

**EPA Superfund
Record of Decision:**

**HEWLETT-PACKARD (620-640 PAGE MILL ROAD)
EPA ID: CAD980884209
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PALO ALTO, CA
03/24/1995**

RECORD OF DECISION

Hewlett-Packard 640 Page Mill Road Superfund Site
Palo Alto, California

EPA ID# CAD980884209

PART I - DECLARATION

Statement of Basis and Purpose

This Record of Decision (ROD) presents the selected remedial action for the Hewlett-Packard 640 Page Mill Road Superfund site (HP-640 PMR) in Palo Alto, 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 (NCP), 40 C.F.R. Part 300, and the laws of the State of California. This decision is based on the Administrative Record for the site. The Administrative Record Index appended to this ROD identifies the documents upon which the selection of the remedial action is based.

The State of California Regional Water Quality Control Board (RWQCB) is the lead agency that has been responsible for overseeing the Remedial Investigation and Feasibility Study (RI/FS) for this site. The state has finalized its selection of a remedial action for the site in the RWQCB Site Cleanup Requirements (SCRs). With this Record of Decision, the U. S. Environmental Protection Agency (EPA) selects and concurs with the remedy chosen in the RWQCB SCRs.

Assessment of the Site

Actual or threatened releases of hazardous substances from the HP-640 PMR 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.

Description of the Remedy

Leaks from an underground waste solvent storage tank resulted in soil and groundwater contamination at the HP-640 PMR site. Interim remedial measures included excavation and off-site disposal between 1987 and 1992 of approximately 10,700 cubic yards of soil; a soil vapor extraction and treatment system beginning in April 1994; and extraction and treatment of groundwater for seven months in 1982 and again from 1987 to the present.

These interim response actions addressed the principal threats at the HP-640 PMR site, soil and groundwater contamination. The final remedy addresses threats remaining after the interim measures. The major components of the selected remedy include:

- Continued operation of the existing 15- well soil vapor extraction and treatment system at the HP-640 PMR site until final cleanup standards are achieved
- Expansion and continued operation of the current on-site and off-site groundwater extraction system to capture and treat contaminated groundwater until final cleanup standards are achieved
- Long-term groundwater monitoring
- A deed restriction for the HP-640 PMR site prohibiting the use of on-site groundwater until final cleanup standards are achieved

Statutory Determinations

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

Because this remedy will result in hazardous substances remaining on-site, a review of the remedial action will be conducted every five years after initiation of the final remedial action to ensure that the remedy continues to provide protection of human health and the environment.

Heidi A. Talc —

3-24-95

John C. Wise
Deputy Regional Administrator

Date

PART II - DECISION SUMMARY

Hewlett-Packard 640 Page Mill Road Superfund Site Palo Alto, California

A detailed analysis of the selected remedial action for the HP-640 PMR site is contained in the SCRs adopted by the RWQCB on September 21, 1994. The site information summarized below is discussed fully in the final RI/FS report. EPA's Record of Decision concurs with the state's action, and selects the remedial action alternative proposed in the RWQCB SCRs without change.

1. Site Name, Location and Description

The HP-640 PMR site is located in Palo Alto, California within the Stanford Research Park, a light-industrial and research area owned by Stanford University. Hewlett-Packard Company (HP) manufactured gallium arsenide-and silicon-based semiconductors at the property from 1962 until operations ceased in 1986. The facility consisted of two main buildings (#10 and #11) and a storage building. Both buildings have since been demolished and the site redeveloped for an office building with an underground garage.

Land use in the vicinity of the site is predominantly commercial and industrial, with smaller areas of residential development. The nearest residential areas are located approximately 1/8 mile N/E of the facility. Five municipal backup supply wells drawing from a deep aquifer are within three miles of the site, but are not currently used. All of the City of Palo Alto drinking water is supplied by the San Francisco Water Department's Hetch Hetchy System.

The HP-640 PMR site is located near the western margin of the Santa Clara Valley. The valley surface in this area is a gently sloping alluvial plain that extends northeast from the foothills to San Francisco Bay, located approximately three miles to the northeast. The area is underlain by interbedded alluvial fan deposits and fine-grained floodplain deposits.

Vegetation in the area is generally limited to landscaped areas which incorporate non-native species of grasses, trees and shrubs. Much of the area is covered by asphalt-paved roadways and parking lots, concrete sidewalks, and buildings. Animal species found in the area include small mammals and birds adapted to an urban habitat.

The only surface water in the vicinity of HP-640 PMR is Matadero Creek, located to the east of the site. Matadero Creek is an intermittent stream that originates near the Los Altos Hills and flows in a northerly direction through the residential, commercial and industrial areas of Palo Alto. The creek flows within a natural channel northward to El Camino Real where creek waters enter Matadero canal, a concrete-lined channel. Matadero Creek returns to its natural channel at the Bayshore Freeway. No endangered species have been identified in the area.

2. Site History and Enforcement Activities

Volatile organic compounds (VOCs), semivolatile organics and metals have been found in soil and groundwater at the HP-640 PMR site. Site investigation began in 1981 after a leaking 1000- gallon underground solvent storage tank was discovered between Building 11 and the storage building. Sources of metals were found in Building 10, associated with acid neutralization sumps, piping and operations areas in the building. The primary contaminants detected at the site were trichloroethene (TCE); 1,1,1-trichloroethane (1,1,1-TCA); tetrachloroethene (PCE); gallium; and arsenic.

The HP-640 PMR site was proposed to the EPA National Priorities List (NPL) in June 1988 and was added to the NPL in February 1990. Since the listing, the groundwater contamination plume emanating from the HP-640 PMR site was found to be commingled in part with groundwater contamination plumes associated with other potential sources beyond the

HP-640 PMR facility boundaries. This ROD addresses soil and groundwater contamination found at HP-640 PMR as well as the area-wide commingled groundwater contamination.

Pursuant to the South Bay Multi-Site Cooperative Agreement and the South Bay Groundwater Contamination Enforcement Agreement entered into by the RWQCB, EPA and the California Department of Toxic Substances Control (DTSC) (formerly the California Department of Health Services (DHS)), the RWQCB has been acting as lead regulatory agency for the site.

The RI/FS report was prepared jointly for the HP-640 PMR site, an adjacent Varian Associates (Varian) facility at 601 California Street and an HP facility at 395 Page Mill Road. The groundwater portion of the RI/FS includes the area that has been designated the California-Olive-Emerson (COE) Study Area. It is bounded by California Avenue to the west, Olive Avenue to the east and Emerson Street to the north. An adjacent area has been designated the Perimeter Area, which extends from Olive Avenue beyond Matadero Creek to the east (see Figure 1), and represents the limits of the known groundwater contamination plume. It borders another Varian facility located at 611 Hansen Way. The HP 395 Page Mill Road site and the Varian 601 California Street site are regulated under the same RWQCB SCRs as the HP-640 PMR site; the Varian 611 Hansen Way facility is regulated by DTSC.

Interim remedial measures (IRMs) have been conducted since 1982. Soil excavations at the HP-640 PMR site between 1987 and 1992 removed approximately 7700 cubic yards of contaminated soil to Class I landfills and approximately 3000 cubic yards to Class III landfills. Additional areas of the site were also excavated to remove above-background concentrations of arsenic, gallium and several other metals. Residual concentrations of VOCs at the HP-640 PMR site are being addressed by a 15-well soil vapor extraction system that went on-line in April 1994. Groundwater remediation at HP-640 PMR was initiated in 1982 for seven months; extraction was restarted in 1987 and has continued to the present.

3. Highlights of Community Participation

Since 1989, five fact sheets have been released describing activities at the HP-640 PMR site. The Barron Park Association Foundation, an active community group in the area, has a Technical Assistance Grant from EPA to assist the community in reviewing technical documents regarding the investigation and cleanup of the site. In July 1994 the RWQCB released a Proposed Plan fact sheet for the site that described the proposed remedy for the site. Site documents were made available at the lead agency office and a local repository, and a public notice was published allowing 30 days for public comment on the RI/FS and Proposed Plan. A public meeting was held on July 26, 1994 to describe the proposed remedy and receive comments. Responses to comments are found in the Responsiveness Summary appended to this Record of Decision. The decision for this site is based upon the Administrative Record prepared for the site and maintained at the lead agency office.

4. Scope and Role of Remedial Actions

The remedial actions selected in this Record of Decision will be the final response actions performed at the HP-640 PMR site. As described earlier, significant IRMs were performed at the site in the past. These actions addressed the principal threats at the site. The selected remedy addresses the contaminants remaining in soils and groundwater at the site.

5. Site Characteristics

The COE and Perimeter Areas are underlain by two primary aquifers, the upper A Aquifer and the lower B Aquifer. Each of these two aquifers contains distinct sand zones. The A Aquifer extends up to 55 feet below ground surface, and groundwater is first encountered at depths between 15 and 30 feet. Within the A Aquifer, the A1 Upper (A1U) Zone is generally found between depths of 15 and 30 feet, the A1 Zone between 30 and 40 feet, and the A2 Zone between 40 and 55 feet. The fine-grained aquitards separating the three zones range from one to 22 feet in thickness and allow varying degrees of hydraulic

communication. The aquitard between the A1 and A2 Zones is generally not present west of Page Mill Road and beneath the 601 California site.

The aquitard between the A and B Aquifers is approximately 12 to 23 feet thick and is composed of gray silts and clays with fine sand. Within this aquitard are localized sandy lenses that range between 0.5 and 2 feet in thickness. These lenses are referred to as the A2 Deep (A2D) Zone.

Within the B Aquifer, the B1 Zone occurs below an approximate depth of 60 feet below ground surface. This zone is typically about 10 feet thick. Where encountered, the B2 Zone begins at approximately 85 feet below the surface and is between six and 33 feet thick.

The general groundwater gradient in the A Aquifer is to the north-northeast. Groundwater flow directions are influenced locally by the preferential flow through relatively thick, transmissive aquifer sands. In the A1 Zone at certain locations, groundwater and chemicals have been deflected toward the east along preferential flow paths. This easterly deflection of chemicals is not evident in the A1U and A2 Zones.

The Oregon Expressway Underpass (OEU) serves as a subsurface roadway beneath the Southern Pacific Railroad tracks, Alma Street and Park Boulevard. The underpass, built in 1958, extends 24 feet below ground surface into the A1U Zone. A dewatering system installed beneath the underpass controls natural groundwater inflow and surface runoff. This dewatering appears to affect groundwater flow in the A1U, A1 and A2 Zones, and does not allow contaminants to bypass the subdrain to the north.

During low flow periods, the average rate of discharge is typically 140 gallons per minute (gpm), with total VOC concentrations ranging between 200 and 300 parts per billion (ppb). This water is discharged to the City of Palo Alto sanitary sewer. The discharge during high flow periods consists of both surface water and groundwater; excess is pumped via auxiliary pumps and discharged to the City of Palo Alto storm drain system.

Groundwater monitoring has been conducted at the HP-640 PMR site since 1981, and investigation of the off-site area began in 1985 near the HP-640 PMR site. The present groundwater monitoring network on the HP-640 PMR site consists of 28 wells. In addition, there are 10 on-site groundwater monitoring wells at the 601 California site, 18 on-site monitoring wells at the 395 Page Mill Road site, and 91 off-site monitoring wells installed by HP and Varian.

VOCs are most widely distributed in the A1U and A1 Zones. Maximum concentrations are 17,000 ppb TCE; 30,000 ppb 1,1,1-TCA; 2200 ppb DCE; and 39,000 ppb PCE. The A1U is unsaturated over much of its western half due to a lengthy drought. Contamination in the B-Aquifer is minimal -- VOCs have been detected at concentrations below cleanup levels in the COE Area and above cleanup levels at one location in the Perimeter Area that appears to be associated with a separate source.

The current groundwater extraction system includes one well at the HP-640 PMR site and three wells at the Varian 601 California site. Off-site groundwater extraction was initiated in 1988 on the adjacent Mayfield school property with the installation of two A1U wells. These two extraction wells were inoperable for three years beginning in mid-1991 because the shallow aquifer zone had become unsaturated in this area; they resumed operation in spring 1994 after water levels rose.

The treatment system for the HP-640 PMR on-site wells and six off-site wells is located on the HP-640 PMR site. In late 1992 and early 1993, nine groundwater extraction wells and associated observation wells were installed as part of the expanded interim remedial system. Regional groundwater extraction and treatment in the COE and Perimeter Areas and at the Varian 611 Hansen Way site will be coordinated when additional extraction wells, to be located at 611 Hansen Way, come on-line. Treated groundwater from the HP-640 PMR site treatment system is discharged to the sanitary sewer according to the sewer discharge permit issued by the Palo Alto Regional Water Quality Control Plant (PARWQCP).

In addition to the groundwater extraction system, a 15-well soil vapor extraction (SVE) system was installed at the HP-640 PMR site and became operational in April 1994. The SVE system is operating under a BAAQMD permit, and is being monitored in accordance with permit conditions.

6. Summary of Site Risks

EPA prepared the Baseline Public Health Evaluation (BPHE) for the HP-640 PMR site. Since all areas of soil contamination had been or were in the process of being remediated, the BPHE addressed groundwater contamination only. Because the plume is commingled, the report addressed known groundwater contamination from other potential sources in the area as well as from the HP-640 PMR site.

Risks were calculated for both an average exposure case and a reasonable maximum exposure (RME) case for each of three areas, the A-Aquifer (On-Site), B-Aquifer (On-Site) and Perimeter Area (Off-Site). Four potential exposure scenarios were developed for groundwater contamination pathways: Current On-Site Worker; Current Off-Site Resident; Future On-Site Resident; and Future Off-Site Resident. Because there presently is no residential use of groundwater in the area, the current potential exposure pathways are limited to inhalation of indoor air and not ingestion, dermal contact or inhalation while showering. All four exposure pathways were evaluated for future use.

No carcinogenic risks above the 10^{-4} to 10^{-6} risk range nor non-carcinogenic Hazard Index (HI) greater than 1 were estimated for the B-Aquifer under any scenario. Table 1 lists the carcinogenic risks above the 10^{-4} to 10^{-6} risk range and non-carcinogenic HI numbers greater than 1 in the A-Aquifer and Perimeter Area that were calculated for the indicated pathways.

The findings of the BPHE suggest that potential human health risks could result under some land use and exposure scenarios. If no further remediation took place, if the site was converted to residential use, and if the groundwater was used for domestic purposes, several exposure pathways of concern might exist that could pose carcinogenic and/or non-carcinogenic human health risks. The most significant potential exposures identified in the BPHE are the following:

- 1) Ingestion of groundwater containing chemicals of potential concern
- 2) Inhalation of VOC vapors from the groundwater during showering and/or other domestic uses
- 3) Inhalation of VOC vapors inside buildings resulting from volatilization from groundwater

7. Summary of Remedial Alternatives

The FS identified a range of general response actions and remedial technologies for groundwater and soil in order to develop remedial alternatives for the site. A brief narrative summary of the alternatives is presented below; each alternative is described in detail in the FS report.

