous phase liquid ("DNAPL") mixture of PCB and TCB in a 7,000-gallon above-ground storage tank at the south end of Reservoir 2. The release of Inerteen from the tank or leakage from the associated underground pipelines in this area resulted in the infiltration of DNAPL through the vadose zone and into the A aquifer (i.e., on top of the A/B aquitard). Prior to the initiation of DNAPL recovery from wells W38 and W48 in August of 1990, DNAPL thicknesses were measured between none detected to 0.17 feet, and 0.58 to 2.83 feet, respectively, in these wells.

The Inerteen tank was removed from the Reservoir 2 area in 1971. The associated underground piping remains in place and is no longer in use. The approximate extent of residual PCB in the vadose zone soil is shown in Figure 5. The approximate extent of DNAPL and aqueous phase PCB in the A aquifer is shown in Figure 6.

Inerteen was also released at several areas along the underground Inerteen pipeline as indicated by the presence of PCB in the soils along the pipeline. In addition, several inches of DNAPL were identified on top of the A/B aquitard in well W46 near the pipeline. The presence of DNAPL in this well is attributed to either leakage of Inerteen from the Inerteen pipeline or from the former transformer filling station located in Building 21. The detection of PCB and high-boiling-point hydrocarbons ("HBHCs") in the groundwater from well W53 suggest that some PCB may have been dissolved in the hydraulic fluid released from the adjacent former hydraulic testing sump.

These detections of PCB DNAPL in the A aquifer are significant because they are an extensive, persistent source of contamination to groundwater involving PCB.

Soil concentrations of PCB in the source area often exceed 500 parts per million (ppm) and are as high as ten or twenty thousand ppm in a number of soil samples. These concentrations do not attenuate appreciably with depth until the A/B aquitard is encountered. (Soils with concentrations of greater than 500 ppm PCB are considered a "principal threat," as defined by the August 1990 EPA Guidance on Remedial Action for Superfund Sites With PCB Contamination.)

Groundwater concentrations exceed the federal maximum contaminant level ("MCL") of 0.5 parts per billion ("ppb") in the source areas where DNAPL is detected and in the B aquifer. In several instances, concentrations actually exceed the solubility limits for PCB (2.7 ppb), indicating that some sort of facilitated transport is occurring.

Limited information is available on the concentration and distribution of PCB in soil beneath Building 21 where the transformer manufacture occurred. Relatively low concentrations of PCBs have been detected in one soil sample beneath the building (10.7 mg/kg from the boring from Well 53; no other contaminants of concern "COCs" were detected). Four wells have been installed in Building 21 and no DNAPL has been encountered. Enough information exists to indicate that soils beneath Building 21 do not serve as a continuing source of contamination to the groundwater.

4.2.2 Gasoline and Related Compounds

Prior to 1986, Westinghouse stored gasoline in a 500-gallon underground tank west of Building 12A at the north end of Reservoir 2. Releases of gasoline from this tank contaminated the soil and groundwater beneath the tank.

The tank and surrounding gasoline-affected soils were removed in 1986, to a depth of 9 to 9.5 feet below ground surface. The area and depth of excavation were limited because of concerns for the structural integrity of Reservoir 2, Building 12A, and monitoring wells W20 and W21.

Although no residual gasoline-affected soils were detected by the analysis of soils from the boring for W41, soils containing residual gasoline may remain in this area; the subsequent detection of gasoline in the groundwater near the former tank indicates that gasoline infiltrated below the depth of the tank excavation. Gasoline concentrations in groundwater near the former tank (wells W34 and W41, monitoring the A-aquifer) have ranged from 280 to 6800 ppb.

Benzene, toluene, ethylbenzene and xylene are also detected in wells W34 and W41. Benzene detections have ranged in concentration from 0.7 to 800 ppb. Toluene concentrations in these two wells range from one to 98 parts per billion. For ethylbenzene, detected concentrations range from two to 540 ppb.

Gasoline, ethylbenzene, and xylene are also detected in the B-aquifer in well W61. The most recent sampling in April of 1991 shows concentrations at 18,000, 300, and 830 ppb respectively. The source of gasoline and related compounds in this well is uncertain and there is some indication that detections here are related to an upgradient source east of Fair Oaks Avenue from a property adjacent to the Westinghouse property. This source on the adjacent property is being investigated under the Underground Storage Tank program administered by the State of California.

4.2.3 High-Boiling-Point Hydrocarbons ("HBHCs")

The primary sources of releases of HBHCs at the site included three 13,000-gallon above-ground mineral oil storage tanks and a 20,000-gallon underground fuel storage tank at the south end of Reservoir 2, and the former hydraulic testing sump adjacent to well W53 in Building 21. The above-ground mineral oil tanks were removed from the Reservoir 2 area prior to 1974, and the hydraulic testing sump was backfilled and paved over with concrete prior to 1981. The 20,000-gallon fuel storage tank and associated piping remain in place and are no longer in use. Subsequent to their release, these HBHCs infiltrated through the vadose zone soils to the A aquifer.

Residual HBHCs occur in the vadose zone beneath these sources; and HBHCs in the form of a light, non-aqueous phase liquid floating on top of the water table are localized to the area of wells W36 and W38. Prior to the implementation of light non-aqueous phase liquid (LNAPL) recovery from wells W36 and W38 in August 1990, LNAPL thickness measurements ranged from none detected to 1.1 foot and none detected to 0.01 foot, respectively, in these wells.

While the presence of HBHCs has been investigated at this site, they are not considered contaminants of concern due to low toxic effects and no evidence of carcinogenicity. The selected remedy, which includes extraction and treatment components, will remediate these chemicals along with the more toxic and carcinogenic compounds of concern found at the site.

4.2.4 Volatile Organic Compounds

Concentrations of one or more volatile organic compound ("VOCs") (excluding fuel hydrocarbons and DCB) were detected in the A aquifer groundwater samples from eight monitoring wells located near Building 21. The sporadic distribution and relatively low concentrations of VOCs in the A aquifer (total VOC concentration range: 0.7 to 131 parts per billion) suggests that these VOCs entered the groundwater in an aqueous phase. Although a specific source for these VOCs has not been identified, the distribution of VOCs in the A aquifer indicates that the VOCs are localized near Building 21.

4.3 Transport of Site Chemicals

4.3.1 Transport Mechanisms

This section discusses the transport of site contaminants of concern ("COCs") and the factors that may have influenced chemical migration.

Volatilization - Volatilization is considered to be a potential transport mechanism possibly resulting in the loss of chlorinated benzenes and VOCs in shallow soil to the atmosphere. PCBs are essentially nonvolatile and therefore are expected to enter the vapor phase only in negligible amounts.

Water Solubility and Partitioning - Chlorinated benzenes and VOCs generally show increasing water solubility with decreasing chlorination. As a whole, they are more soluble in water than PCBs and will be transported by water in both vadose-zone and aquifer soils to a larger extent. Chlorobenzenes and VOCs have relatively low K_{oc} and K_{ow} values and thus are not strongly adsorbed to particulate matter.

PCB does not readily dissolve in water and is strongly adsorbed onto soils. The following discussion presents the technical assumptions made in predicting transport. They are a mathematical representation of the factors which govern how PCB may travel in the aquifer, allowing the calculation of a prediction for how fast and how far the contamination will travel.

Assuming a bulk density of 1.5 kilograms per liter, an estimated porosity of 20 percent, a K_{oc} value of 530,000 ml/g (based on Aroclor 1254 in the absence of specific data for Aroclor 1260), and an average organic carbon content of 0.2 percent in the A aquifer, the retardation factor for aqueous PCB transport is estimated to be approximately 7950. The actual retardation factor for Aroclor 1260 may be much higher than the estimated value because the K_{oc} value is likely to be much larger than that of Aroclor 1254 due to its lower aqueous solubility. Using this retardation factor, an average A aquifer groundwater gradient of 0.025, and a range of aquifer permeability from 10^{-2} cm/sec to 10^{-4} cm/sec, it is estimated that PCB Aroclor 1260 should not have migrated as an aqueous solute more than 0.08 to 8.2 feet from the residual DNAPL in the aquifer matrix over the past fifty years in the absence of any facilitated transport mechanism (i.e., cosolvent effects or colloidal transport).

Because PCBs have been detected at distances (200 to 350 feet from the source) much greater than would be predicted based on idealized Darcian flow and adsorption/desorption kinetics, the transport of PCBs in the groundwater may have been facilitated by either colloid transport or cosolvent effects. The groundwater mound (see Section 4.2) may have also contributed to the current distribution of PCB in the A and B aquifers.

<u>Colloid Transport</u> - Colloid transport could be a potential mechanism for facilitating migration of PCB at the site because PCB Aroclor 1260 has a high K_{oc} and K_{ow} (these numbers represent the tendency of a compound to attach to soil or other organic particles in preference for dissolving in water or some other solvent), and is thus strongly adsorbed on soil, colloids, and other particulates. The presence of silty and clayey sands within some portions of the A aquifer zone, however would act as a fine grained filter material which may effectively negate this transport mechanism. Similarly, in the absence of a preferential pathway between the A and B1 aquifers, such as poorly sealed deep borings or an incompetent feature in the aquifer (e.g., ancient root holes or sand stringers), the potential for colloid transport through the A/B1 aquitard is considered questionable because the silty clay aquitard would be likely to filter out the colloids. However, there is some evidence from the comparison of filtered and unfiltered samples to indicate that colloidal transport may have occurred.

<u>Cosolvent Effects</u> - Cosolvent effects may also be a mechanism for facilitating the transport of PCB at the site because PCB Aroclor 1260 has a high affinity for hydrocarbon solvents (i.e., HBHCs and

gasoline). PCBs have been detected at concentrations in excess of the maximum aqueous solubility (i.e., 2.7 ppb) in wells W39 (8.1 ppb), W54 (7 to 25 ppb), and W61 (3.3 ppb). The increase in apparent aqueous solubility may be the result of cosolvent effects because these elevated PCB concentrations are coincident with the highest concentrations of dissolved HBHCs and gasoline detected in the site's monitoring wells (i.e., 6,200 ppb HBHCs in well W39, 17,000 ppb HBHCs in well W54, and 20,000 ppb gasoline in well 61). However, the gasoline in Well 61 is thought to be from an offsite source, rather than from the source area where PCB occurs. Therefore there is some question about the hypothesis for this well.

While TCB initially facilitated the transport of PCB through the vadose zone due to its solvent effects, it does not appear to have any current significant cosolvent effects for the transport of PCB through the groundwater. The highest concentrations of TCB in the groundwater are located in or near areas containing DNAPL (i.e., wells W22, W46, and W56). TCB was not detected in the majority of the wells in which PCB was detected.

Preferential Pathways - While no direct evidence from the investigation indicates that a preferential pathway exists to facilitate chemical migration, this transport mechanism has not been discounted. A preferential pathway is a more permeable pathway through the aquifer material. These subsurface features contain more sand or gravel and may have been ancient river channels. Groundwater or contamination may be transported more quickly through these old river channels than would be expected given the regional flow rates.

Regardless of the transport mechanisms involved for PCB transport in the groundwater, the techniques used for investigating the extent of PCB migration and the technologies for remediating PCBs in the groundwater are the same.

4.3.2 Persistence

Highly chlorinated PCBs (e.g., Aroclor 1260) are relatively resistant to biodegradation. Biodegradation of nonchlorinated VOCs (benzene, toluene, ethylbenzene, xylene - often referred to as BTEX - and acetone) is generally slow and not typically an important environmental process, although fuel hydrocarbons can be biodegraded under proper conditions. Biodegradation data for chlorinated VOCs are generally lacking for vadose-zone conditions, but it is thought to occur very slowly in saturated conditions. Oxidation, hydrolysis, and photolysis of PCBs, chlorinated benzenes, and VOCs are all generally insignificant processes in natural environments.

4.3.3 Transport Pathways

DNAPL (PCB and TCB) - A conceptual cross section showing the pathways for the transport of PCB and TCB from the former Inerteen storage tank area through the vadose zone and groundwater is shown in Figure 7. PCB and TCB infiltrated into the site soils in the form of a DNAPL. As noted above in the section on transport mechanisms, TCB acted as a solvent to reduce the viscosity of the PCB and facilitated the transport of PCB through the vadose zone. The release of Inerteen in the former storage tank area was of sufficient magnitude to exceed the specific retention capacity (the ability of the soil to hold a liquid as a sponge holds liquids) of the soils and allow Inerteen to infiltrate to the water table. Another release resulting in the infiltration of Inerteen to the water table occurred from the Inerteen pipeline near Building 21 or from the former transformer filling station in Building 21.

Because of the long period of time which has passed since the Inerteen was used in the Reservoir 2 area, the PCB retained in the vadose zone is considered to be held as specific retention. TCB is no longer detected in these soils and it is assumed that, as a more mobile constituent of Inerteen, it passed on through the vadose zone leaving PCB behind. Gravity drainage of PCB is not considered a current transport mechanism for the transport of PCB through the vadose zone.

Upon reaching the A/B aquitard, the DNAPL spread laterally until (1) it settled in small depressions along the top of the aquitard, (2) the amount of DNAPL available for lateral migration was dissipated by the retention of DNAPL within the soil pores at the base of the aquifer, or (3) the DNAPL pore pressure no longer exceeded the minimum displacement pressure required for DNAPL entry into water-filled soil pores of the aquifer.

The residual DNAPL in the aquifer matrix and the DNAPL located on top of the A/B aquitard constitute an ongoing source of PCB and chlorobenzenes in the groundwater. These compounds slowly (over years) dissolve into the aquifer and are transported in the groundwater in the same direction as the groundwater flow. Since the creation of the groundwater mound at the north end of Reservoir 2, groundwater flow within the area affected by the groundwater mound is outward from the center of the mound. The presence of the mound has caused the distribution of PCBs in the groundwater to be more widespread in the A aquifer than would have been expected in the absence of the mound. The reversal in the groundwater gradient in the southern portion of the site due to the mound has resulted in the detection of some PCB at wells W39 and W10 located south (i.e., in the original upgradient direction) of the former Inerteen tank.

Groundwater flow in the B aquifer is to the north-northeast, and the orientation of the PCB and TCB plume in this aquifer is consistent with the groundwater flow direction (Figure 8). As noted in the section on transport mechanisms, the presence of PCB and TCB in the B aquifer may be attributed to the migration of these compounds through poorly sealed deep soil borings or some incompetent feature in the A/B1 aquitard (i.e., ancient root holes or sand stringers). The presence of PCBs in the B aquifer south of the former Inerteen tank (i.e., at wells W49 and W25) indicates that some of the PCB which had migrated to the south in the A-aquifer had subsequently migrated across the A/B aquitard due to the downward gradient between the A and B aquifers. As noted earlier, the detection of PCB (3.3 ppb) above the aqueous saturation limit (2.7 ppb) for this compound in well W61 in conjunction with the detection of 20,000 ppb gasoline suggests that cosolvent effects may be facilitating the transport of PCB in the groundwater at the site.

<u>Gasoline</u> - The extent of dissolved gasoline in the groundwater of the A aquifer is limited to the area containing wells W20, W41, and W34 (Figure 9). These wells are near or adjacent to the location of the former underground gasoline tank at the north end of Reservoir 2. No LNAPL has been detected in these wells. The leakage of gasoline from the former tank resulted in the infiltration of gasoline to the groundwater table where it dissolved into the groundwater. Because the former tank location is approximately coincident with the center of the groundwater mound, dissolved gasoline would be expected to flow somewhat radially away from the tank site.

Gasoline was detected in the B aquifer well W61 east of Fair Oaks Avenue. The transport of gasoline in the B aquifer is toward the north to northeast consistent with the regional gradient. The source of gasoline in the B aquifer at well W61 is uncertain because (1) a hydraulic connection between the gasoline detected in the A aquifer wells at the north end of Reservoir 2 (i.e., wells W34 and W41) and the gasoline detected in well W61 in the B aquifer is not apparent from the groundwater monitoring data, and (2) the gasoline may be related to an upgradient source east of Fair Oaks Avenue.

<u>High-Boiling-Point Hydrocarbons ("HBHCs")</u> - Releases of HBHCs to the soils and groundwater are associated with the three former aboveground mineral oil storage tanks and the 20,000-gallon underground tank at the south end of Reservoir 2 and the former hydraulic testing sump adjacent to well W53 in Building 21. Again, Figure 9 presents the distribution of these compounds along with the gasoline compounds. Dissolved HBHCs have been detected in the groundwater near these sources (i.e., wells W23, W24, W25, W39, W47, W49, and W53). HBHCs in the form of LNAPL have only been detected floating on the groundwater in wells W36 and W38. Approximately 1.1 foot of LNAPL was detected in well W36 in February 1990 and approximately 0.1 foot of LNAPL was detected in well W38 in January 1990. These were the maximum thicknesses of

LNAPL detected in these wells during the remedial investigation ("RI"). After three months of product recovery from these wells the LNAPL thickness in each well was reduced to approximately 0.001 foot. Because of the limited extent of LNAPL at the site, LNAPL transport has not been considered a significant transport mechanism at the site.

Dissolved HBHCs have been detected in the groundwater samples from several monitoring wells in both the A and B1 aquifers. The HBHCs in the groundwater will travel through the aquifers in the same direction as the groundwater. However, as mentioned earlier, these compounds are not considered as contaminants of concern in the risk evaluation. They are being monitored and they will be addressed by the groundwater extraction and treatment system during cleanup.

Volatile Organic Compounds ("VOCs") - Concentrations of one or more VOCs (excluding fuel hydrocarbons and DCB) were detected in the A aquifer groundwater samples from eight monitoring wells located near Building 21 (Figure 10). No halogenated VOCs were detected in the B aquifer. The sporadic distribution and relatively low concentrations of VOCs in the A aquifer (total VOC concentration range: 0.7 to 131 ppb) suggests that these VOCs entered the groundwater in an aqueous phase. The distribution of VOCs in the A-aquifer indicates that the VOCs are localized near Building 21. The VOCs are dissolved in the groundwater and flow in the same direction as the groundwater.

4.3.4 Potential Exposure Points

Surface and subsurface soils containing COCs to depths of five to eight feet below ground surface are considered potential exposure points for workers or future onsite residents. (Future onsite residential use has been evaluated in the Risk Assessment as a hypothetical case. The remedy selected in this ROD includes institutional controls such as land use restrictions to prevent residential development.) The onsite groundwater would be considered a potential exposure point in the event that the Reservoir 2 area were converted to residential use in the future and that groundwater was extracted from the A and B aquifers for domestic use at these residences. The groundwater is considered a potential exposure point for offsite residences with existing wells if the COCs at the site migrate toward these wells and if a conduit exists for the transport of COCs into these wells.

Well surveys identified six wells that could potentially receive COCs from site groundwater. These wells are described as follows:

(1) A domestic and irrigation well (well 14) located downgradient about 6,900 feet to the northeast of Reservoir 2;

(2) A municipal well (well 82) located downgradient about 2,900 feet northwest of the facility;

(3) A deep well (depth greater than 500 feet below ground surface) located in the center of the facility, about 1200 feet west of Reservoir 2;

(4) Three domestic water supply wells (wells 157, 156, and 183) located approximately 4,200 feet west-northwest, 4,300 feet west-northwest, and 7,000 feet northwest of Reservoir 2, respectively. A complete description of the well survey conducted during the RI for the site and regional groundwater use is included in Appendix G of the final RI/FS Report.

None of these six wells have been affected by Westinghouse chemicals. For perspective, the nearest downgradient well is 2500 feet from the Westinghouse plume, which has traveled 350 feet from the point of release in a 30- to 50-year time frame.

5.0 SUMMARY OF SITE RISKS

5.1 Human Health Risks

This section summarizes the potential present and future human health risks associated with exposure to the contaminants of concern ("COCs") in site soils and groundwater at the Westinghouse site. The risk analysis has been conducted in order to evaluate what risk the site currently poses, and what risk it may pose in the future if no remediation occurs. This results of the risk assessment serve as the rationale for the cleanup of the site.

The following chemicals constitute the COCs, for the Westinghouse site:

<u>Contaminants of Concern at Westinghouse</u>

Benzene*
Chlorobenzene (CB)
1,2-Dichlorobenzene (1,2-DCB)
1,3-Dichlorobenzene (1,3-DCB)
1,4-Dichlorobenzene (1,4-DCB)
1,2-Dichloroethane (1,2-DCA)
1,1-Dichloroethene (1,1-DCE)
cis-1,2-Dichloroethene (cis-1,2-DCE)
Ethylbenzene*
Polychlorinated biphenyls (PCBs)
Toluene*
1,2,4-Trichlorobenzene (1,2,4-TCB)
1,1,1-Trichloroethane (1,1,1-TCA)
Trichloroethene (TCE)
Xylene(s)*

* Benzene, Toluene, Ethylbenzene, and Xylene, fuel components, are often referred to as a group with the acronym BTEX

The above list of chemicals includes all chemicals detected during the RI with the exception of the high-boiling-point-hydrocarbons (HBHCs) and acetone. The extent and distribution of HBHCs and acetone has been characterized. The selected remedy, which includes extraction and treatment components, will remediate these compounds. However, the HBHCs are not considered contaminants of concern or COCs due to low toxicity and the lack of evidence of carcinogenicity. Acetone was detected twice at concentrations of less than 10 parts per billion (cleanup levels are set at 3500 parts per billion) and is not considered a COC due to its infrequency of detection and low concentration.

5.1.1 Exposure Assessment

The exposure assessment identifies potential exposure pathways and segments of the population that may be exposed to site-related COCs via those pathways.

Potential Human Receptors - For the last 85 years the Westinghouse site has been used only for industrial purposes (the property was used industrially for many years prior to Westinghouse ownership) and is expected to be used for such purposes in the future. Access to the facility is controlled and the property is surrounded by a high security fence. Future exposures to COCs at this site are expected to be consistent with those arising from a limited access industrial setting.

Exposure to soil containing COCs may occur among two types of outdoor workers (defined as adults 18 years of age or older) involved in activities in the onsite area containing COCs in soil: those engaged only in surface activities (surface workers), and those engaged in subsurface construction activities (subsurface workers) such as installation or maintenance of underground utilities. The risk from incidental ingestion of soil and dermal contact with soils are evaluated for both the surface and subsurface workers. Inhalation risk for surface workers was considered minimal because of the small surface area (fifty-foot diameter at the surface) and its paved status. For subsurface workers inhalation risks were factored into the evaluation.

The risk analysis also analyzed the risks which would exist if the site were developed residentially. For this hypothetical future scenario, where residential development and consequent exposures would occur at this site, risks from ingestion and dermal absorption of soil is evaluated for two receptor groups: children aged one to six, and adults 18 years of age or older.

Because of the limited distribution of COCs in soil, the risk evaluation addresses only soil in those area of concern where contact with COCs may potentially take place. The following two onsite areas are the only locations where such exposure is likely (Figure 5):

(1) The roughly 650 square feet to the south of Reservoir 2 in the former location of the aboveground Inerteen tank;

(2) Soil associated with the underground Inerteen pipeline with which subsurface workers may come into contact during excavation activities.

Because the groundwater is classified as a potential source of drinking water, the hypothetical future residential scenario also considers potential exposure to COCs in the groundwater via domestic water use in the event that a groundwater well that intercepts shallow groundwater were installed and used at the site. The exposure routes considered are the ingestion, dermal contact, and inhalation of VOCs and PCB associated with residential exposure scenarios.

While there are currently residences in close proximity to the Westinghouse property, the exposure assessment indicates that these neighborhoods do not constitute potential receptors. Soil contamination is confined to a localized area completely within Westinghouse property boundaries and is paved over with asphalt. A mechanism to transport soil-borne COCs from the site does not exist, and no domestic groundwater wells receive water impacted by site COCs. High security fencelines and controlled entry to the facility preclude any plausible scenarios for current exposure to nearby residents.

5.1.2 Potential Exposure Pathways

Soil, groundwater, and air can serve as exposure media for the potential receptor populations. This section discusses potential exposure media and exposure routes for both the current-use and future-use exposure scenarios.

The compounds that have been detected on site and are considered in the following evaluation are as follows: For soil - PCB, three DCB isomers, and three TCB isomers; for groundwater - PCB, three DCB isomers, three TCB isomers, BTEX, TCA, 1,2-DCA, 1,1-DCA, CB 1,1-DCE, cis-1,2-DCE, TCE, and acetone.

Soil - PCB and TCB are the primary COCs detected in soils on the site. There are three possible routes of exposure to contamination in these soils: ingestion, dermal contact, and inhalation.

Groundwater - PCB, DCB, TCB, and VOCs have been detected in at least one of the two water-bearing zones on and off the site (contaminant plumes are presented in Figures 9, 10, 11, and 12). Exposure to groundwater COCs could occur if groundwater in the contaminated areas of the A and B aquifers were used as a source of water supply. There is currently no known use of water from these two aquifers near the area of the Westinghouse contamination. However, a hypothetical scenario involving such use has been included in the exposure assessment. If the contaminated groundwater from the A and B aquifers were used as a domestic water supply, exposure could occur through ingestion, dermal contact, inhalation, or ingestion of fruits and vegetables irrigated with chemical-bearing groundwater. These aquifers are classified as potential sources of drinking water.

5.1.3 Intake Assessment

This section integrates receptor populations, current and potential future site activities, and exposure pathways into exposure scenarios representing reasonable maximum exposure ("RME") and typical exposure conditions, enabling the evaluation of human health risks.

Two exposure scenarios are evaluated in the intake assessment. Scenario one, the worker exposure scenario, applies to exposures attributable to potential soil-related worker activities. Scenario two addresses potential exposures to hypothetical future residents.

To evaluate potential worker exposures to soil at the site, Scenario one addresses typical and reasonable maximum exposures (RME) to a surface worker and a subsurface worker over a period of 9 and 30 years, respectively. The specific subsurface construction activity evaluated was installation and maintenance of utility trenches. The soil exposure scenarios were used to estimate the potential adverse health effects to surface and subsurface worker populations via ingestion, inhalation, and dermal contact.

Scenario two addresses soil- and groundwater-related exposures assuming the Westinghouse property were to be converted to residential use at some time in the future. In this scenario, ingestion and dermal absorption of COCs from exposure to contaminated soil, and oral, dermal, and inhalation exposure to groundwater is evaluated for adults 18 years of age or older and children aged one to six years. (The inhalation pathway for soil was considered minimal for this scenario because landscaping or pavement would generally prevent airborne transport of contaminated particles, the fifty-foot diameter area at issue is small, and the risk for this pathway would be eclipsed by the ingestion and dermal absorption pathways; i.e., there would be no measurable increase in the total risk from this pathway.)

Tables 1 through 5 present pathway-specific equations, intake parameters, and the references or rationale for selecting the values used in estimating the chronic daily intakes ("CDIs"). Common to all the scenarios are fixed-receptor body weights and the estimation of averaging times. The typical body weight used for workers is 70 kilograms (kg). The typical body weight used for adult residential receptors is also 70 kg. The typical body weight for a one- to six-year-old was 16 kg.

Table 9 includes toxicity and carcinogenicity information for each of the COCs, i.e., chronic reference doses and cancer potency factors.

5.1.4 Risk Characterization

This section discusses the potential adverse noncarcinogenic health effects and excess carcinogenic risks (i.e., additional cancer risks above expected current background cancer risks) associated with ingestion, dermal and inhalation exposures to the COCs identified in soils and groundwater at the site. It should be noted that both the A and B aquifers are classified as potential drinking water sources.

Noncarcinogenic health effects resulting from exposure to a single compound, or a combination of compounds, are evaluated by calculating a hazard quotient ("HQ"). The HQ is the ratio of estimated chemical intake (i.e., CDI) for a particular route of exposure to a reference dose ("RfD"). An RfD for chronic exposure is an EPA-established value that represents chemical-specific, exposure-route-specific doses to which nearly all populations may be exposed for a period of up to 365 days per year for 70 years without experiencing adverse health effects. For any single chemical, or combination of chemicals where the HQ exceeds unity (1.0), potential health risks may be a concern. The sum of HQs for all pertinent chemicals over all pertinent exposure routes (e.g., ingestion, dermal, or inhalation) is the total hazard index ("HI"). The HI represents the total adverse health effect associated with exposure to noncarcinogenic compounds of a particular exposure scenario (e.g., typical exposure for a surface worker). As with the HQ, an HI less than unity (1.0) is considered to be indicative of no adverse health effects.