Soil Remedial Alternatives:

Soil excavation options were eliminated during the FS screening process based on implementability. Further excavation is not implementable because of the new building construction that has already occurred as part of the site development. Thus, only two remedial alternatives were developed and evaluated for contaminated soils at the HP-640 PMR site:

Alternative 1: No further action

Alternative 2: Continued operation of the existing soil vapor extraction system and treatment by granular activated carbon (GAC)

IRMs have already been implemented at the HP-640 PMR site that have removed a major portion of the VOCs in vadose zone soils. However, concentrations of VOCs remain in soil at the site that do not meet remedial action objectives. The soil cleanup standard for VOCs at the site is 1.0 mg/kg total VOCs, excluding acetone. The cleanup standard proposed for acetone in vadose zone soils is 25 mg/kg. This number was derived using a chemical transport model that is described in detail in Attachment A-1 to the FS. The total amount of soil requiring remediation is estimated at 4500 cubic yards. The total amount of VOCs remaining in vadose zone soil is estimated at approximately 1300 pounds, with acetone as the major constituent.

Alternative 1 represents current conditions at the site if operation of the IRM system was discontinued. Alternative 2 would continue the existing in situ remediation of VOCs in soil by vapor extraction. Extracted vapors are treated by vapor-phase GAC to control air emissions. It is estimated that this alternative will require approximately three years to achieve a 1 mg/kg total VOCs cleanup level (excluding acetone) and to achieve a 25 mg/kg acetone cleanup level.

Potential ARARs for the HP-640 PMR site are discussed in detail in the FS report and are summarized in this ROD for the soil and groundwater alternatives.

There are no chemical-specific ARARs for soil. In the absence of ARARs, non-promulgated standards, criteria, guidance and advisories must be used to provide a protective remedy. In the Ground Water Basin Plan Amendments, adopted October 21, 1992, the RWQCB states that "at this time the Regional Water Board finds that [1 mg/kg] is an appropriate cleanup level for total VOCs in the unsaturated zone at sites where ground water is being monitored and where cleanup to background is unreasonable." EPA has selected the RWQCB soil cleanup level of 1 mg/kg for total VOCs in RODs for many South Bay Superfund sites and agrees that this cleanup level is appropriate for the HP-640 PMR site.

Action-specific ARARs and TBCs for the soil remedial alternatives include the following:

Bay Area Air Quality Management District (BAAQMD) Regulation 8, Rule 47: This rule applies to specified discharges of organic compounds to the atmosphere through soil vapor extraction operations during removal of organic compounds from soil.

EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9355.0-28 (June 15, 1989): This memorandum establishes guidance on the methods and implementation procedures for control of VOC air emissions from air strippers and soil vapor extraction systems used at Superfund sites.

Groundwater Remedial Alternatives:

Three remedial alternatives were developed and evaluated for contaminated groundwater:

Alternative 1: No further action; continued operation of the existing IRM extraction and treatment system; continued groundwater monitoring

Alternative 2: Continued operation of existing IRM extraction wells, plus construction and operation of new wells added primarily at the boundaries of the groundwater contamination plume; continued groundwater monitoring

Alternative 3: Continued operation of existing IRM extraction wells, construction and operation of the wells described in Alternative 2, and construction and operation of new wells located in selected areas of elevated chemical concentrations; continued groundwater monitoring

All three groundwater alternatives are based on continued operation of the existing IRM wells and the OEU dewatering system as part of the remedy. All alternatives employ similar treatment and disposal methods and include continued groundwater monitoring and deed restrictions to limit future use of groundwater. Therefore, the only significant differences between the alternatives are in the number and placement of wells.

All of the final alternatives involve treatment of extracted groundwater by air stripping followed by granular activated carbon (GAC). Separate treatment systems for the area-wide groundwater contamination plume will be located at the facilities at 640 Page Mill Road, 601 California Avenue, 395 Page Mill Road and 611 Hansen Way. Options for the disposal of treated groundwater are: reuse for irrigation and non-potable consumption; discharge to the local sanitary sewer; and discharge via NPDES permit to surface water. Reuse of treated groundwater is preferred over discharge to the POTW or the storm drain, in accordance with city and state preferences for reuse of treated groundwater.

Alternative 1 represents a no further action rather than a no-action alternative. As stated in the NCP (40 CFR 300.430(e)(6), "the no-action alternative may be no further action if some removal or remedial action has already occurred at the site." In the case of the HP-640 PMR site and the associated area-wide groundwater contamination plume, groundwater extraction wells at 640 Page Mill Road, 601 California and 611 Hansen Way have been operating since 1982, 1987 and 1991, respectively. In addition, the OEU subdrain has been operated by the Santa Clara County Transportation Agency since 1958 and is expected to operate continuously as long as the underpass exists. The effect of its groundwater extraction can be considered a permanent impact in the area and a unique circumstance with respect to developing alternatives. The operation of the OEU subdrain and the existing IRM wells represents more realistic baseline conditions in this area. The RWQCB SCRs require that HP and Varian submit a workplan and time schedule for alternate control and remediation of groundwater if the present OEU remediation system is rendered ineffective in remediating or preventing the spread of groundwater contamination.

Chemical-specific ARARs for the groundwater alternatives are federal and state Maximum Contaminant Levels (MCLs), excluding acetone. Since there is no state or federal MCL for acetone, the cleanup level is derived from the EPA Health Effects Assessment Summary Tables (HEAST, 1992).

Action-specific ARARs for the groundwater alternatives include OSWER Directive 9355.0-28 described under the soil alternatives. Hazardous waste regulations relating to the disposal of treatment residuals that are classified as hazardous waste (e.g., spent activated carbon) are ARARs for both soil and groundwater alternatives.

Location-specific ARARs would apply to both soil and groundwater alternatives. Location-specific ARARs include the fault zone and flood plain requirements of 40 CFR Part 264.18 and 22 CFR Sect. 66264-18. The HP-640 PMR site is not within 200 feet of an active fault, but part of the area of groundwater contamination is location within the year floodplain of Matadero Creek. Under state and federal regulations, a hazardous waste facility located in a 100-year floodplain must be designed, constructed, operated and maintained to prevent washout of any hazardous waste by a 100-year flood, unless it can be demonstrated that certain exemptions apply. No construction is planned to be located within the 100- year floodplain of Matadero Creek except under groundwater Alternative 3.

8. Summary of Comparative Analysis of Alternatives

Each alternative was analyzed using the nine evaluation criteria required by the NCP. A detailed comparative analysis is presented in the FS report and is summarized here.

Soil Remedial Alternatives:

Because concentrations of VOCs and acetone remain in vadose zone soil at the site, the no further action alternative may not be protective of human health and the environment. Because the remaining contaminated soils are found only at depth (at least 15 feet below

ground surface) and because they are now covered by the new building, emissions of chemical vapors and dust from surface soil do not represent a current or future human health risk. However, the no further action alternative might not provide adequate protection of designated beneficial uses of groundwater (and thus might pose risks to human health and the environment) because of the potential migration of chemicals from soil to groundwater that could result in concentrations of chemicals in groundwater in excess of the cleanup standards.

Alternative 1 does not comply with soil cleanup standards for the remaining contaminated soil. It may not meet the requirement for long-term effectiveness and permanence, although cleanup standards might eventually be achieved through naturally occurring processes over a very long period of time. The no further action alternative does not involve any further physical or chemical treatment of soils, and thus does not achieve any reduction in volume. This alternative could actually result in an increase in the volume of affected soil and groundwater, as chemicals continue to migrate vertically. No significant short-term reduction in the toxicity of chemicals present in the vadose zone would occur, although toxicity might decrease over a very long period of time.

The short-term effectiveness of Alternative 1 is low because the time to reach cleanup levels through naturally occurring processes would be long with no further action. The no further action alternative is implementable and there are no capital or O&M costs associated with it. The no further action alternative is not acceptable to either the state or the community. Alternative 2 meets all nine criteria. This alternative is protective of human health and the environment because it will remove chemicals from soil and thus prevent their migration from soil to groundwater. Alternative 2 is expected to achieve the soil cleanup standards set for the site and would meet those ARARs associated with air emissions and treatment residuals from the treatment system. The potential risk due to air emissions is negligible as the system has been designed to meet BAAQMD regulations.

Because Alternative 2 is expected to achieve cleanup standards and chemicals would be removed from the vadose zone, the long-term effectiveness and permanence of this alternative is high. Because Alternative 2 includes removal and treatment of VOCs, it will result in a reduction in both toxicity and volume of contaminated soil. Treatment of vapors by GAC filters would reduce the volume of affected medium by removing VOCs from a gas stream and sorbing them to a solid. Because construction of the IRM system has already been completed, the only additional potential exposure to be considered is from continued operation of the SVE system. Short-term exposure to workers or the public is minimal and manageable by proper health and safety measures.

Alternative 2 is considered fully implementable. An SVE Pilot Study conducted in 1991 confirmed that SVE is an effective technology for removing VOCs from vadose zone soils at the site.

The capital cost for Alternative 2 is approximately \$327,000. The present-worth O&M cost is approximately \$296,000, assuming a three-year operation period.

Alternative 2 is acceptable to both the state and the community.

Groundwater Remedial Alternatives:

All three groundwater remedial alternatives would provide protection of human health by actively removing chemicals from groundwater. Under Alternative 1, a portion of the area would not be actively remediated and would likely not meet MCLs. Chemicals in this area could migrate to the north or east. Although the groundwater is not used for human consumption, an exposure pathway may exist for inhalation of VOCs in indoor air. In addition, chemicals remaining in these areas could adversely affect beneficial uses of groundwater and therefore may not be protective of the environment. Because concentrations above MCLs would remain outside the capture zone for Alternative 1, long-term effectiveness may not be achieved.

Under Alternative 1, the toxicity of chemicals would be reduced by regeneration or disposal of carbon, but would not be total because not all VOCs would be captured. Alternatives 2 and 3 will reduce the volume and mobility of chemicals by extraction.

The volume of VOCs in groundwater will gradually decrease as remediation progresses, and the mobility of the chemicals will be limited by containment within the capture zones of the extraction wells. The alternatives will reduce the toxicity of chemicals by regeneration or disposal of saturated carbon. State and federal ARARs associated with the storage, handling and regeneration of spent carbon would be met for all alternatives.

All three alternatives have or will involve installation of a treatment system and conveyance piping. None of these activities are expected to have any adverse human health or environmental impacts. Alternative 1 may require a longer cleanup time than Alternatives 2 and 3 because it has the lowest total pumping rate. Differences in cleanup times for the three remedial alternatives may be negligible, however, given the small differences in pumping rates, the limited availability of water in the aquifer system (which may limit the achievable pumping rates), and the potential for chemical concentrations to approach asymptotic levels.

Alternative 1 has already been implemented. Access could be restricted at three potential well locations under Alternative 2 and at five potential well locations under Alternative 3, but is not expected to be a significant problem. The treatment system for all three alternatives are commercially available and do not require any special modifications. This treatment technology represents a reliable technology that has been applied at numerous sites. System performance can be easily monitored and adjustments made, if necessary, to optimize system performance. Emissions of VOCs into air under all three alternatives would be controlled by vapor-phase carbon treatment. The treatment technology is not expected to result in any exposures to chemicals of concern.

The estimated present worth costs for the groundwater alternatives are:

	<u>Alternative 1</u>	<u>Alternative 2</u>	<u>Alternative 3</u>
Capital Cost	\$ 1,692,000	\$ 2,919,000	\$ 3,304,000
Total O&M Costs	4,808,000	5,072,000	6,241,000
Monitoring Costs	8,013,000	8,013,000	8,013,000
Total	\$ 14,513,000	\$ 16,004,000	\$ 17,557,000

State agencies and the community have supported Alternative 2 as the preferred groundwater remedial alternative.

9. Selected Remedy

Soil Alternative 2 and Groundwater Alternative 2 were selected for remediation of the HP-640 PMR site. The major components of the selected remedy are:

- Continued operation of the existing 15- well soil vapor extraction system at the HP-640 PMR site until final cleanup standards are achieved
- Continued operation and expansion of the current on-site and off-site groundwater extraction and treatment system until final cleanup standards are achieved
- Long-term groundwater monitoring
- A deed restriction for the HP- 640 PMR site prohibiting use of on-site groundwater for drinking water until final cleanup standards are achieved

The final cleanup standards are 1 mg/kg total VOCs and 25 mg/kg acetone for soil. For groundwater, the cleanup standards are MCLs for VOCs and semivolatiles, except for acetone, which does not have an MCL. The groundwater cleanup standards are listed in Table 1 of the RWQCB SCRs (Appendix A).

The selected remedy provides overall protection of human health and the environment, complies with ARARs, and provides the best overall balance of alternatives under the nine selection criteria of the NCP. The analysis of the selected remedy with respect to the nine criteria is summarized below:

Overall Protection of Human Health and the Environment: Constituents in groundwater are contained within a defined area and groundwater is properly treated and released, under permit. Extraction, treatment and disposal provides for the future protection of human health and the environment.

Compliance with ARARs: The selected remedy is expected to achieve the soil and groundwater cleanup levels that were set for this site. In addition, the selected remedy is expected to meet action-specific ARARs related to the treatment of chemicals extracted from soil and groundwater.

Long-term Effectiveness and Permanence: IRMs at the site have already reduced contaminant concentrations. The selected remedy will reduce potential future risks once cleanup levels are reached. The FS estimates that the time to reach groundwater MCLs is at least 30 years. Soil cleanup is estimated to take 3 years. Treatment residuals will be treated and disposed of off-site with appropriate controls in permitted facilities. A deed restriction prohibiting residential development will provide additional assurance of long-term effectiveness. Continued groundwater monitoring will ensure that further off-site migration of contaminants does not occur.

Reduction of Toxicity, Mobility or Volume through Treatment: Expanded groundwater extraction and treatment, along with soil vapor extraction and treatment, will decrease the volume and toxicity of contaminated groundwater and soil. The mobility of the chemicals in groundwater will be limited by containment within the capture zones of the extraction wells. Operation of the soil vapor extraction system will remove chemicals from soil and thus prevent their migration from soil to groundwater.

Short-Term Effectiveness: Risks of worker exposure to chemicals during system installation and operation are minimal and safety measures will be implemented to address them. No environmental impacts or health risks to the community are expected. Short-term operation of the groundwater extraction wells will contain the groundwater contamination in a defined area and result in decreased concentrations. Vapor extraction from soils will enhance removal of contaminants and prevent additional groundwater from becoming contaminated. Evaluation of the effectiveness of extraction, treatment and discharge will occur periodically in accordance with agency requirements.

Implementability: The groundwater extraction, treatment and discharge has already been implemented at 640 Page Mill Road and other sites in the area-wide groundwater contamination plume; the expansion of the system is readily implementable. The soil vapor extraction and treatment system for 640 Page Mill Road is already in place and operational.

Cost: The selected remedy is cost effective. Groundwater Alternative 2 provides greater assurance of long-term effectiveness at a reasonable cost; the additional cost of Alternative 3 was not justified.

State Acceptance: The RWQCB is the lead agency that has been responsible for overseeing the RI/FS for the HP-640 PMR site. Comments and responses on the Proposed Plan for the HP-640 PMR site are included in the attached Responsiveness Summary. After considering comments from the public, potentially responsible parties, and other state agencies, the RWQCB finalized its selection of the remedial action for the site in its final SCRs. A

copy of the RWQCB SCRs, adopted September 21, 1994, is appended. EPA selects and concurs with the remedy chosen in the RWQCB SCRs.

Community Acceptance: A public meeting was held on July 26, 1994 to discuss and receive comment on the proposed remedy for the site. Community members attending the meeting were satisfied with the selected remedy, and written comments from members of the community were also generally favorable. Public comments, along with agency responses, are included in the Responsiveness Summary.