5.1.4.1 Soil Exposure

<u>Noncarcinogenic Risk</u> - PCB and TCBs were the COCs considered for potential soil exposures. Because there are no RfDs associated with PCB, 1,2,3-TCB, or 1,3,5-TCB, noncarcinogenic risks associated with exposure to soil could not be evaluated for these compounds. The Rfd for 1,2,4-TCB was used to calculate the risk of exposure to this isomer in soils.

Table 6 presents the calculated HIs associated with exposure to soils in the area of concern for both the current industrial-use scenario and the hypothetical future residential-use scenario. The HIs for workers or hypothetical future residents do not exceed one (1.0), thus no adverse, noncarcinogenic health effects are associated with these exposures.

<u>Carcinogenic Risks</u> - The results of calculations for exposures to PCB- and TCB-containing soil via ingestion and dermal contact are summarized in Table 6 for the onsite surface and subsurface worker populations and hypothetical future residential populations.

The excess cancer risks for both the typical and RME scenarios for all receptor populations exceed the ten to the minus six to ten to the minus four (10^{-6} to 10^{-4}) range considered acceptable by the EPA (see the National Contingency Plan, 40 C.F.R. §300.430(e)(2)(i)(A)(2)). The primary exposure pathway contributing to the excess risk appears to be the direct contact with PCB-containing soil through dermal exposure.

5.1.4.2 Groundwater Exposure

Noncarcinogenic Risks - As shown in Table 6, the HI associated with hypothetical future use of the A aquifer as a sole source of domestic water exceeds 1.0 for both the typical and reasonable maximum exposure scenarios for children (19 and 57, respectively) and for adults (8.5 and 26, respectively). 1,2,4-TCB is the primary contributor to these HIs.

For the B aquifer, as shown in Table 6, the HIs associated with hypothetical use of the B aquifer as a sole source of domestic water do not exceed 1.0 for the typical or reasonable maximum exposure scenarios for adults or children. Therefore, no adverse, noncarcinogenic health effects are associated with the use of groundwater from the B aquifer for domestic purposes.

Carcinogenic Risks - As shown in Table 6, the total estimated excess cancer risks associated with the use of the A aquifer as a sole source of domestic water are outside the range considered acceptable by the EPA [10^{-6} to 10^{-4}, pursuant to the National Contingency Plan, 40 C.F.R. §300.430(e)(2)(i)(A)(2)]. The potential exposure to PCB through ingestion of contaminated groundwater was primarily responsible for these excess risks. Under the longer exposure period modeled under the RME scenarios, dermal contact and inhalation of benzene and 1,1-DCE also contributed to the total excess cancer risk.

Total excess cancer risks associated with use of the B aquifer as a sole source of domestic water are 2.73×10^{-5} and 1.88×10^{-5} for the typical scenarios of a child and an adult, respectively. Total excess cancer risks of 4.33×10^{-5} and 9.89×10^{-5} were associated with the RME to children and adults, respectively. These risk levels, for both age groups, are within the 10^{-6} to 10^{-4} range of acceptable human health risks for Superfund sites (see the National Contingency Plan, 40 C.F.R. §300.430(e)(2)(i)(A)(2)). The potential ingestion of PCB is primarily responsible for the risk levels calculated for these scenarios.

5.2 Environmental Evaluation

Wildlife that may be present in the vicinity of the site includes raccoons, gophers, ground squirrels, rats, field mice and a variety of birds, including burrowing owls. The State of California Department of Fish and Game has listed the burrowing owl (Athene curicularia) as a "species of special concern." The burrowing owl's primary habitat is grassland and open prairie. Neither of these habitats exist in the immediate area of the site. Because the site is covered with pavement or structures, access to the site is restricted by a fence and sources of food are essentially nonexistent, direct-contact exposures to COCs in soil on the site by wildlife are unlikely. Wildlife exposure to COCs in surface water offsite is also not likely to occur because surface drainage at the site is controlled by storm sewers. For these reasons, impact to wildlife is expected to be minimal.

5.3 Uncertainty Analysis

The risk evaluation for the Westinghouse site is based on data collected at the site over a period of approximately three years. Use of these data introduces uncertainty into the risk evaluation regarding the degree that the data accurately represent typical (average) and RME (reasonable maximum exposure) concentrations of the COCs. For example, much of the data from the area of concern was collected to identify "hot spots," areas of uncharacteristically high concentrations. Because these data were used to derive average concentrations at specified depths upon which "typical" exposure scenarios were based, the resulting concentrations probably tend to overestimate such conditions. Additionally, these calculated risk estimates are based on data collected from the relatively small area near the Reservoir 2 and should not be inferred to apply to the entire Westinghouse property.

5.4 Conclusions

Because the excess upper bound lifetime cancer risks associated with exposure to soils in the area of concern and contaminated groundwater in the A aquifer exceed the risk range considered acceptable by the EPA, 10^{-6} to 10^{-4}, remedial action is appropriate for the Westinghouse site. Additionally, although the risk levels calculated for the B aquifer fall within the acceptable range, concentrations of COCs that exceed MCLs occur in several wells, thus necessitating remediation of the B aquifer.

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

6.0 DESCRIPTION OF ALTERNATIVES

6.1 Introduction

EPA has evaluated four alternatives in selecting the final cleanup plan for the Westinghouse site. These alternatives were developed from an evaluation that began by setting cleanup objectives, and included studying the universe of applicable response actions and technologies that might address the Westinghouse site contamination. This evaluation and screening process is documented in detail in the Feasibility Study.

Table 7 presents the alternatives that were developed. Briefly, the key features of each are outlined as follows:

Alternative A - No Action

Alternative B - No excavation
Capping
Groundwater Treatment and Containment

Alternative C - Excavation to Eight Feet
Offsite Disposal (C1) or Treatment (C2)
Capping
Groundwater Treatment and Containment

Alternative D - Excavation to Thirty-two Feet
Offsite Disposal (D1) or Treatment (D2)
Capping
Groundwater Treatment and Containment

Alternative A is the "no action" alternative. Alternatives B, C and D all address groundwater with the same extraction and treatment system. The only differences among these three "action alternatives" is in how each of them addresses soil contamination. Alternative B considers capping only as an option. Alternatives C and D are excavation options (eight feet and 32 feet). These two excavation options (C and D) consider offsite disposal versus offsite incineration of the excavated soils in sub-alternatives C1, C2, D1, and D2.

The federal or state (whichever is more stringent) maximum contaminant levels ("MCLs") for drinking water are relevant and appropriate requirements to be met in the A and B aquifers, with the exception of the source area covered by the waiver of the PCB standard as described below. The cleanup standards that have been set for groundwater are presented in Table 8. The cleanup level selected for 1,3-DCB is a State Action Level (130 ppb), which is not an ARAR but is a "to be considered" or TBC criteria. Additionally, the level selected for 1,2,4-Trichlorobenzene is a proposed value and is expected to be promulgated in March of 1992 making it a TBC criteria along with the 1,3-DCB value. These levels are set as a cleanup standards in the absence of a federal or state promulgated drinking water standards and must also be met in the A and B aquifers.

Soil cleanup has been set at 25 ppm, which is consistent with soil cleanup standards for PCB spills at industrial facilities as described in the Guidance on Remedial Actions for Superfund Sites With PCB Contamination (OSWER Directive No. 9355.4-01, August 1990). This guidance is a TBC criteria. TBCs are considered in determining the necessary levels of cleanup for protection of health or the environment.

The groundwater cleanup standards and the soil cleanup standard have been selected based on protectiveness criteria and the requirements of law. Note that although the contaminated shallow

A and B aquifers are not currently used as a source of supply, they are classified as a potential source of drinking water. State Water Resources Control Board Resolution 88-63 has incorporated Board policy "Sources of Drinking Water" into the Basin Plan, which is an ARAR for this site. Under this policy, the A and B aquifers are potential sources of drinking water.

The following sections discuss the treatment, containment and other general components of the four alternatives. The discussion is organized into two parts: Section 5.2 presents the components of the groundwater remedies and Section 5.3 presents the components of the soil remedies. See Table 7 for cost summary information for each alternative.

6.2 Groundwater Remedies

The federal or state (whichever is more stringent) maximum contaminant levels ("MCLs") for drinking water are ARARs to be met in the A and B aquifers. The cleanup level for 1,3-DCB is a State Action Level (130 ppb), which is not an ARAR but is a TBC criteria. Additionally, the proposed federal MCL for 1,2,4-Trichlorobenzene is TBC. These TBC standards are set in the absence of a promulgated federal or state drinking water standards and must be met in the A and B aquifers. The MCL standards, which are derived from the Safe Drinking Water Act, are considered relevant and appropriate to the groundwater portion of the remedy (NCP, 40 C.F.R. § 300.430(e)(2)(i)(C)) and are to be met in the affected aquifers. However, the remedy does not include a requirement that the federal MCL for PCB be met in the source area of the A aquifer. For this limited area, for which all action alternatives considered require permanent containment, (see section 6.2.2.2) an ARAR waiver is invoked based upon technical impracticability, in accordance with CERCLA Section 121(d)(4)(C).

The substantive discharge standards under the Clean Water Act are applicable requirements for discharge of any effluent from the groundwater treatment system to the storm sewers; therefore, NPDES-derived criteria will be the criteria for the discharge. Substantive discharge requirements under the California Porter-Cologne Act also apply to such discharges.

The California Regional Water Quality Control Board's Basin Plan is also an ARAR, including the State of California's "Statement of Policy With Respect to Maintaining High Quality of Waters in California," Resolution 68-16, incorporated therein. This deals with the maintenance of high quality waters in California. Additionally, Resolution 88-63 is also incorporated into the Basin Plan and applies to the classification of the shallow aquifers as potential sources of drinking water.

Other specific laws or regulations which apply or are relevant and appropriate to particular treatment technologies are discussed below in section 5.2.2.1, for each technology described.

6.2.1 No Action - Groundwater

The "no action" alternative represents a baseline against which the other alternatives can be compared. It does not include remediation of the groundwater. Only a monitoring program would be implemented. This alternative assumes no capital costs for active remediation, but only minor capital costs for expanding the monitoring well network. As shown in Table 7, these capital costs have been estimated at $62,000. Annual operation and maintenance ("O & M") is estimated at $160,000, and total present worth (based on thirty years) is estimated to be $3,700,000 (Table 10).

6.2.2 Action Alternatives B, C and D - Groundwater

Alternatives B, C and D all employ the same extraction and treatment system. Because the contaminant plumes are small (300 feet long in the A Aquifer, and 500 feet long in the B aquifer; see Figures 9-12) and because the aquifer yields are low (estimated less than 50 gallons per minute), it was not practical to vary the extraction system appreciably in any way (e.g., using different pumping rates to achieve different cleanup time frames). Additionally, because the source area where dense non-aqueous phase liquid ("DNAPL") occurs demanded a containment approach, the extraction system design for each alternative needed to address containment.

The extraction and treatment system will be designed to reduce the extent of the aqueous phase plume until cleanup standards have been met throughout the A and B aquifers (with the exception of the PCB standard in the DNAPL source area) and to contain permanently the source area such that aqueous phase contaminants will be prevented from migrating beyond the source area. The following subsections discuss the various components of the extraction and treatment system, including the compliance points at the perimeter of the DNAPL source area that is to be contained permanently.

6.2.2.1 Treatment Components for Groundwater

The treatment options will be selected during the design phase based on treatability study results. The groundwater treatment system must effectively remove PCB, VOCs, and petroleum hydrocarbons (gasoline, diesel, and related compounds). These chemicals have different physical and chemical characteristics potentially requiring more than one technology. For example, air stripping is effective for volatile petroleum and halogenated compounds but not for semivolatile and nonvolatile compounds, which can be effectively removed by carbon adsorption. Other options are membrane technologies and ultraviolet-chemical oxidation. Physico-chemical pretreatment for nonhazardous inorganics may also be required.

Additionally, it is expected that the chemistry of the treatment system influent may alter appreciably over time. It will be important to retain the flexibility to add, subtract or adjust the components of the process train as this occurs. The underlying feature of the treatment system that must be maintained, whatever the actual components of the process train are, is the use of destruction treatment technologies to reduce permanently the toxicity, mobility and volume of COCs in the extracted groundwater.

The process train will be selected during the remediation design phase after treatability and bench-scale studies are performed. Product recovered by the extraction wells, or during initial phase-separation steps, can be temporarily stored and then transported offsite for incineration consistent with the laws applicable at the time of such offsite transport. Modifications to the process train may be necessary as the chemistry of the influent may alter significantly over time.

Treated effluent will be discharged to the storm sewer, unless an evaluation indicates that an alternative "end-use" (such as use as facility process water or reinjection into the aquifer) can be practicably implemented.

<u>Treatability Studies</u> - Treatability studies will be conducted to identify a cost-effective technology for treating the extracted groundwater. Groundwater chemistry data will be used to assess the general water quality and to calculate approximate concentrations of contaminants in the treatment system influent. Aquifer test data will be used to calculate approximate extraction flow rates. Treatment performance will be based on surface-water discharge criteria.

The overall objective of the treatability studies is to provide sufficient data to select and design a groundwater treatment system that can effectively achieve the performance standards in a cost-effective manner.

The treatability studies will be performed in two phases. The first phase will consist of bench-scale studies of GAC (granular activated carbon) adsorption, ultraviolet (UV)-chemical oxidation and membrane filtration. Air stripping will be evaluated by modeling the process. In Phase I, standard tests of the remedial technologies will be used to (1) identify the differences in process efficiencies and (2) examine the effects of process variables on effluent chemical concentrations. The objective of Phase I is to determine whether these technologies perform satisfactorily for site conditions. The Phase I studies will be used to select one or more processes that will be examined in further detail in Phase II.

Phase II will be one or more pilot-scale studies. The objective of Phase II is to (1) identify an "optimal" process, (2) evaluate the scale-up of the process and process design parameters, (3) statistically compare removal efficiencies with discharge criteria, and (4) estimate capital and operation and maintenance costs.

The following sections describe each of the technologies to be tested in Phase I.

Granular Activated Carbon (GAC) Adsorption - Adsorption of COCs onto activated carbon occurs selectively when contaminated water flows through a bed of carbon granules. For the extracted groundwater at this site, expected adsorption would be high for PCB, medium for TCB, and low for VOCs. However, if PCB is present in colloidal form, GAC may not be as effective as expected based on the chemical properties of PCB alone. If GAC is implemented at this site, the used carbon must be sent offsite to a TSCA-permitted incinerator to destroy the adsorbed COCs. Used carbon is typically regenerated, but no carbon regeneration facility has a TSCA permit. The incineration cost will be considered in the evaluation of this technology.

Ultraviolet-Chemical Oxidation - Ultraviolet light in combination with hydrogen peroxide or ozone can be used to destroy completely organic molecules to form carbon dioxide, water, and inorganic salts. This advanced oxidation process has proven effective for the full range of COCs found at the site. Pretreatment to remove particles may be required because large particles may lessen the treatment effectiveness. Acid may be added to control alkalinity. If ozone is used, air emission control (pursuant to substantive requirements of the Bay Area Air Quality Management District's regulations) is required and will be considered in the evaluation of this technology.

Air Stripping - Air stripping will transfer volatile organic compounds from the water phase to the gas phase using countercurrent flow in a packed tower. For the extracted groundwater at this site, an air stripper is expected to be very effective for the low concentrations of chlorinated VOCs and gasoline-related compounds and moderately effective for DCBs because they are not as volatile as most of the VOCs, but not effective for PCB or diesel fuel. Pretreatment may be required, such as removing suspended solids and adjusting pH or adding a sequestriant to reduce scaling on the packing material. Both the effluent gas (regulated by Bay Area Air Quality Management District rules) and effluent water from the tower may be subjected to further treatment by GAC in order to meet performance criteria.

Membrane Filtration - Ultrafiltration and reverse osmosis are the two membrane filtration processes that will be evaluated during the Phase I treatability studies. Ultrafiltration ("UF") depends on a pressure driving force and a semipermeable membrane to separate solutes, generally macromolecules with molecular weights above 500, from water. Although the molecular weights of the COCs at the site are less than 500, field filtration of one groundwater sample through a 0.45-micron filter removed 100 percent of the PCB and 30 to 50 percent of the TCB (DCB was not removed). Thus UF may be effective for concentrating and reducing the volume of COCs needing treatment.

Osmosis is the spontaneous flow of a solvent (e.g., water) across a semipermeable membrane from a dilute solution to a concentrated solution. Reverse osmosis ("RO") uses differential pressure across a membrane to cause water to flow in reverse from the concentrated solution (concentrate) to the dilute solution (permeate). RO is similar to UF but uses higher applied pressures and different membranes, and can separate even low-molecular-weight species from water.

Preliminary evaluation of both UF and RO will be performed to determine the number and type of membranes to be evaluated during bench scale tests.

6.2.2.2 Containment Component for Groundwater

While the extraction system will be designed to reduce the aqueous phase concentrations of COCs and the extent of the plume in the A and B aquifers, it will also be designed to prevent further migration of COCs in both aquifers through gradient control. In particular, a key objective will be permanent containment of the DNAPL source area in the A aquifer such that aqueous phase contaminants will be prevented from migrating beyond specified compliance points. This key objective will be met using a densely spaced line of groundwater extraction wells north of Building 21 (Figure 11).

All groundwater cleanup standards must be achieved in both the A and B aquifers with the exception of the PCB standard in the DNAPL source area of the A aquifer in the area where EPA has determined that it is technically impracticable to meet this standard. This area is defined by the wells outside the perimeter of the known or suspected extent of DNAPL, and permanent containment of this area is required.

EPA's current intent is to use the following monitoring wells to define the compliance points for meeting all cleanup standards in the A aquifer: W10, W24, W26, W30, W57, CCG-2, W58, W60, W31, W44, W43, W63, W64, W65, W54, W55, W66. However, these points may be adjusted, based upon information generated during remedial design of the extraction system. The selected wells will serve as compliance points where all standards must be met, including the PCB standard. All points outside of this perimeter must also achieve the cleanup standards for groundwater in the A and B aquifers. Figure 6 depicts the extent of PCB contamination in the A aquifer and the locations of the monitoring wells that are named here as compliance points.

6.2.2.3 General Components for Groundwater

Monitoring of water levels and water quality will be an integral part of the extraction and treatment system. The monitoring program will be designed to ensure that gradients are controlled and that satisfactory capture of aqueous phase contamination is maintained. The monitoring program will also verify aqueous phase plume reductions and achievement of cleanup standards, as well as provide information that may be used to adjust the extraction and treatment systems for optimum cost-effective performance over time.

Institutional controls such as land use restrictions will be applied to the DNAPL source area within the compliance perimeter to prevent water supply well construction here.

EPA is concerned that PCB in the B aquifer has been detected at distances greater than would normally be predicted (see Section 4.3.1 on transport mechanisms for site chemicals) for their migration from the source area. The State and local agencies, the City of Sunnyvale and the neighborhood residents have all expressed similar concerns. While the risk to receptors does not increase measurably over the next few years, or in any way constitute an emergency, the threat from the groundwater does constitute an imminent and substantial endangerment, and EPA believes that the time to implementation of the remedial action should be as short as practicable within the legal constraints of CERCLA. From the time an enforcement mechanism, such as a consent decree or an order, becomes effective, it is estimated that time to full-scale start-up of the groundwater extraction and treatment system would be approximately two years.

Table 7 presents cost summaries of the alternatives. The direct capital costs for groundwater remediation will be $850,000 including a 20 percent contingency. Indirect capital costs, including a 15 percent contingency are $440,000. Operation and maintenance costs (15 percent contingency included) are $60,000 for the first year, and $29,000 for each year thereafter.

6.3 Soil Remedies

This section continues the discussion of the treatment, containment and other general components of the four alternatives. The previous section, 6.2, focused on the groundwater remediation. The focus of this section is soil remediation.

As has been described, approximately 1450 cubic yards of vadose-zone soils contaminated with greater than 500 ppm PCB extend from the surface down to the water table at 32 feet (Figures 6 and 8).

Subpart D of the Toxic Substance Control Act ("TSCA") PCB regulations, which specify treatment, storage, and disposal requirements for PCB, applies to excavated soils at the site. The

Resource Conservation and Recovery Act ("RCRA") does not apply to soil cleanup activities at Westinghouse because PCB is exempt from RCRA (because it is regulated under TSCA). The California storage requirements for soils containing greater than 50 ppm PCB, contained in C.C.R. Title 26, §22-66371 and §22-66508, are ARARs for the storage of hazardous waste at the site . Additionally, the Bay Area Air Quality Management District's (BAAQMD) Regulation 8, Rule 40 is an ARAR for excavation activities at the site. This Rule deals with volatilization of COCs.

It should be noted that the RI/FS Report estimates the volume of PCBs in this 32-foot column of soil to be about 30 percent of the total mass of PCB in the source area. PCB DNAPL contamination in the A aquifer represents the remaining 70 percent of contaminant mass.

As explained earlier, alternative A is the "no action" alternative. Alternatives B, C and D all address groundwater contamination in the same manner, differing only in the ways in which soil contamination is addressed. Because the DNAPL in the A aquifer outweighs soil contamination as an ongoing significant source of contamination to groundwater (by virtue of its greater mass and immediate proximity), removal of contaminated soil does not measurably reduce the threat of further contamination of groundwater. However, containment of contaminated soil does prevent direct contact with these soils at the surface, and removal of shallow soil prevents direct contact exposure to subsurface workers in shallow soils. The approaches to soil remediation in Alternatives B, C and D reflect varying degrees of protection from direct contact exposure.

Alternative B requires capping. Alternatives C and D are excavation options (eight feet and 32 feet). These two excavation options (C and D) consider offsite disposal versus offsite incineration of the excavated soils in sub-alternatives C1, C2, D1 and D2. Table 7 provides cost summary information for each alternative and includes breakout information on the soil options considered.

6.3.1 No Action - Soil

The "no action" alternative represents a baseline against which the other alternatives can be compared. It does not include any remediation of the contaminated soils at the site. The costs associated with this alternative are those outlined in section 6.2.1 for groundwater monitoring only (Table 7).

6.3.2 Alternative B - Soil Capping

Alternative B does not consider any treatment components for soil.

It is a containment remedy for soils, using an asphalt cap. The purpose of the cap is to prevent direct contact with PCB-contaminated soils at the ground surface, to eliminate air-borne transport of contaminated soil particles, and to prevent infiltration of water through the contaminated soils so that PCB will not migrate to the groundwater. As discussed earlier, the prevention of direct contact is the most significant protection offered by the cap. Although the cap does prevent infiltration of water that may transport PCB to groundwater, the groundwater is already seriously affected by DNAPL. The extraction system, also a part of Alternative B, addresses groundwater contamination.

Long-term maintenance of the asphalt cap, land use restrictions, and ongoing monitoring are also part of this alternative. Approximately 1450 cubic yards of shallow and vadose zone soils contaminated with greater than 500 ppm PCB are left in place. These contaminated soils extend from the surface down to the water table at 32 feet (Figures 5 and 7).

The estimated capital costs associated with capping the soil total $37,000 (Table 10).

6.3.3 Alternative C - Soil Excavation to Eight Feet

Alternative C evaluates removal of soils containing greater than 25 ppm PCB to a depth of eight feet (approximately 400 cubic yards or ten percent of the total contaminant mass, including DNAPL, in the source area). Removed soils are replaced with clean fill and the excavated area is capped with an asphalt cover to prevent infiltration of water through contaminated soils below eight feet.

Again, as in Alternative B, long-term maintenance of the cap, land-use restrictions, and ongoing monitoring are part of Alternative C. Approximately 1050 cubic yards of soil containing PCB at concentrations greater than 500 ppm are left in place. These are, however, considered low threat soils because they exist at depth where direct contact activities are not envisioned, because PCB in these soils is very immobile, and because they do not pose a significant threat to groundwater.

Sub-alternatives C1 and C2 weigh offsite disposal versus offsite incineration of the excavated soils, respectively. Both of these sub-alternatives must comply with TSCA requirements governing transport and disposal or incineration of PCB wastes. Sub-alternative C2 is consistent with the recommendation in guidance that "principal threats" should be treated (Guidance on Remedial Actions for Superfund Sites With PCB Contamination, August 1990, which has been identified as TBC criteria). Sub-alternative C2 also combines treatment and containment components.

The capital costs associated with soil removal to eight feet and offsite disposal (C1) are $430,000. The capital costs of removal and incineration (C2) are $1,800,000.

6.3.4 Alternative D - Soil Excavation to 32 Feet

Alternative D evaluates removal of PCB-contaminated soils to a depth of 32 feet. In the upper eight feet, soil containing greater than 25 ppm PCB will be removed. Below eight feet and down to 32 feet, soil containing greater than 500 ppm will be removed. This constitutes approximately 1450 cubic yards of soil and represents about 30 percent of the estimated total mass of PCB contamination in the source area. DNAPL contamination in the A aquifer represents the remaining 70 percent of estimated contaminant mass.

Sub-alternatives D1 and D2 weigh offsite disposal versus offsite incineration, respectively. Both of these sub-alternatives must comply with TSCA requirements governing transport and disposal or incineration of PCB wastes. Sub-alternative D2 is consistent with the recommendation in guidance that "principal threats" should be treated (Guidance on Remedial Actions for Superfund Sites With PCB Contamination, August 1990). Sub-alternative D2 also combines treatment and containment components.

The capital costs for removal of 32 feet of soil and offsite disposal (D1) are estimated to be $1,400,000. The capital costs for removal to 32 feet and offsite incineration are estimated to be $6,400,000.

7.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

This section documents the key advantages and disadvantages among the alternatives in relation to the nine criteria set forth in the National Contingency Plan ("NCP"). The evaluations of the alternatives are based on continued industrial use of the site. Table 7 contains a summary presentation of the four alternatives in relation to the nine criteria. The following nine sections correspond to the nine criteria and each section contains a discussion of all four alternatives with respect to that criterion.

7.1 Overall Protection of Human Health and the Environment

Alternatives B, C and D all provide equal protection from exposure to contaminated groundwater because they all employ the same groundwater extraction and treatment system. This system combines containment and restoration of the contaminated A and B aquifers. All three of these alternatives (B, C, and D) require the groundwater to be cleaned up to the state or federal MCLs (whichever are more stringent), with the exception of the PCB MCL in the source area of the A aquifer (see Section 6.2.2.2). Additional cleanup levels to be met in the affected aquifers for 1,3-Dichlorobenzene and 1,2,4-trichlorobenzene are based on TBC criteria (a proposed federal MCL and a State of California Action Level, respectively) in the absence of promulgated criteria. Also, these three alternatives include the same groundwater monitoring program for verifying system performance, the same discharge criteria for the extracted and treated groundwater, and the same land use restrictions preventing water supply well construction. These measures will prevent exposure to contaminants in the A and B aquifers, which are classified as potential sources of drinking water.

Alternatives B, C and D all prevent exposure to PCB-contaminated soils. These soils are limited to a 50-foot diameter area south of the Reservoir 2 and one smaller shallow (less than five feet deep) area along the Inerteen pipeline, all of which are on the Westinghouse property, as described in Section 4.2.1 (Figure 5). Much of this soil contains concentrations of PCB greater than 500 ppm, which makes it, by definition, a "principal threat" (Guidance on Remedial Actions For Superfund Sites With PCB Contamination, August 1991). All three alternatives require capping with asphalt and maintenance of the cap. Land use restrictions would prevent excavation below the eight feet where soil is removed for any of these three alternatives. In Alternatives C and D, clean fill would replace the removed soil. Land use restrictions will permit temporary subsurface work in the clean fill areas, but complete restoration of any disturbance to the fill, or the asphalt cap, will be required once the work is completed. Alternative D requires removal of all contaminated soil down to the water table at 32 feet below ground surface. Alternative C requires removal of soil from the surface to a depth of eight feet. Alternative B does not require any removal of soil, relying entirely upon the cap and land use restrictions to prevent exposures to contaminated soil.