10. Statutory Determinations

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

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

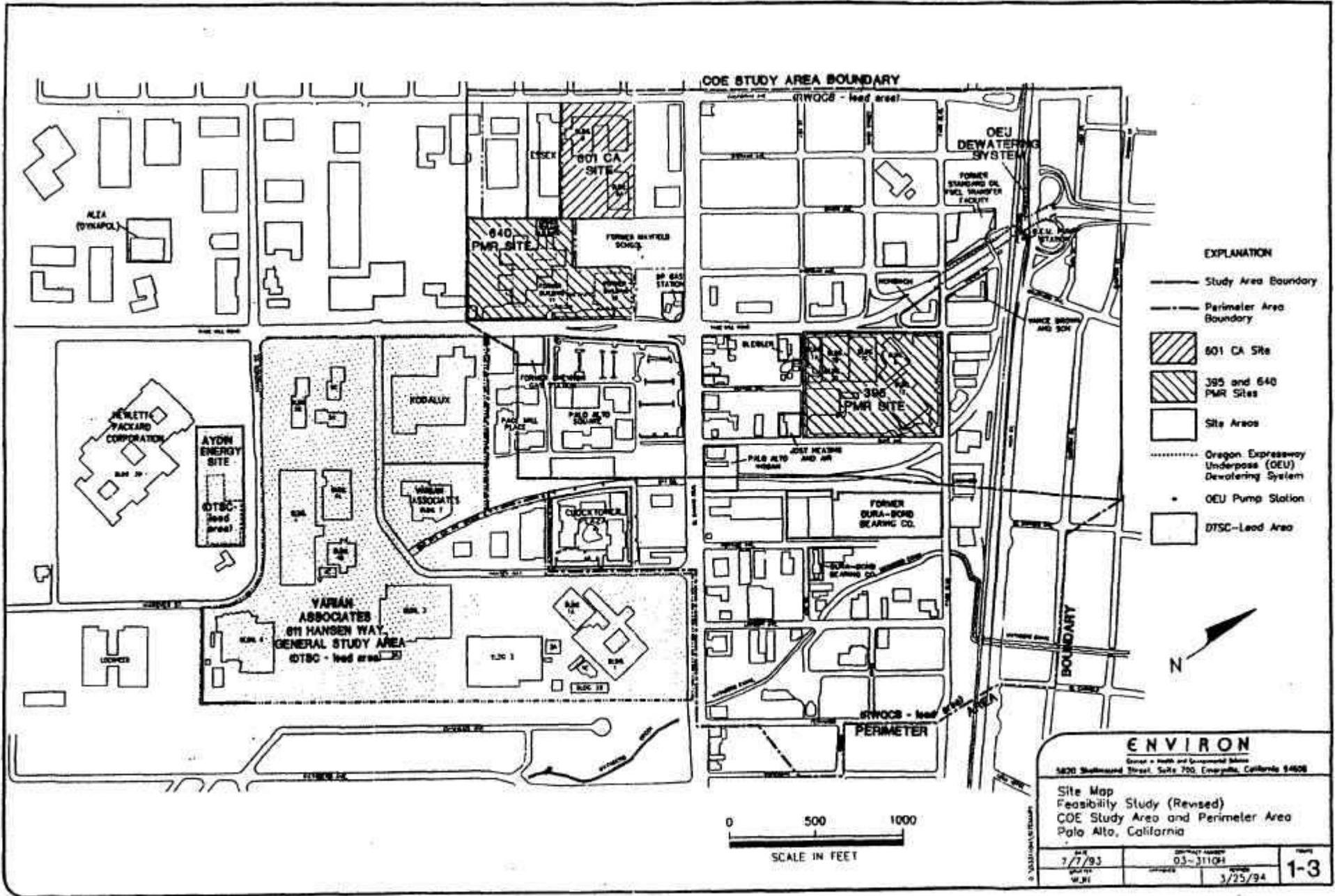


TABLE 1

Carcinogenic Risk

Groundwater Unit	Exposure Pathway	Carcinogenic Risk			
		Adult Resident (Average/RME)	/	Adult Worker (Average/RME)	
A-Aquifer	<u>Current:</u> Inhalation - Indoor Air (Study Area)	3x10 ⁻⁵	2x10 ⁻⁴	1x10 ⁻⁸	4x10 ⁻⁸
	Inhalation - Indoor Air (Hot spot)	NA	NA	1x10 ⁻⁸	3x10 ⁻⁸
	<u>Future:</u> Ingestion	2x10 ⁻⁴	1x10 ⁻³	9x10 ⁻⁵	4x10 ⁻⁴
	Inhalation - Showering	3x10 ⁻⁵	2x10 ⁻⁴	NA	NA
Perimeter Area	<u>Current:</u> Inhalation - Indoor Air (Study Area)	1x10 ⁻⁵	4x10 ⁻⁵	4x10 ⁻⁹	7x10 ⁻⁹
	Inhalation - Indoor Air (Hot spot)	NA	NA	4x10 ⁻⁹	9x10 ⁻⁹
	<u>Future:</u> Ingestion	3x10 ⁻⁵	2x10 ⁻⁴	2x10 ⁻⁵	5x10 ⁻⁵

Non-Carcinogenic Risk

A-Aquifer	<u>Current</u> Inhalation - Indoor Air (Study Area)	6	9	0.001	0.002
	<u>Future</u> Ingestion	5	10	2	4
	Inhalation - Showering	7	20	NA	NA
Perimeter Area	<u>Current</u> Inhalation - Indoor Air (Study Area)	2	2	0.0004	0.0005
	<u>Future</u> Ingestion	1	2	0.4	0.7
	Inhalation - Showering	1	2	NA	NA

PART III: RESPONSIVENESS SUMMARY

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

SAN FRANCISCO BAY REGION
2101 WEBSTER STREET, SUITE 500
OAKLAND CA 94612
510: 286-1255



Date: SEP 31 1994
File No. 2189.8063B(jmh)

Subject: Response to Comments on tentative Site Cleanup Requirements for Hewlett-Packard, 640 and 395 Page Mill Road and Varian 601 California Avenue, Palo Alto

To: Mailing list:

The Regional Water Quality Control Board, San Francisco Bay Region, has written a response to comments (responsivness summary) to interested persons attending either the community meeting held at Escondido School on July 26, 1994 or responding in writing during the 30 day comment period. The Board will consider adopting the tentative Site Cleanup Requirements for the 1501 Page Mill Road site at 8:30 on September 21 at the Bart Headquarters Building, 2nd floor Meeting room, 800 Madison Street in Oakland. Enclosed is a copy of the response to comments.

If you have any questions, please contact John Hillenbrand (510) 286-0671.

Sincerely,

A handwritten signature in cursive script, appearing to read "Stephen Morse", is written over a faint circular stamp or seal.

Stephen Morse, Chief
Toxic Cleanup Division

Attachment

cc w/attachment: Mailing List

Mailing List

Paula Kakimoto
Stanford Management Company
2770 Sand Hill Road
Menlo Park, CA 94025

Doris Maez
City of Palo Alto
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50 Hamilton Avenue
Palo Alto, CA 94301

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1029 Paradise Way
Palo Alto CA 94306

David Chalton
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Palo Alto 94306

Bob Moss
4010 Orme
Palo Alto CA 94306

**RESPONSIVENESS SUMMARY FOR 30 DAY PUBLIC COMMENT PERIOD
FROM
JULY 20, TO AUGUST 19, 1994**

**REGARDING THE PROPOSED REMEDIAL ACTION PLAN
FOR
HEWLETT- PACKARD 640 AND 395 PAGE MILL ROAD
AND
VARIAN 601 CALIFORNIA AVENUE
SUPERFUND SITE
PALO ALTO, CALIFORNIA**

EXECUTIVE SUMMARY

A 30 day public comment period was held from July 20 through August 19 and a community meeting was held on July 26. During the public comment period there were five sets of written comments and one verbal comment submitted to Board staff. Verbal comments and questions were also received from the community meeting. Most of the comments were minor and easily addressed. Out of these comments two are considered significant:

1. A community member at the public meeting expressed concern about the risk to residents who live over the contaminated groundwater in the off-site area. The concern was over the actual risk level. A risk assessment was done by a contractor for the U. S. EPA. This assessment indicated that the risk to residents over the contaminated areas is acceptable given the conservative nature of the assessment. The response provided below goes into detail about specific calculations and conditions which emphasizes that the risk is acceptable and was calculated according to conservative EPA procedures.
2. The Department of Toxic Substances Control expressed concern over the protectiveness of the 1 ppm total VOCs soil cleanup level proposed in the tentative Site Cleanup Requirements for this site. The Department suggests that a cleanup standard closer to .1 ppm for one of the chemicals, 1,1-DCE, may be more appropriate. Since cleanup at the site is 1 ppm total VOCs and 1,1-DCE is never found in soil samples above one tenth of any total VOC concentration, the cleanup level of 1 ppm total VOC concentration is protective.

Written and verbal comments received during the public comment period and verbal comments received from the community meeting are answered in detail below.

INTRODUCTION

This responsiveness summary reviews comments and questions regarding the tentative Site Cleanup Requirements, Remedial Investigation/ Feasibility Study (I/FS) and proposed final cleanup plan (proposed plan) for the Hewlett- Packard Company facilities 640 and 395 Page Mill Road, Varian 601 California Avenue facility and the off-site COE (California Avenue-Olive Avenue-Emerson Street) area in Palo Alto. The remedy is presented in the tentative Site Cleanup Requirements (SCR) and the Proposed Plan Fact Sheet. This summary includes comments received during the period from the opening of public comment at the Board meeting on July 20, 1994, through August 19, 1994.

Part I contains responses to comments from a public meeting held at Escondido School on July 26, 1994 and Part II contains the responses to written and verbal comments received from the following entities:

1. Barron Park Association Foundation
2. Santa Clara Valley Water District
3. Stanford Management Company
4. Hewlett-Packard Company
5. Varian Associates

Part I

During the community meeting on July 26, numerous questions were asked about the proposed plan and were, in general, answered during the meeting (a transcript is available from the meeting). The one remaining issue from the meeting requiring a further response is described below:

What is the current and future risk to residents in the COE off-site area?

A Baseline Public Health Evaluation was done for the U. S. EPA in September 1992. This evaluation indicated that the only current potential exposure pathway in the COE area is through the inhalation of VOCs that have migrated through the soil to indoor air.

The potential carcinogenic risks from this exposure pathway to a current adult resident range between 1×10^{-5} and 2×10^{-4} . This is just below acceptable levels (1×10^{-4}). The single chemical that contributes nearly all (96%) of the total risk is vinyl chloride which has been detected in only 5 samples from separate wells out of approximately 600 sampling events. With the large amount of conservative assumptions built into the model, Board and EPA staff believe the current risk exposure in the COE area is acceptable.

In addition, since the off-site hot spot areas (western corner of Lambert and Ash and north of the eastern corner of the HP 395 site) that contain the greatest risk are both non-residential, the complete pathway does not exist. Also, future risk is acceptable for residential use of the two hot spot areas because cleanup is currently underway which will significantly reduce the groundwater contaminant concentrations in those areas. The hot spot on the 395 property will have an additional site specific risk assessment done before any residences can be built in the area.

Part II

The following written and verbal comments were received during the 30 day public comment period:

Baron Park Association Foundation (BPAF)

No comments on the tentative Site Cleanup Requirements were received from the BPAF and therefore no changes will be made to the document. The BPAF indicated that the RI and FS were acceptable and had been approved and adopted by the BPAF Board of Directors. A few additional suggestions and comments needing clarification.

1. *BPAF Comment* BPAF's consultant suggests that chloroform in the groundwater may be from leaking water mains in the area and at the Alza site. The source of these water mains should be examined and the Alza site may require the design and operation of a groundwater remediation system.

Board Staff Response The Alza site at 1454 Page Mill Road is currently operating a groundwater extraction and remediation system under Cleanup and Abatement Order No. 88-1. The spill resulted from a chemical handling area and is not the result of a leaking water main. The chloroform in the area, other than the Alza site, does not appear to be significant when compared to other contamination and may be from lab contamination. This contamination, if present, can be reexamined as part of the five year review.

2. *BPAF Comment* Regional Board staff requested that Hewlett- Packard and Varian make the Oregon Expressway underpass dewatering system an integral part of the remediation system and guarantee its operation. No such guarantees appear to have been provided within the text of the FS.

Board Staff Response Task 29 of the tentative Site Cleanup Requirements requires within 90 days after a request made by the Executive Officer, Hewlett-Packard and Varian submit a workplan and time schedule for control and remediation of groundwater should the present dewatering system be rendered ineffective in remediating or preventing the spread of groundwater contamination.

3. *BPAF Comment* Board staff requested a deed restriction recognizing that a pump and treat system will probably not cleanup the source area completely. No recognition of the inability of a pump and treat system to cleanup groundwater in the source areas has been made in the FS. Hewlett-Packard and Varian should express such a recognition in the FS and in a subsequent review (perhaps in five years) of remediation progress.

Board Staff Response Recognition of the ineffectiveness of groundwater pump and treat technology is discussed extensively in Findings 18 and 20 of the tentative Site Cleanup Requirements. Hewlett-Packard and Varian have agreed to the substance of these findings. Board staff believes that because these findings are part of the Remedial Action Plan (composed of the RI, FS, the Proposed Plan Fact Sheet and the Site Cleanup Requirements) that the recognition Findings 18 and 20 is adequate. Also, Task 37 of the tentative Site Cleanup Requirements require a five year status report and effectiveness evaluation due on June 1, 2000.

4. *BPAF Comment* Bioremediation should be considered for site cleanup either at the normal 5 year review or sooner if advances in technology warrant it.

Board Staff Response Regional Board staff agrees with this request and reiterates that a 5 year review is scheduled for 2000. Also Task 39 of the tentative Site Cleanup Requirements states that, at any time upon the request of the Executive Officer, new technical or economic information relating to remediation must be reviewed.

5. *BPAF Comment* The BPAF should get a copy of a redline version of the RI/FS that was given to Regional Board staff to aid in its review.

Board Staff Response Although intended only for Board staff, this document was given to BPAF's consultant Uribe and Associates by Board staff to help them expedite review of the RI/FS. In addition, a redline version of the RI/FS is available as a public document in the Administrative Record at the Regional Boards Offices in Oakland. This document can be reviewed and/ or copied by any member of the public.

Santa Clara Valley Water District

The Water District is in concurrence with, and supports adoption of the tentative Site Cleanup Requirements with the understanding that additional work will be required if the five year review indicates that the selected alternative is not adequate to remediate the groundwater. No response is needed

Stanford Management Company

The comments from Stanford deal primarily with clarifications of text except for Stanford's request to have less than 10% of the Non-Binding Allocation of Responsibility.

All minor clarifications requested by Stanford to tentative Site Cleanup Requirements will be incorporated. The Non-Binding Allocation of Responsibility will not be changed. A 10% allocation is a standard allocation for property owners. To make slight adjustment to account for Stanford owning 2 out of the 3 properties would imply an accuracy that does not exist.

Hewlett-Packard Company

Hewlett-Packard submitted text comments for both companies. These comments were mostly typographic and clarification modifications and have been made. The only comment requiring a detailed response is Task 1B, the deed restriction. Task 1B had asked for Hewlett-Packard to notify current sub-tenants about locations of hazardous materials in the subsurface and the potential health hazards associated with such materials. Hewlett-Packard has notified the current sub-tenant and specified that future tenants will also be notified. Therefore, the Task will be modified to require that only future sub-tenants must be notified.