It should be noted that the DNAPL in the A aquifer, which is generally located directly below the soil contamination and results from the same release, eclipses the soils as a contaminant source to the groundwater, i.e., removal of any amount of soil would not accomplish a measurable reduction in the risk of further contaminating groundwater because the DNAPL provides a far more significant source of contamination. Protection from exposure to groundwater contamination is addressed by the groundwater extraction and treatment system discussed above.

Alternative A, no action, does not prevent exposure to contaminated site soils or groundwater in any way. Neither does it prevent continued migration of site contaminants in the uppermost aquifers, which may pose a risk should these aquifers ever be used as a source of supply water in the future. (Although there is no current use of these aquifers, they are classified as a potential source of drinking water.)

7.2 Compliance With Applicable or Relevant and Appropriate Requirements (ARARs)

The Maximum Contaminant Levels ("MCLs") are relevant and appropriate requirements to be met in the affected aquifers (NCP, 40 C.F.R. §300.430(e)(2)(i)(C). These are presented in Table 8. Also presented in Table 8 are two cleanup levels to be met in the affected aquifers that are based on TBC criteria in the absence of any promulgated standard for those chemicals (1,3-Dichlorobenzene and 1,2,4-Trichlorobenzene). Alternative A cannot meet the MCLs in the affected aquifers. Alternatives B, C, and D comply with these requirements everywhere in the A and B aquifers with the exception of the A aquifer source area, where EPA has determined that it is technically impracticable to meet the MCL for PCB. This limited portion of the A aquifer is defined by specific compliance points as discussed in Part II, Section 6.2.2.2 of this ROD. The technical impracticability waiver of the "relevant and appropriate" PCB MCL is based upon the presence of spatially discontinuous, dense, non-aqueous phase liquids (PCB Aroclor 1260) in significant amounts; the heterogeneity of the subsurface combined with low permeabilities; and the characteristics of PCB (low solubility, high tendency to partition onto organic materials and high viscosity).

ARARs for soil cleanup levels have not been established. However, a 25 ppm soil cleanup level for PCB contaminated soils at industrial sites is consistent with Guidance on Remedial Actions For Superfund Sites With PCB Contamination, OSWER Directive No. 9355.4-01, August 1990, which is a TBC criteria. The 25 ppm number is based upon a risk analysis and includes a consideration of the depth of contamination. It is not necessarily appropriate, according to the guidance, to apply it to deep vadose-zone soils. Both Alternatives C and D meet this criterion from the surface to a depth of eight feet. Alternative D also removes all soil containing greater than 500 ppm PCB from eight feet to 32 feet. Alternatives A and B leave all contaminated soils in place.

The substantive discharge standards under the Clean Water Act are applicable requirements for discharge of any effluent from the groundwater treatment system to the storm sewers. The substantive discharge requirements under the California Porter-Cologne Act (California Water Code, Division 7, Section 13000, et seq.) also apply to such discharges. Alternatives B, C and D all comply with these requirements. Alternative A does not include a discharge component.

The California Regional Water Quality Control Board's Basin Plan is also an ARAR, including the State of California's "Statement of Policy With Respect to Maintaining High Quality of Waters in California," Resolution 68-16, incorporated therein. Alternatives B, C and D all comply with these requirements, which deal with maintenance of high quality waters in California. Alternative A does not.

Alternatives B, C and D all include a groundwater extraction and treatment system. Therefore the same ARARs apply in each alternative to the various components of the extracted groundwater treatment system. If granular activated carbon adsorption is implemented as part of the treatment process, Subpart D of TSCA is an ARAR for the storage and treatment of spent carbon. The same law is an ARAR for spent filtration membranes if they are included in the treatment process. If ozone is used for the ultraviolet-chemical oxidation process, or if an air stripper is added to the process train, Bay Area Air Management District's Regulation 8, Rule 47 is an ARAR for air emissions from either of these treatment process components. Alternatives B, C and D comply with these requirements. Alternative A does not employ any action that would trigger these ARARs.

The Bay Area Air Management District's Regulation 8, Rule 40, which deals with contaminant air emissions during excavation, is an ARAR for Alternatives C and D, both of which employ excavation as a component of the remedy. Alternatives C and D comply with this requirement. Alternatives A and B do not require any excavation and therefore do not trigger these requirements.

Subpart D of the TSCA, which specifies treatment, storage, and disposal requirements for PCB, applies to excavated site soils. Alternatives C and D each require excavation and short-term storage of excavated soils. Sub-alternatives C1 and D1 require offsite disposal of soil and trigger the TSCA disposal requirements. Sub-alternatives C2 and D2 trigger the TSCA treatment requirements. Alternatives C and D (inclusive of the sub-alternatives) comply with these requirements concerning treatment, storage, and disposal. Alternatives A and B do not trigger these requirements.

The storage requirements for soils containing greater than 50 ppm PCB contained in the California Code of Regulation, Title 26, §22-66371 and §22-66508, are ARARs for the storage of hazardous wastes at the site. Both Alternatives C and D, which include excavation of soils, comply with these requirements. Alternatives A and B do not employ any actions that trigger these requirements.

It should be noted that RCRA is not an ARAR for the treatment storage or disposal of the Westinghouse soils because PCB is not a RCRA waste, and no RCRA wastes are mixed with the PCB-contaminated soils. Nor does EPA believe the situation at this site is sufficiently similar to that addressed by these RCRA requirements to justify a determination that they are relevant and appropriate to this cleanup.

7.3 Long-Term Effectiveness and Permanence

Groundwater - Because removal or treatment of PCB DNAPL, which occur in the shallow A aquifer, is considered technically impracticable at this site, all three of the "action alternatives," B, C and D, require long term containment through hydraulic control of the portion of the aquifer where DNAPL occurs (see Section

5.2.2.2). In addition to containment of PCB within the area where DNAPL occurs, the extraction and treatment system, (which is common to all three of these alternatives) will effectively restore the groundwater to all other MCLs. Outside of the contained area all MCLs, the CDHS Action Level for 1,3-Dichlorobenzene, and the proposed federal MCL for 1,2,4-Trichlorobenzene must be met in the affected aquifers. Included in the system are groundwater monitoring, treatment of extracted groundwater to discharge limits, and land use restrictions to prevent water supply well construction in the contained area of the aquifer. While remediation of all of the contaminated groundwater is technically impracticable and there is an area of the A aquifer that will require long-term management, the groundwater extraction and treatment system required in Alternative B, C and D would be effective in preventing exposure to contaminated groundwater.

The treatment technologies that are being applied to extracted groundwater in Alternatives B, C and D will permanently destroy contaminants through offsite incineration of spent filtration membranes and/or spent carbon, or through ultraviolet chemical-oxidation of extracted groundwater.

Soil - As noted earlier, the three "action alternatives," B, C and D, are different from one another in the ways each addresses soil contamination. The permanence and long-term effectiveness of each of the soil options is discussed in the following paragraphs .

Alternative D requires removal of all soil containing PCB above 500 ppm, from the surface down to the water table at a depth of 32 feet. Additionally, soil containing more than 25 ppm PCB must be removed in the upper eight feet of the excavation. This action would result in the permanent removal of vadose zone soils contaminated above these levels at the Westinghouse property. However, permanence is also defined by the disposition of the removed soil. As noted above, Sub-alternatives D1 and D2 require offsite disposal and offsite incineration, respectively. Incineration is the more permanent option for excavated soils because the PCB is destroyed.

Alternative C requires removal of all soil containing PCB above the cleanup standards, from the surface down to a depth of eight feet. Again, these soils would be permanently removed from the Westinghouse property, but their final disposition would determine any additional permanence achieved, with incineration (Sub-alternative C2) being a more permanent action than land disposal (Sub-alternative C1). Also, Alternative C is a less permanent solution than Alternative D in that contaminated soils remain in place below a depth of eight feet. For Alternative C, protection is achieved with land use restrictions that prevent excavation work below eight feet, allows only temporary excavation above eight feet, and by capping.

Alternative B, which requires capping with no soil removal or treatment, represents a "containment only" approach to contaminated soils. Of the three "action alternatives," it is the least permanent solution. In addition to the cap, land use restrictions and the facility fence are required for prevention of exposure to contaminated soils at the site.

Alternative A, no action, does not provide permanent or effective protection from site contamination.

7.4 Reduction of Toxicity, Mobility or Volume Through Treatment

The groundwater extraction and treatment system, which is common to Alternatives B, C and D, treats extracted groundwater with permanent destruction technologies. Recovered product phases, filtration membranes, and activated carbon filters will be incinerated offsite. Ultraviolet/chemical-oxidation will destroy contaminants by oxidizing them. Destruction results in a reduction of the toxicity, mobility and volume of site contaminants.

Sub-alternatives C2 and D2 require incineration of PCB-contaminated soils that have been removed from the site. This treatment results in a reduction of the toxicity, mobility and volume of soil contaminants. D2 provides the greatest reductions because more soil is removed and incinerated.

Alternative B, sub-alternatives C1 and D1 do not require treatment of soils, therefore these alternatives do not achieve reductions in toxicity, mobility or volume of soil contaminants.

Alternative A does not achieve reductions in toxicity, mobility or volume for soil or groundwater contaminants.

7.5 Short-Term Effectiveness

Alternatives C and D require soil excavation, which introduces some risk of soil exposure to excavation workers through potential inhalation, ingestion, and dermal contact; this risk is greater for Alternative D, the deeper excavation, because the exposure time is greater. Dust control measures coupled with proper health and safety procedures, including protective clothing, can mitigate the risks posed during excavation work. Alternative B introduces a small short-term exposure risk to the workers installing the cap over the affected soils; however, this risk is easily mitigated by health and safety procedures. Alternatives B through D include groundwater extraction well construction, which introduces a small short-term risk to workers that can be mitigated through standard health and safety procedures. It is not anticipated that any short-term risks of exposure are posed to nearby residents by implementation of any of the four alternatives. There are no short-term risks associated with implementing Alternative A, the no action option.

7.6 Implementability

All alternatives are administratively feasible. No problems are anticipated regarding the availability of material to perform remediation in accordance with any of the alternatives.

All alternatives are technically feasible. The technologies required in each alternative are practical and proven. Alternative A is the easiest to implement. Groundwater remediation is equally implementable for Alternatives B, C and D. Soil remediation is relatively easy for Alternative B, more difficult for Alternative C, and most difficult for Alternative D.

7.7 Cost

Table 7 presents cost information at the bottom of the table for each alternative. Alternative A, which only involves expansion of the existing monitoring program is the least expensive. The present worth of capital and operations and maintenance ("O & M") costs for thirty years is $3.7 million.

Alternatives B, C and D have the same O & M and direct costs for groundwater remediation, but differ in capital costs for soil remediation. Rounded capital costs for Alternative B are $1.3 million, the majority of which is for groundwater remediation. Alternatives C and D include soil excavation, and the sub-alternatives using disposal are considerably less expensive than those using incineration. Capital costs of sub-alternatives using disposal are $1.7 million for C1, and $2.7 million for D1. Capital costs of sub-alternatives using incineration are as follows: C2, $3.1 million; D2, $7.7 million.

The approximate present worth cost for thirty years for each alternative is listed below:

- o Alternative A - $3.7 million
- o Alternative B - $6.5 million
- o Alternative C - C1, $6.9 million; C2, $8.3 million
- o Alternative D - D1, $7.8 million; D2, $12.9 million

Alternative C, by removing ten percent of the PCB-containing soils requires thirty percent (C1) to 135 percent (C2) more in capital costs than Alternative B. Alternative D, by removing twenty percent more of the PCB-containing soils than in Alternative C, requires 56 percent (D1) to 150 percent (D2) more in capital costs than Alternative C.

<u>Sensitivity Analysis</u> - Because the treatment system for extracted groundwater is not fully defined, costs for extraction, treatment, and monitoring were approximated using the available data. To evaluate the cost sensitivity of the design assumptions, specific components of the remediation scheme were varied to generate a

range of costs. Design assumptions were varied for items with a high uncertainty and items for which a slight change significantly impacted the overall costs.

The sensitivity analysis is discussed in detail in Section 12.5.7 of the Remedial Investigation and Feasibility Study Report. Table 10 summarizes the results of the analysis. The no action alternative is the most sensitive on a percentage basis (24 percent) because the overall capital costs are low. Sensitivity decreases as capital costs increase (from an average of ten percent for Alternative B to an average of two percent for Alternative D2). In contrast, for O & M costs, there is a difference of five percent for Alternatives A, B, C, and D. Present worth costs vary between three and seven percent from the median for all four alternatives.

7.8 State Agency Acceptance

The California Regional Water Quality Control Board ("the Board") commented on the Proposed Plan and stated that it was in general concurrence with it. The Board's stated concerns focus on the waiver of the drinking water standard for PCB in the source area and the associated permanent loss of a potential drinking water supply. However, the State concurs with the technical basis for the waiver and states that it "believes that the potential drinking water source loss may be allowable in this specific case." A full response to comments received from the RWQCB can be found in the attached Responsiveness Summary, Attachment A.

7.9 Community Acceptance

As discussed in Part I of this ROD in Section 3.0, Highlights of Community Participation, the Proposed Plan public hearing was well attended and approximately thirty comment letters were received during the sixty-day public comment period.

There were many concerns raised by community members at the public hearing and in the written comments received. The major concern was with waiving the relevant and appropriate maximum contaminant level (MCL) for PCB in the A aquifer source area where DNAPL occurs. Some commenters indicated that <u>all</u> contamination should be removed from the site. None of the comments received provided EPA with any technical or health risk justifications for not invoking the waiver. EPA remains convinced that removal of the DNAPL is technically impracticable and that there is merit in acknowledging so with the technical impracticability waiver. This action provides a clear basis for the requirement to permanently contain the source area. The permanent containment component is a significant feature of the remedy designed to provide ongoing protection of the surrounding aquifers. EPA believes that the technical impracticability waiver coupled with the requirement to contain permanently and to monitor the area covered by the waiver provides a significant protection from exposure to contaminated groundwater.

Another key concern voiced by the community is related to the potential for health effects to residents and workers. While the concerns raised regarding health effects were broader than are typically addressed in the process leading to a selection of a cleanup remedy, the Agency for Toxic Substances and Disease Registry ("ATSDR") and California Department of Health Services ("CDHS") are currently conducting a health assessment which does consider possible health effects to both onsite workers and offsite residents. This health assessment may or may not recommend further health activities such as "health studies" based upon the data evaluated. Based on the location and limited extent of contamination in addition to the lack of evidence that any exposures are occurring, EPA believes that the risks associated with the site are very low. However, in order to facilitate communication between community members and the agencies performing the health assessment, EPA is taking several measures which are outlined in the Responsiveness Summary. One of these measures is a request to CDHS that a notice of the availability of the draft health assessment be mailed to all persons who commented on the Westinghouse Proposed Plan.

Additional concerns raised by the community are addressed in detail in the attached Responsiveness Summary, Attachment A.

7.10 Comparative Evaluation Conclusions

Based on the comparative analysis EPA selects Alternative C2 as the alternative that represents the best balance of the nine criteria. Alternative A is unacceptable because it does not provide adequate protection of human health and the environment. Alternatives B, C, and D provide the equal protection of human health and the environment regarding groundwater exposure, and the cost for groundwater cleanup is the same for all three alternatives.

Alternatives B, C and D differ by the degree of soil remediation required. The lateral area of contaminated soil is small (50-foot diameter), but the concentrations are high. The decision to remove soil in this area to a maximum depth of eight feet, rather than capping it in place (Alternative B) less expensively, is reasonable given the plausible scenarios for shallow excavation activities which might occur on this industrial property in the future. Removing all contaminated soil to the depth of the water table at 32 feet (Alternative D) does not achieve a measurable reduction in risk due to direct contact exposure because there is no plausible expectation that subsurface work would occur below the eight-foot level. Therefore, the much higher additional cost for this alternative is not justified. Land use restrictions preventing subsurface work below eight feet would provide adequate protection in these circumstances. Additionally, it has been explained that DNAPL contamination in the A aquifer outweighs the deep vadose-zone soils as an ongoing contributing source of contamination to groundwater such that soil removal does not result in any measurable reduction in risk to groundwater. The selection of incineration (C2) over land disposal (C1) is based upon the statutory preference for remedies that employ treatment and use more permanent solutions to the extent practicable.

8.0 The Selected Remedy

8.1 Description of the Selected Remedy

The selected remedy, which addresses the primary risks posed by both soil contamination (which can be characterized as a principal threat at this site) and shallow groundwater contamination (which includes detected DNAPL in the source area that may also be characterized as a principal threat), consists of the following components:

(1) Permanent **containment** of contaminated groundwater in the source area where DNAPL is detected, using extraction;

(2) **Restoration** of contaminated groundwater, using **extraction**, to the CDHS Action Level for 1,3-Dichlorobenzene, the proposed MCL for 1,2,4-Trichlorobenzene and the federal and state maximum contaminant levels ("MCLs"), with the exception of the standard for polychlorinated biphenyls ("PCB") in the onsite source area where DNAPL occurs (these cleanup levels are presented in Table 8);

(3) **Treatment** of the extracted groundwater to meet all ARARs identified for this discharge prior to **discharge** to the on-site storm sewer, unless an evaluation indicates that an alternative "end-use" for the treated effluent (such as use for facility process water) can be practicably implemented;

(4) **Removal** of contaminated soil containing greater than 25 parts per million PCB to a depth of eight feet (approximately 400 cubic yards);

(5) Off-site **incineration** of excavated soils at a federally permitted facility;

(6) **Institutional controls**, such as land use restrictions, to prevent well construction (for water supply purposes) in source areas that remain contaminated. Excavation below the eight feet soil has been removed will be restricted. Restrictions will also preclude excavation, other than temporary subsurface work in the upper eight feet and will require complete restoration of any disturbed fill or the asphalt cap one any such temporary work was completed;

(7) A requirement that EPA receive **notification** of any future intention to cease operations in, abandon, demolish, or perform construction in (including partial demolition or construction) Building 21 (see facility map, Figure 2);

(8) Permanent and ongoing **monitoring** of the affected aquifers to verify that the extraction system is effective in capturing and reducing the size and contaminant concentration of the aqueous phase plume and in containing aqueous phase contamination in the DNAPL source area.

The process steps for treatment of extracted groundwater may include phase separation (offsite incineration of any product phase recovered), either membrane or carbon filtration, ultraviolet/chemical-oxidation, air stripping, and a carbon polish. The components of the system will be determined during the project design and will be subject to modification during operation, based upon the actual flow rates and chemistry of the extracted groundwater (both of which may vary significantly over time). Destruction of groundwater contaminants will be accomplished through (1) offsite incineration of any separated product phase, (2) offsite incineration of spent carbon and/or filtration membranes and (3) ultraviolet/chemical-oxidation.

It is estimated that once the remedy is completed and the groundwater meets the required cleanup standards, total carcinogenic risk from ingesting groundwater from this site will be 8.5×10^{-5}. The noncarcinogenic hazard index for ingestion of site groundwater meeting the cleanup criteria (MCLs) is equal to 0.34. Because the remedy eliminates the risk pathways associated with residual contamination left on site (the DNAPL source area and the contaminated soils below eight feet), the risk of exposure to this contamination is effectively eliminated.

The points of compliance defining the groundwater source area are described in Section 6.2.2.2. They consist of monitoring wells at the perimeter of the groundwater source area, within which the waiver for the requirement to meet the PCB MCL in groundwater will be invoked, and for which permanent containment is required. The selected remedy requires all MCLs, the CDHS Action Level for 1,3-Dichlorobenzene, and the proposed MCL for 1,2,4-Trichlorobenzene (these last two cleanup standards are based on TBC criteria in the absence of promulgated standards) to be met at the points of compliance.

The total capital costs of this remedy are estimated at $3.1 million. The present worth cost of this remedy over thirty years is estimated to be $8.3 million. The annual O & M costs are estimated at $225,000.

8.2 Statutory Determinations

8.2.1 Protectiveness

The selected remedy is protective of human health and the environment. Protection is achieved at this industrial site, and in the aquifers extending beyond the Westinghouse property, in the following ways:

(1) Groundwater will be restored to health-based standards for all contaminated groundwater outside of the source area (the source area is characterized by a dense, non-aqueous phase liquid), thus preventing potential exposures, should these shallow aquifers ever be used for water supply purposes.

(2) Permanent hydraulic containment of the source area will prevent pollutant migration and further contamination of the shallow aquifers, which are potential drinking water supplies. This containment will be combined with land use restrictions to prevent construction of supply wells in the source area where dense non-aqueous phase liquid has been detected.

(3) The extracted groundwater will be treated, prior to onsite discharge, to meet all ARARs identified for such discharges.

(4) Contaminated soil containing greater than 25 parts per million PCB which represents a 10^{-6} risk in an industrial setting will be removed to a depth of eight feet, thereby preventing potential exposure at the surface, or in the subsurface (e.g., utility line workers).

(5) The removed soil, spent filtration membranes and spent carbon will be incinerated offsite, resulting in the destruction of these contaminants and thereby preventing further possibility of exposure to them.

(6) Land use restrictions will prevent excavation, and therefore exposure, in the area where contaminated soils remain at depths greater than eight feet.

(7) Land use restrictions will also prevent any residential development in the source area, in order to further preclude any risk of exposure due to contact with soil contamination.

8.2.2 Applicable or Relevant and Appropriate Requirements

Chemical-Specific ARARs - ARARs for the groundwater are the current state or federal (whichever are more stringent) maximum contaminant levels (MCLs) to be met in the affected aquifers (NCP, 40 C.F.R. §300.430(e)(2)(i)(C). These relevant and appropriate requirements are presented in Table 8. Included in Table 8 are two cleanup standards that are based on TBC criteria in the absence of promulgated standards and they must also be met in the affected aquifers. These are 1,3 Dichlorobenzene and 1,2,4-Trichlorobenzene. Alternative C2 complies with these requirements everywhere in the A and B aquifers with the exception of the A aquifer source area, where EPA has determined that it is technically impracticable to meet the MCL for PCB and has invoked a waiver for this requirement pursuant to CERCLA §121(d)(4)(C). Permanent containment of this limited portion of the A aquifer, which is discussed further in Section 6.2.2.2 of this ROD, is required. The technical impracticability waiver of the relevant and appropriate PCB MCL is based upon the presence of spatially discontinuous, dense, non-aqueous phase liquid (PCB Aroclor 1260) in significant amounts; the heterogeneity of the subsurface combined with low permeabilities; and the characteristics of PCB (low solubility, high tendency to partition onto organic materials and high viscosity).

ARARs for soil cleanup levels have not been established. However, a 25 ppm soil cleanup level for PCB contaminated soils at industrial sites is consistent with <u>Guidance on Remedial Actions For Superfund Sites With PCB Contamination</u>, OSWER Directive No. 9355.4-01, August 1990, which is a TBC criteria. The selected remedy complies with the 25 ppm soil cleanup level from the surface to a depth of eight feet.

<u>Action-Specific ARARs</u> - The substantive discharge standards under the Clean Water Act are applicable requirements for discharge of any effluent from the groundwater treatment system to the storm sewers. The substantive discharge requirements under the California Porter-Cologne Act also apply to such discharges. The selected remedy requires compliance with these applicable requirements.

The California Regional Water Quality Control Board's Basin Plan is also an ARAR, including the State of California's "Statement of Policy With Respect to Maintaining High Quality of Waters in California," Resolution 68-16, incorporated therein. The selected remedy requires compliance with these applicable requirements, which deal with maintenance of high quality waters in California.

Certain ARARs are applicable to the various components of the extracted groundwater treatment system. If granular activated carbon adsorption is implemented as part of the treatment process, Subpart D of TSCA is an ARAR for the storage and treatment of spent carbon. The same requirement is an ARAR for spent filtration membranes if they are included in the treatment process. If ozone is used for the ultraviolet-chemical oxidation process, or if an air stripper is added to the process train, Bay Area Air Management District's Regulation 8, Rule 47 is an ARAR for air emissions from either of these treatment process components. The selected remedy requires compliance with these applicable requirements.

The Bay Area Air Management District's Regulation 8, Rule 40, which deals with contaminant air emissions during excavation is an ARAR for the selected remedy, which employs excavation as a component of the remedy. The selected remedy requires compliance with this applicable requirement.

Subpart D of TSCA, which specifies treatment, storage, and disposal requirements for PCB, applies to excavated site soils. The selected remedy requires excavation and short-term storage of excavated soils. The selected remedy requires compliance with the TSCA treatment requirements and those requirements concerning storage, all of which are applicable.

The storage requirements for soils containing greater than 50 ppm PCB found in C.C.R. Title 26, §22-66371 and §22-66508 are ARAR for the storage of hazardous wastes at the site. The selected remedy, which includes excavation of soils, requires compliance with these applicable requirements.

It should be noted that RCRA is not an ARAR for the treatment storage or disposal of the Westinghouse soils because PCB is not a RCRA waste and no RCRA wastes are mixed with the PCB-contaminated soils. Nor does EPA believe the situation at this site is sufficiently similar to that addressed by these RCRA requirements to justify a determination that they are relevant and appropriate to this cleanup.

<u>Location-Specific ARARs</u> - There have been no location-specific requirements identified that are ARARs for the cleanup of the Westinghouse site.

8.2.3 Cost Effectiveness

The remedy is cost effective because maximum protection is achieved for the estimated cost of performance. The comparative analysis of the alternatives (see Section 7.7 of this ROD) demonstrates that additional remedial action and the cost associated with that action would not achieve a measurable reduction in risk, but that less effort and a lower cost would result in a measurably higher risk at the site.

8.2.4 Use of Permanent Solutions, Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable

The selected remedy, which combines containment and treatment components, requires cleanup which allows for continued industrial use of this site. In the absence of a technically practicable technology for treating or removing the DNAPL contamination in the A aquifer, this area of the aquifer will be permanently contained. The containment method is hydraulic control, i.e., extraction, and the extracted groundwater will be treated using technologies that result in destruction of the contaminants. Outside of the source area, both the A and B aquifers will be restored to the MCLs, the CDHS Action Level for 1,3-Dichlorobenzene and the proposed MCL for 1,2,4-Trichlorobenzene through extraction. All extracted groundwater will be treated by the same treatment system.

Among the options considered for addressing contaminated soils, the best balance of the nine criteria set forth in the NCP is achieved by the selected remedy. Soils which do not represent a principal threat due to their location at depths greater than eight feet and their inability to significantly affect groundwater are left in place. Eight feet of clean fill soil, an asphalt cap and land use restrictions further prevent potential contact with these soils. Temporary subsurface work in the upper eight feet in the clean fill areas is permitted under the land use restrictions, but complete restoration of the fill material and asphalt cap will be required once any work is completed. Deeper excavation and soil removal does not reduce the risk measurably, but costs much more. Capping, with no soil removal, (containment only), is significantly less expensive, but there is a much higher risk in relying entirely on land use restrictions and fencing to prevent any potential exposure to the principal threat soils below the cap.

Incineration has been selected over land disposal for the excavated soils. This decision to select a significantly more expensive option is based upon the strong statutory preference for treatment. Additionally, these soils are classified as principal threat soils and there is an expectation that such wastes will be treated rather than land disposed wherever practicable (see NCP, 40 C.F.R. §300.430(a)(1)(iii)).

The selection of the treatment technologies for soil and groundwater discussed above demonstrate that, where it is practicable, the selected remedy will include permanent solutions.

However, because removal or treatment of dense non-aqueous phase liquids at this site has been determined to be technically impracticable, the remedy requires long-term containment of the source area. Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted within five years after commencement of the remedial action, and every five years thereafter, to ensure that the remedy continues to provide adequate protection of human health and the environment.

8.2.5 Preference for Treatment as a Principal Element

Soil containing greater than 25 parts per million PCB will be excavated to a depth of eight feet and incinerated offsite, reducing the toxicity, mobility and volume of site contamination by permanently destroying the PCBs in the excavated soils with a treatment technology.

Toxicity, mobility and volume of groundwater contaminants will also be reduced as extracted groundwater is treated, by the combination of phase separation (product phase will be incinerated), filtration (filters will be incinerated) and ozone oxidation (chemical destruction) steps.

The selection of these treatment technologies as an integral part of the cleanup plan for both soil and groundwater demonstrates that the cleanup plan satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

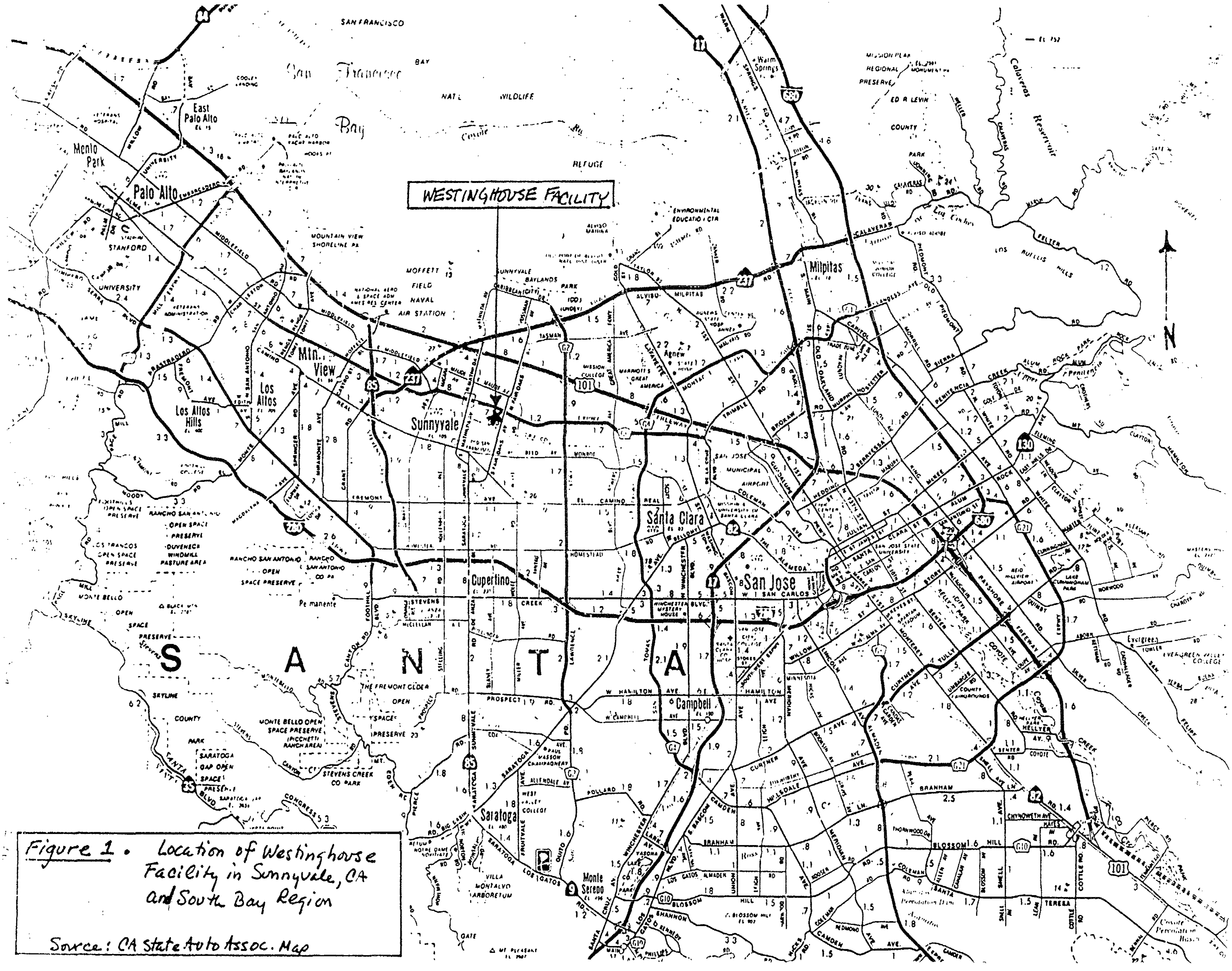

Figure 1. Location of Westinghouse Facility in Sunnyvale, CA and South Bay Region

Source: CA State Auto Assoc. Map

133414

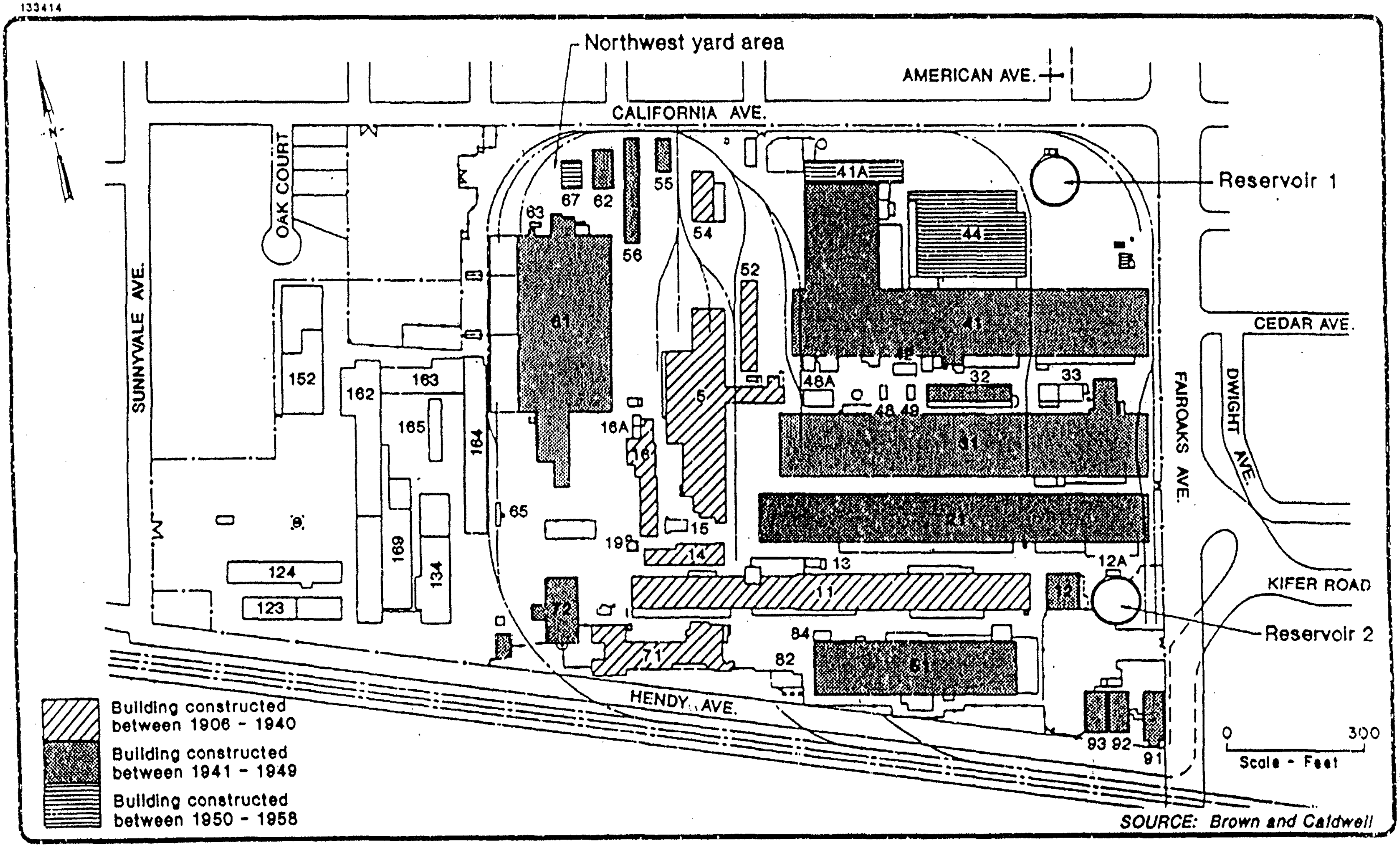

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Figure 2. FACILTY MAP

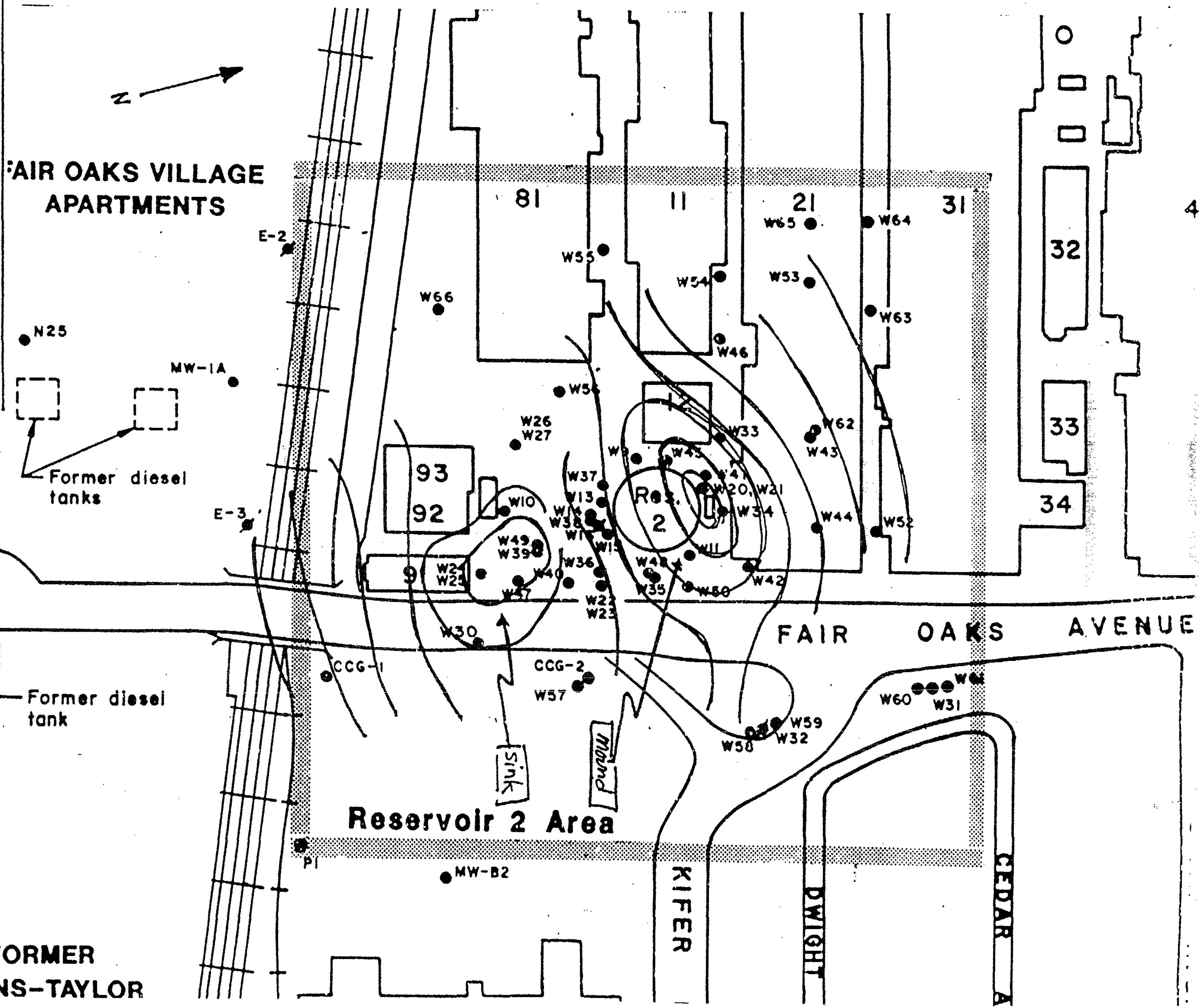

FIGURE 3. General Sketch of Groundwater Mound; Contours in A Aquifer.

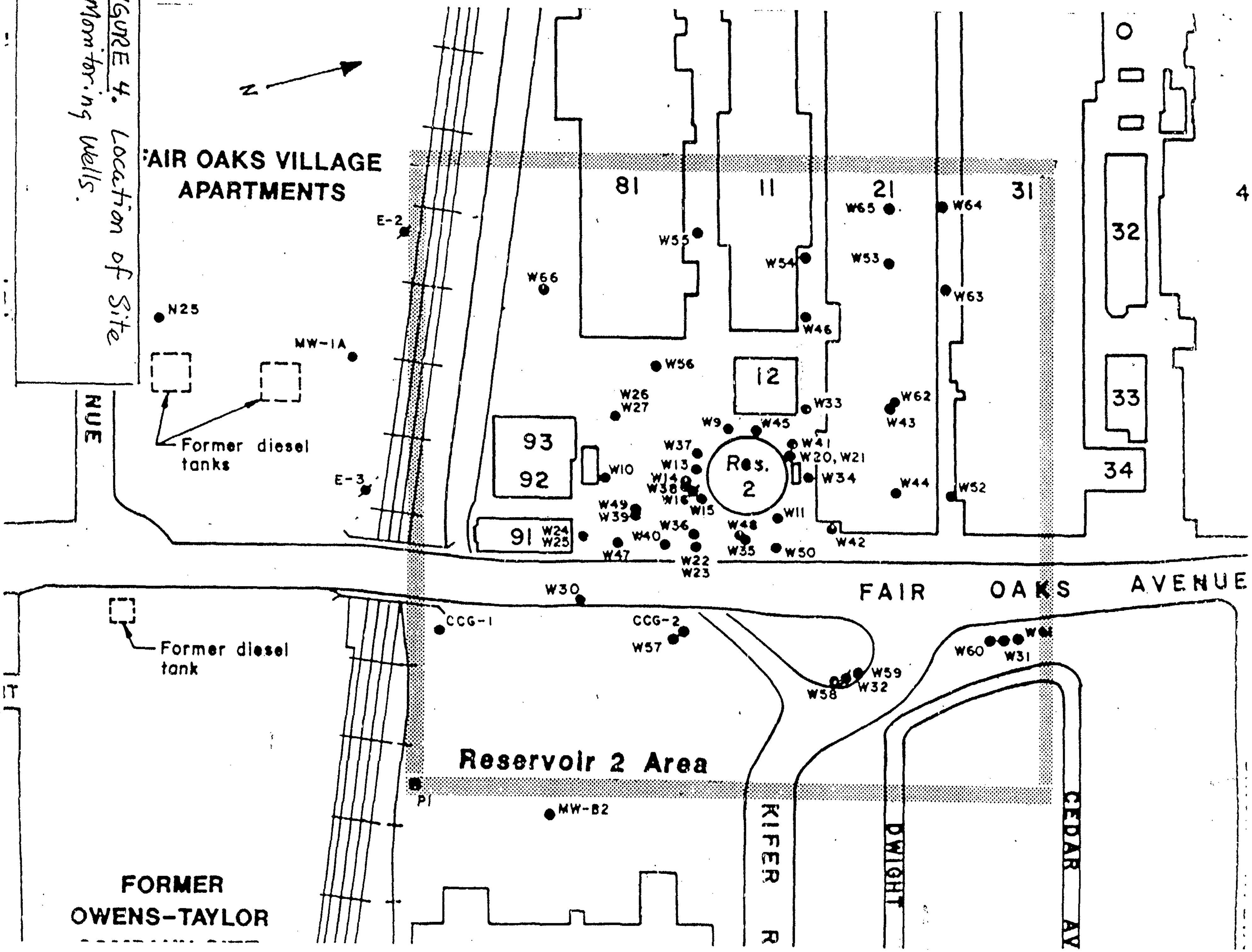

FIGURE 4. Location of Site Monitoring Wells.

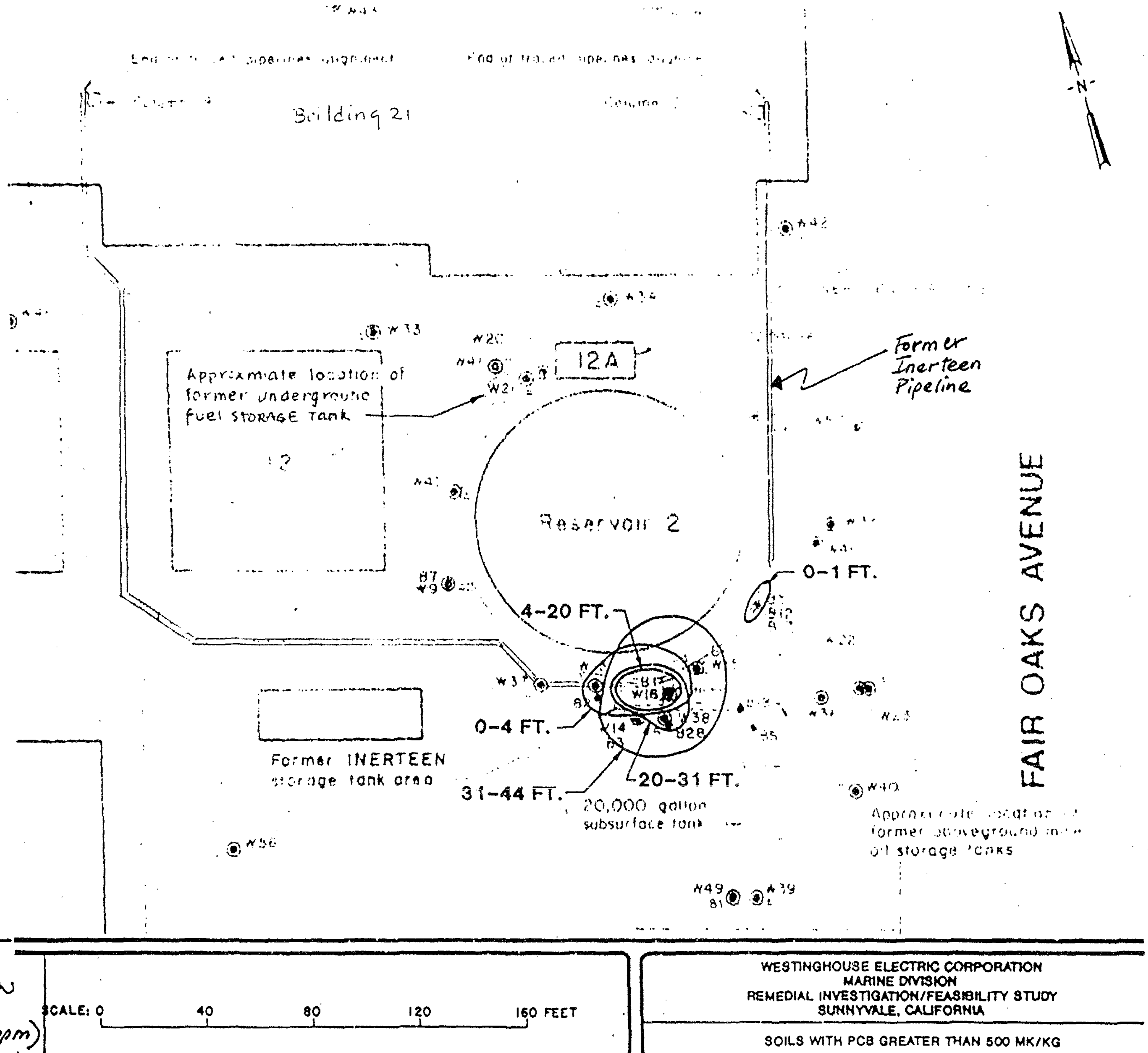

FIGURE 5. DISTRIBUTION OF PCB IN SOIL (7500 ppm)

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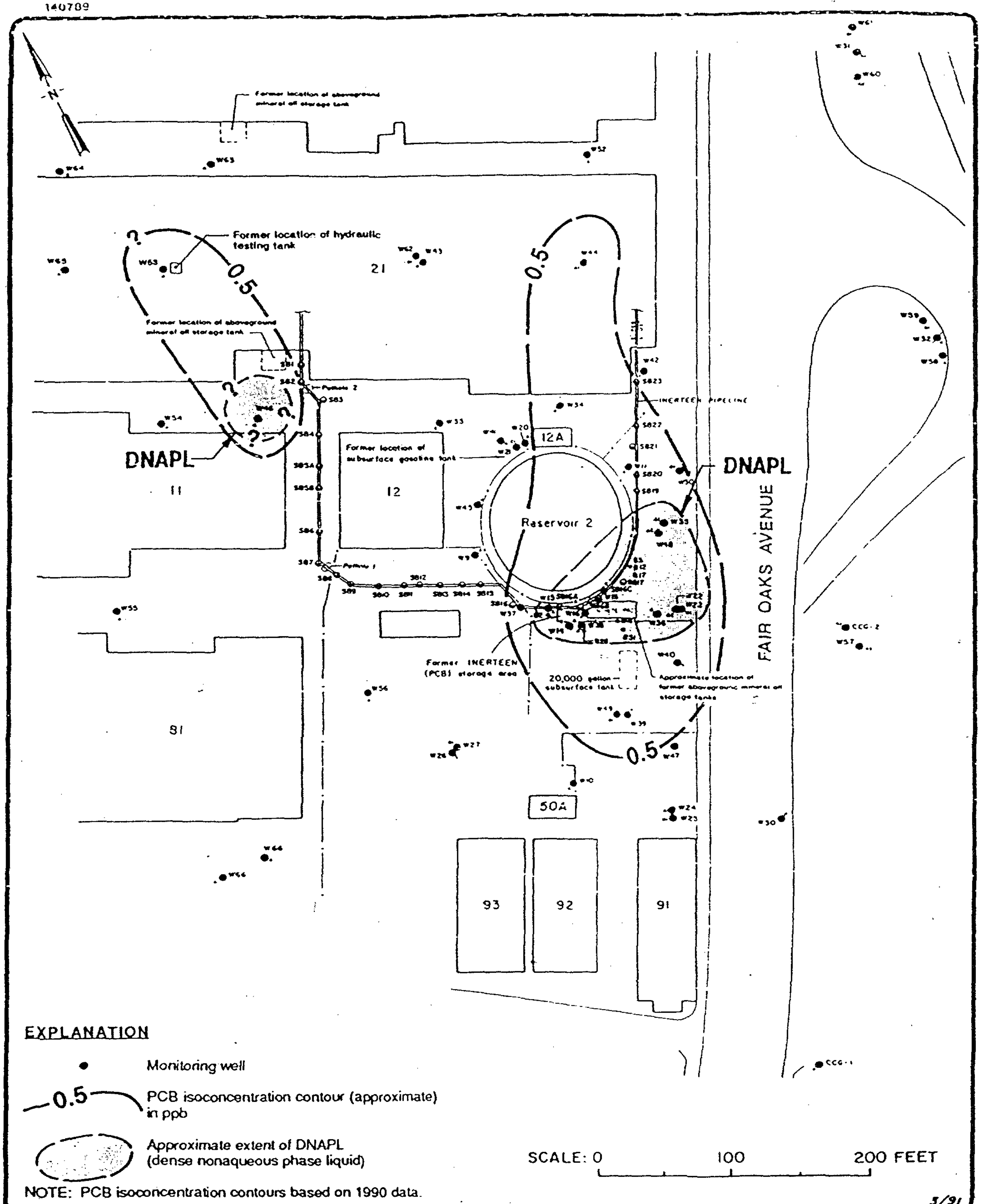
SOILS WITH PCB GREATER THAN 500 MK/KG

140789



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A-AQUIFER PCB CONCENTRATIONS

FIGURE 6.
(April 1990)
Approximate Extent of DNAPL in A Aquifer.

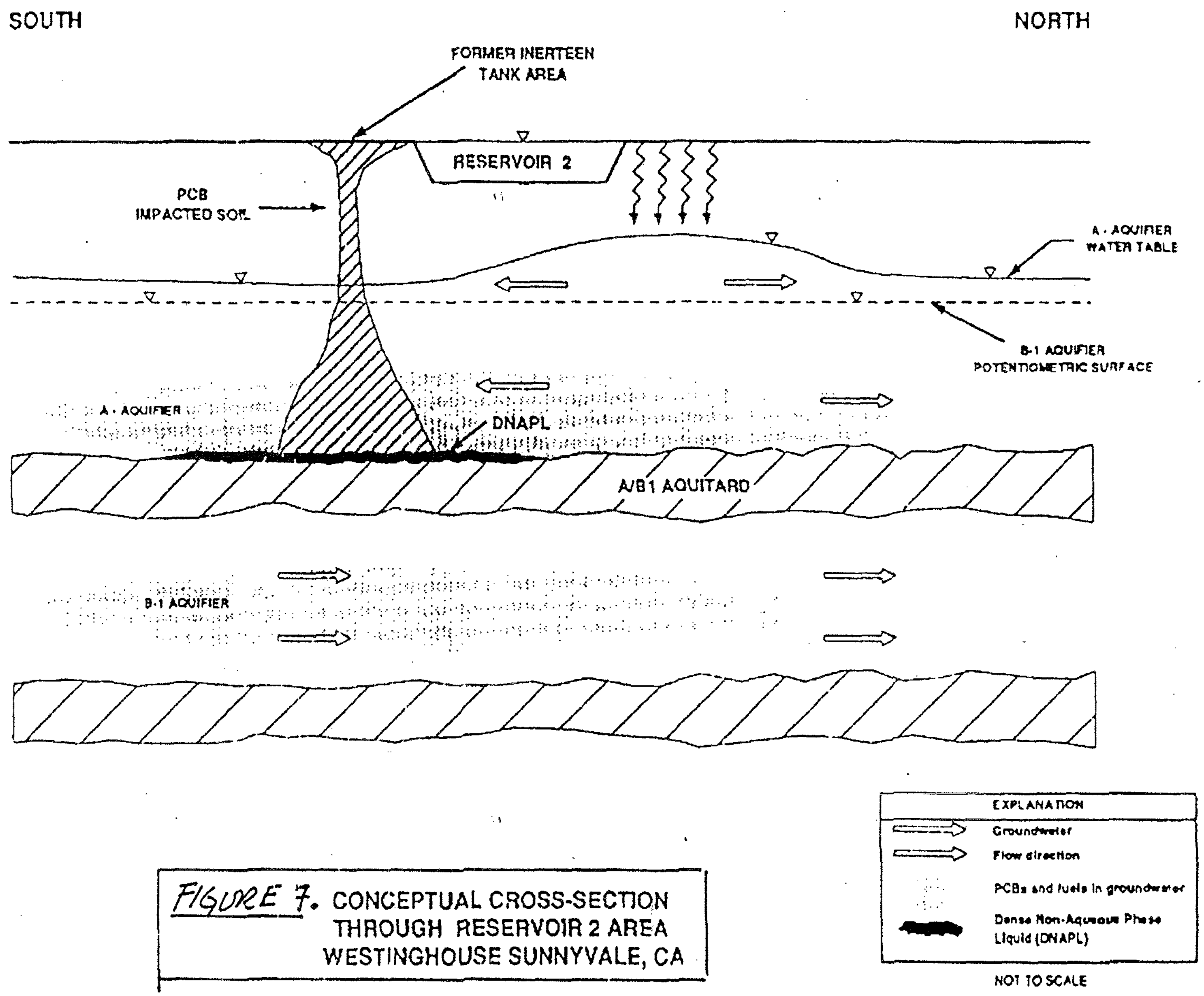

FIGURE 7. CONCEPTUAL CROSS-SECTION THROUGH RESERVOIR 2 AREA WESTINGHOUSE SUNNYVALE, CA

URS #130 4/91 rvsd 5/91

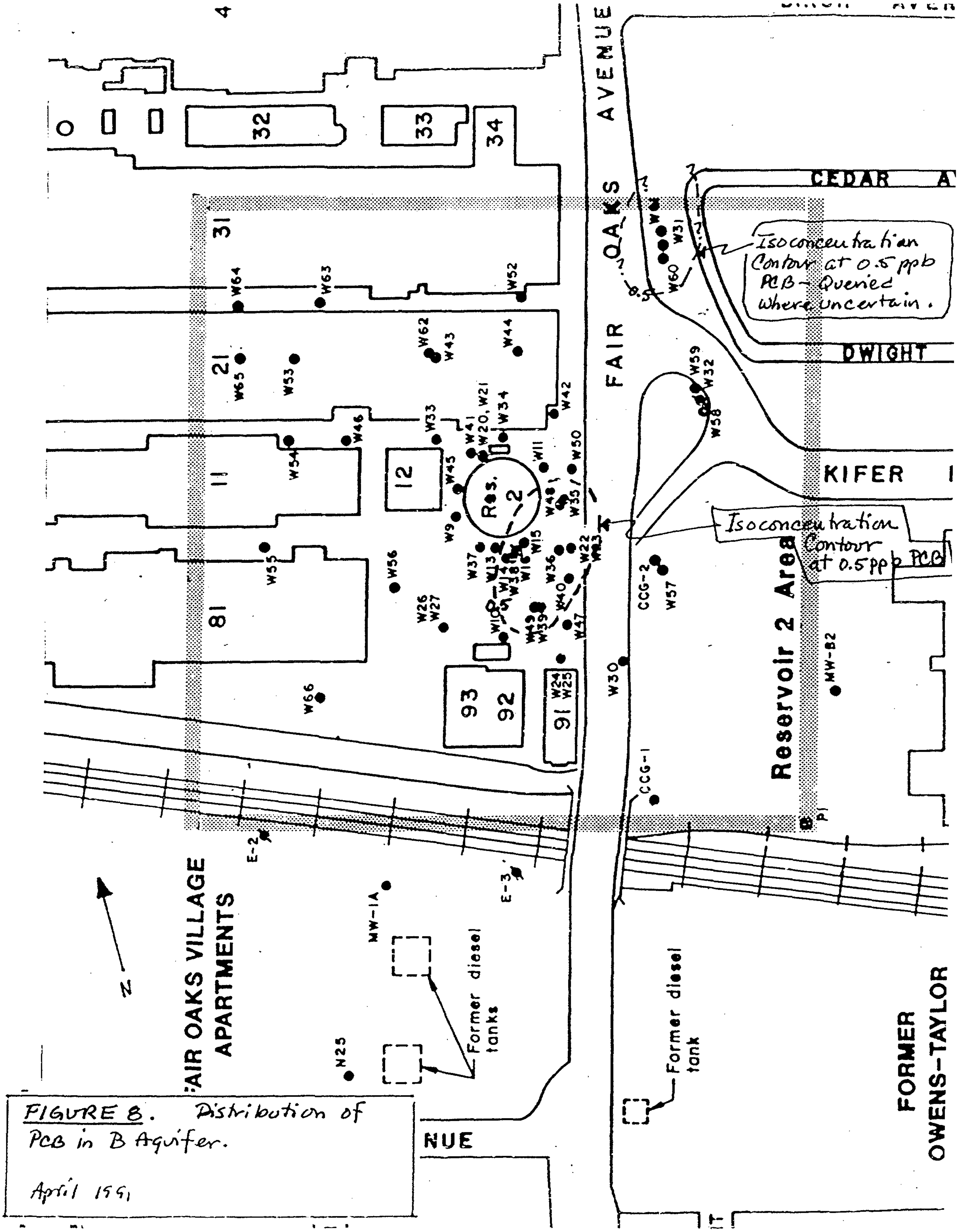

FIGURE 8. Distribution of PCB in B Aquifer.