The companies requested that Task 37, the five year review of soil and groundwater remediation, be restricted to the groundwater only. This Task will not be changed because soil remediation is an important topic to be covered in this report.

Varian Associates

Like Task 1B for Hewlett-Packard, Task 9B had asked for Varian to notify current sub-tenants about locations of hazardous materials in the subsurface and the potential health hazards associated with such materials. Varian has notified the current sub-tenant in a letter dated August 12, 1994 and specified that future tenants will also be notified. Therefore, the Task will be modified to require that only future sub-tenants must be notified.

California EPA, Department of Toxic Substances Control

The Department made two verbal comments in an August 20, 1994 phone conversation with Board staff.

The first involves the reuse of the Hewlett-Packard 395 Page Mill Road site. The department expressed concern that the health risks to individuals that will reuse the site has not been addressed. Hewlett-Packard will conduct a risk assessment for the intended use of the site once the final use is determined.

The second comment concerns the protectiveness of the soil cleanup level of 1 ppm total VOCs. Department staff has indicated their concern that site specific studies should be done so that the more mobile and/or toxic substances will be prevented from degrading groundwater in on-site areas. They specifically cited 1,1-DCE as a chemical that, at some DTSC sites, requires levels as low as .16 ppm in order to be protective of groundwater.

Board staff believes that for these sites the 1 ppm total VOCs cleanup standard is appropriate because 1,1-DCE is always found to contribute less than 10% of the total VOCs in the soil samples at the Varian 601 California Avenue and Hewlett-Packard 640 and 395 Page Mill Road sites. In addition, the change in chemical composition of the groundwater through time will indicate whether there is a continuing source. The five year review, as required in Task 37 of the tentative Site Cleanup Requirements, will assess the effectiveness of the groundwater extraction and treatment system.

APPENDIX A

RWQCB SITE CLEANUP REQUIREMENTS

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER 94-130

REVISED SITE CLEANUP REQUIREMENTS FOR:

Hewlett-Packard Company
640 Page Mill Road and 395 Page Mill Road
Palo Alto
Santa Clara County

Varian Associates
601 California Avenue
Palo Alto
Santa Clara County

Stanford University
Palo Alto
Santa Clara County

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter called the Board) finds that:

1. **Site Location and Description** The sites addressed by this Order include on and off-site contamination from Hewlett-Packard 640 Page Mill Road (640 site), Varian Associates 601 California Avenue (601 site) and Hewlett-Packard 395 Page Mill Road (395 site) in Palo Alto. The 601 and 640 sites are located within Stanford Research Park. These areas are described below.

Stanford University has owned the Stanford Research Park property since 1885. The research park consists of 655 acres with approximately 60 tenants. Most of the tenants have 51-or 99-year ground leases and operate the facilities on their sites.

Hewlett-Packard Company (HP) operated the Optoelectronics Division at 620 and 640 Page Mill Road between 1964 and 1986. The 640 site was primarily used for the manufacture of gallium arsenide and silicon based semiconductors. HP, which leases the property from Stanford University, had manufacturing buildings 10 and 11 and a storage building on site. HP has redeveloped the property and constructed an office building.

Varian Associates Inc. (Varian) operated a business at 601 California Avenue between 1965 and 1991. The site was originally leased from Stanford and operated by General Electric between 1954 and 1965, and by Varian from 1966 to 1991. The buildings were sold by Varian in 1991 to Intevac. The on-site area consists of manufacturing Buildings 8 and 8A.

Hewlett-Packard Company owns and operates property and a fabrication facility at 395 Page Mill Road. The 395 site has been operated by HP since 1942 and houses various industrial operations related to the manufacture of electronic equipment. The on-site area consists of buildings 7A, 7B, 7C, 7D, 8 and 12 and former buildings 7E, 7F and 7G.

The Off-Site Area, which is composed of the California-Olive-Emerson (COE) Area and the Perimeter Area, is bounded by California Avenue, Emerson Street, Margarita Avenue and, generally, the boundary with the Varian Associates facility at 611 Hansen Way. The Off-Site Area excludes the 640, 601 and 395 on-site areas as described above (Figure 2).

2. History Site

Hewlett-Packard 640 Volatile organic compounds (VOCs), semivolatile organics, and metals were detected at this site. The source of VOCs and semivolatiles was primarily from a 1,000 gallon steel underground waste solvent storage tank located between building 11 and the storage building. Sources of metals at the site were found in building 10, and were associated with acid neutralization sumps, piping, and operations areas. All of these metal sources have been removed. The chemicals detected most frequently at the site included gallium, arsenic, trichloroethene (TCE), 1,1,1-trichloroethane (1,1,1-TCA), and tetrachloroethene (PCE).

Varian 601 The most frequently detected chemicals at this site include TCE, 1,1,1-TCA, and 1,1-dichloroethene (1,1-DCE). The sources of these chemicals come from two main areas. The first is a chemical handling area at the southern corner of Building 8. An above ground TCE tank was removed from this area in 1981. The second source was a 2-foot diameter dry well in the courtyard area of Building 8. The dry well was removed in 1990, at which time material at the bottom was found to contain 3.6 percent TCE. The Board has not determined whether the dry well was installed and used during Varian's or General Electric's occupancy of the site, nor has the Board determined the extent to which the chemicals detected in soil or groundwater at that site were released during Varian's or General Electric's occupancy.

Hewlett-Packard 395 The most frequently detected chemicals at this site include TCE, 1,1,1-TCA, 1,1-DCE, and PCE. There were several potential source areas, the most significant of which is located near the northeastern corner of the site. An extensive excavation program in 1992 and 1993 removed or addressed all soil source areas by excavation except the area near the northeast corner of the site. This area will be addressed as part of the final remediation as addressed in this Order.

Off-Site Area The most frequently detected VOCs in shallow groundwater in the Off-Site Area include TCE, 1,1,1-TCA, 1,1-DCE, and PCE. Investigations were completed in 1993 which defined the boundaries of this area. Other than the on-site areas, the largest contributor of chlorinated solvents to this Off-Site Area is the Varian 611 Hansen Way facility, which is not a part of this Order. This contributor has up to three areas of major shallow groundwater contamination that are either very close to or in the area designated as the Off-Site Area as defined in this Order. The Varian 611 Hansen Way facility is currently regulated by the California Department of Toxic Substances Control. Other sites within the Off-Site Area contribute less extensive contamination (fuel and VOCs) to the groundwater. Some potential sources in the Off-Site Area are identified in the Remedial Investigation (RI) Report.

In order for the remedial program required by this Order to be effective, all sources of contamination to groundwater that affect groundwater within the COE and Perimeter Areas must be identified and controlled. The Regional Board will utilize its authority under applicable law to require potential sources within the area, other than the Hewlett-Packard and Varian sites addressed in this Order, to be investigated and controlled by parties other than HP and Varian and to require those parties to coordinate their remedial activities with the activities to be carried out pursuant to this Order. In order to facilitate the effective operation of the remedial systems required by this Order, the Regional Board will provide Hewlett-Packard and Varian with information concerning sources and remedial activities that may impact such systems.

3. Adjacent Sites The COE and Perimeter Areas are bordered on the south/southwest side by research or manufacturing facilities that have or potentially have impacted groundwater. The other three sides are residential areas that are not known to be contributing to groundwater contamination. Investigations at the Varian 611 Hansen Way site and the Aydin State Superfund site under the oversight of the California Department of Toxic Substances Control have indicated that a significant

contribution of groundwater contaminants is entering the COE and Perimeter Areas from these sites. Varian is currently developing plans for groundwater extraction at the 611 Hansen Way site, but has yet not completed a formal Remedial Action Plan. Other sites from outside the COE and Perimeter Areas (including those named in the RI) may be contributing to contamination, but these sites are viewed as not significant for the purposes of commencing a groundwater cleanup as required in this Order.

4. **National Priority List - "Superfund"** On June 24, 1988, the U. S. Environmental Protection Agency (EPA) proposed adding the HP 640 PMR facility to the National Priority List (NPL), subject to the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Final listing was made on February 1, 1990. The NPL site is defined as the vadose zone and contaminated groundwater on the 640 site and commingled groundwater in the Off-Site Area.

The groundwater and vadose zone on the Varian 601 site is not part of the NPL site but is addressed in this order. The vadose zone at the Hewlett-Packard 395 site is not part of the NPL site but is addressed in this Order. The NPL provisions do not apply to the areas covered in this Order that are not part of the NPL site.

Pursuant to the South Bay Multi-Site Cooperative Agreement and the South Bay Groundwater Contamination Enforcement Agreement entered into by the Board, EPA and the California Department of Toxic Substances Control (then DHS), the Board has been acting as lead regulatory agency on this site. The Regional Board will continue to regulate the dischargers' remediation consistent with CERCLA as amended.

5. **Regional Board Orders** The Board has adopted the following orders for this site:

Company/Area	Order No. (Type)	Date Adopted
Hewlett-Packard/395 Page Mill	89-050 (SCR)	4-19-89
Hewlett-Packard/640 Page Mill	90-067 (SCR)	5-16-90
	*89-037 (SCR)	3-15-89
	*87-164 (SCR) joint	12-16-87
	*87-142 (SCR) joint	10-21-87
	*86-027 (WDR)	4-16-86
Varian Associates/601 California	90-066 (SCR)	5-16-90
	*89-059 (SCR)	4-19-89
	*87-164 (SCR) joint	12-16-87
	*87-142 (SCR) joint	10-21-87
	*87-039 (SCR)	4-15-87

*These Orders have been previously rescinded.

6. **Geology** The entire COE and Perimeter Areas are underlain by interbedded alluvial fan deposits and fine-grained floodplain deposits. The alluvial fan deposits consist of a mixture of sand, gravel, silt, and clay soils. The alluvium is derived from San Francisquito and Matadero Creeks. The alluvial fans of these two creeks overlap beneath the site and contain coarse-grained channel deposits with different directional and spatial orientations. The coarse-grained units can be up to 20 feet thick. Both the coarse-grained and fine-grained alluvial units may extend over distances of thousands of feet.

The deeper floodplain deposits can be up to 23 feet thick and appear to be continuous across the Area. The floodplain deposits are predominantly fine-grained and are usually gray in color.

7. **Soil and Source Investigation**

Hewlett-Packard 640 Soil investigations began at the 640 site in 1981 after a 1,000 gallon underground solvent storage tank was discovered to be leaking between building 11 and the storage building. Since then over 120 borings have been drilled on-site. The contaminated soil was found surrounding and beneath manufacturing areas, underground tanks, acid neutralization sumps, and storage areas, and resulted from releases on-site. The chemicals detected most frequently in soil at the site were arsenic, gallium, trichloroethene, 1,1,1-trichloroethane, 1,1-dichloroethene, tetrachloroethene, 1,2,4-trichlorobenzene, and phenol.

Varian 601 Investigations were initiated at the 601 site in 1986 after a request from the Regional Board. This investigation and a later soil gas investigation in 1987 established the courtyard as the major source of VOC contamination of soils. During this site investigation, 59 borings have been drilled on-site. A dry well in the courtyard was determined to be the main source of chemicals, and the chemical handling area in the southern corner of building 8 was determined to be a minor source. Installation and use of the dry well may have occurred during General Electric's occupancy of this site. The chemical handling area was in an area of fine-grained sediments that absorbed VOCs, while the courtyard area was generally more permeable. The chemicals detected most frequently in soil at the site are trichloroethene, toluene, ethylbenzene and xylenes.

Hewlett-Packard 395 Soil investigations under the direction of the Board began at the 395 site in 1983 to investigate an underground waste solvent tank. Over 140 borings have been drilled on-site and analyzed for metals, VOCs, and total petroleum hydrocarbons. Seven major source areas were identified, including a drum storage area, manufacturing areas, sumps and a storm drain. The storm drain source area in the northeastern corner of the site released VOCs as a dense non-aqueous phase liquid (DNAPL) to the soil and groundwater. The chemicals detected most frequently in the soils at the site include trichloroethene, tetrachloroethene, 1,1-dichloroethene, and 1,1,1-trichloroethane.

8. **Hydrogeology** The COE and Perimeter Areas are underlain by two primary aquifers, the upper A Aquifer and the lower B Aquifer. Each of these two aquifers contains distinct sand zones. The A Aquifer extends up to 55 feet below ground surface, and groundwater is first encountered at depths between 15 and 30 feet. Within the A Aquifer, the A1 Upper (A1U) Zone is generally found between depths of 15 and 30 feet, the A1 Zone between 30 and 40 feet, and the A2 Zone between 40 and 55 feet. The fine-grained aquitards separating the three zones range from 1 to 22 feet in thickness and allow varying degrees of hydraulic communication through them. The aquitard between the A1 and A2 Zones is generally not present west of Page Mill Road and beneath the 601 site.

The aquitard between the A and B Aquifers is approximately 12 to 23 feet thick and is composed of gray silts and clays with fine sand. Within this aquitard are localized sandy lenses which range between 0.5 and 2 feet in thickness. These lenses are referred to as the A2 Deep (A2D) Zone.

Within the B Aquifer, the B1 Zone occurs below an approximate depth of 60 feet below ground surface. This zone is typically about 10 feet thick. Where encountered, the B2 Zone begins at approximately 85 feet below the surface and is between 6 and 33 feet thick.

The general groundwater gradient in the A Aquifer is to the north-northeast. Groundwater flow directions are influenced locally by the preferential flow through relatively thick, transmissive aquifer sands. In the A1 Zone at certain locations, groundwater and chemicals have been deflected toward the east along preferential flow paths. This easterly deflection of chemicals is not evident in the A1U and A2 Zones.

9. **Oregon Expressway Underpass** This structure serves as a subsurface roadway beneath the Southern Pacific Railroad tracks, Alma Street and Park Boulevard. The underpass, built in 1958, extends 24 feet below ground surface into the A1U Zone. A dewatering system installed beneath the underpass controls natural groundwater inflow and surface runoff. This dewatering appears to affect groundwater flow in the A1U, A1 and A2 Zones and does not allow contaminants to bypass the subdrain to the north.

During the summer, the average rate of discharge is typically 140 gallons per minute (gpm) with total VOC concentrations ranging between 200 and 300 parts per billion (ppb). The discharge during winter consists of both surface water and groundwater. This significant local hydrologic feature acts to contain further migration of VOCs in groundwater in the COE area and portions of the Perimeter area.

10. **Groundwater Investigation**

Hewlett-Packard 640 Groundwater investigations have been ongoing at the 640 facility since 1981 after the discovery of the leaking 1,000 gallon waste solvent tank. Initial sampling of the groundwater beneath this tank found TCE (1,800,000 ppb) and TCA (1,300,000 ppb) in the A1 Zone groundwater. These concentrations indicate the strong likelihood of DNAPL at the site at that time. However, DNAPL has not been observed in either soil or groundwater at this site. Hewlett-Packard has installed and currently maintains 28 groundwater monitoring wells and has advanced 21 CPTs on-site. The chemicals detected most frequently in the groundwater beneath the 640 site include TCE, 1,1,1-TCA, 1,1-DCE and PCE.

The A1U Zone is poorly developed at the 640 site and is currently unsaturated. The aquitard separating the A1U and the A1 Zones is approximately 6 feet thick. In the central portion of the site, both the A1 and A2 Zones are composed of clean sands and gravel. The aquitard separating the A1 and A2 Zones is between 1 and 5 feet thick and does not exist at a few well locations.