April 1991

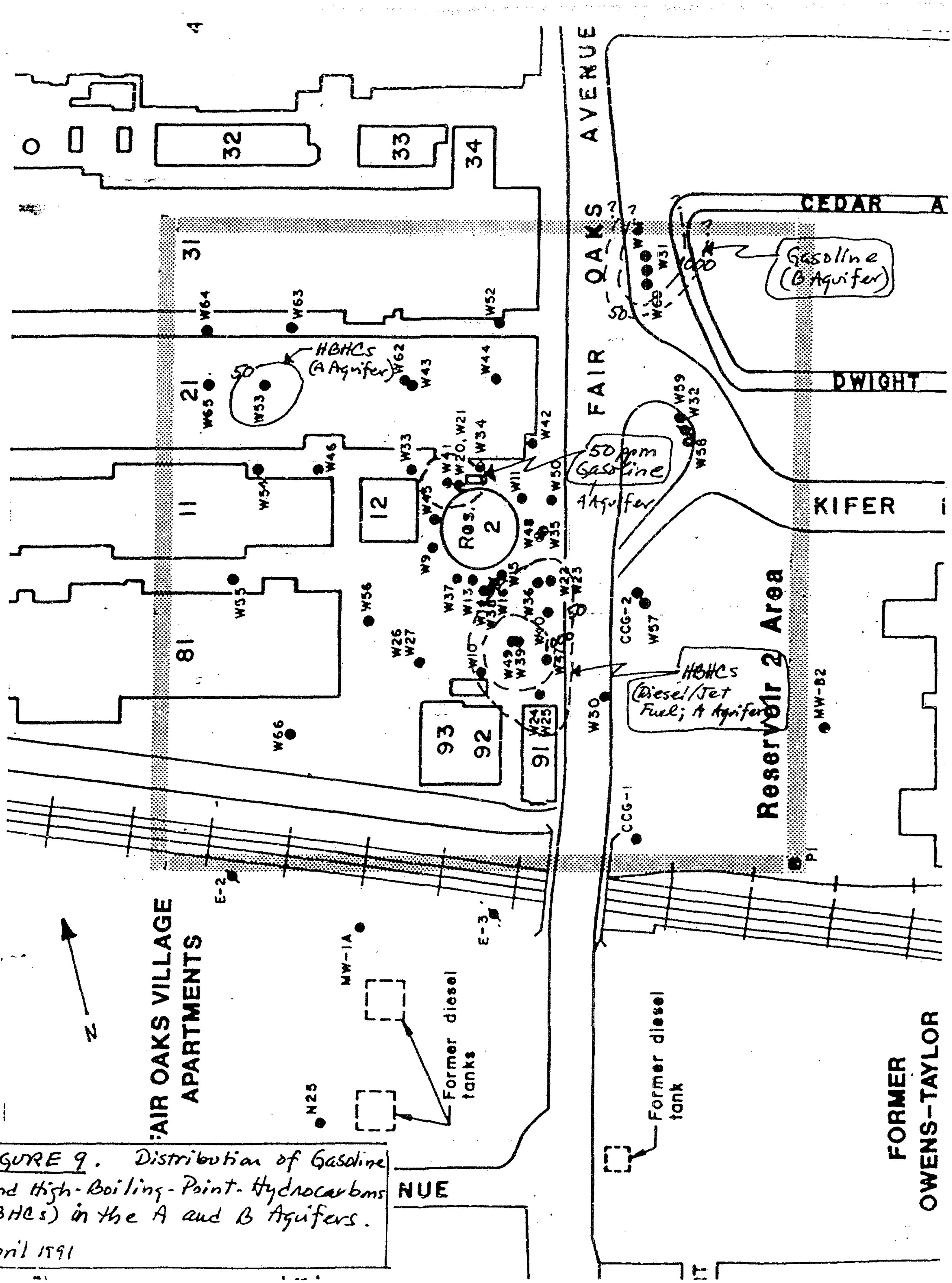

FIGURE 9. Distribution of Gasoline and High-Boiling-Point-Hydrocarbons (HBHCs) in the A and B Aquifers.

April 1991

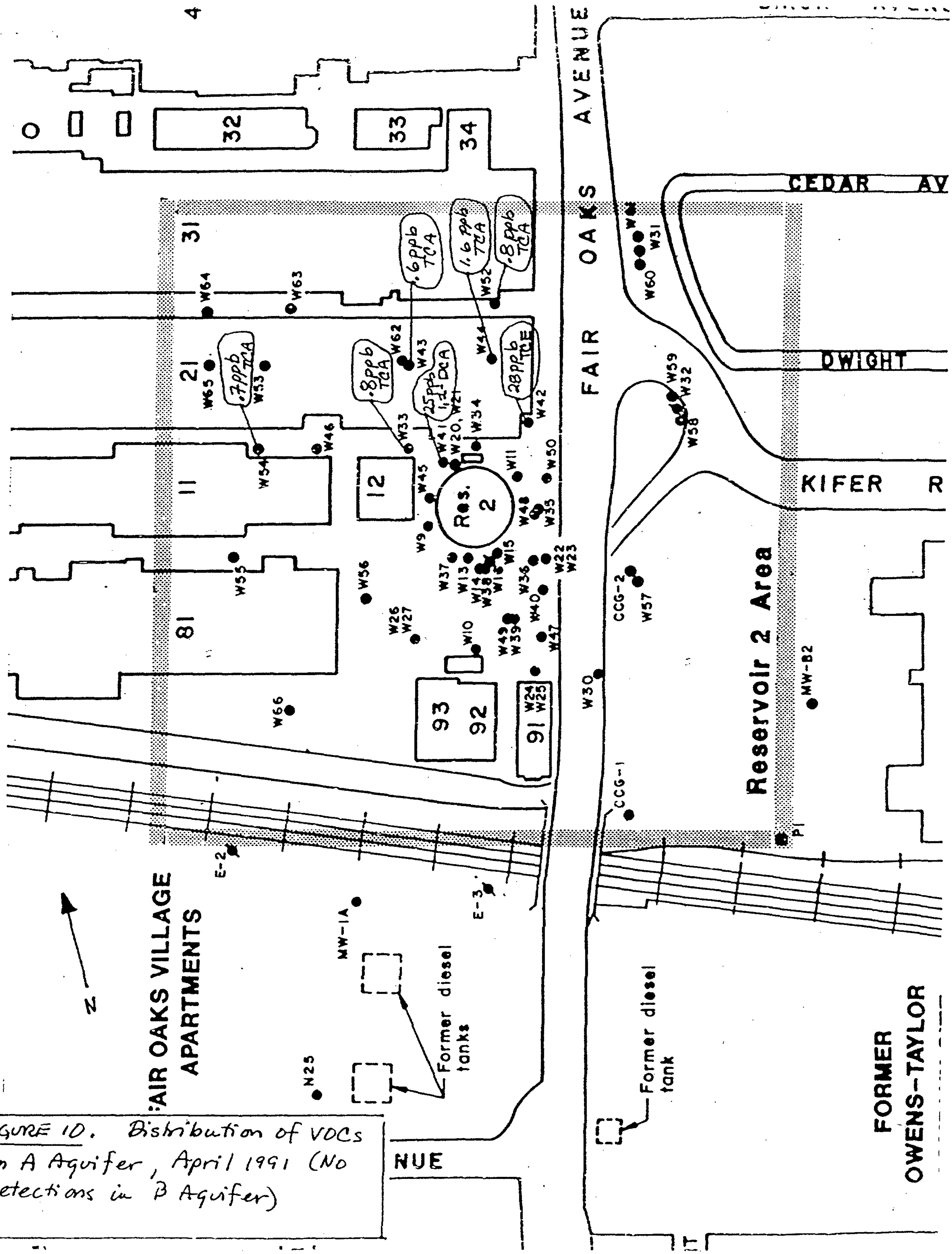

FIGURE 10. Distribution of VOCs in A Aquifer, April 1991 (No detections in B Aquifer)

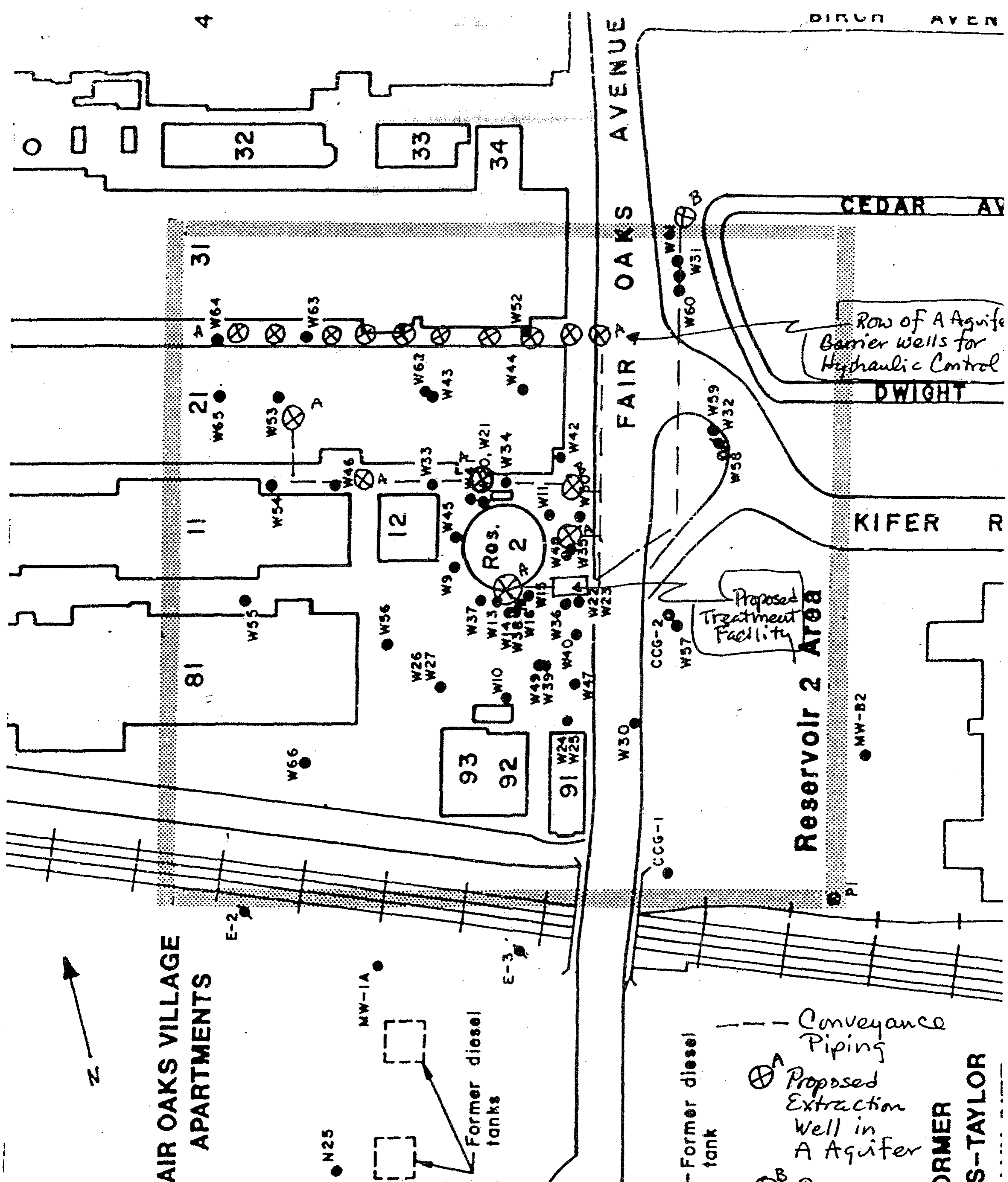

FIGURE 11. Sketch of General Conceptual Groundwater Remediation System

Table 1.
Scenario 1
Worker Exposure: Ingestion of Chemicals in Soil

Equation:

$$\text{Absorbed dose (mg/kg-day)} = \frac{CS \times ABS \times INGR \times CF \times FI \times EF \times ED}{BW \times AT}$$

where:
- CS = chemical concentration in soil (mg/kg)
- ABS = absorption fraction (unitless)
- INGR = ingestion rate (mg soil/day
- CF = conversion factor (10^{-6} kg/mg)
- FI = fraction ingested from contaminated source (unitless)
- EF = exposure frequency (days/years)
- ED = exposure duration (years)
- BW = body weight (kg)
- AT = averaging time (period over which exposure is averaged - days)

Variable	Case	Receptor	Value (Rationale/Source)
CS	RME	Workers (all)	95% confidence interval of mean concentrations in soil (EPA, 1989a)
	Typical	Workers (all)	Arithmetic mean concentrations in soil (EPA, 1989a)
ABS	RME/Typical	Workers (all)	0.3 PCBs (EPA, 1990a), 1.0 others (default assumption; EPA, 1989a)
INGR	RME/Typical	Workers (all)	100 mg/day (age groups greater than 6 years old; EPA, 1989d)
FI	RME/Typical	Workers (all)	1.0 (assumed)
EF	RME	Subsurface worker	0.6 day/year (3 days every 5 years)
		Surface worker	50 days/year
	Typical	Subsurface worker	0.2 day/year (1 day every 5 years)
		Surface worker	6 days/year
ED	RME	Workers (all)	30 years (EPA, 1989c)
	Typical	Workers (all)	9 years (average length of employment at facility)
BW	RME/Typical	Workers (all)	70 kg (average; EPA, 1989c)
AT	RME/Typical	Workers (all)	Pathway-specific period of exposure for *noncarcinogenic effects* (i.e., ED x 365 days/year), and 70-year lifetime for carcinogenic effects (i.e., 70 years x 365 days/year)

Table 2.
Scenario 1
Worker Exposure: Dermal Contact with Chemicals in Soil

Equation:

$$\text{Absorbed dose (mg/kg-day)} = \frac{CS \times ABS \times CF \times SA \times AF \times EF \times ED}{BW \times AT}$$

where: CS = chemical concentration in soil (mg/kg)
ABS = absorption fraction (unitless)
CF = conversion factor (10^{-6} kg/mg)
SA = skin surface area available for contact (cm^2/event)
AF = soil-to-skin adherence factor (mg/cm^2)
EF = exposure frequency (days/years)
ED = exposure duration (years)
BW = body weight (kg)
AT = averaging time (period over which exposure is averaged - days)

Variable	Case	Receptor	Value (Rationale/Source)
CS	RME	Workers (all)	95% confidence interval of mean concentrations in soil (EPA, 1989a)
	Typical	Workers (all)	Arithmetic mean concentrations in soil (EPA, 1989a)
ABS	RME/Typical	Workers (all)	0.1 PCBs (EPA, 1990a); DCB, TCB (0.25; see text Section 8.5)
SA	RME/Typical	Workers (all)	3,200 cm^2 (hands and arms; surface area; EPA, 1989c)
AF	RME	Workers (all)	1.5 mg/cm^2 (EPA, 1984)
	Typical	Workers (all)	0.5 mg/cm^2 (EPA, 1984)
EF	RME	Subsurface worker	0.6 day/year (3 days every 5 years)
		Surface worker	50 days/year
	Typical	Subsurface worker	0.2 day/year (1 day every 5 years)
		Surface worker	6 days/year
ED	RME	Workers (all)	30 years (EPA, 1989c)
	Typical	Workers (all)	9 years (average length of employment at facility)
BW	RME/Typical	Workers (all)	70 kg (average; EPA, 1989c)
AT	RME/Typical	Workers (all)	Pathway-specific period of exposure for noncarcinogenic effects (i.e., ED x 365 days/year), and 70-year lifetime for carcinogenic effects (i.e., 70 years x 365 days/year)

Table 3
Scenario 2
Residential Exposure: Ingestion of Chemicals in Soil

Equation:

$$\text{Absorbed dose (mg/kg-day)} = \frac{CS \times ABS \times INGR \times CF \times FI \times EF \times ED}{BW \times AT}$$

where:
- CS = chemical concentration in soil (mg/kg)
- ABS = absorption fraction (unitless)
- INGR = ingestion rate (mg soil/day
- CF = conversion factor (10^{-6} kg/mg)
- FI = fraction ingested from contaminated source (unitless)
- EF = exposure frequency (days/years)
- ED = exposure duration (years)
- BW = body weight (kg)
- AT = averaging time (period over which exposure is averaged - days)

Variable	Case	Receptor	Value (Rationale/Source)
CS	RME	All	95% confidence interval of mean concentrations in soil (EPA, 1989a)
	Typical	All	Arithmetic mean concentration (EPA, 1989a)
ABS	RME/Typical	All	0.3 PCBs (EPA, 1990a), 1.0 other chemicals
INGR	RME/Typical	Adults	100 mg/day (age groups greater than 6 years old; EPA, 1989d)
	RME/Typical	Children	200 mg/day (children 1 through 6 years old; EPA, 1989d)
FI	RME/Typical	All	1.0 (assumed)
EF	RME/Typical	All	365 days/year (assumed)
ED	RME	Adults	30 years (90th percentile time at one residence; EPA, 1989c)
	Typical	Adults	9 years (median time at one residence; EPA, 1989c)
	RME/Typical	Children	6 years (EPA, 1991b)
BW	RME	All	Median body weight for each respective age group (70 kg adult male, 16 kg child; EPA, 1989c, 1991a)
AT	RME	All	Pathway-specific period of exposure for noncarcinogenic effects (i.e., ED x 365 days/year), and 70-year lifetime for carcinogenic effects (i.e., 70 years x 365 days/year)

Table 4
Scenario 2
Residential Exposure: Dermal Contact with Chemicals in Soil

Equation:

$$\text{Absorbed dose (mg/kg-day)} = \frac{CS \times ABS \times CF \times SA \times AF \times EF \times ED}{BW \times AT}$$

where: CS = chemical concentration in soil (mg/kg)
ABS = absorption fraction (unitless)
CF = conversion factor (10^{-6} kg/mg)
SA = skin surface area available for contact (cm^2/event)
AF = soil-to-skin adherence factor (mg/cm^2)
EF = exposure frequency (days/years)
ED = exposure duration (years)
BW = body weight (kg)
AT = averaging time (period over which exposure is averaged - days)

Variable	Case	Receptor	Value (Rationale/Source)
CS	RME	All	95% confidence interval of mean concentrations in soil (EPA, 1989a)
	Typical	All	Arithmetic mean concentrations in soil (EPA, 1989a)
ABS	RME/Typical	All	0.1 for PCBs (EPA, 1990a); 0.25 for DCB and TCB (see text Section 8.5)
SA	RME/Typical	Adults	4,600 cm^2 (hands, forearms, and one-half legs; surface area; EPA, 1989c)
	RME/Typical	Child	1,800 cm^2 (hands and one-half arms and legs; surface areas; EPA, 1989b)
AF	RME	All	1.5 mg/cm^2 (EPA, 1984)
	Typical	All	0.5 mg/cm^2 (EPA, 1984)
EF	RME/Typical	All	365 days/year (assumed)
ED	RME	Adults	30 years (national upper bound time [90th percentile] at one residence; EPA, 1989c)
	Typical	Adults	9 years (median national time at one residence; EPA, 1989c)
	RME/Typical	Children	6 years (EPA, 1991b)
BW	RME/Typical	All	Median body weights for each respective age group (70 kg adult male, 16 kg child; EPA, 1989c and 1991a)
AT	RME/Typical	All	Pathway-specific period of exposure for noncarcinogenic effects (i.e., ED x 365 days/year), and 70-year lifetime for carcinogenic effects (i.e., 70 years x 365 days/year)

Table 5
Scenario 2
Residential Exposure: Ingestion of Chemicals in Drinking Water
(and Beverages Made Using Drinking Water)

Equation:

$$\text{Intake (mg/kg-day)} = \frac{CW \times FI \times ABS \times IR \times EF \times ED}{BW \times AT}$$

where: CW = chemical concentration in soil (mg/l)
FI = fraction ingested from source (unitless, assumed to be 1)
ABS = fraction absorbed (unitless, assumed to be 1)
IR = ingestion rate (l/day)
EF = exposure frequency (days/years)
ED = exposure duration (years)
BW = body weight (kg)
AT = averaging time (period over which exposure is averaged - days)

Variable	Case	Receptor	Value (Rationale/Source)
CW	RME	All	Maximum concentrations in ground water (EPA, 1989a)
	Typical	All	Arithmetic mean concentration in ground water (EPA, 1989a)
FI			
ABS	RME/Typical	All	1 (by convention; EPA, 1989b)
IR	RME/Typical	Adult	2 l/day (EPA, 1991a)
	RME/Typical	Child	1 l/day (EPA, 1991a)
EF	RME/Typical	All	365 days/year (EPA, 1989b)
ED	RME	Adults	30 years (90th percentile time spent at one residence; EPA, 1989a)
	Typical	Adults	9 years (median time spent at one residence; EPA, 1989a)
	RME/Typical	Children	6 years (EPA, 1991b)
BW	RME/Typical	Adult	70 kg (EPA, 1989a, 1990b)
	RME/Typical	Child	16 kg (typical value corresponding to body weight of 4-year-old; EPA, 1991a)
AT	RME/Typical	All	Pathway-specific period of exposure for noncarcinogenic effects (i.e., ED x 365 days/year), and 70-year lifetime for carcinogenic effects (i.e., 70 years x 365 days/year)

Table 6.
Summary of Estimated Carcinogenic and Noncarcinogenic Risks
at the Westinghouse Site

	Typical Exposure Scenario		RME Scenario	
	Cancer Risk	Hazard Index	Cancer Risk	Hazard Index
Ground-Water Exposure				
Aquifer A				
Adult Male Resident				
Ingestion	5.25E-03	5.95E+00	5.15E-02	1.80E+01
Inhalation/dermal	1.35E-05	2.59E+00	9.82E-05	7.90E+00
TOTAL	5.26E-03	8.54E+00	5.16E-02	2.59E+01
1- to 6-year-old Child Resident				
Ingestion	7.64E-03	1.29E+01	2.31E-02	3.94E+01
Inhalation/dermal	1.45E-05	5.66E+00	4.28E-05	1.73E+01
TOTAL	7.65E-03	1.86E+01	2.31E-02	5.67E+01
Aquifer B1				
Adult Male Residents				
Ingestion	1.87E-05	3.24E-02	9.80E-05	8.08E-02
Inhalation/dermal	1.05E-07	9.44E-02	9.34E-07	2.41E-01
TOTAL	1.88E-05	1.27E-01	9.89E-05	3.22E-01
1- to 6-year-old Child Resident				
Ingestion	2.72E-05	7.11E-02	4.29E-05	1.77E-01
Inhalation/dermal	1.53E-07	2.07E-01	4.09E-07	5.28E-01
TOTAL	2.73E-05	2.78E-01	4.33E-05	7.05E-01
Soil Exposure				
Adult Male Resident				
Ingestion	7.62E-02	1.12E-02	1.19E-01	2.44E-02
Dermal	1.67E-01	1.94E-01	9.46E-01	4.21E-01
TOTAL	2.43E-01	2.05E-01	1.00E+00	4.45E-01
1- to 6-year-old Child Resident				
Ingestion	1.29E-01	9.85E-02	2.00E-01	2.14E-01
Dermal	4.64E-01	3.32E-01	6.32E-01	7.21E-01
TOTAL	5.93E-01	4.31E-01	8.32E-01	9.35E-01
Surface Worker				
Ingestion	6.01E-04	2.90E-04	2.55E-02	1.08E-01
Dermal	3.20E-03	1.16E-03	3.38E-01	1.08E-01
TOTAL	3.80E-03	1.45E-03	3.64E-01	1.17E-01
Subsurface Worker				
Ingestion	1.82E-07	8.70E-07	4.37E-06	7.63E-06
Dermal	9.78E-07	3.49E-06	6.99E-05	9.16E-05
TOTAL	1.16E-06	4.36E-06	7.43E-05	9.92E-05

TABLE 7
Remedial Alternatives

<table>
<tr><th></th><th>Alternative A
No Action</th><th>Alternative B
No Excavation
Capping
Groundwater Containment</th><th colspan="2">Alternative C
Excavation to 8 ft
Offsite disposal or treatment
Capping/Groundwater Containment</th><th colspan="2">Alternative D
Excavation to 32 ft.
Offsite disposal or treatment
Capping/Groundwater Containment</th></tr>
<tr><td>Protects Health and Environment</td><td>- No reduction in risk
- Potential water supplies threatened</td><td>- Protects workers at surface but not in subsurface
- Groundwater containment protects downgradient aquifers</td><td colspan="2">- Protects workers at surface and in subsurface
- Groundwater containment protects downgradient aquifers</td><td colspan="2">- Protects workers at surface and in subsurface
- Groundwater containment protects downgradient aquifers</td></tr>
<tr><td>Complies with Federal, State, Local Requirements</td><td>- Does not comply</td><td>- Complies with all requirements except drinking water Standards for PCB</td><td colspan="2">- Complies with all requirements except drinking water Standards for PCB</td><td colspan="2">- Complies with all requirements except drinking water Standards for PCB</td></tr>
<tr><td rowspan="3">Reduces Toxicity, Mobility and Volume (TMV) Through Treatment</td><td rowspan="3">- No reduction in TMV</td><td rowspan="3">- Reduces TMV by Treating extracted groundwater
- No TMV for soils</td><td>C1 Disposal</td><td>C2 Treatment</td><td>D1 Disposal</td><td>D2 Treatment</td></tr>
<tr><td>- No TMV through treatment with disposal of soil</td><td>- Treatment of soils reduces TMV</td><td>- No TMV through treatment with disposal of soil</td><td>- Treatment of soils reduces TMV</td></tr>
<tr><td colspan="2">- Reduces TMV by Treating extracted groundwater</td><td colspan="2">- Reduces TMV by Treating extracted groundwater</td></tr>
<tr><td>Effectiveness</td><td>- Not effective</td><td>- Institutional controls and long term management of soils and groundwater in source area</td><td colspan="2">- More effective/less management required when 8 ft. of soil removed
- Still relies on institutional controls and long term pumping</td><td colspan="2">- Soils in source area removed completely but still relies on long term pump and treat control of groundwater</td></tr>
<tr><td>Implementability</td><td>- Easily implemented</td><td>- Easily implemented</td><td colspan="2">- Some difficulty for soils treatment (C2) option with storage, transport, treatment</td><td colspan="2">- Some difficulty for soils treatment (C2) option with storage, transport, treatment</td></tr>
<tr><td>COSTS</td><td></td><td></td><td>C1</td><td>C2</td><td>D1</td><td>D2</td></tr>
<tr><td>Capital</td><td>$ 62,000</td><td>$1,325,000</td><td>$1,725,000</td><td>$3,114,000</td><td>$2,691,000</td><td>$7,733,000</td></tr>
<tr><td>Annual O & M</td><td>$ 158,000</td><td>$225,000</td><td>$225,000</td><td>$225,000</td><td>$225,000</td><td>$225,000</td></tr>
<tr><td>Present Worth</td><td>$3,744,000</td><td>$6,474,000</td><td>$6,874,000</td><td>$8,263,000</td><td>$7,840,000</td><td>$12,882,000</td></tr>
</table>

TABLE 8
Groundwater Cleanup Criteria
ppb[1]

Chemical Name	Standard
Benzene	1[2]
1,2-Dichlorobenzene	600[3]
1,3-Dichlorobenzene	130[4]
1,4-Dichlorobenzene	5[2]
1,1-Dichloroethane	5[2]
1,2-Dichloroethane	0.5[2]
1,1-Dichloroethene	6[2]
cis-1,2-Dichloroethene	6[2]
Ethylbenzene	680[2]
Monochlorobenzene	30[2]
Polychlorinated biphenyls	0.5[6]
Toluene	1000[3]
1,2,4-Trichlorobenzene	5[5]
1,1,1-Trichloroethane	200[3]
Trichloroethene	5[3]
Xylene(s)	1750[2]

1. ppb = parts per billion
2. State Maximum Contaminant Level (MCL)
3. Federal Maximum Contaminant Level (MCL)
4. State Department of Health Services Action Level
5 Proposed Federal Maximum Conataminant Level, expected to be promulgated March 1992
6. Promulgated Federal MCL, effective July 1992

Table 9
Carcinogenic Risks and Hazard Quotients of Injesting Ground-Water
with Concentrations at Water Quality Criteria

COMPOUND	Maximum Contaminant Levels (MCLs) EPA (µg/l)	State (µg/l)	Highest Detected Concentration at site (a) (µg/l)	Calculated Ingestion Rate (b) (mg/kg-day)	Chronic Reference Dose (c) (Rfd) (mg/kg-day)	Cancer Potency Factor (c) (slope factor) (mg/kg-day)-1	Chemical Specific Cancer Risk (d)	Hazard Quotient for Non-carcinogens (e)
VOLATILE ORGANICS								
Benzene	5	1		1.22E-05	NA	2.9E-02	3.6E-07	
Chlorobenzene	100	30	9.6	2.74E-04	2.0E-02	NA		1.4E-02
1,2-Dichlorobenzene	600		174	4.97E-03	9.0E-02	NA		5.5E-02
1,3-Dichlorobenzene		130 (f)	120	3.43E-03	NA	NA		
1,4-Dichlorobenzene	75	5		6.12E-05	NA	2.4E-02		
1,1-Dichloroethane		5	1.2	1.47E-05	1.0E-01			1.5E-04
1,2-Dichloroethane	5	0.5		6.12E-06	NA	9.1E-02	5.6E-07	
1,1-Dichloroethene	7	6	5	6.12E-05	9.0E-03	6.0E-01	3.7E-05	6.8E-03
cis-1,2-Dichloroethene	70	6	2	5.71E-05	1.0E-02	NA		5.7E-03
Ethylbenzene	700	680	330	9.43E-03	1.0E-01	NA		9.4E-02
Polychlorinated biphenyl	0.5			6.12E-06	NA	7.7E+00	4.7E-05	
Toluene	1,000		100	1.22E-03	2.0E-02	NA		6.1E-02
1,2,4-Trichlorobenzene	9			1.10E-04	1.3E-03	NA		8.4E-02
1,1,1-Trichloroethane	200	200	22	6.29E-04	9.0E-02	NA		7.0E-03
Trichloroethene	5	5		6.12E-05	NA	1.1E-02	6.7E-07	
Xylene(s)	10,000	1,750	987	2.82E-02	2.0E+00	NA		1.4E-02
						Total Risk (g)	**8.5E-05**	
						Hazard Index (h)		**3.4E-01**

(a) Only listed for those site COCs at concentrations less than federal or state water quality criteria.
(b) Assumes that concentration of compound in drinking water matches, state or federal MCL, DHS Action Level, or highest detected concentration (see section 8, table 8.5-5 for equation).
(c) From Health Effects Assessment Summary Tables (HEAST), Four Quarter FY - 1990
(d) Chemical-specific cancer risk calculated by multiplying injestion by slope factor
(e) Chemical hazard index calculated by dividing injestion by reference dose
(f) DHS Action Level
(g) Total risk calculated by summing chemical-specific cancer risk
(h) Hazard Indes calculated by summing chemical-specific hazard quotients
Blank space: No existing value.

Table 10
Sensitivity Analysis Summary

Cost	Low	Difference	% Less Than Median	Median	Difference	% Greater Than Median	High
Capital Cost							
A	$47,000	$15,000	24%	$62,000	$16,000	26%	$78,000
B	$1,210,000	$115,000	9%	$1,325,000	$161,000	12%	$1,486,000
C1	$1,610,000	$115,000	7%	$1,725,000	$161,000	9%	$1,886,000
C2	$2,999,000	$115,000	4%	$3,114,000	$161,000	5%	$3,275,000
D1	$2,576,000	$115,000	4%	$2,691,000	$161,000	6%	$2,852,000
D2	$7,618,000	$115,000	1%	$7,733,000	$161,000	2%	$7,894,000
O&M Cost, Year 1							
A	$370,000	$20,000	5%	$390,000	$19,000	5%	$409,000
B,C,D	$435,000	$23,000	5%	$458,000	$24,000	5%	$482,000
O&M Cost, Year 2							
A	$150,000	$8,000	5%	$158,000	$8,000	5%	$166,000
B,C,D	$214,000	$11,000	5%	$225,000	$13,000	6%	$238,000
Present Worth							
A	$3,543,000	$201,000	5%	$3,744,000	$202,000	5%	$3,946,000
B	$6,106,000	$368,000	6%	$6,474,000	$456,000	7%	$6,930,000
C1	$6,506,000	$368,000	5%	$6,874,000	$456,000	7%	$7,330,000
C2	$7,895,000	$368,000	4%	$8,263,000	$456,000	6%	$8,719,000
D1	$7,472,000	$368,000	5%	$7,840,000	$456,000	6%	$8,296,000
D2	$12,514,000	$368,000	3%	$12,882,000	$456,000	4%	$13,338,000

Low=20% less, Median=base case, High=20% more
Ground-water extraction system variables: number and location of wells, soil disposal, pumps
Ground-water treatment system variables: design flow rate, O&M for alternate flow rates
Ground-water monitoring system variables: number of wells, O&M

Attachment A

RESPONSIVENESS SUMMARY

for PUBLIC COMMENTS RECEIVED from

July 1, 1991 through AUGUST 29, 1991

ON THE PROPOSED PLAN FOR THE FINAL REMEDIAL ACTION AT THE WESTINGHOUSE SUPERFUND SITE IN SUNNYVALE, SANTA CLARA COUNTY, CALIFORNIA

This document summarizes and responds to all significant oral and written comments received during the sixty day public comment period on EPA's proposed plan for the Westinghouse Superfund Site in Sunnyvale, Santa Clara County, California. This summary is divided into two parts. Part I provides a summary of the major issues raised by commenters and focuses on EPA's responses to the concerns of the local community. Part II is a detailed response to comments received that were of a more technical or legal nature. The comments of an individual commenter may be divided between Part I and Part II, depending on the nature of the comments. A copy of all of the comments received is included in the Administrative Record File.

RESPONSIVENESS SUMMARY - PART I

GENERAL COMMENTS FROM MEMBERS OF THE LOCAL COMMUNITY

1. One commenter wanted to know how much it would cost to clean up the PCBs for which a waiver is being granted and another commenter stated that he believed that the decision not to require cleanup of all of the PCB contamination was based on economics, not the unavailability of a current technology that would successfully remove them. Another commenter wanted to know what methods could be used to remove all PCBs.

RESPONSE: In the process of developing cleanup alternatives for detailed consideration, EPA identifies the volumes or area to which general response action (e.g., excavation) might be applied, taking into account the requirements for protectiveness and the chemical and physical characterization of the site.

Complete excavation was not considered a viable or reliable option mainly because the location of all non-aqueous phase PCB liquids cannot be reliably defined. While EPA has estimated the maximum limits of where it might be expected to occur, this area constitutes approximately four acres. Thus, a deep excavation (40 to 50 feet) over at least a four acre area would be necessary. The possibility of exacerbating the contaminant problems in the aquifer by spreading contamination or inadvertently leaving contamination behind was determined to constitute too great a risk, given that other technically reliable and protective solutions to the problem exist. Additionally, complete excavation would threaten the integrity of the Fair Oaks overpass and a number of other structures, including the Westinghouse fire protection reservoir. Even if complete excavation had been developed for the detailed analysis, it would have been ruled out due to the uncertainties surrounding its effectiveness, significant short-term risks, and inordinate cost relative to the amount of risk reduction involved.

In discussing what is meant by "technically impracticable," the preamble to the National Contingency Plan ("NCP"), 40 C.F.R. Part 300, recognizes that "[e]ngineering practice is in reality ultimately limited by costs, hence cost may legitimately be considered in determining what is ultimately practicable." 55 Fed.Reg. 8666, at 8748. Therefore, cost was one of the factors considered in the decision to invoke the waiver.

2. If a waiver were granted, would contaminated groundwater have to be pumped forever?

RESPONSE: Yes, unless a different remedial action were implemented in the future which would be protective of human health and the environment without such pumping.

3. The majority of commenters stated that they were opposed to EPA granting any waiver of the MCL for PCBs in groundwater. Of these, many voiced concern that such a waiver would prevent the implementation of a technology capable of cleaning up the PCBs if one were developed in the future, or relieve Westinghouse of liability for any such future implementation. Some wanted Westinghouse and EPA to be responsible for implementing any new technology that becomes available for cleaning up the PCBs, and some would prefer to see an interim remedial action taken, while more information on PCB cleanup technology is developed.

RESPONSE: EPA is invoking a waiver, based on technical impracticability, of the requirement that the PCB MCL be met in the A aquifer source area. The bases for invoking this waiver are elaborated in the ROD and in the response to General Comment #1, above.

Nothing in this Record of Decision ("ROD") relieves Westinghouse or any other entity from any liability it may have for any further remedial actions to be performed at the site.

Generally, once EPA signs a ROD for a Superfund site, the Agency either attempts to negotiate a consent decree with any potentially responsible parties ("PRPs) requiring the PRPs to implement the selected remedy, or the Agency issues the PRPs an order requiring them to implement the selected remedy. An order to implement a remedy generally does not contain any type of release from liability. A consent decree may contain a covenant not to sue the PRPs for specific types of liability under the Comprehensive Environmental Response, Compensation and Liability Act, ("CERCLA"). If the United States enters into such a decree with any PRP, the public would have a minimum of thirty days to submit written comments on the decree, including any limitation it contained on the United States' ability to pursue a party in the future. See CERCLA Section 122(d), 42 U.S.C. § 9622(d). The United States must consider any such comments before deciding whether to go forward with the agreement. If the United States still desires to go forward, it must submit the comments and its responses to them to the appropriate federal district court. CERCLA Section 122(d)(2)(B). Of course, EPA may, in its enforcement discretion, decide not to enter into a decree which contains any such limitation. In that case, EPA would be free to pursue any potentially responsible party in the future if the Agency decided that a new technology should be implemented at the site. Also, if EPA did enter a decree which covenanted not to sue any party for some aspect of future liability with respect to the site, this would not prevent the Agency from using the Superfund to implement such a remedy at the site, if it so chose.

EPA does not agree that it would be appropriate to decide at this point whether or not to implement any new technology that might become available for the cleanup of the PCBs. In order to select a remedy, EPA must determine that it meets all applicable or relevant and appropriate requirements ("ARARs"), is protective of public health and the environment, is cost-effective, and represents the best balance of the nine criteria used in comparing remedies. This determination cannot be made in a vacuum; an actual cleanup technology would have to exist before EPA could engage in the necessary analysis. Furthermore, because EPA has determined, based on the information available at this time, that the remedy adopted today will be protective of public health and the environment, the Agency may decide not to reopen the remedy selection issue, depending on the available information about any new technology. However, in cases such as this, where hazardous waste will be left onsite, CERCLA Section 121(c), 42 U.S.C. § 9621(c), requires EPA to review the remedy every five years after its initiation to assure that human health and the environment are being protected. If EPA determines that further action is appropriate, the Agency shall take or require such action.

Finally, EPA believes that invoking a waiver based on technical impracticability is preferable to selecting an interim remedy (based on the hope that some promising alternative will be developed in the near future) in that it provides a basis for setting requirements of a more permanent nature, both in the ROD and in the enforcement process to follow, than would be appropriate if the ROD were interim. EPA also believes that the Administrative

Record supports the determination, based on currently available information, of technical impracticability.

4. Regarding the degree of cleanup, one commenter stated that "every drop" of soil contamination should be cleaned up.

RESPONSE: CERCLA does not require cleanup of all contamination or elimination of all risk resulting from a release. Rather, remedies must achieve a degree of cleanup that is protective of public health and the environment. CERCLA Section 121(d), 42 U.S.C. § 9621(d). The National Contingency Plan (NCP) provides that for systemic toxicants, acceptable exposure levels shall represent concentration levels to which the human population, including sensitive subgroups, may be exposed without adverse effect during a lifetime or part of a lifetime, incorporating an adequate margin of safety. 40 C.F.R. § 300.430(9)(2)(i)(A)(1). For known or suspected carcinogens, exposures within the risk range of 10^{-4} through 10^{-6} will generally be considered protective. 40 C.F.R. § 300.430(e)(2)(i)(A)(2). The implementation of this remedial action will result in the achievement of these exposure levels at the site, as further elaborated in the ROD.

5. What are "institutional controls?"

RESPONSE: Institutional controls are actions which limit human activities at or near facilities in order to protect human health and the environment and assure the continued effectiveness of a remedy. Examples include land and resource use and deed restrictions, well-drilling prohibitions, building permits, well use advisories and deed notices. See 55 Fed.Reg. 8706.

6. What health problems are associated with PCBs?

RESPONSE: Based on studies of long-term occupational exposure to PCBs, PCBs have been shown to cause: (a) severe, persistent skin eruptions, (b) liver damage that could include symptoms such as weight loss, anorexia, nausea, vomiting, jaundice and abdominal pain. PCB exposure has also been associated with (a) reproductive problems and birth defects in animals and (b) decreased birth weights in infants born to women exposed during pregnancy. Some PCBs are also considered probable human carcinogens.

7. Many commenters wanted to know if it was safe to live near the site. They raised concerns ranging from health effects (including a past miscarriage and the effects on small children) and impacts on pets (including dogs and exotic birds), to the safety of eating fruit and vegetables grown near the site.

RESPONSE: Residing near the site is as safe as living in any similar industrialized area. While such areas may have background levels of contamination which are higher than in rural or other nonindustrial settings, the contamination at the Westinghouse plant, as described in the ROD, has not resulted in any measurable increase in risk to nearby residents. The limited extent of contamination in the shallow groundwater and onsite soils, the asphalt covering over the onsite soils and the fact that this groundwater is not used for drinking or irrigation supply currently prevent local residents from being exposed to the chemicals of concern at the site. Without exposure to these chemicals, residents will not experience any negative health effects.

There is no evidence to suggest that fruit and vegetables grown near the site are contaminated. Offsite groundwater contamination is limited to the second aquifer down (the B aquifer). Plant or tree roots would be unlikely to reach these depths (70 feet) and even if they did, would be unlikely to survive saturated conditions of the A aquifer which is not contaminated (i.e., they would drown). Additionally, the calculated health risks due to ingestion of B-aquifer water are within the acceptable EPA risk range for cleanups. Despite, the low risks associated with ingestion of this B aquifer groundwater, EPA is choosing to clean it up to the drinking water standards (MCLs). See also the response to General Comment #14, below, in this Part I, regarding information on the health assessment currently being conducted for the site.

8. How does the EPA know there are no contaminated soils off of the Westinghouse property?

RESPONSE: Site investigations begin with gathering all information available about where chemicals have been used or stored at the site. At Westinghouse, PCB-contaminated soils were found near the former PCB storage tank and along the pipelines that transported these chemicals. They were also found along fencelines where these PCB fluids had been used to control weeds. The fenceline soils that were contaminated have been removed, including some offsite soils outside of the fence. The remaining soils are those along the pipeline and near the former storage tank. Nearly one thousand soil samples have been taken at this site (including offsite sampling along the fenceline) to define the extent of soil contamination. Sample results from soils outside of the immediate areas where PCB fluids were used or stored show no detections of PCB. There is no evidence that PCB was used or stored in the neighborhoods around Westinghouse, and there are no mechanisms for contamination in onsite soils to migrate to offsite soils. Therefore there is no reason to suspect that contaminated soils occur in offsite areas.

9. A commentator stated that "all toxins must be removed from the area."

RESPONSE: See the response to General Comment # 4, above.

10. One commenter was concerned about the possibility of contaminated fruit in her backyard, stating that he or she had

tried to remove a tree and, after digging down ten feet had still not uncovered the end of the roots of the tree. S/he believes the roots go down more than 25 feet.

RESPONSE: The offsite contamination is limited to the B aquifer which is 70 feet below ground surface. The A aquifer is clean in this area. See also the response to comment number seven, second paragraph.

11. Numerous commenters requested further monitoring to determine the effects of the contamination on offsite areas and/or further investigations to determine whether the contamination has spread offsite. Requests included testing of groundwater, soil, air, vegetables and fruit, and drinking water, as well as vapors within and under residences. These commenters generally felt that the amount of testing done to date was not sufficient to determine whether the neighborhood surrounding the site was safe and what impact the groundwater contamination has had on properties surrounding the site.

RESPONSE: EPA plans to require further groundwater testing in the B aquifer to complete final definition of the lateral and vertical extent of contamination in this water-bearing unit. This testing will be done during the next phase of site activities. See the response to General Comment #8, above, for the reasons why EPA does not believe further testing of soils is warranted in the offsite area at this time.

Some volatile chemicals that are capable of causing negative impacts through the air pathway do occur in the B aquifer plume which has recently moved offsite. The fact that the sampling data indicate that this contamination is not under residences at this time and that it occurs in the second aquifer down, make it improbable that volatilization of the chemicals from groundwater and into homes is occurring. The most significant evidence to support this supposition is that none of these chemicals are detected in the A aquifer in this same offsite area.

EPA has not required any testing in the neighborhood surrounding Westinghouse because none of the information gathered by EPA, including that submitted during the public comment period, indicates that contamination exists in the offsite areas. The one exception is a limited area of the B aquifer which occurs 70 feet below ground surface and is separated from the surface by the A/B aquitard and the A aquifer, which tests clean in the offsite area.

12. Without testing water in homes, how can it be determined whether contaminants might be leaking from the soil into pipes?

RESPONSE: Water distribution pipes lay in shallow soils that do not come in contact with either the A or B aquifers. The offsite groundwater contamination only occurs in the B aquifer at 70 feet below ground surface. There is no mechanism by which contaminants could get into the pipes from this distance, especially given that a clean aquifer exists between the B aquifer and the pipes.

13. Commenters wanted EPA to require monitoring of air emissions from Westinghouse's current operations and the cleanup. One commenter requested continual air monitoring surrounding Westinghouse's plant starting as soon as possible and continuing throughout the cleanup. Another commenter wanted to know how we can be sure that no contamination will get into the air; this commenter is concerned that the cleanup will stir PCBs into the air and increase the risk from the site.

RESPONSE: Air monitoring occurs routinely during investigation and cleanup work when applicable health and safety procedures require it. When there are no concerns regarding air emissions due to the type of chemicals or activities involved, air testing is not performed. EPA estimates that the excavation portion of the remedy may take two to three weeks once it is begun. Requirements to control air borne particulates or volatile compounds during excavation activities will be in place and are referenced in the ROD. PCB is a non-volatile compound. The short-term risks during excavation will mainly affect the workers performing the excavation work and they will wear appropriate protective clothing. Offsite air risks are expected to be minimal.

As far as monitoring air emissions from Westinghouse's current operations, Westinghouse has a permit from the Bay Air Quality Management District covering these emissions. This permit requires the emissions from the facility to be within the limits applicable under both federal and state law. Therefore, air monitoring of the ongoing operations at Westinghouse's plant would not be an appropriate part of this Superfund cleanup process, which is focused on the PCB spill and related contamination.

14. Several commenters requested that a health study be done to identify any pattern of illness among the workers and residents in the area. One commenter wanted to know if any such health studies had been done in the past.

RESPONSE: The Agency for Toxic Substances and Disease Registry ("ATSDR"), a federal public health agency created by the Superfund legislation, conducts a public health assessment for every waste site on the National Priorities List. ATSDR, in conjunction with the California Department of Health Services ("CDHS"), is currently in the process of collecting information and data to evaluate the effect of the release at the Westinghouse site on public health. This evaluation, which considers the populations of both offsite residents and onsite workers, is called a health assessment. When CDHS completes its draft health assessment, it will be released for public comment. Whether or not the health assessment will recommend a health investigation or "health study" is a decision entirely within the jurisdiction of ATSDR and CDHS. The contact person at ATSDR who is dealing with this site is Diana M. Lee, M.P.H., Research Scientist. She can be reached at (510) 540-3657; her address is Department of Health Services, 2151 Berkeley Way, Berkeley, California 94704-1011.

Based on the contamination and its location, EPA believes that the risks associated with the site are very low. However, in order to facilitate communication between community members and the agencies performing the health assessment, EPA is also taking the following measures: (1) requesting that CDHS mail a notice of the availability of the draft health assessment to all persons who commented on the Westinghouse Proposed Plan; (2) forwarding to CDHS a copy of each comment (with sensitive information redacted) which mentioned health effects or health concerns; and (3) including in the Administrative Record correspondence between CDHS and Westinghouse regarding the health assessment. See Administrative Record, Letters from Diana Lee at California Department of Health Services to Westinghouse personnel Burt Walters and Tom Froman, dated July 16, 1991 and October 1, 1991, respectively, and Letter from Bert Walters to Diana Lee, dated August 15, 1991. See also the response to Comment #25 in Part II, below, regarding health studies performed by Westinghouse.

15. Why has it taken ten years to get to this stage of the cleanup?

RESPONSE: There are many factors that have contributed to the ten-year time-frame from discovery of the contamination to selection of a final remedy. It should be remembered that the field of toxic spill investigation and cleanup is barely ten to fifteen years old and that the State and Federal programs that regulate these cleanups are about ten years old. Many toxic spills are technically complex and this is true for the Westinghouse site. Both the Regional Water Quality Control Board and EPA have applied their best efforts to this site, often learning through experience and research as the technological information in the toxics field expanded. It has been important to provide an adequate amount of time in order to study the site to determine what kind of remedy to select so that health protection is truly achieved. Although it has taken longer than anyone would wish, we now have a sound plan for cleanup of the Westinghouse site.

16. Many commenters were concerned about the timeframe for the cleanup process and expressed opinions about ways to achieve a timely cleanup. These requests included the following: (a) establishing a definite timeframe for each aspect of the cleanup, (b) beginning the cleanup immediately, (c) beginning the cleanup as soon as possible, (d) immediate installation of monitoring and/or extraction wells, (e) immediate installation of monitoring wells upon completion of analysis of necessary data (f) monitoring wells in place by September, 1991 (g) monitoring wells in place by

October, 1991, (h) extraction wells be December, 1991, (i) additional monitoring wells and initial cleanup to begin no later than January of 1991, and (j) a year or more before the start of extraction of groundwater is too long. A commenter also wanted to know how long the cleanup would take.

RESPONSE: Once an enforcement mechanism, such as an order or a consent decree, is in place, an EPA approved workplan for the cleanup can be finalized. This workplan will include the specific schedule for all cleanup activities and the order or decree will enforce compliance with that schedule. At this time we estimate that it will be one to two years before the entire groundwater extraction and hydraulic containment system is in full operation.

17. Several commenters objected to Westinghouse's conduct at the August 7, 1991 EPA community meeting, with one commenter stating that it was "unethical and unforgivable. In attendance was the head of the Westinghouse Sunnyvale Health and Safety Department, the head of the Westinghouse Sunnyvale Public Relations Department, and someone from Westinghouse's national environmental office. When community members asked if someone for Westinghouse could help answer some of their concerns, the Westinghouse management team refused. They hid in the audience dressed in street clothes refusing to even identify themselves." Another commenter stated that a Westinghouse spokesperson should have been present at the meeting, especially as Westinghouse had prepared the Feasibility Study and will implement the remediation plan. Another commenter wanted to know if Westinghouse officials would be willing to meet with the neighborhood group on a regular basis to address concerns such as noise and prevention of further contamination.

RESPONSE: Westinghouse did not send an official representative to the public meeting on the Proposed Plan, in part because EPA did not request that they do so. Therefore, any employees from Westinghouse who were present were not prepared to speak on behalf of the company. EPA does not believe that any individual employee of Westinghouse should be required to represent the company's position as a precondition for attending a public meeting. On the other hand, EPA understands, based on the comments at the meeting and those received afterward, that the community would like to have more input from Westinghouse regarding the site. EPA will attempt to facilitate interaction between the community and Westinghouse in the future on issues related to the cleanup.

18. How does EPA determine that a property is a Superfund site?

RESPONSE: Pursuant to CERCLA, EPA maintains a list of the most seriously contaminated hazardous substance sites eligible for cleanup funds under the Superfund law; this list is called the National Priorities List ("NPL"). EPA first assesses the risk represented by a site, based on a preliminary investigation of the contaminants at the site, site location, etc. Using a ranking system, a "score," is derived, which provides a numerical value for the risk presented by the site. Those sites with sufficiently high scores are added to the NPL and addressed through the Superfund remedial process. For more information on the Superfund process, from discovery through the preliminary assessment and site investigation process, see 40 C.F.R. §300.300 through 40 C.F.R. § 300.410.