The thick sands of the A1 Zone trend east-west across the central portion of the 640 site and provide a preferential pathway for groundwater flow. The A1 Zone sands grade fine-grained on the northern side of the site, which has the apparent effect of deflecting groundwater flow and a portion of the VOCs toward the east. In contrast, relatively thick A2 Zone sands occur below most of the 640 site, and groundwater and VOCs flow north in the direction of the Oregon Expressway Underpass.

Varian 601 The 601 site initiated groundwater investigations in 1986 by installing monitoring wells and presently has installed 22 groundwater monitoring wells and advanced 20 CPTs on-site and on down-gradient adjacent properties. The highest concentration of chemicals in the groundwater on-site are 43,000 ppb total VOCs in the main source area and up to 26,000 ppb total VOCs from a well near the former above ground tank in the chemical handling area. A sludge containing 3.6% TCE at the bottom of the dry well in the courtyard area indicates that the presence of DNAPL is possible. The chemicals most frequently detected in the groundwater beneath the 601 site include TCE, 1,1,1-TCA and 1,1-DCE.

The A1U Zone is well developed on the eastern half of the property beneath a portion of the courtyard where the dry well was located and nonexistent on the southwest portion where the chemical handling area is situated. The A1 and the A2 Zones are in contact with no separating aquitard present. The lithologic data indicate that the A1U and A1/A2 Zones contain a trough-like feature beneath the site which creates a preferential flow path for groundwater and contaminants.

Hewlett-Packard 395 Groundwater investigations at the 395 site began in 1981 with the investigation of a 1,000 gallon underground waste solvent tank which indicated no release to groundwater. Since that time, Hewlett-Packard has installed and currently maintains 18 groundwater monitoring wells and has advanced 31 CPTs on-site. These wells have found relatively low concentrations of contamination in

the groundwater across the site, with the exception of the northeastern corner of the site where DNAPL has been found in one well. Samples from the well where the DNAPL was found indicate TCA (13,000 ppb) and PCE (39,000 ppb) are present in the AlU Zone groundwater. The chemicals detected most frequently in the groundwater beneath the 395 site include TCE, TCA, and PCE.

The AlU Zone is present across the 395 site at irregular depths but is abruptly absent on the northeastern side. Where present, the Al Zone is thin. The A2 Zone is continuous throughout the 395 site. The Oregon Expressway Underpass dewatering system, in combination with local irregular aquifer configurations, seems to have a significant hydraulic influence on the groundwater beneath the site. Contamination in the AlU, Al and A2 Zones beneath the 395 site appears to be drawn toward the OEU.

Off-Site Area Investigation of the Off-Site Area began in 1985 near the 640 site. Since then, 79 groundwater monitoring wells have been installed and are currently maintained, and approximately 182 CPTs have been advanced in the Off-Site Area. The chemicals detected most frequently in groundwater in the Off-Site Area A Aquifer are TCE, 1,1,1-TCA, 1,1-DCE, and PCE. Contamination in the B Aquifer is very minimal. The two main features other than the regional gradient that control the distribution of contaminants in the A Aquifer are the Oregon Expressway Underpass and the preferential flow paths created by the distribution of highly transmissive zones within the aquifers.

VOCs are the most widely distributed in the AlU and Al Zones and together, the extent of VOCs in these two zones defines the outline of the Off-Site Area covered by this Order. The AlU is unsaturated over much of its western half. This unsaturated portion has fluctuated with the amount of recharge and has been low in recent years due to a lengthy drought.

VOCs in the Al Zone are present in the northern and southern halves of the Off-Site Area with a region in the middle that is free of contaminants because of its low permeability. The contaminants in the northern half are primarily derived from the 601, 640 and 395 sites. The contaminants on the southern half are derived primarily from the 640 and Varian 611 Hansen Way sites.

The distribution of VOCs in the A2 Zone is more limited than the above Zones and is primarily in the northern half of the Off-Site Area. The non-fuel VOC contamination on the northern half is derived primarily from the 601 and 640 sites. The southern half has limited contaminants that are derived from Varian 611 Hansen Way in addition to other possible sites.

11. Interim Remedial Actions

Hewlett-Packard 640 Soil excavations between 1987 and 1992 have removed approximately 7,700 cubic yards of contaminated soil to Class I landfills and approximately 3,000 cubic yards to Class III landfills. Metal-contaminated soil at the site has been excavated to background throughout the entire vadose zone where it was present. All semi-VOCs above 10 ppm have been excavated. Residual VOCs remain at the site above the remediation goal of 1 ppm and are being remediated by the 28-well soil vapor extraction system which went on-line in April 1994.

Groundwater remediation on-site was initiated in 1982 for seven months. Extraction was restarted in 1987 and has continued up to the time of this Order. During redevelopment, temporary extraction wells were used in order to maintain continuous contaminant removal. Groundwater extracted from on-site extraction wells EW-4, EW-5, and EW-7 in addition to off-site wells discussed below will be treated at the 640 site.

Varian 601 In 1990, the dry well in the courtyard, dry well contents, and soils in the vicinity of the dry well were removed. In 1991, soil vapor extraction was

initiated in four wells to address contamination in the courtyard area. This was expanded in 1992 with 8 additional wells and in 1993 by adding two more wells in the area of the chemical handling area. The use of one well was discontinued due to cleanup of surrounding soils.

Groundwater extraction began at the 601 site in 1987 near the source area in the courtyard. In 1991, an extraction well was installed near the former above ground solvent tank in the chemical handling area. A third well was installed in a downgradient area off-site in 1992. A fourth well is scheduled to begin extraction as part of the off-site phased groundwater extraction program.

Hewlett-Packard 395 Soil remediation at the site was initiated in 1986 with the operation of a SVE system at the 1,000 gallon underground storage tank. This system was shut down in 1989 after concentrations of contaminants in the soil dropped to acceptable levels. Site-wide soil excavation was conducted in 1992 and 1993 and removed 2,100 cubic yards. Additional contaminated soil exists and will be remediated with the DNAPL area in the northeastern corner of the property as part of future cleanup activities. Additional cleanup activities may be conducted during site redevelopment scheduled to begin by 1995.

Groundwater extraction well EW-11 was installed in 1992 in the northeast corner of the site to remediate the A1U and A1 Zones. Discovery of 12 inches of PCE and TCA DNAPL in one of the nearby observation wells caused EW-11 to be abandoned since it penetrated two aquifer zones. Since that time, the DNAPL-containing observation well has been pumped to remove the DNAPL, and groundwater extraction in this area has been temporarily delayed pending reevaluation of cleanup methodologies. When groundwater treatment is initiated, it will likely take place at the 395 site.

Off-Site Area Groundwater extraction in the Off-Site Area was initiated in 1988 on the Mayfield school property by the installation of A1U wells EW-1 and EW-2. Off-site extraction wells EW-8 through EW-11 and EW-13 have been installed. The treatment system for 640 on-site and off-site wells EW-1, -2, -6, -8, -9, and -10 is located on the 640 site. Extraction well EW-6 was placed in the A1/A2 Zone beneath the Mayfield school property in 1992 to address elevated (10,000 ppb TCE) concentrations of contaminants. Phased groundwater extraction for all off-site wells is currently under way and is scheduled to be fully implemented by September 1994. Groundwater from EW-13 will be treated at Building 1 at the Varian 611 Hansen Way site. Regional groundwater extraction in the COE and Perimeter Areas and at the Varian 611 Hansen Way site will be coordinated when additional extraction wells to be located on-site at the Varian 611 site come on-line after September 1994.

12. Baseline Public Health Evaluation A Baseline Public Health Evaluation (BPHE), dated September 1992, was prepared by EPA for the COE and Perimeter Areas to evaluate current and potential future health risks posed by the site. Potential current risks are estimated based on exposures that may be presently occurring. Potential future health risks are based on exposures that potentially could occur in the future if residential development occurs on the site or if untreated groundwater was used for human consumption. To ensure that human health is protected, the BPHE incorporated conservative assumptions. Therefore, it is very unlikely that the actual risks posed by the site would be greater than estimated. Average case and maximum case scenarios are presented in the BPHE. This finding refers to a 70 year duration exposure. The BPHE found that potential current exposures at the site do not result in a carcinogenic risk greater than 1×10^{-4} . These exposures include inhalation of indoor air on and off-site that could result from volatilization off of groundwater. The potential noncarcinogenic hazard index estimated in the BPHE for inhalation of vapor volatilizing off the groundwater ranged from less than 1.0 to 9. EPA recommends that excess cancer risk not exceed a range of 1×10^{-4} to 1×10^{-6} and that the non-carcinogenic hazard index not exceed 1.0.

Potential future exposures if no cleanup were to occur could include ingestion of

groundwater, inhalation of vapor volatilized from on-site soil and groundwater or inhalation of VOCs from domestic use of groundwater. Without cleanup, the maximum carcinogenic risk estimated in the BPHE to a future on-site resident (adult or child) from ingestion of groundwater, inhalation of VOCs from the use of groundwater and inhalation of vapor from volatilized soil and groundwater would be 1×10^{-3} . The total potential noncarcinogenic hazard index for ingestion of shallow groundwater and inhalation of VOCs from the use of groundwater was estimated to be 30.

Actual future risk is likely to be lower than these estimated potential risk numbers because the assumptions on which these calculations are based are likely to overestimate exposure. For example, these estimated risk calculations assume that the highest chemical concentrations from the entire site area can be found in every well. Therefore, for most of the plume area, including the Off-Site Area, chemical concentrations actually measured are much lower than the concentrations used to estimate these risks.

Finally, even using the conservative exposure scenarios of the BPHE, the actual risk from exposure to groundwater will be much lower than the estimated risks because HP and Varian are currently cleaning up the groundwater. HP and Varian's comments on the BPHE are presented in Appendix L of the RI.

a. **Chemicals of Concern** Of the 34 chemicals detected in groundwater during the Remedial Investigation, the chemicals of concern are those found to be present in groundwater at concentrations exceeding maximum contaminant levels or detected at concentrations that exceed the upper bound excess carcinogenic risk and/or exceed non-carcinogenic health based values.

b. **Toxicity Classification of Chemicals of Concern** The final list of chemicals of concern for target cleanup levels in soil and groundwater are identified in the table below.

The EPA categories for carcinogenic classification as applied to the chemicals of concern are: A (human carcinogen with sufficient evidence in human epidemiological studies), B2 (probable human carcinogen, with inadequate human evidence and sufficient evidence from animal experiments), and C (possible human carcinogen, limited evidence of carcinogenicity in animals with inadequate human data).

<u>CARCINOGENS</u>	<u>class</u>
arsenic*	
benzene	A
1,1- dichloroethane (1,1-DCA)	C
1,2- dichloroedme (1,2-DCA)	B2
cis- 1,2- dichloroethene (cis-1,2-DCE)	C
methylene chloride	B2
tetrachloroethene (PCE)	B2
1,1,2- trichloroethane	C
trichloroethene (TCE)	B2

NON-CARCINOGENS

acetone
 1,2-dichlorobenzene
 1,1-dichloroethene (1,1-DCE)
 trans-1,2 dichloroethene (trans-1,2 DCE)
 freon 113
 1,2,4-trichlorobenzene
 1,1,1-trichloroethane (1,1,1-TCA)
 toluene*
 total xylenes*

* Chemical found only in soil

13. Remedial Investigation /Feasibility Study /and Final Remedial Action Plan
 Hewlett-Packard and Varian Associates completed a first draft Remedial Investigation/Feasibility Study (RI/FS) in April 1991. After additional work, a second draft was submitted in June 1993. Comments by Board staff have been incorporated in a final RI/FS dated May 1994. The technical information contained in the RI/FS is consistent with the Health and Safety Code requirements for a final remedial action plan and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) requirements for a RI/FS. Regional Board staff have determined that the technical information contained in the Feasibility Study is acceptable for developing a final cleanup plan for the site. The FS contains an evaluation of ARARs, a discussion of interim remedial actions, an evaluation of final remedial actions, and proposed remedial standards. The final Remedial Action Plan for the site will consist of this Order, the Remedial Investigation/Feasibility Study, and the Regional Board Proposed Plan Fact Sheet.
14. Remedial Alternatives The Feasibility Study identified a range of general response actions and remedial technologies. Three remedial alternatives were developed and evaluated: 1) no action, 2) continuation of current groundwater and soil vapor extraction, and 3) additional groundwater extraction and continuation of soil vapor extraction. All scenarios include continued operation of the Oregon Expressway Underpass. A complete description of these alternatives is contained in the Feasibility Study.
15. Summary of Evaluation Criteria EPA's National Contingency Plan identifies nine evaluation criteria to be used to evaluate remedial alternatives (40 CFR 300.430). The RI/FS contained a detailed evaluation using these nine criteria as well as similar criteria found in Section 25356.1 of the California Health and Safety code. The nine criteria are:
- Overall protection of human health and the environment This criterion addresses whether a remedy provides adequate protection of human health and the environment.

Compliance with applicable or relevant and appropriate requirements (ARARs) This criterion addresses whether a remedy will meet all of the ARARs or other Federal and State environmental laws. ARARs for the site are discussed in detail in the RI/ FS,

Long-term effectiveness and permanence This criterion refers to expected residual risk and residual chemical concentrations after cleanup goals have been met and the ability of a remedy to maintain reliable protection of human health and the environment over time.

Reduction of toxicity, mobility or volume This criterion refers to the anticipated performance of the treatment technologies a remedy may employ.

Short-term effectiveness This criterion addresses the period of time needed to achieve cleanup and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup goals are achieved.

Implementability This criterion refers to the technical and administrative feasibility of a remedy.

Cost This criterion includes estimated capital and operation and maintenance costs, usually presented in a 30 year present worth format.

Support Agency Acceptance This criterion addresses EPA's acceptance of the selected remedy and any other EPA comments.

Community Acceptance This criterion summarizes the public's general response to the alternatives.

16. Selected Final Remedy The selected remedy is Alternative 2, for the reasons stated in Finding 17. Alternative 2 includes the following elements:

a. Soil The chosen alternative consists of operating the existing vapor extraction wells at the 640, 395 and 601 sites. Additional soil vapor extraction wells may be needed in the northeastern corner of the 395 site. The soil vapor wells will continue to operate until levels of 1 mg/kg total VOCs are achieved, unless the discharger can demonstrate that a proposed alternative level will be protective of human health and the environment. In addition, when areas beneath existing structures at the 395 and 601 sites become accessible, additional characterization and reevaluation of alternatives to meet the 1 ppm total VOC cleanup standard may be required.

b. Groundwater Operation of the current groundwater extraction system will continue with additional wells to capture and treat contaminated groundwater until drinking water quality is achieved, or until groundwater cleanup standards are modified as described in Findings 19 and 20. As outlined in the Feasibility Study, additional extraction wells will be added near the Lockheed-occupied site and near Lambert and Ash and Portage and Ash. The estimated time to achieve groundwater cleanup is unknown. The estimated 30 year present worth cost is \$15.5 million. Groundwater will be treated at the 640 site, the 601 site, the 395 site, and the Varian 611 Hansen Way site. Reuse of water will be attempted as much as possible in accordance with Board Resolution 88-160.

Long term monitoring will be required after cleanup levels are achieved. The duration and complexity of the monitoring will be determined at that time.

A deed restriction will be filed by HP for the 395 site and by Stanford University for the 640 site and the 601 site in their capacity as landowners, prohibiting use of on-site groundwater for drinking water until final cleanup standards are achieved.

17. **Remedy Selection Rationale and Statutory Determinations**

a. BASIS FOR REJECTION

Alternative 1: Continued Operation of Current Extraction Wells; Groundwater Monitoring; No Further Action Regarding Vadose Zone Soils

This alternative has been rejected because it may allow some groundwater containing chemicals above cleanup standards to migrate beyond the estimated capture zone of the overall remediation system. In addition, chemicals remaining in soils may migrate downward and impact groundwater.

Alternative 3: Expanded Groundwater Extraction and Treatment Groundwater Monitoring Continues.

This alternative has been rejected because the additional cost of implementation is not justified.

b. BASIS FOR ACCEPTANCE

Alternative 2: Expanded Groundwater Extraction and Treatment and Existing Soil Vapor Extraction Groundwater Monitoring Continues.

Overall Protection of Human Health and the Environment

Constituents in groundwater are contained within a defined area and contaminated groundwater is properly treated and released, under permit. Extraction, treatment, and disposal provides for the future protection of human health and the environment.

Compliance with ARARs

The cleanup goal for groundwater cleanup is the State or Federal MCL, whichever is more stringent. The goal of this remedial action is to restore groundwater to its beneficial uses.

Long Term Effectiveness

Once chemical concentrations in groundwater and soils are reduced to cleanup standards, potential long-term risks identified in the BPHE are reduced. Treatment residuals are treated and disposed of off-site with appropriate controls in permitted facilities, thus reducing the potential risk of exposure. Long term management plans include continued groundwater monitoring. The FS estimates that the time to reach MCL standards in groundwater is at least 30 years.

Reduction or Toxicity, Mobility, or Volume Through Treatment

Expanded groundwater extraction, treatment, and soil vapor extraction facilities will decrease the volume of the chemicals of concern in the groundwater and the toxicity of the groundwater.

Short Term Effectiveness

Risks of worker exposure to chemicals during system installation and operation are minimal, and safety measures will be implemented. No environmental impacts or potential risks to the community are expected. Short term operation of the groundwater extraction wells will contain the groundwater contamination in a defined area and result in decreased concentrations of the chemicals of concern. Vapor extraction from soils will enhance removal of contaminants and prevent additional groundwater from becoming contaminated. Evaluation of the effectiveness of extraction, treatment, and discharge will occur periodically in accordance with the

agency requirements.

Implementability

The groundwater extraction, treatment, and discharge alternative is being implemented at the 640 and 601 sites and in the Off-Site Area. Implementation in other areas is also achievable.

Cost

Present value costs for the selected alternative as presented in the RI/FS are \$15.5 million over 30 years, which includes installation of additional wells and operation and maintenance of the entire system.

Support Agency Acceptance

Groundwater and soil vapor extraction, treatment, and discharge will likely be acceptable to all involved agencies.

Community Acceptance

Community response to groundwater extraction and treatment, and soil vapor extraction were considered in choosing the proposed alternative. The community supports these methods of treatment.

18. **Cleanup Standards** The groundwater cleanup standards for the site are U. S. Environmental Protection Agency MCLs, California Department of Health Services MCLs or, for acetone, a target level based on toxicity characteristics published by EPA. Applicable MCL Goals (i.e., greater than zero) are met by the cleanup standards required by this Order.

Groundwater extraction will continue until drinking water quality is achieved, if feasible. If these standards are determined to be infeasible, groundwater extraction shall continue as long as significant quantities of chemicals are being removed through groundwater extraction. Achieving drinking water quality is an ARAR for this site. If drinking water quality cannot be achieved, the dischargers must demonstrate to the satisfaction of the Regional Board and EPA that the conditions for waiving an ARAR are met (e.g., that meeting the ARAR is technically impracticable from an engineering perspective) and that the alternative proposed will be protective of human health and the environment. The Order will then need to be modified by the Regional Board and, to the extent the modification affects the NPL Site, the US EPA Record of Decision (ROD) will need to be modified by EPA to allow a less stringent groundwater cleanup level.

The soil cleanup standard of 1.0 mg/kg for total VOCs is intended to prevent leaching of VOCs to groundwater at a level which would result in concentrations of VOCs in groundwater in excess of MCLs, thereby protecting groundwater quality.

19. **Risks Associated with Cleanup Standards** The selected remedy is protective of human health and the environment, as required by Section 121 of CERCLA. EPA considers a carcinogenic risk range of 1×10^{-4} to 1×10^{-6} as acceptable. If the noncarcinogenic Hazard Index is less than 1, EPA considers the combined intake of chemicals unlikely to pose a health risk. The cleanup standards for the COE and Perimeter Areas are protective of human health, have a carcinogenic risk that falls within a range of 1×10^{-4} to 1×10^{-6} , and a Hazard Index of less than 1. The method and assumptions used to obtain the Carcinogenic Risk and Hazard Index associated with the cleanup standards are contained in the RI/FS and the BPHE.

20. **Uncertainty in Achieving Cleanup Standards** The goal of this remedial action is to restore groundwater to its beneficial uses. Based on information obtained during the

RI and a careful analysis of all remedial alternatives, the Board believes that the selected remedy will achieve this goal. However, studies at other sites suggest that groundwater extraction and treatment will not be, in all cases, completely successful in reducing contaminants to health based levels in the aquifer zones. The Board recognizes that operation of the selected extraction and treatment system may indicate the technical impracticability of reaching MCL- based groundwater quality standards using this approach. If it becomes apparent during implementation of this system that contaminant levels have ceased to decline and are remaining at levels higher than the remedial standards, or if the data otherwise suggest that achievement of the standards is technically impracticable or cannot be achieved within a reasonable time frame, the standards and remedy may be reevaluated.

21. **Future Changes to Cleanup Standards** If new information indicates cleanup standards cannot be attained or can be surpassed, the Board and EPA will decide if further final cleanup actions, beyond those completed, shall be implemented at this Site. If changes in health criteria, administrative requirements, site conditions, or remediation efficiency occur, then the dischargers may, or at the request of the Executive Officer shall, submit an evaluation of the effects of these changes on the cleanup standards defined in Specification B. 3 and 4.

The Regional Board recognizes that the dischargers have already performed extensive investigative and remedial work and that the dischargers are being ordered hereby to perform additional remedial tasks. It is in the public interest to have the dischargers undertake such remedial actions promptly and without prolonged litigation or the expenditure of public funds. The Regional Board recognizes that an important element in encouraging the dischargers to invest substantial resources in undertaking such remedial actions is to provide the dischargers with reasonable assurances that the remedial actions called for in this Order will be the final remedial actions required to be undertaken by the dischargers. On the other hand, the Regional Board also recognizes its responsibility to protect water quality, public health, and the environment and that future developments could indicate that some additional remedial actions may be necessary.

The Regional Board has considered and balanced these important considerations, and has determined that the remedial actions ordered herein represent the Regional Board's best, current judgment of the remedial actions to be required of the dischargers. The Regional Board will not require the dischargers to undertake additional remedial actions with respect to the matters previously described herein unless: (1) conditions on the site, previously unknown to the Regional Board, are discovered after adoption of this Order, or (2) new information is received by the Regional Board, in whole or in part after the date of this Order, and these previously unknown conditions or this new information indicates that the remedial actions required in this Order may not be protective of public health and the environment. The Regional Board will also consider technical practicality, cost effectiveness, State Board Resolution No. 68-16 and other factors evaluated by the Regional Board in issuing this Order and in determining whether such additional remedial actions are appropriate and necessary.

22. **Named Dischargers** Hewlett-Packard Company (herein referred to as a discharger) is a discharger because of the release of chemicals that have resulted from its facilities at 640 Page Mill Road and 395 Page Mill Road, and because it owns the property at 395 Page Mill Road. Varian Associates (herein referred to as a discharger) is a discharger because of the releases of chemicals that have occurred at 601 California Avenue. Stanford University (hereinafter referred to as a discharger) is a discharger because it owns the property at 640 Page Mill Road and 601 California Avenue. Stanford University (secondarily responsible) will be responsible for performance of Tasks 1A, 2A, 9A, 10A, and 17 below and for compliance with the remaining Tasks associated with the 640 site, 601site and off-site area only in the event that Hewlett-Packard and/or Varian Associates (primarily responsible, as applicable) fail to comply with the requirements of this Order.

If additional information is submitted indicating that any other party caused or permitted any waste to be discharged in the COE or Perimeter Areas or in any adjacent area where the waste entered or could have entered waters of the State, the Board will consider adding that party's name to this Order.

23. **Joint Order** This Order is written as a joint Order for 640 Page Mill Road, 601 California Avenue, and 395 Page Mill Road because the groundwater plumes from these source areas have commingled. The dischargers are encouraged to submit joint reports for the Off-Site Area. If joint reports are not submitted, the individual dischargers are still responsible for the joint tasks in this Order.
24. **Potentially Responsible Parties** Results of the Potentially Responsible Party (PRP) search pursuant to Health and Safety Code Section 25356.1 are that Hewlett-Packard Company and Varian Associates are potentially responsible parties (and therefore are named as dischargers) associated with the releases of pollutants previously discussed in this Order. Stanford University is also a potentially responsible party (and also a named discharger) because it both (i) is the current owner of the 601 California Avenue and 640 Page Mill Road properties at which pollutants are currently located and (ii) was the owner of the above mentioned properties where the previously discussed releases of pollutants have occurred in the past. However, nothing in these findings or in this Order shall limit the rights or abilities of these parties to identify other potentially responsible parties for purposes of cost recovery under any applicable law.
25. **Non-Binding Allocation of Responsibility (NBAR)** Section 25356.1 of the California Health and Safety Code requires a final remedial action plan (RAP) to include a non-binding allocation of responsibility (NBAR) among all identifiable potentially responsible parties at the site. Any potentially responsible party or combination of parties assigned more than 50% of the liability in the NBAR may seek binding arbitration to allocate the costs of implementing the selected remedy (see Section 25356.3).
26. **Lead Agency** Pursuant to the South Bay Multi- Site Cooperative Agreement and the South Bay Ground Water Contamination Enforcement Agreement, entered into on May 2, 1985, (as amended) by the Regional Board, EPA, and DTSC, the Regional Board has been acting as the lead agency. EPA is expected to agree with the remedy selected and issue a Record of Decision following adoption by the Regional Board of the final remedy for the site. The Regional Board will continue to regulate the dischargers' remediation and administer enforcement actions in accordance with CERCLA (as amended by SARA), the California Water Code, the California Health and Safety Code, and regulations adopted thereunder.
27. **Deed Restrictions** By a letter submitted by Hewlett-Packard dated September 7, 1994 and a letter from Varian dated August 12, 1994, both companies have notified current tenants and will notify future tenants as to the location of hazardous materials in the subsurface and the potential health hazards associated with such materials.
28. **Administrative Record** The Administrative Record for the NPL site has been prepared in accordance with EPA guidance, has been made available for public and PRP review, and provides the backup documentation for recommendations of staff and decisions by the Board. The administrative record is available for review at the Water Board offices in Oakland and important documents are available at the US Geological Survey, 345 Middlefield Road in Menlo Park.
29. **Community Involvement** An aggressive community involvement program has been ongoing for the Hewlett-Packard and Varian sites named in this Order. The Board published a notice in the July 15, 1994 issue of the Palo Alto Weekly announcing the proposed final Remedial Action Plan and opportunity for public comment at the Board hearing of July 20, 1994 in Oakland, and announcing the opportunity for Public comment at an evening community meeting to be held at the Escondido School in Palo Alto on July

26, 1994. A presentation of the proposed final cleanup Plan was made at the September 21, 1994 Board meeting and the July 26, 1994 evening community meeting. The 30 day comment period was from July 20 to August 19, 1994.

Since 1989, five fact sheets have been mailed to interested residents, local government officials, and media representatives. Fact sheet 1, mailed in September, 1989 summarized the contamination problems at 640 and described interim cleanup actions. A second fact sheet published in January 1990 listed revisions to the original investigation and cleanup schedule and included 601 information. The third fact sheet, published in December 1991, summarized the results of additional investigation at the site as well as interim cleanup actions. The fourth fact sheet of October, 1992 described the health assessment and the further definition of the plume. Fact sheet 5 was mailed out in June and explained the final proposed plan for site cleanup.

The Barron Park Association Foundation, an active community group in the area, has been given a Technical Assistance Grant by the US EPA to help assist the community examine technical documents regarding investigation and cleanup of the site.

30. **State Water Resources Control Board Resolution No. 68-16** On October 28, 1968, the State Board adopted Resolution 68-16, "Statement of Policy with Respect to Maintaining High Quality Waters in California." This policy calls for maintaining the existing high quality of State waters unless it is demonstrated that any change would be consistent with the maximum public benefit and not unreasonably affect beneficial uses. The original discharge of waste to groundwater at this site was contrary to this policy. Therefore, the groundwater quality needs to be restored to its original quality to the extent reasonable. Shallow groundwater at the site is designated as a potential source of drinking water. For this reason, MCLs are acceptable as concentrations that meet the intent of Resolution 68-16.
31. **Regional Board Re-solution No. 88-160** This resolution strongly encourages the maximum feasible reuse of extracted groundwater from groundwater remediation activities, either by the discharger or by other public or private water users. Currently, treated groundwater from interim groundwater remediation at 640 Page Mill Road and 601 California Avenue that is not reused for irrigation and/or gray water is discharged to the sanitary sewer, and is available for reuse as effluent from tile Palo Alto sewage treatment plant. Hewlett- Packard has conducted a reuse study for its existing and planned groundwater treatment facilities at 395 and 640 Page Mill Road, and Varian has conducted a similar reuse study for 601 California Avenue. The Board will assess future compliance with this resolution if and when the dischargers apply to discharge treated groundwater to surface waters.
32. **Water Quality Control Plan** The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on December 17, 1986, and the State Board approved it on May 21, 1987. The Basin Plan contains water quality objectives and beneficial uses of surface and ground waters.

The existing and potential uses of groundwater underlying and adjacent to the site include:

- a. Industrial process water supply
- b. Industrial service water supply
- c. Municipal and domestic water supply
- d. Agricultural water supply

Shallow groundwater underlying and adjacent to the site is currently not used for any of the above uses.

33. The dischargers have caused or permitted, and threaten to cause or permit waste to be discharged or deposited where it is or probably will be discharged to waters of

the State and creates or threatens to create a condition of pollution or nuisance.

34. This action is an order to enforce the laws and regulations administered by the Board. This action is categorically exempt from the provisions of the California Environmental Quality Act (CEQA) pursuant to Section 15321 of the Resources Agency Guidelines.
35. The Board has notified the dischargers and interested persons and agencies of its intent under California Water Code Section 13304 to prescribe Site Cleanup Requirements for the discharge and has provided them with the opportunity for a public hearing and an opportunity to submit their written views and recommendations.
36. The Board, in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED, pursuant to Section 13304 of the California Water Code and Section 25356.1 of the California Health and Safety Code, that the dischargers shall cleanup and abate the effects described in the above findings as follows:

A. PROHIBITIONS

1. The discharge of wastes or hazardous materials in a manner which will degrade water quality or adversely affect the beneficial uses of the waters of the State is prohibited.
2. Further significant migration of pollutants through subsurface transport to waters of the State is prohibited.
3. Activities associated with subsurface investigation and cleanup which will cause significant adverse migration of pollutants are prohibited.