19. Is Westinghouse paying for all of the studies, testing and cleanup?

RESPONSE: This is an enforcement issue which is not relevant to remedy selection. However, the general policy of the Agency is to seek to have responsible parties pay for the cleanup of sites.

20. Some comments were received stressing the importance of keeping the local residents, workers and the City fully informed of the progress of the cleanup and new information which develops. These comments also mentioned the need to make such information easily obtainable in a timely manner. Several individuals also requested that they be kept informed in the future.

RESPONSE: EPA agrees that it is important to keep the public informed. EPA maintains a site-specific mailing list for the Westinghouse site, and everyone who requested to be kept informed has been added to this mailing list. Information about the site is also available to th public in the Sunnyvale Public Library and in the Region 9 Records Center. The EPA contact person for this site is the Remedial Project Manager, Helen McKinley. Her phone number is (415) 744-2236; her work address is H-6-3, U.S. EPA, 75 Hawthorne Stree, San Francisco, California, 94105.

COMMENTS FROM THE CITY OF SUNNYVALE

Comments from City's August 7, 1991 Letter

1. The handling of Superfund cleanup activities is a federal matter. The City's goal for the protection of residents, however, is to make sure that what needs to be done is done by the agencies and companies with the specific responsibility for environmental protection in Sunnyvale.

RESPONSE: EPA supports the City in its goal of protecting its residents and believes that the City has worked very cooperatively with the agencies involved in the cleanup process.

2. Because the City operates a public drinking water system, it is especially concerned that deep aquifers, the source of a significant portion of the city's water supply, are protected by prompt and effective clean-up of contaminated shallow aquifers and soils. Although the site at this time appears not to be either an

immediate or long-term threat to the quality and safety of Sunnyvale's drinking water, the City recommends that the clean-up plan be fully implemented as soon as possible, monitoring of potential offsite migration of contamination be continued, and that preventive measures be carried out. The City will continue its rigorous water quality assurance program in order to detect the presence of any trace amount of contaminants, and take prompt steps to take care of the problem should it ever occur.

RESPONSE: A thorough investigation of the potential for conduits from the shallow A and B aquifers where Westinghouse contamination occurs to the deeper aquifers has been conducted. No wells which might serve as conduits for Westinghouse contamination have been identified. PCB contamination has never been identified in a City of Sunnyvale municipal well to EPA's knowledge. Therefore, EPA agrees that the site does not represent a threat to either the quality or the safety of Sunnyvale's drinking water. The City's rigorous sampling provides an added assurance in this regard. EPA agrees that the remedy should be implemented quickly, within the legal constraints of CERCLA (e.g., any settlement covering remedial action activities must be contained in a judicial consent decree, and a minimum thirty day public comment period must be held, CERCLA Section 122, 42 U.S.C. § 9622). Monitoring of potential offsite migration is a key component of the selected remedy. The preventive measures which EPA intends to have implemented are described in the ROD.

3. The City is deeply concerned that problems such as the Westinghouse Superfund site not occur again. The City outlines numerous model programs and ordinances it has developed to regulate businesses and industries which use, handle or store hazardous materials.

RESPONSE: We commend the City for the leadership role it has taken in developing laws to deal effectively with the use, handling and storage of hazardous substances. EPA shares the City's concerns about avoiding future environmental problems. In addition to its Superfund responsibilities, which are aimed chiefly at cleaning up contamination caused by past use of hazardous substances, EPA oversees programs under the Toxic Substances Control Act ("TSCA"), Resource Conservation and Recovery Act and other statutes designed to prevent situations such as the one at the Westinghouse site from occurring in the future.

4. The City is concerned that public and private financial resources committed to environmental protection and clean-up are invested effectively to protect the public. Whether it is public money or private money, it makes no sense to spend it on activities which will not make a real difference to improve environmental quality or protect public health, especially when there are so many high priorities to address. The City is concerned that the City, the State, EPA and Westinghouse put their efforts and dollars where

there will be the greatest return for environmental protection. This EPA process to identify the costs and benefits of alternative clean-up plans for the Westinghouse site is an appropriate method for this purpose.

RESPONSE: CERCLA Section 121(d), 42 U.S.C. § 4621(d) requires, among other things, that EPA select a remedy that is cost-effective. Based on this requirement, the NCP includes cost as one of the nine criteria which EPA uses to select a remedy. The remedy chosen in the ROD, Alternative C2, is cost-effective, while providing adequate protection of public health and the environment.

5. Implementation of EPA's preferred alternative, Alternative C, would address the City's concerns for protecting the public and the City's water system. Alternative C would significantly reduce the source of potential PCB exposure at the Westinghouse site, clean up offsite shallow groundwater contamination to drinking water standards, and prevent any further offsite migration of contamination. Compared to the other alternatives which either would not provide much improvement or would cost much more without yielding much greater benefit, the effective implementation of Alternative C appears to meet the environmental objectives of the City. The key words are "effective implementation," however, and the City will continue to monitor the progress of clean-up at Westinghouse very closely.

RESPONSE: EPA agrees that Alternative C is the best remedial action alternative for cleanup at this site.

Comments from City's August 21, 1991 Letter

6. All necessary steps should be taken as soon as possible to ensure a clear definition of the extent of contaminated groundwater. Present conventional definition steps include the installation of the appropriate number of monitoring wells at appropriate locations. Although the City is confident that the integrity of its municipal water system is protected, it is nonetheless the case that early identification and containment are the necessary prerequisite steps to remediation and removal of contamination. Although the City does not foresee a time that water being used by its customers would be contaminated, there is some potential that the shallow aquifers could penetrate to the deeper aquifers and therefore make unusable a portion of the City's water system.

RESPONSE: This statement seems to contradict the City's statement in its August 7, 1991 letter that "the Westinghouse Superfund site at this time appears not to be either an immediate or long-term threat to the quality and safety of Sunnyvale's drinking water . . . " (emphasis added). The City does not point to any facts on which it bases this change in position with respect to whether or not the site represents a threat to the City's drinking water supply.

EPA does not agree that the deep aquifers are threatened. No conduits between the shallow areas near the site to the deep aquifers used as municipal supplies have been identified. A thorough survey has been conducted to confirm this. The selected remedy will make contamination of the deep aquifers an even more remote possibility. The next phase of site activities will include installation of monitoring wells to "ensure clear definition of the extent of contaminated groundwater."

7. Steps should be taken as soon as possible to begin the extraction of contaminated groundwater to activate the process of cleanup in order to halt any further spread of the plume.

RESPONSE: As stated in response to the City's earlier comment (#2), EPA agrees that the remedy should be implemented quickly, within the legal constraints under which the Agency operates.

8. The City supports any necessary offsite testing of soils so as to assure that contamination is not spread to those areas. Such testing should include not only soil samples, but testing for vapors as well.

RESPONSE: See the response the General Comment #11, above.

9. Remediation of contaminated soils should be undertaken in such a fashion that maximum cleanup is obtained. This should occur as expeditiously and comprehensively as possible.

RESPONSE: EPA agrees that the implementation of Alternative C2 should be undertaken in such a way as to achieve maximum cleanup of the soil, within the limits defined by Alternative C2. However, Alternative C does not require the cleanup of soils containing PCBs at or below 25 ppm. This is the level considered protective for an industrial site, based on the <u>Guidance on Remedial Actions for Superfund Sites With PCB Contamination</u>, August 1990 (OSWER Directive No. 9355.4-01, which has been identified as a "To Be Considered" criteria for this site. The remedy also does not require the cleanup of contaminated soil below depths of eight feet. Such a requirement would result in spending an additional $4.5 million, with no appreciable reduction in risk. Because there is no plausible expectation that any subsurface work would occur on the Westinghouse property below eight feet deep and because these soils do not pose a significant threat to groundwater, the excavation of soil below a depth of eight feet does not measurably reduce risk. As the City recognized in its August 7, 1991 letter, "it makes no sense to spend [money] on activities which will not make a real difference to improve environmental quality or protect public health, especially when there are so many high priorities to address. The City is concerned that the City, the State, EPA and Westinghouse put their efforts and dollars where there will be the greatest return for environmental protection." In any event, selection of a remedy which includes excavating this soil would violate the CERCLA statute and the NCP, which mandate that EPA select a cost-effective remedy.

10. The City suggests that public safety cannot be assured unless contaminated materials are removed to accepted health standards. Further, the City wants to make certain that whatever action is taken by EPA remains open to new and developing technologies regarding contamination removal so that any position today does not lock in today's technology when new processes and procedures may become available in the future which allow better site cleanup.

RESPONSE: Soil to depths of eight feet will be cleaned up to accepted health standards, as set forth in the EPA Guidance on Remedial Actions For Superfund Sites With Pcb Contamination, August 1991. Access to soils below this level will be prevented through institutional controls (e.g., land use restrictions). This type of treatment and containment remedy is supported by the NCP. 55 Fed.Reg. 8706-8707. As explained in response to the previous comment, EPA does not believe that treatment of soils below this depth is appropriate because it would not result in an appreciable reduction in the risk represented by the site.

Accepted health standards (i.e., MCLs) will be met for all contaminants in the groundwater other than PCBs, and the MCL for PCB will be met everywhere other than the source area in the A aquifer where DNAPL occurs. EPA has determined that it is technologically impracticable to meet the MCLs for PCB in the DNAPL source area, as further elaborated in the ROD.

See the response to General Comment #3, above, regarding advances in technology.

11. Residents have requested that appropriate health studies be undertaken to identify any pattern of illness that could be linked to air, water or soil contamination. It is essential that citizens be assured, through appropriate studies, that any potential health effect on them is isolated and determined at the earliest possible time.

RESPONSE: See the response to General Comment #14, above.

12. It is important that City officials and neighboring citizens be provided with frequent and clear information regarding both the process and substance of federal actions regarding this matter. This includes information regarding any potential negative effects which may result from actions directed in the cleanup plan itself and ongoing and frequent updates on the progress of remediation.

RESPONSE: EPA agrees that it is important that City officials and citizens in the area surrounding the site receive clear, up to date information on site-related activities. CERCLA Section 117 and the National Contingency Plan set forth the minimum requirements that EPA must follow to ensure public involvement in the process of remedial action selection; these requirements have been met or exceeded at this site. EPA will meet all requirements for public participation in the future. In addition, the preamble to the NCP recognizes that, at individual sites, it may be appropriate for EPA to engage in additional activities promoting public participation and information sharing, beyond those required by the statute and the regulations. 55 Fed.Reg. 8666, at 8767. For the Westinghouse site, EPA has engaged in additional outreach activities (e.g., attending neighborhood meetings and encouraging the neighborhood group to apply for a Technical Assistance Grant) in order to ensure maximum public participation. In addition, EPA plans to continue to work with the Westinghouse community, sharing information and updates on site activities. EPA has also met frequently with City officials over the four and a half years that EPA has acted as the lead agency on this site, in order to keep these officials apprised of activities and decisions related to the site. We hope that the good working relationship that has developed from this process will continue during remedial design and remedial action activities.

RESPONSIVENESS SUMMARY - PART II

If a comment was fully responded to in Part I, it is not dealt with in this Part II. Also, comments from several commenters may be combined into one comment when the comments deal with the same topic.

1. Has the cement in the buildings at Westinghouse been tested, in particular Building 21? There were a lot of spills. There were also spills around leaking transformers inside many buildings. Also, what about the oil that leaks out of the ancient machinery? The oilers have to put gallons into some machines on a daily basis. The Schiess in Building 31 is reported to have lost 20,000 gallons under its foundation. The leak was discovered when the motor stalled due to being flooded with oil. Many of our floors are made of asphalt, so oil can soak right through the asphalt into the ground. Can the soil beneath Building 21 be tested now.

RESPONSE: No, the cement in the buildings at Westinghouse has not been tested. Yes, it would be possible to perform some testing of this soil now, and in fact some soil samples were tested when four monitoring wells were installed in Building 21. However, it would be technically difficult to assess more thoroughly the soil conditions under these buildings without serious disruption to ongoing operations at the facility. Given the information currently known to EPA about chemical use at the facility and the fact that the limited soil testing beneath the Building showed only minor amounts of PCB (below the 25 ppm cleanup level) and in only one of the soil cores removed during well drilling, the main focus of the remedial investigation and feasibility study has been the

PCB spill from the former storage tank and associated pipeline and the resulting contamination.

The historical use of Building 21 as a manufacturing facility for PCBs could give rise to a concern. Therefore, the ROD requires Westinghouse or any future owner of the property to provide notice to EPA and the City of Sunnyvale of any future intentions to cease operations in, abandon or demolish (even partially) Building 21. At that time a sampling plan can be developed to determine if the soil under the building has been contaminated and steps taken to deal with any such contamination.

A survey of historical and current chemical use in all site buildings has been performed. Based on current information, EPA does not suspect that any other contamination from hazardous substances exists at the site. Petroleum products are generally excluded from the statutory definition of a "hazardous substance" under Superfund. This limits EPA's ability to address spills from petroleum products such as oil. CERCLA Section 1201(14); 42 U.S.C. § 9601(14). However, the statute and case law do contain some exceptions to this general principle. If, in the future, EPA obtains new information about other contamination at the site, then EPA, the State or other entities can respond under the authorities which exist at that time.

2. The proposed cleanup criteria do not adequately address the following issues [Note: RESPONSE follows each item]:

a. Definition of lateral and vertical extent to which contamination may have migrated offsite.

RESPONSE: The definition of the lateral and vertical extent of contamination both onsite and offsite is adequate to select a cleanup plan. The lateral and vertical extent of soil contamination and the extent of contamination in the A aquifer has been adequately defined. There is one limited area of the B aquifer plume that remains undefined. The leading edge of the B aquifer plume has migrated past the downgradient points of definition during the last year. Prior to November of 1990, no detections were seen in these wells to indicate that the plume was moving into the offsite area. The selection of the pump and treat remedy would not change with further information about the location of the leading edge of this plume. EPA will require that the extent of contamination be defined during the next phase of site activities, but does not believe such characterization is needed in order to select the remedy.

b. Determination of whether potential offsite contamination has exposed local residents to PCBs via any possible route of entry (water delivery system, local wells, edible fruit grown locally, fumes, vapors, dusts or other media).

RESPONSE: See the response to General Comment #7 in Part I, above, regarding offsite exposures. The information in the record provides a sufficient basis for EPA's remedy selection decision.

c. Determination of whether any adverse health effects have occurred in population of nearby residents based on aforementioned potential routes of entry.

RESPONSE: The most recent risk assessment results are presented in Section 8 of the Remedial Investigation and Feasibility Study Report. Potential exposure pathways were identified and the risk associated with the potential exposure calculated. Because no current exposures were identified, the risks of exposure due to ingestion, inhalation or direct contact are potential risks only. Since there is no evidence that exposures are occurring, there is no justification to evaluate adverse health effects. The information regarding exposure risks to nearby residents contained in the Administrative Record is adequate to form a basis for EPA's remedy selection. Also see the response to General Comment # 14 in Part I, above.

d. Clarification of whether EPA will require Westinghouse to remove all known concentrated deposits of PCBs onsite.

RESPONSE: The record clearly reflects that the proposed plan includes a waiver of the MCL for PCB in the A aquifer source area. This MCL would otherwise be a relevant and appropriate requirement in this area. This waiver is included based on the determination that it is technically impracticable to remove the PCBs from the groundwater in this area. See CERCLA Section 121(d)(4)(C), 42 U.S.C. § 9621(d)(4)(C). Protection from exposure to this groundwater will be achieved through hydraulic containment and land use restrictions.

The remedy also involves leaving PCB-contaminated soil onsite at depths below eight feet. Given the presence of PCB in the groundwater, removal of PCB below this depth would not result in any appreciable reduction in risk of exposure through the groundwater route. Protection from exposure to contaminated soil at the surface is achieved by a combination of excavation of all PCB-contaminated soils at levels above 25 ppm found at depths above eight feet and land use restrictions.

The cleanup levels for other contaminants found in the groundwater are the federal and state maximum contaminant levels ("MCLs") for drinking water and other "to be considered" criteria. The risk levels represented by these requirements fall within the acceptable risk range for Superfund sites. 40 C.F.R. §300.430(e)(2)(i)(A)(2). Therefore, the ROD requires the removal of all contamination which exceeds these levels.

e. Clarification of whether EPA will require Westinghouse to remove all known concentrated deposits of PCBs off-site.

RESPONSE: The remedy consists of the removal of all PCB in groundwater above 0.5 parts per billion (i.e., the current MCL) for all areas off of Westinghouse's plant, except for the A aquifer source area. (For further elaboration on the extent of this source area, see Section 6.2.2.2 of the ROD.) This area does not include any residential area. There are no known concentrated deposits of soil contamination offsite.

3. With the limited information available to the local residents, it is not possible to determine whether the cleanup plan adequately addresses whether the contamination is contained onsite or has already spread offsite. Evidently the plan intends to cleanup offsite groundwater to drinking water standards, therefore, I presume the contamination is not contained on Westinghouse's property? What purpose does removing soil to eight feet on Westinghouse's property serve if similar deposits offsite are not considered?

RESPONSE: Soil contamination is limited to property currently owned by Westinghouse. There are no similar deposits of soil contamination on offsite property. The justification for removing the soil contamination found onsite at depths of eight feet and above is to reduce to acceptable levels the risks to onsite surface and subsurface workers. The A aquifer contamination is limited to the Westinghouse property and a small area on the adjecent industrial property near well W57 and Well CCG-2. Contamination in these two wells is at or below the MCL. The B aquifer groundwater contamination is not limited exclusively to Westinghouse's property. The plume has recently extended beyond well W61. The remedy calls for the achievement of current drinking water standards and other "to be considered" criteria in this area as well as in all of the area on Westinghouse's property that does not fall within the contained area in the A aquifer where the PCB fluids remain. See Part II, Section 6.2.2.2 in the ROD for definition of the contained area.

4. What deed restrictions and real estate notifications will be imposed upon Victory Village residents in the event that they choose to use their existing wells, eat fruit from their gardens, conduct improvements on their property, rent their property to others or sell their property?

RESPONSE: In selecting this remedy, EPA does not impose any land use restrictions or real estate notification requirements upon any residential property. The remedial investigation showed that no wells currently exist in the offsite area to which the groundwater contamination has spread. Well construction in the area is prohibited unless a permit is obtained from the Santa Clara Valley Water District. Santa Clara Valley Water District Ordinance No.

90-1. The Water District is fully aware of the situation at the site and in the surrounding area.

Given the extremely limited extent of offsite groundwater contamination (see description in response to Comment #2a above), the lack of offsite soil contamination and the permitting requirements for well construction, EPA does not believe it is necessary to deed restrict the residential properties in the area. If the situation in the future were to change, EPA could issue a well-advisory. In addition, if, in the future, pumping of any wells in the vicinity were interfering with the remedial action, EPA would have the authority to enjoin such pumping. However, based on the Administrative Record, in particular the risk analysis' conclusion that the risk of ingestion of the B aquifer groundwater is calculated at 10^{-5}, EPA does not believe at this time that these actions are necessary.

As to whether any real estate notifications would be required, this is a matter of state or local law. It would not be appropriate for EPA to issue an advisory legal opinion on this matter so people concerned about legal requirements when purchasing or selling land should contact a private attorney.

5. The preliminary health assessment does not apparently address all possible routes of entry. There is no mention of the safety of fruit grown in the area on trees which likely use the shallow aquifer for water which may be contaminated. Such failure strengthens our argument that offsite issues have not been adequately investigated.

RESPONSE: In addition to the preliminary Baseline Public Health Evaluation, a further EPA-approved risk assessment was prepared for this site. (See Section 8 of the RI/FS Report or Summary of Site Risks Part II, Section 5 of the ROD). No evaluation of fruit trees has been done because the shallow aquifer offsite is not contaminated. See also the response to General Comments #7 and #10 in Part I, above.

6. The proposed cleanup levels indicate that drinking water standards cannot be met onsite. I presume there is too much contamination to meet the standard. Instead, will pumping be used to reverse normal groundwater flow to prevent additional offsite migration?

RESPONSE: Yes, pumping will be used to reverse normal groundwater flow to prevent additional offsite migration of the groundwater plume. This is referred to as "hydraulic containment" in the ROD. In addition, pumping and treatment of groundwater will be required such that current drinking water standards and other "to be considered" criteria will be met in all offsite areas. These standards and criteria will also be met in all onsite areas with the exception of the PCB standard, which is waived for the A aquifer source area.

7. The proposal indicates that it will maintain drinking water standards offsite. Will drinking water standards be met within the upper (presumably contaminated) aquifer? Will the upper aquifer be treated any differently because it is not used for drinking water? I do not believe that Westinghouse and the EPA have adequately investigated these issues or communicated them to the public in a manner in which they are understandable.

RESPONSE: In the Proposed Plan fact sheet that was mailed to 10,000 residents EPA stated that "outside of the source area <u>all</u> the cleanup standards must be met." This means that everywhere in the affected aquifers, with the exception of the source area which is subject to permanent containment, the MCLs for drinking water will be met. In fact all MCLs, with the exception of the PCB MCL, must be met everywhere in the affected aquifers, including the source area. The two affected aquifers (A and B) are both shallow and neither are used for drinking water. However, because both are classified as potential sources of drinking water, they are being cleaned up accordingly.

8. EPA's preferred alternative, Alternative C, does not specifically define how it will investigate offsite impacts of the known contamination. Therefore, Alternative C is not satisfactory. None of the alternatives are acceptable on this basis. EPA and Westinghouse should rescind the current alternatives and propose new alternatives which more specifically include offsite impacts. EPA should not render a final decision based on the current information.

RESPONSE: Because the risk assessment indicates that people located offsite are not currently at risk (i.e., there are no offsite impacts) from the contamination, no further study of offsite impacts is needed to select a remedy. The selected remedy also reduces potential <u>future</u> risks to persons offsite by requiring cleanup of the groundwater plume to current drinking water standards in all offsite areas. EPA believes that the Administrative Record supports the selection of Alternative C2 as the remedy for this site, and that there is no reason to delay the cleanup process by engaging in another analysis of alternatives.

9. Are there any private wells in the neighborhood? Have the owners been notified of the possible danger?

RESPONSE: Based on a well-survey, including door-to-door contact, EPA found that there are no private wells in the nearby neighborhood. With respect to notification and other information regarding potential wells in this area in the future, see the response to Comment #4, above, in this Part II and response to Comment #3 of the Santa Clara Valley Water Management District.

10. Westinghouse should be required to hold a community meeting to discuss Westinghouse's "legal responsibility" for the Westinghouse toxic spill.

RESPONSE: The issue of a potential responsible party's liability is not relevant to remedy selection. Furthermore, in drafting the Superfund law, Congress recognized that a party may elect to implement the cleanup of a site without admitting liability for the contamination to be cleaned up. CERCLA Section 122(d)(1), which provides that agreements with potentially responsible parties to implement remedial action shall be embodied in judicial consent decrees, states that:

> The entry of any consent decree under this subsection shall not be construed to be an acknowledgment by the parties that the release or threatened release concerned constitutes an imminent and substantial endangerment to the public health or welfare or the environment. Except as otherwise provided in the Federal Rules of Evidence, the participation by any party in the process under this section shall not be considered an admission of liability for any purpose, and the fact of such participation shall not be admissible in any judicial or administrative proceeding including a subsequent proceeding under this section.

42 U.S.C. § 9621(d)(1)(B). Therefore, the statute does not require Westinghouse to hold a public meeting to discuss legal responsibility for the site. However, as noted in the response to General Comment #17 in Part I, above, EPA understands the community's desire for more input from Westinghouse and will attempt to facilitate interaction between Westinghouse and the community on issues related to the cleanup.

11. The EPA shall formulate and implement operational standards that will require the EPA to act in a timely manner encompassing any toxic spill concerning the identification of any toxic spill (as defined to pose possible harmful health side-effects to any individual within the law), the identification of the responsible party, the formulation, implementation and evaluation of EPA corrective actions cleanup plans within a specified time period so as not to be deemed negligent as defined by law. These operational standards are to become part of the public record and shall be made available to any individual upon request.

RESPONSE: This comment deals generally with processes that the commenter believes EPA should adopt when dealing with toxic spills; it is not relevant to EPA's remedy selection at this site. EPA operates various programs pursuant to the directives and authority contained in statutes adopted by Congress. In overseeing this particular cleanup EPA is acting pursuant to authority contained in and procedures mandated by CERCLA, 42 U.S.C. Section 9601, et seq. and the regulations promulgated thereunder, found at 40 C.F.R. Part 300 (i.e, the National Contingency Plan), and the Resource Conservation and Recovery Act, 42 U.S.C. § 6901 et seq. Federal response to many but not all toxic spills fall within the scope of one or both of these two statutes.

12. The EPA shall, prior to the implementation of any proposed site cleanup plan, publicly address the City of Sunnyvale through a Sunnyvale community meeting other than the August 7, 1991 meeting, to discuss the EPA's "'negligence' to act in a timely manner" regarding the Westinghouse spill.

RESPONSE: CERCLA Section 117, 42 U.S.C. § 9617 requires EPA, prior to adoption of a remedial action plan, to provide "an opportunity for a public meeting at or near the facility at issue regarding the proposed plan and regarding any proposed findings . . . related to cleanup standards." This requirement that a public meeting be held is reiterated in the NCP, 40 C.F.R. § 300.430(f)(3)(i)(D). The public meeting held in Sunnyvale on August 7, 1991 fulfilled this requirement that a public meeting be held near the facility. The preamble to the NCP also recognizes that "[i]f a person needs more information about a site, he/she may, at any time in the remedial process, review the ongoing compilation of documents in the administrative record file or request that the lead agency conduct a public briefing or workshop in addition to that required by the NCP." 55 Fed.Reg. 8767 (March 8, 1990). In response to this requester, EPA's Remedial Project Manager for this site attended a workshop on the cleanup held on September 9, 1991 which was attended by many local residents. The Remedial Project Manager has also agreed to attend another such workshop to be held on October 17, 1991. If community interest were to remain at the current high level, EPA representatives would work with community members to set up more such workshops. Finally, EPA disagrees with this commenter's characterization of EPA's actions as "negligent."

13. The EPA shall conclude a complete health study to determine the present and possible harmful health side-effects resulting from any form of exposure to the contaminants identified at the Westinghouse spill. This health study shall include all the Westinghouse employees as well as the surrounding residential population within a one mile radius of the Westinghouse spill site and include a one mile radius of the entire length of all aquifers that have become contaminated as well as all aquifers that are subject to possible contamination as a result of Westinghouse's negligence but not to be limited to any boundaries so as to reduce the liability of Westinghouse or the EPA. This health study shall be completed before the implementation of any proposed EPA cleanup plan. The results from the health study shall be reviewed in accordance with the formulation, implementation, and evaluation of any proposed EPA cleanup plan presented to the public in the past,

present and future of such disclosure of said cleanup plans to the public. This health study shall be documented and become public record to be made available to any individual upon request.

RESPONSE: See the response to General Comment # 14, in Part I, above.

14. The City of Sunnyvale shall hold a community meeting for all the citizens that live within the area immediately affected by the Westinghouse spill as well as all residents that are potentially subjected to possible health side-effects as a result of the Westinghouse toxic spill's expansion (movement) throughout the City, to discuss the City of Sunnyvale's "negligence" concerning the City's obligation to inform those residents that have lived in the areas prior to, during, and after the contaminated areas have been identified. [Note: This comment goes on in great detail about what such a study should contain].

RESPONSE: The City of Sunnyvale's decisions regarding whether or not to hold public meetings and whether or not to conduct studies is outside of the control of the EPA, and is not relevant to EPA's selection of a remedial action for this site. EPA has met or exceeded all requirements for public comment, the holding of public meetings and public input into the decision-making process for the remedial action selection at this site. See CERCLA Section 117, 42 U.S.C. § 9617.