B. SPECIFICATIONS

1. The storage, handling, treatment, or disposal of soil or groundwater containing pollutants shall not create a nuisance as defined in Section 13050(m) of the California Water Code.
2. The dischargers shall conduct monitoring activities as determined by the Executive Officer to define the current local hydrogeologic conditions, and the lateral and vertical extent of soil and groundwater pollution. Should monitoring results show evidence of plume migration, additional characterization of the pollutant plume may be required.
3. Groundwater cleanup standards for all SMP wells are set forth in Table 1.
4. The soil cleanup standard is 1 ppm for total VOCs.
5. The dischargers shall implement the final cleanup plan as described in Finding 16.
6. Cost Recovery: Pursuant to Section 13304 of the California Water Code, the dischargers are hereby notified that the Board is entitled to, and may seek reimbursement of, all reasonable costs actually incurred by the Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, as required by this Order.

C. PROVISIONS

1. The dischargers shall comply with the attached Self-Monitoring Program.
2. The dischargers shall comply with this Order immediately upon adoption and shall comply with the Prohibitions and Specifications described above in accordance with the following tasks and compliance dates. With regard to the 640 Page Mill Road site, the 601 California Avenue site, and the Off-Site Area, in the event that Hewlett-Packard and/or Varian Associates, as applicable, fail to comply with this Order, the Executive Officer may notify Stanford University and Stanford University shall be responsible for compliance.

3. HEWLETT-PACKARD 640 PAGE MILL ROAD ON-SITE
(Hewlett-Packard and Stanford University)

- a. **COMPLETION DATE: December 1, 1994**

TASK 1: PROPOSED CONSTRAINTS: Stanford University shall submit a technical report acceptable to the Executive Officer documenting procedures to be implemented for a deed restriction for the 640 site prohibiting the use of on-site contaminated groundwater as a source of drinking water. The Executive Officer may approve an alternative mechanism if it accomplishes the same function as a deed restriction. Constraints shall remain in effect until groundwater cleanup standards have been achieved and pollutant levels have stabilized in the aquifers beneath the site.

- b. **COMPLETION DATE: Before building occupancy by new tenant**

TASK 2: PROPOSED CONSTRAINTS: Hewlett-Packard shall submit a technical report acceptable to the Executive Officer documenting that Hewlett-Packard has notified future tenants as to the locations of hazardous materials in the subsurface and the potential health hazards associated with such materials.

- c. **COMPLETION DATE: 60 days after Executive Officer's approval of above task.**

TASK 3: IMPLEMENT CONSTRAINTS: Stanford University shall submit a technical report acceptable to the Executive Officer documenting that a deed restriction or alternative approved constraints have been implemented.

- d. **COMPLETION DATE: July 1, 1995**

TASK 4: EVALUATE EFFECTIVENESS OF SOIL VAPOR EXTRACTION SYSTEM:

Hewlett-Packard shall submit a technical report acceptable to the Executive Officer which documents implementation of the approved SVE system, which is described in the Feasibility Study, evaluates effectiveness of the entire soil vapor extraction system, and proposes modifications to the system, if necessary, and a time schedule to accomplish the cleanup standard. This evaluation should include the installation of soil vapor monitoring devices needed to assess the effectiveness of the soil vapor extraction system.

- e. **COMPLETION DATE: According to the schedule in the above Task approved by the Executive Officer.**

TASK 5: START-UP OF MODIFICATIONS TO SOIL VAPOR EXTRACTION SYSTEM:

Hewlett-Packard shall submit a technical report acceptable to the Executive Officer documenting completion of any modifications identified in the above Task.

- f. **COMPLETION DATE: 60 days prior to proposed curtailment of any soil vapor extraction well or soil vapor treatment system.**

TASK 6: SOIL VAPOR WELL EXTRACTION CURTAILMENT CRITERIA AND PROPOSAL:

Hewlett-Packard shall submit a technical report acceptable to the Executive Officer containing a proposal and time schedule for curtailment (i.e., termination or significant reduction of pumping rate) from any soil vapor extraction well(s) or piping and the criteria used to justify such curtailment. If the reason for curtailment is achievement of final cleanup standards, then the report shall include a proposal indicating the methods for determining concentrations of VOCs remaining in the soil. The proposal may include termination of soil vapor extraction well operation for an extended period of time to study the effects on chemical migration prior to well abandonment. The proposal shall include a schedule for implementation.

If the dischargers claim that it is not practicable to achieve cleanup standards through continued soil vapor extraction in all or any portion of the contaminated soil area and that significant quantities of chemicals are not being removed through soil vapor extraction, the dischargers shall evaluate the reductions in chemical concentrations and alternative cleanup standards that can be practicably achieved. The report shall evaluate alternative means of achieving cleanup standards, whether meeting the cleanup standard is technically impracticable and whether the alternative cleanup standard proposed will be protective of human health and the environment.

- g. **COMPLETION DATE: According to the schedule in the above Task approved by the Executive Officer**

TASK 7: IMPLEMENTATION OF CURTAILMENT AND COMPLETION OF SOIL REMEDIATION:

Hewlett-Packard shall submit a technical report acceptable to the Executive Officer documenting completion of the necessary tasks identified in the technical report submitted for the above task. This report shall include the results of any chemical analyses performed.

- h. **COMPLETION DATE: 60 days prior to proposed curtailment of any groundwater extraction well or groundwater treatment system.**

TASK 8: GROUNDWATER EXTRACTION CURTAILMENT CRITERIA AND PROPOSAL:

Hewlett-Packard shall submit a technical report and time schedule acceptable to the Executive Officer containing a proposal for curtailing pumping from any groundwater extraction well(s) and the criteria used to justify such curtailment. This report may include data to show that groundwater cleanup standards for all VOCs have been achieved and that pollutant levels have stabilized or are stabilizing, and that the potential for pollutant levels rising above cleanup standards is minimal. Curtailment of groundwater extraction means final shutdown of the system, a phased approach to shutdown, elimination of pumping in selected wells (including pulsed pumping), or a similar significant change to the system. In the case of final shutdown of any portion of the system, the report shall identify the basis for the time frame that will be used to confirm that groundwater concentrations have stabilized at or below final cleanup standards and that the potential for increases above cleanup standards is minimal in that portion of the system.

Any proposal to implement final shutdown of the system is subject to approval by the Board, and any proposal to implement a phased approach to shutdown or to eliminate the pumping in selected wells shall be subject to the approval of the Executive Officer and, if requested by the Executive Officer, the Board.

If the dischargers claim that it is not practicable to achieve cleanup standards through continued groundwater extraction in all or any portion of

the groundwater plume area, the dischargers shall evaluate the reductions in chemical concentrations, the mass quantities being removed through groundwater extraction, and alternative cleanup standards that can be practically achieved. The report shall evaluate alternative means of achieving cleanup standards, whether meeting the cleanup standards is technically impracticable, cost effectiveness and whether the alternative cleanup standard proposed will be protective of human health and the environment.

- i. **COMPLETION DATE: According to the schedule in the above Task approved by the Executive Officer**

TASK 9: IMPLEMENTATION OF GROUNDWATER EXTRACTION CURTAILMENT: Hewlett-Packard shall submit a technical report acceptable to the Executive Officer documenting completion of the necessary tasks identified in the technical report submitted for the above task.

- 4. **VARIAN 601 CALIFORNIA AVENUE ON-SITE**
(Varian Associates and Stanford University)

- a. **COMPLETION DATE: December 1, 1994**

TASK 10: PROPOSED CONSTRAINTS: Stanford University shall submit a technical report acceptable to the Executive Officer documenting procedures to be implemented for a deed restriction for the 601 site prohibiting the use of on-site contaminated groundwater as a source of drinking water. The Executive Officer may approve an alternative mechanism if it accomplishes the same function as a deed restriction. Constraints shall remain in effect until groundwater cleanup standards have been achieved and pollutant levels have stabilized in the aquifers beneath the site.

- b. **COMPLETION DATE: 30 days following receipt of written notice to Varian of building occupancy by new tenant.**

TASK 11: PROPOSED CONSTRAINTS: Varian Associates shall submit a technical report acceptable to the Executive Officer documenting that Varian has notified future tenants as to the locations of hazardous materials in the subsurface and the potential health hazards associated with such materials.

- c. **COMPLETION DATE: 60 days after Executive Officer's approval of above task.**

TASK 12: IMPLEMENT CONSTRAINTS: Stanford University shall submit a technical report acceptable to the Executive Officer documenting that a deed restriction or alternate approved constraints have been implemented.

- d. **COMPLETION DATE: July 1, 1995**

TASK 13: EVALUATE EFFECTIVENESS OF SOIL VAPOR EXTRACTION SYSTEM: Varian Associates shall submit a technical report acceptable to the Executive Officer which documents implementation of the expanded SVE system, evaluates effectiveness of the entire soil vapor extraction system, and proposes modifications to the system and a time schedule, if necessary, to accomplish the cleanup standard and a time schedule. This evaluation should include soil vapor monitoring devices needed to assess the effectiveness of the soil vapor extraction system.

- e. **COMPLETION DATE: According to the schedule in the above Task approved by the Executive Officer.**

TASK 14: START-UP OF MODIFICATIONS TO SOIL VAPOR EXTRACTION SYSTEM: Varian Associates shall submit a technical report acceptable to the Executive Officer

documenting completion of any modifications identified in the above Task.

- f. **COMPLETION DATE: 60 days prior to proposed curtailment of any soil vapor extraction well or soil vapor treatment system.**

TASK 15: SOIL VAPOR WELL PUMPING CURTAILMENT CRITERIA AND PROPOSAL: Varian Associates shall submit a technical report acceptable to the Executive Officer containing a proposal for curtailment (i.e., termination or significant reduction of pumping rate) from any soil vapor extraction well(s) or piping and the criteria used to justify such curtailment. If the reason for curtailment is achievement of final cleanup standards, then the report shall include a proposal indicating the methods for determining concentrations of VOCs remaining in the soil. The proposal may include termination of soil vapor extraction well operation for an extended period of time to study the effects on chemical migration prior to well abandonment. The proposal shall include a schedule for implementation.

If the dischargers claim that it is not practicable to achieve cleanup standards through continued soil vapor extraction in all or any portion of the contaminated soil area and that significant quantities of chemicals are not being removed through soil vapor extraction, the dischargers shall evaluate the reductions in chemical concentrations and alternative cleanup standards that can be practicably achieved. The report shall evaluate alternative means, of achieving cleanup standards, whether meeting the cleanup standard is technically impracticable, cost effective, and whether the alternative cleanup standard proposed will be protective of human health and the environment.

- g. **COMPLETION DATE: According to the schedule in the above Task approved by the Executive Officer**

TASK 16: IMPLEMENTATION OF CURTAILMENT AND COMPLETION OF SOIL REMEDIATION: Varian Associates shall submit a technical report acceptable to the Executive Officer documenting completion of the necessary tasks identified in the technical report submitted for the above task. The report shall include the results of any chemical analyses performed.

- h. **COMPLETION DATE: 60 days prior to proposed curtailment of any groundwater extraction well or groundwater treatment system.**

TASK 17: GROUNDWATER EXTRACTION CURTAILMENT CRITERIA AND PROPOSAL: Varian Associates shall submit a technical report acceptable to the Executive Officer containing a proposal for curtailing pumping from any groundwater extraction well(s) and the criteria used to justify such curtailment. This report shall include data to show that groundwater cleanup standards for all VOCs have been achieved and that pollutant levels have stabilized or are stabilizing, and that the potential for pollutant levels rising above cleanup standards is minimal. Curtailment of groundwater extraction means final shutdown of the system, a phased approach to shutdown, elimination of pumping in selected wells (including pulsed pumping), or a similar significant change to the system. In the case of final shutdown of any portion of the system, the report shall identify the basis for the time frame that will be used to confirm that groundwater concentrations have stabilized at or below final cleanup standards and that the potential for increases above cleanup standards is minimal in that portion of the system.

Any proposal to implement final shutdown of the system is subject to approval by the Board, and any proposal to implement a phased approach to shutdown or to eliminate the pumping in selected wells shall be subject to the approval of the Executive Officer and, if requested by the Executive Officer, the Board.

If the dischargers claim that it is not practicable to achieve cleanup standards through continued groundwater extraction in all or any portion of the groundwater plume area, the dischargers shall evaluate the reductions in chemical concentrations, the mass quantities being removed through groundwater extraction, and alternative cleanup standards that can be practically achieved. The report shall evaluate alternative means of achieving cleanup standards, whether meeting the cleanup standards is technically impracticable, cost effectiveness, and whether the alternative cleanup standard proposed will be protective of human health and the environment.

- i. **COMPLETION DATE: According to the schedule in the above Task approved by the Executive Officer.**

TASK 18: IMPLEMENTATION OF GROUNDWATER EXTRACTION CURTAILMENT: Varian Associates shall submit a technical report acceptable to the Executive Officer documenting completion of the necessary tasks identified in the technical report submitted for the above task.

- j. **COMPLETION DATE: 15 days following written notice to Stanford University of planned building demolition**

TASK 19: NOTICE OF PLANNED BUILDING DEMOLITION: Stanford University shall provide the Executive Officer and Varian Associates with written notice of planned building demolition on the 601 site.

- k. **COMPLETION DATE: 45 days following receipt of written notice from Stanford University of planned building demolition (or as determined, in coordination with proposed redevelopment activities).**

TASK 20: PROPOSAL FOR INVESTIGATION OF AREAS EXPOSED BY BUILDING DEMOLITION: Varian Associates shall submit a technical report acceptable to the Executive Officer proposing a sampling schedule for areas which have previously been inaccessible beneath on-site buildings because of physical or operational constraints. This includes areas which could potentially impact groundwater or the environment and were difficult to sample prior to this Order.

- 5. **HEWLETT-PACKARD 395 PAGE MILL ROAD ON-SITE**
(Hewlett-Packard)

- a. **COMPLETION DATE: February 1, 1995**

TASK 21: PROPOSED CONSTRAINTS: Hewlett-Packard shall submit a technical report acceptable to the Executive Officer documenting procedures to be implemented for a deed restriction prohibiting the use of the contaminated groundwater as a source of drinking water. The Executive Officer may approve an alternative mechanism if it accomplishes the same function as a deed restriction. Constraints shall remain in effect until groundwater cleanup standards have been achieved and pollutant levels have stabilized in the aquifers beneath the site.

- b. **COMPLETION DATE: 60 days after Executive Officer's approval of above task.**

TASK 22: IMPLEMENT CONSTRAINTS: Hewlett-Packard shall submit a technical report acceptable to the Executive Officer documenting a deed restriction or alternative approved constraints have been implemented.

- c. **COMPLETION DATE: February 1, 1995**

TASK 22: REMEDIATION OF NORTHEASTERN CORNER OF SITE: Hewlett-Packard shall submit a workplan and time schedule acceptable to the Executive Officer for

remediation of the vadose and groundwater zones near Building 12 that have been impacted by contaminants. This area is known as Area X (ten). The workplan will justify any proposed modifications to the remediation alternatives for Area X currently recommended in the COE groundwater and 395 Site soils Feasibility Study.