15. The EPA shall map the entire area that has been contaminated by the Westinghouse spill. This map shall include all contaminated aquifers over the entire length of such aquifers as well as all non-contaminated aquifers that intersect the contaminated aquifers. If it is deemed that said aquifers have no boundary than it shall be stated so and the EPA proposed cleanup plan shall reflect the "infinite" boundary. This documented map shall become part of the public record and be made available to any individual upon request.

RESPONSE: The purpose of the administrative record is to support EPA's remedy selection. CERCLA Section 113(k)(1), 42 U.S.C. § 9613(k)(1). The record contains documentation of the location of the contamination adequate to support the selection of Alternative C as the remedy for this site. This documentation includes numerous maps and cross sections of the subsurface presenting all known data on contaminant distribution. See, for example, the Remedial Investigation and Feasibility Study Report, Administrative Record #0594-00214. Similar maps updating site information as it has been gathered have been available for public review during the entire length of the project and will continue to be made available. Contact Helen McKinley (415) 744-2236 for assistance in locating specific information or to ask questions about the available information.

16. The EPA shall, upon implementation of the accepted cleanup

plan, hold a Sunnyvale community meeting every 45 days to discuss the progress of this cleanup plan. The EPA shall provide public notice of these meetings through direct mail notice to every individual residing in as well as individuals who work within the Westinghouse spill areas as well as all areas that might become contaminated as a result of spill movement. Furthermore, the EPA shall provide documented "proof of request" of all the local area television news networks to "our broadcast" of the scheduled EPA cleanup review meetings times during the local Network News prime-time segments at least three separate times within four days prior to the proposed EPA Sunnyvale community meeting. If the proposed cleanup plan should become "finished" within 45 days, from start date to completion date, the EPA will hold at least three community meetings during the duration of the cleanup plan regardless of the cleanup plans proposed time period.

RESPONSE: The NCP, 40 C.F.R § 300.435 and 40 C.F.R. § 300.825 set forth the requirements that EPA must meet for public participation, consideration of public comments and administrative record maintenance once the ROD is signed. The only requirements relative to public meetings are as follows: (a) if EPA proposes an amendment to the ROD which fundamentally alters the basic features of the selected remedy with respect to scope, performance or cost, it must provide the opportunity for a public meeting (see 40 C.F.R. § 300.435(c)(2)(ii)(D)), and (b) after final design of the remedy is completed, EPA must provide, as appropriate, a public briefing prior to initiation of the remedial action (see 40 C.F.R. § 300.435(c)(3). Of course, EPA may decide to hold more public meetings in the future, in addition to any required meetings. In deciding whether to do so, EPA considers the level of community interest, what type of additional information is available and the resources required to hold the meeting. See also the response to Comment #12 in this Part II.

17. Westinghouse and the EPA shall document and make available as part of the public record all tests that have been conducted as well as all tests that will be performed regarding the evaluation of specific contaminants as well as contaminant levels registered before, during and after the Westinghouse spill cleanup program is completed.

RESPONSE: All site data from sampling and testing that EPA has in its possession is included in the record and is available to the public. Some data collected early in the project (during the years 1981 to 1983) that contains some minor gaps due to less rigorous reporting and record keeping requirements during that period of time. The data gaps mentioned here do not affect the outcome of remedy selection. The information contained in the site files has been fully sufficient to evaluate the alternatives and select the remedy. EPA will continue to comply with all public disclosure requirements with respect to site data in the future.

18. The EPA will document and make available, as part of the public record to be made available to any individual upon request, its "expertise" in successfully dealing with and resolving toxic spills such as the Westinghouse spill as well as similar spills although not of the exact same nature as the Westinghouse spill, so as to lend credibility and confidence for the general public in the EPA's ability to successfully and in a timely manner complete any such proposed and implemented cleanup plan.

RESPONSE: The administrative record is a site-specific document designed to set forth the basis for remedy selection at a particular site. The Administrative Record for this site contains a variety of technical information considered or relied upon by EPA in selecting the remedy for the site, including a survey of technical literature related to the cleanup of contaminants from groundwater. The information surveyed included both PCBs and other, similar types of contaminants. See Administrative Record Doc. #0594-00211 for a key appraisal of the status of cleanup options for dense non-aqueous phase liquids. EPA believes that the scientific information included in the Administrative Record provides an adequate basis for the remedy selected at this site. EPA encourages members of the public to contact the Remedial Project Manager if they want to learn more about the general technical background of cleanup of PCBs and other, similar contaminants. See also the response to Comment #19, below.

19. Does the EPA have any previous experience with the cleanup of PCB? How will the Agency know how to handle the PCBs at the site?

RESPONSE: One out of five EPA Superfund sites has PCB contamination, and EPA has many years of experience both under the Superfund law and under the Toxic Substances Control Act (which has regulated PCB since 1978) dealing with the cleanup of PCB. There are only a few technologies that are proven and are currently being applied to PCB cleanups. Soil contamination is most reliably treated by incineration, but there are a few innovative technologies that are now being applied to soils. These innovative technologies either detoxify the PCB chemically or rinse PCB out of excavated soils. The Toxic Substance Control Act requires that if such innovative technologies are to be used, they must achieve the same level of treatment as incineration. Problems with handling materials and with achieving treatment performance equivalent to incineration have been factors considered when choosing between these less proven technologies and other, more proven technologies. Additionally, there are stabilization technologies in which contaminated soils are mixed with cement-like materials that immobilize the contaminants. This technology is favored for sites where there are large amounts of soil with relatively low levels of PCB contamination or where metals in the soil prevent incineration. Long-term performance of the stabilization technologies cannot be evaluated yet because they have only been recently applied. For groundwater, the only technology available at this point is extraction and treatment. Treatment technologies for extracted groundwater include ultraviolet/chemical-oxidation and various membrane filtration techniques, both of which will be employed in the Westinghouse remedy design.

In the remedy selection process, the Proposed Plan was reviewed by the EPA Air and Water Divisions and the Toxics Substances Control group (which works most frequently with PCB). Additionally, the Proposed Plan underwent rigorous peer review within the Superfund program itself. The input obtained from these various internal reviews is included in the Administrative Record. This input, which represents a wide range of comments from many technically gifted people, has been relied upon in selecting the remedy for this site.

20. EPA should spend more money on research and development, perhaps five to ten percent of its budget. This would promote more informed decisionmaking at sites.

RESPONSE: The cleanup of dense, nonaqueous phase liquids ("DNAPLs"), such as PCB, is among the top priorities of the Agency's current research efforts. EPA is supporting a long-term research effort by the Robert S. Kerr Environmental Research Laboratory ("RSKERL") in Ada, Oklahoma to evaluate innovative technologies that will be effective in removing PCB and other, similar contaminants from the subsurface. EPA is also supporting a National Research Council study that will assess the current opinions and experiences with groundwater remediation and look at alternatives for addressing this type of contamination. Also, EPA is conducting or overseeing the design and construction of many groundwater remediation systems throughout the county under the Superfund program. Monitoring and assessment of these actual systems will provide a wealth of useful information to EPA's ongoing research and development program. There are many conflicting demands placed upon the Agency's limited budget, and EPA is working constantly to achieve the correct balance between research and other priorities.

21. EPA should implement Alternative D2 with no waiver.

RESPONSE: The reason for including the ARAR waiver is elaborated in response to General Comment #1, in Part I, above. The only other difference between EPA's preferred Alternative C2 and the cleanup suggested by this commenter is that Alternative C involves excavation of PCB-contaminated soil to depths of eight feet and Alternative D2 called for excavation of soil to depths of 32 feet. EPA does not believe that treatment of soils below depths of eight feet is appropriate because it would not result in an appreciable reduction in the risk represented by the site, given the ARAR waiver and the concommitant continued existence of PCBs in the onsite area of the shallow aquifer underlying the PCB-contaminated soil.

22. Westinghouse should cleanup all soil and groundwater contaminated with PCBS, solvents and fuel compounds originating from its site.

RESPONSE: As described above in response to Comment #2.d, above, in this Part II, the remedy includes the cleanup of solvents and fuel compounds to specified levels. The PCBs will be cleaned up to specified levels, except that PCBs will be left at higher levels in the groundwater in the area for which an ARAR waiver has been granted, and contaminated soil will be left onsite at depths below eight feet. The reasons for invoking the waiver and for leaving the contaminated soil in place are more fully elaborated in the ROD, as well as in response to General Comments #1 and #3, above, in Part I.

23. Thorough testing of the earth, water and air in the affected area must begin immediately. A regular schedule of testing (including all areas of the Westinghouse site) must be implemented. The frequency of testing must be based on the determined rate at which various toxins are spreading. The safety of the site and neighborhood must not be endangered by the testing procedures.

RESPONSE: EPA has collected data sufficient to form the basis for its remedy selection decision at this site. Regular quarterly groundwater monitoring is ongoing. Further groundwater monitoring and soil testing will be included in the remedial action, sufficient to ensure that the remedial performance standards selected in the ROD are met, and that the cleanup plan is proceeding in an acceptable timeframe. This sampling and monitoring is done in accordance with health and safety procedures approved by EPA to ensure the safety of onsite workers as well as persons located offsite. It is not necessary to test all areas of the Westinghouse site because the testing done to date has already resulted in the gathering of sufficient data to enable the remedial effort to be focused on the areas of known contamination. It should be noted that soil contamination is not changing with time, therefore routine periodic testing for changing conditions is only warranted for groundwater.

24. Westinghouse should install monitoring wells as necessary to determine the extent of groundwater contamination. This will likely require wells beyond the actual plant site.

RESPONSE: EPA agrees that the system of monitoring wells will need to be expanded. This will occur during the next phases of site activity. There are already several offsite wells in place and more are anticipated. Who will perform such monitoring will be determined through the enforcement process, and is not relevant to the issue of remedy selection.

25. Westinghouse should be required to make public the result of its health studies of employees exposed to hazardous materials. What effect has the spill had on Westinghouse's employees?

RESPONSE: The California Department of Health Services, ("CDHS"), under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry ("ATSDR"), is performing a public health assessment to evaluate data and information about the effects of the release at the Westinghouse site on public health. CDHS has requested from Westinghouse the results of any health studies performed by Westinghouse relevant to the site. Westinghouse has provided some information about health evaluations it performed, stating that no PCBs were detected in the blood of employees who had been tested. CDHS is requesting further information from Westinghouse. See references to correspondence in response to General Comment #13 in Part 1, above. See also the response to General Comment #13 in Part I, above, for a further explanation of the role of these health agencies and information on how to contact them. EPA does not believe that the results of health studies are necessary to make an informed decision regarding remedy selection at this site. The health studies in question relate to the possibility of past worker exposures. Workers no longer use PCB in the manufacturing processes at the site. The remedy is concerned with preventing potential onsite exposure to the PCB-contaminated soils and groundwater.

26. Westinghouse has not informed its employees of the PCB problem. Westinghouse's priority is profits and not the health and safety of its employees or the neighborhood residents. Westinghouse in the process of severely cutting back on its employees' health benefits. This commenter also submitted: (a) a copy of an article regarding a lawsuit between Westinghouse employees and the company regarding exposure of workers to PCBs at another Superfund site in Indiana; (b) copies of an article and an add showing that Westinghouse is involved in the cleanup, for profit, of hazardous waste spills, including those involving PCBs; and (c) a petition signed by approximately sixty Westinghouse employees requesting that the groundwater waiver not be granted. These documents are included in the Administrative Record.

RESPONSE: For EPA's response to the comments that the waiver should not be granted, see the response to General Comments #1 and #3, in Part I, above. The fact that Westinghouse is involved in the cleanup of PCBs for profit does not change the technical basis on which EPA bases its decision to invoke the waiver. The federal Agency for Toxic Substances and Disease Registry and the California Department of Health Services are conducting a health assessment for the site. Onsite workers are included in the population considered. This comment has been passed on to these agencies. See also the responses to General Comment # 13 in Part I, above and Comment #25 in this Part II.

27. Westinghouse should "buy out" property owners near the site or otherwise be financially responsible to such property owners.

RESPONSE: Because of the extremely limited extent of offsite contamination, EPA does not believe any such measures are necessary to the selection of a remedy that protects public health and the environment.

28. Why did EPA not include a map showing the relationship between the plume and the offsite neighborhood area in the June 1991 proposed plan fact sheet?

RESPONSE: The B aquifer plume has only recently encroached on the neighborhood area. Its limited migration into this area does not increase risk for the neighborhood in any way unless supply wells are installed into the plume and people drink this groundwater. The calculated carcinogenic risk from ingesting this groundwater would be approximately 10^{-5}, which is within the EPA's acceptable risk range for Superfund cleanups. Furthermore, well construction in this area is not likely to occur. See the response to Comment #4, above, in this Part II for more information on well construction. Maps showing the extent of offsite contamination are provided in the Westinghouse RI/FS Report (Administrative Record Document #0594-00214) which is in the Sunnyvale repository for site information at the Sunnyvale Public Library. Plume Maps were not included in the fact sheet that was sent to the neighborhood because of limited space (there are about six maps) and the need to keep the level of technical detail at an understandable level. The map on the front of the fact sheet should have showed that the study area extended slightly off the Westinghouse property. The fact that it did not was an oversight.

29. How far does the plume of contaminated groundwater extend?

RESPONSE: See the response to Comment #2.a, above, in this Part II.

30. What is the source of the VOCs detected in the shallow groundwater under the Westinghouse property?

RESPONSE: The source has not been identified. However, the VOC contamination in groundwater will be addressed by the extraction and treatment system.

31. If the soil is removed to a depth of only eight feet, what prevents rain from washing PCB from the remaining contaminated soil into the groundwater?

RESPONSE: An asphalt cap will effectively prevent rainwater infiltration from mobilizing soil contamination.

32. Is asphalt a safe "cap" to prevent any type of exposure to these chemicals?

RESPONSE: Eight feet of clean fill and the asphalt cap will effectively prevent exposure to PCB at the surface and in the subsurface. Subsurface activities will be prohibited below eight feet and restricted above eight feet. Additionally, the risk analysis shows that occasional work in the soils below eight feet is associated with a 10^{-5} risk, which is within EPA's acceptable risk range. Despite this low risk from occasional exposure, EPA believes that these soils should not be disturbed due to their relatively high concentrations of PCB, and activities below eight feet will not be allowed under the required land use restrictions.

33. Has anyone considered how being exposed to this combination of chemicals, even in small amounts, might greatly increase the health risks.

RESPONSE: The risk assessment considers the cumulative risk represented by exposure to all of the contaminants of concern, and, even considering these cumulative risks, the cleanup results in exposure levels within the range considered acceptable for Superfund sites. 40 C.F.R. § 300.430(e)(2)(i)(A)(2). Furthermore, EPA considers this cumulative risk assessment to overstate the actual risk represented by the site (after cleanup) because the site conditions are such that it is highly unlikely that this type of cumulative exposure to both soil and groundwater contaminants would occur.

34. The Brown and Caldwell report in June 1981 states that the PCBs could travel in the groundwater. Was any containment action taken? If not, why?

RESPONSE: EPA has always known that PCB can migrate in groundwater. Modeling predicted that PCB transport would be much slower than has actually occurred at the Westinghouse site. Even so, it has still moved very slowly, only 350 feet in fifty years. Both EPA and the RWQCB have felt that more information on the extent of the plume was necessary before attempting containment. EPA is now selecting a remedy that will effectively contain and cleanup the aqueous phase contaminant plume in the affected aquifers.

35. The EPA information mailed to the neighborhood mentions a remaining fuel tank that is not in use. Will it be removed? Where on the site is it?

RESPONSE: The location of this tank is shown on the majority of the maps that are found in the RI/FS Report in the Sunnyvale Library (See Administrative Record Document #0594-00214). It is about fifty feet southeast of Reservoir 2. This tank will be removed under the Underground Storage Tank Program.

36. While EPA's representatives have stated that the Agency is focusing on the Superfund cleanup, residents should know which

toxins are being used at the Westinghouse plant today. This information is difficult for a member of the public to obtain. What chemicals currently are used and stored on the Westinghouse property? What is delivered by train to and from Westinghouse?

RESPONSE: EPA does not maintain a list of all chemicals used and stored at Westinghouse's facility, or all materials delivered to it by train. There are three potential sources of information to which EPA's Superfund program can direct this commenter. The first is the Santa Clara Valley County Health Department's Hazardous Materials Program. This Program can be reached at 2220 Moor Park Avenue, San Jose, California 95128. This agency maintains information regarding chemical use by facilities, which are required to submit to them specific information regarding such use, pursuant to the Emergency Planning and Right to Know Act, 42 U.S.C. § 11001 et seq. The commenter might also contact the Sunnyvale Fire Department, which maintains a Hazardous Materials Management Plan. Finally, it is EPA's understanding that companies such as Westinghouse are also required to report certain information about hazardous materials use to the City. Any member of the public can contact these entities directly to find out how to obtain information from them.

37. Some of the homeowners in Victory Village have owned homes for more than ten years. Why are these people just now hearing about the Superfund site at Westinghouse?

RESPONSE: Fact sheets have been mailed or hand-delivered to Westinghouse neighbors and City Officials on three different occasions (December 1988, December 1990, and June 1991). Articles regarding the Westinghouse site have appeared in local newspapers during these years, as well. Westinghouse was listed as a Superfund site in 1986. EPA cannot, of course, determine why any specific individual did not hear about this site from these sources.

38. How often does the EPA or the City of Sunnyvale check the extraction wells in the area of Dwight and Cedar for contamination? How about the same wells at the end of Hendy Avenue and Kifer Road?

RESPONSE: Westinghouse conducts a quarterly monitoring program and reports the results to EPA. The wells that the commenter refers to here are probably included in the monitoring program, but without better identification it cannot be confirmed. Site wells that are routinely monitored in the areas referred to include wells W61, W31, W60, W59, W58, W57, W30, and CCG-2.

39. What is the purpose of the designated "fire protection reservoir" on the Westinghouse property when there are so many fire hydrants along Hendy and California Avenues?

RESPONSE: The Westinghouse property consists of 75 acres of older wooden buildings. In the event of a fire, city water supplies could be seriously stressed without adequate backup. This reservoir is for fire protection purposes.

40. Does the City of Sunnyvale have any disaster contingency plans regarding Westinghouse? Is there a way for residents to be involved in and informed about this planning?

RESPONSE: Yes, the City of Sunnyvale has disaster contingency plans regarding the Westinghouse facility. Residents should contact the City to learn how to be involved in and informed about this planning.

41. Do contractors, real estate agents or the City of Sunnyvale have any legal responsibility for building on sites like this that are contaminated or are known to be contaminated?

RESPONSE: Restrictions of this nature would be a matter of state or local law. As it would not be appropriate for EPA to issue an advisory legal opinion on this matter, people who wish to receive a legal opinion on this type of matter should contact a private attorney. EPA does note that test results showing that the contamination had spread off of Westinghouse's property were not available until November of 1990, and that this data came from wells that showed no detections prior to that time. Given the very slow rates of migration that are being observed at this site, it is unlikely that the plume has extended more than a few feet into the Victory Village neighborhood. Monitoring wells will be installed to confirm this supposition. EPA notes that this question is not relevant to the remedy selection issue.

COMMENTS FROM THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

The Regional Water Quality Control Board ("RWQCB") stated that it concurs in EPA's proposed selection of Alternative C2 as the cleanup plan. RWQCB also submitted four specific comments which are summarized and responded to here.

1. While agreeing with EPA's technical decision to allow PCBs to remain above drinking water standards, the RWQCB is concerned about the permanent loss of a potential drinking water source. The comment states that "to maintain compliance with State Board Resolution No. 68-16 on nondegradation, staff also believes that the Proposed Plan should be modified to require full restoration of the potential drinking water source, if a new technology is developed that can meet the cleanup standard for PCB."

RESPONSE: See the response to General Comment #3 in Part I, above, regarding advances in technology. Also, EPA disagrees with the RWQCB staff's opinion that State Board Resolution No. 68-16 would require EPA to adopt as a remedy at the site any new technology that is developed which could meet the cleanup standard for PCB.

Resolution 68-16 states that high quality water will be maintained until it has been demonstrated that a change "will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies." Without further information on the environmental, human health and other impacts, as well as costs, of a new technology, the "reasonableness" of any change cannot be judged. Furthermore, the issue of what ARARs would apply to a different remedy, what the ARARs require in the context of a new remedy, how they would be complied with and whether any ARARs should be waived would only arise in the context of a decision by EPA to reopen the remedy selection process for this site.

2. Specific compliance points should be set to determine the limits of the area in which EPA will allow PCB levels to exceed drinking water standards, and EPA should provide an opportunity for interested persons and agencies to comment on the selected compliance points before the ROD is approved.

RESPONSE: In selecting a remedy, EPA is not required to specify this type of design detail prior to the design stage. EPA's current intentions with respect to the compliance points is that they will be set at the perimeter of the source area, as described in Part II, Section 6.2.2.2 of the ROD. However, these points may be adjusted, based upon information developed during remedial design. The standard for whether or not public comment must be held if the compliance points are changed is whether or not the change fundamentally alters the selected remedy with respect to scope, performance or operation. 40 C.F.R. § 300.435(c)(2)(ii). EPA has discussed its determinations regarding the appropriate compliance points with the RWQCB as of the preparation of these responses, and the Board has expressed concurrence with the points selected.

3. Groundwater extraction should begin as soon as possible. The RWQCB recommends that EPA and Westinghouse commit to a plan and a schedule for implementing groundwater extraction as soon as possible.

RESPONSE: The observed rate of contaminant migration in groundwater is very slow. EPA does not believe that the risk to receptors increases measurably over the next few years. EPA also does not believe that the situation in any way constitutes an emergency. However, EPA believes it is important to begin groundwater extraction as soon as practicable. See also, the response to Comment #6 from the Santa Clara Valley Water District, below.

4. Westinghouse will be extracting the polluted groundwater for many years to come. Thus, options besides discharge to surface waters should be evaluated. If treated extracted groundwater is to be discharged to the San Francisco Bay as part of the remedy, than

Title X of the California Constitution would be an ARAR for the site. Resolution No. 88-160 requires dischargers of treated extracted groundwater to consider initially the feasibility of reclamation, reuse or discharge to a publicly owned treatment works ("POTW"). Based on the initial feasibility study, it appears that the options of reinjection or industrial use are the most promising. Further investigation of these two options should be carried out prior to any commencement of the discharge of the treated, extracted groundwater to surface waters.

RESPONSE: The ROD provides for an evaluation of whether an alternative 'end use' for the treated effluent (other than discharge to surface water), can be practicably implemented.

COMMENTS FROM THE SANTA CLARA VALLEY WATER DISTRICT

The Santa Clara Valley Water District stated that it is in general concurrence with the proposed cleanup plan with respect to both soil and groundwater, and requested that the following comments be taken into account.

1. Though the overall area of PCB and other contamination in the soils and groundwater is relatively small, we have concerns as PCBs have migrated in groundwater, both areally and vertically, to greater distances than expected. The groundwater plume distribution is complicated by leaks along a pipeline but also by the occurrence of a groundwater mound occurring beneath Reservoir 2 (water supply). As the PCB source area was located adjacent to Reservoir 2, the plume apparently spread radially from the groundwater mound. Immediate attention to the removal of this groundwater mound should be given through interim remediation as its presence would add to the complications of any remediation plan.

RESPONSE: Investigations have been proceeding during the last several months to identify the water leakage causing the mound. These efforts have not identified a leak. It is suspected that the water leak may be coming from an inaccessible underground sump below the pumphouse at the north end of the reservoir. If in fact the water leakage cannot be stopped, the design of the extraction system will have to take it into account.

2. Among the most disturbing revelations is the occurrence of a thin layer of dense nonaqueous phase liquids ("DNAPLs") atop the A-B aquitard at a depth of about 50 feet. The control of movement of DNAPLs through the groundwater environment might be more by geologic structure than by hydraulic gradient. If DNAPLs continue to migrate independently of hydraulic controls in the present downgradient direction, the plume would become enlarged and could exceed the design area of capture by proposed wells. Under such circumstances, none of the three active remediation proposals evaluated would provide containment of either the plume or the

DNAPLs. Consideration and evaluation of slurrywall or partial slurrywall should not be disregarded; otherwise, at a minimum, a detailed monitoring system that would include both the plume and DNAPLs atop the A-B aquitard should be included as a component of the active remediation alternatives. Under the monitoring plan for DNAPLs, a contingency plan must also be listed for implementation should adverse conditions develop.

RESPONSE: A monitoring program is in place and the remedy provides for expansion of current monitoring for both aqueous and non-aqueous phases of groundwater contamination. The situation described in this comment is one of many possible hypothetical examples of remedy failure. EPA believes, based on the technical information gathered for this remedy selection process and presented in the Administrative Record, that the selected remedy will work. Therefore, EPA does not believe it is appropriate to set forth in this ROD contingent measures to be undertaken if the remedy does not work. EPA is required to review the remedy every five years to assure that human health and the environment are being protected. CERCLA Section 121(c), 42 U.S.C. § 9621(c). EPA can select additional or different measures at that point, or at any time that new information causes it to determine that such action is appropriate. If EPA proposes an amendment to the ROD which fundamentally alters the basic features of the selected remedy with respect to scope performance or cost, the Agency would be required to issue a new Proposed Plan, to hold public comment on it, and to respond to all significant public comments received. 40 C.F.R. § 300.435(c)(2)(ii). EPA believes it is appropriate to deal with such hypothetical situations through the established process, if and when they become reality.

3. In the risk evaluation contained in the Feasibility Study, the possibility of contaminated groundwater migrating to deeper aquifers through unknown abandoned wells was not mentioned. This potential is real as has been noted at other case sites. One method to estimate such a risk, to the extent possible, is to conduct a detailed canvass for wells on the site area and immediately adjacent areas in the direction of the plume migration. The Scope of Work outlined in Appendix G of the Feasibility Study was not detailed and relied largely on presently registered wells and known monitoring wells furnished by the Santa Clara Valley Water District. If the well search were limited just to the listings furnished by the District, we would consider the well survey to be inadequate. Additional investigations that should be considered include, but are not limited to, surveys of old aerial photographs to target potential well sites, interviews with long-time residents of the area, interviews with well drillers, surveys of archival maps and a door-to-door canvass of the nearby residents.

RESPONSE: A detailed well canvass, including a door-to-door survey, has been conducted since the SCVWMD made this comment to the draft RI/FS Report in January 1991. The effort did not identify any previously unknown supply wells or any wells that might serve as conduits for contaminant migration to deeper aquifers.

4. We do not believe the vertical extent of the contamination is completed as the B1 aquifer had been noted to be contaminated but the aquifer below it has not been tested. This aquifer should be tested and monitored, perhaps by spotting a monitoring well downgradient of the B1 aquifer plume.

RESPONSE: EPA agrees and will require this additional effort to define vertical extent beyond the B1 aquifer. However, sufficient information exists at this time to select a remedy.

5. A monitoring plan had been submitted by EMCON Associates dated July 1990. Such a plan should be continued through remediation. Also, should DNAPL not be physically contained, it would be important to monitor their potential migration, as DNAPL might spread beyond the proposed designed hydraulic containment of the plume.

RESPONSE: The current monitoring program will be maintained and expanded during the next phase of site activities. Both aqueous and non-aqueous phases will be monitored to the extent practicable. The response to this commenter's Comment #2, above, is also relevant to the hypothetical situation described here, wherein DNAPL is not contained.

6. Remedial design should begin as soon as possible following adoption of the ROD. This proposed fast tracking would involve concurrent undertaking of the design and implementation phase with the lengthy negotiating process.

RESPONSE: EPA agrees that if negotiations for performance of the remedy take place, it would be desirable to have the remedial design and remedial action undertaken concurrently with negotiations. However, CERCLA Section 122 prohibits EPA from issuing an order for remedial action to be performed during the statutorily determined negotiation period. CERCLA Section 122(e)(2), 42 U.S.C. § 9622(e)(2). This and other factors in the enforcement context limit EPA's ability to require that actions be undertaken during the negotiating period.