- d. **COMPLETION DATE: September 1, 1995**

TASK 24: EVALUATE EFFECTIVENESS OF SOIL VAPOR EXTRACTION SYSTEM: For any area of the site where SVE is implemented as the selected remedial alternative, Hewlett-Packard shall submit a technical report acceptable to the Executive Officer which documents implementation of the approved SVE system recommended in the Feasibility Study, evaluates effectiveness of the soil vapor extraction system, and proposes modifications to the system, if necessary, and a time schedule to implement those proposed modifications. This report should include an evaluation of soil vapor monitoring options needed to assess the effectiveness of the soil vapor extraction system.

- e. **COMPLETION DATE: According to the schedule in the above Task approved by the Executive Officer.**

TASK 25: START-UP OF MODIFICATIONS TO SOIL VAPOR EXTRACTION SYSTEM: Hewlett-Packard shall submit a technical report acceptable to the Executive Officer documenting completion of any modifications identified in the above Task.

- f. **COMPLETION DATE: 60 days prior to proposed curtailment of any soil vapor extraction well or soil vapor treatment system.**

TASK 26: SOIL VAPOR EXTRACTION CURTAILMENT CRITERIA AND PROPOSAL: Hewlett-Packard shall submit a technical report acceptable to the Executive Officer containing a proposal for curtailment (i.e., termination or significant reduction in pumping rate) from any soil vapor extraction well(s) or piping and the criteria used to justify such curtailment. If the reason for curtailment is achievement of final cleanup standards, then the report shall include a proposal indicating the methods for determining concentrations of VOCs remaining in the soil. The proposal may include termination of soil vapor extraction well operation for an extended period of time to study the effects on chemical migration prior to well abandonment. The proposal shall include a schedule for implementation.

If the discharger claims that it is not practicable to achieve cleanup standards through continued soil vapor extraction in all or any portion of the contaminated soil area and that significant quantities of chemicals are not being removed through soil vapor extraction, the discharger shall evaluate the reductions in chemical concentrations and alternative cleanup standards that can be practicably achieved. The report shall evaluate alternative means of achieving cleanup standards, whether meeting the cleanup standard is technically impracticable, cost effective, and whether the alternative cleanup standard proposed will be protective of human health and the environment.

- g. **COMPLETION DATE: According to the schedule in the above Task approved by the Executive Officer.**

TASK 27: IMPLEMENTATION OF CURTAILMENT AND COMPLETION OF SOIL REMEDIATION: Hewlett-Packard shall submit a technical report acceptable to the Executive Officer documenting completion of the necessary tasks identified in the technical report submitted for the above task. The report shall include the results of any chemical analyses performed.

- h. **COMPLETION DATE: 60 days prior to proposed curtailment of any groundwater extraction well or groundwater treatment system.**

TASK 28: GROUNDWATER EXTRACTION CURTAILMENT CRITERIA AND PROPOSAL:

Hewlett-Packard shall submit a technical report acceptable to the Executive Officer containing a proposal for curtailing pumping from any groundwater extraction well(s) and the criteria used to justify such curtailment. This report shall include data to show that groundwater cleanup standards for all VOCs have been achieved and that pollutant levels have stabilized or are stabilizing, and that the potential for pollutant levels rising above cleanup standards is minimal. Curtailment of groundwater extraction means final shutdown of the system, a phased approach to shutdown, elimination of pumping in selected wells (including pulsed pumping), or a similar significant change to the system. In the case of final shutdown of any portion of the system, the report shall identify the basis for the time frame that will be used to confirm that groundwater concentrations have stabilized at or below final cleanup standards and that the potential for increases above cleanup standards is minimal in that portion of the system.

Any proposal to implement final shutdown of the system is subject to approval by the Board, and any proposal to implement a phased approach to shutdown or to eliminate the pumping in selected wells shall be subject to the approval of the Executive Officer and, if requested by the Executive Officer, the Board.

If the discharger claims that it is not practicable to achieve cleanup standards through continued groundwater extraction in all or any portion of the groundwater plume area, the discharger shall evaluate the reductions in chemical concentrations, the mass quantities being removed through groundwater extraction, and alternative cleanup standards that can be practically achieved. The report shall evaluate alternative means of achieving cleanup standards, whether meeting the cleanup standards is technically impracticable, cost effectiveness, and whether the alternative cleanup standard proposed will be protective of human health and the environment.

- i. **COMPLETION DATE: According to the schedule in the above Task approved by the Executive Officer.**

TASK 29: IMPLEMENTATION OF GROUNDWATER EXTRACTION CURTAILMENT: Hewlett-Packard shall submit a technical report acceptable to the Executive Officer documenting completion of the necessary tasks identified in the technical report submitted for the above task.

- j. **COMPLETION DATE: 30 days prior to building demolition.**

TASK 30: PROPOSAL FOR INVESTIGATION OF AREAS EXPOSED BY BUILDING DEMOLITION:

Hewlett-Packard shall submit a technical report acceptable to the Executive Officer proposing a sampling schedule for areas which have previously been inaccessible beneath present on-site buildings because of physical or operational constraints. This includes areas which could potentially impact groundwater or the environment and were difficult to sample prior to this Order.

- 6. **OFF-SITE AREA**
(Hewlett-Packard, Varian Associates, and Stanford University, as applicable)

- a. **COMPLETION DATE: 90 days after request made by the Executive Officer**

TASK 31: MAINTENANCE OF OREGON EXPRESSWAY UNDERPASS GROUNDWATER CONTROL AND REMEDIATION SYSTEM: Hewlett-Packard and Varian Associates shall submit a workplan and time schedule acceptable to the Executive Officer for alternate

control and remediation of groundwater if the present Oregon Expressway Underpass remediation system is rendered ineffective in remediating or preventing the spread of groundwater contamination.

- b. **COMPLETION DATE: 60 days prior to proposed curtailment of any groundwater extraction well or groundwater treatment system.**

TASK 32: GROUNDWATER EXTRACTION CURTAILMENT CRITERIA AND PROPOSAL:

Hewlett-Packard and Varian Associates shall submit a technical report acceptable to the Executive Officer containing a proposal for curtailing pumping from any groundwater extraction well(s) and the criteria used to justify such curtailment. This report shall include data to show that groundwater cleanup standards for all VOCs have been achieved and that pollutant levels have stabilized or are stabilizing, and that the potential for pollutant levels rising above cleanup standards is minimal. Curtailment of groundwater extraction means final shutdown of the system, a phased approach to shutdown, elimination of pumping in certain wells (including pulsed pumping), or a similar significant change to the system. In the case of final shutdown of any portion of the system, the report shall identify the basis for the time frame that will be used to confirm that groundwater concentrations have stabilized at or below final cleanup standards and that the potential for increases above cleanup standards is minimal in that portion of the system.

Any proposal to implement final shutdown of the system is subject to approval by the Board, and any proposal to implement a phased approach to shutdown or to eliminate the pumping in selected wells shall be subject to the approval of the Executive Officer and, if requested by the Executive Officer, the Board.

If the dischargers claim that it is not practicable to achieve cleanup standards through continued groundwater extraction in all or any portion of the groundwater plume area, the dischargers shall evaluate the reductions in chemical concentrations, the mass quantities being removed through groundwater extraction, and alternative cleanup standards that can be practically achieved. The report shall evaluate alternative means of achieving cleanup standards, whether meeting the cleanup standards is technically impracticable, cost effectiveness, and whether the alternative cleanup standard proposed will be protective of human health and the environment.

- c. **COMPLETION DATE: According to the schedule in the above Task approved by the Executive Officer**

TASK 33: IMPLEMENTATION OF GROUNDWATER EXTRACTION CURTAILMENT: Hewlett-Packard and Varian Associates shall submit a technical report acceptable to the Executive Officer documenting completion of the necessary tasks identified in the technical report submitted for the above task.

- d. **COMPLETION DATE: November 1, 1995**

TASK 34: INSTALLATION OF ADDITIONAL MONITORING WELLS: Hewlett-Packard and Varian Associates shall submit a technical report acceptable to the Executive Officer documenting installation of any remaining groundwater monitoring wells, CPTs, or hydropunches needed to assess: the effectiveness of the groundwater extraction system, the vertical and lateral distribution of the current groundwater plume and the future changes in plume dimensions as identified in a September 7, 1994 letter from Hewlett-Packard and Varian to Board staff.

- e. **COMPLETION DATE: December 1, 1994**

TASK 35: WORKPLAN FOR INSTALLATION OF EXPANDED GROUNDWATER EXTRACTION AND TREATMENT SYSTEM: Hewlett-Packard and Varian Associates shall submit a workplan and time schedule acceptable to the Executive Officer for installation of the expanded groundwater extraction system, as outlined in the selected final remedy (Alternative 2) described in the Feasibility Study and for evaluation of capture area. The workplan shall contain the final construction schedule through submittal of the start-up report.

- f. **COMPLETION DATE: Twelve months following approval of the workplan**

TASK 36: START-UP REPORT FOR GROUNDWATER EXTRACTION AND TREATMENT SYSTEM: Hewlett-Packard and Varian Associates shall submit a technical report acceptable to the Executive Officer documenting installation of the groundwater extraction system described in the above Task. The report shall contain as built construction drawings of the entire system and the first two weeks of monitoring data.

- g. **COMPLETION DATE: Nine months following date of start-up report**

TASK 37: EVALUATE CAPTURE AREA OF IMPACTED GROUNDWATER AND PROPOSE ADDITIONAL EXTRACTION WELLS IF NECESSARY: Hewlett-Packard and Varian Associates shall submit a technical report acceptable to the Executive Officer documenting implementation of the expanded groundwater extraction system and containing an evaluation of the capture zones of all groundwater extraction systems that impact groundwater in the COE and Perimeter Areas. The capture zones must affect on-and off-site groundwater with chemical concentration above the cleanup standards that originates from the sites. This evaluation must also propose additional extraction wells, if necessary, and an implementation schedule. This report shall contain data from the on-site areas and the Off-Site Area.

- h. **COMPLETION DATE: According to a schedule set in the above task approved by the Executive Officer**

TASK 38: START-UP OF MODIFICATIONS TO GROUNDWATER EXTRACTION AND TREATMENT SYSTEM: Hewlett-Packard and Varian Associates shall submit a technical report acceptable to the Executive Officer documenting completion of any modifications identified in the above Task.

7. **ALL AREAS**
(Hewlett-Packard, Varian Associates, and Stanford University, as applicable)

- a. **COMPLETION DATE: June 1, 2000**

TASK 39: FIVE YEAR STATUS REPORT AND EFFECTIVENESS EVALUATION: Hewlett-Packard and Varian Associates, as applicable, shall submit a technical report acceptable to the Executive Officer containing the results of any additional investigation; an evaluation of the effectiveness of installed final cleanup measures and cleanup costs; additional recommended measures to achieve final cleanup objectives and standards, if necessary; projected costs necessary to achieve cleanup objectives and standards; and the tasks and time schedule necessary to implement any additional final cleanup measures. This report shall also describe the reuse of extracted groundwater and evaluate and document the cleanup of contaminated groundwater. If cleanup standards in this Order have not been achieved on-site and are not expected to be achieved through continued groundwater extraction and/ or soil remediation, this report shall also contain an evaluation addressing whether it is technically practicable and cost effective to achieve the cleanup standards, and if so, a proposal for procedures to do so.

- b. **COMPLETION DATE: 90 days after request made by the Executive Officer**

TASK 40: EVALUATION OF NEW HEALTH CRITERIA: Hewlett-Packard and Varian Associates, as applicable, shall submit a technical report acceptable to the Executive Officer which contains an evaluation of how the final plan and cleanup standards would be affected, if the groundwater or soil cleanup standards listed in Table 1 of this Order change as a result of promulgation of revised drinking water standards, maximum contaminant levels or action levels or other health based criteria.

- c. **COMPLETION DATE: 90 days after request made by the Executive Officer**

TASK 41: EVALUATION OF NEW TECHNICAL INFORMATION: Hewlett-Packard and Varian Associates, as applicable, shall submit a technical report acceptable to the Executive Officer that documents an evaluation of new technical and economic information which indicates that cleanup standards or cleanup technologies in some areas may be considered for revision. Such technical reports shall not be required unless the Executive Officer or the Board determines that such new information indicates a reasonable possibility that the Order may need to be changed under the criteria described in Findings 18 through 21.

8. The submittal of technical reports evaluating final remedial measures will include a discussion of the cost, effectiveness, and impact on human health, and the environment with the guidance provided by Subpart F of the NCP (40 CFR Part 300); Section 25356.1(c) of the California Health and Safety Code; CERCLA guidance documents; and shall be consistent with the State Water Resources Control Board's Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California."
9. If the dischargers are delayed, interrupted or prevented from meeting one or more of the completion dates specified in this order, the dischargers shall promptly notify the Executive Officer, and the Board may consider revision to this Order for such delays.
10. Technical status reports on compliance with the Prohibitions, Specifications, and Provisions of this Order shall be submitted quarterly to the Board commencing on October 15, 1994 (for June, July and August), and covering the previous quarter. Reports shall be submitted on a quarterly basis, until one year after implementation of the expanded groundwater extraction and treatment system. The technical reports may then be submitted semi-annually after the second and fourth quarters thereafter, or as required by the Executive Officer. These reports shall consist of (1) a summary of work completed since submittal of the previous report and work projected to be completed by the time of the next report, (2) identification of any obstacles which may threaten compliance with the schedule of this Order and what actions are being taken to overcome these obstacles, and (3) include, in the event of noncompliance with any Provision or Specification of this Order, written notification which clarifies the reasons for non-compliance and which proposes specific measures and a schedule to achieve compliance. This written notification shall identify work not completed that was projected for completion, and shall identify the impact of non-compliance on achieving compliance with the remaining requirements of this Order.

These reports shall also identify any problems with or changes in the extraction and treatment system. Additionally, the reports shall include, but not be limited to, updated water table and piezometric surface maps and plume maps for all affected water-bearing zones as specified in the current groundwater self-monitoring program requirements, and appropriately scaled and detailed base maps showing the location of all monitoring wells and identifying adjacent facilities and structures. These reports may be combined

with quarterly SMRs required per Provision C.1.

11. On an annual basis beginning with the report due January 31, 1996, or as required by the Executive Officer, the status report shall include an evaluation of the progress of cleanup measures such as hydraulic control of the plume, performance of the remedy, estimation of capture zones influenced by extraction wells, establishment of cones of depression using field data, and a discussion of water quality data relevant to the evaluation of the progress of cleanup measures. The report shall also evaluate the effects of operation of existing extraction wells on groundwater levels and an estimate of the amount of chemicals removed via the extraction systems. These reports may be combined with quarterly SMRs required in Provision C.1. No such report needs to be filed in 2000.
12. Non-Binding Allocation of Responsibility: The cost of implementing the selected remedy should be allocated to Hewlett- Packard (45%) Varian Associates (45%) and Stanford (10%). These parties reserve all of their rights against and with respect to any other potentially responsible parties under any applicable law, including those named previously in this Order.
13. All technical reports or technical documents shall be signed by or stamped with the seal of a registered geologist, engineering geologist, or professional engineer.
14. All samples shall be analyzed by State certified laboratories or by laboratories accepted by the Board using approved EPA methods, where available, for the type of analysis to be performed. All laboratories shall maintain quality assurance/quality control records for Board review.
15. The dischargers shall maintain in good working order, and operate as efficiently as possible, any facility or control system installed to achieve compliance with the requirements of this Order.
16. Copies of all correspondence, reports, and documents pertaining to compliance with this Order or proposed changes to this Order shall be provided to the following agencies:
 - a. Santa Clara Valley Water District
 - b. U. S. Environmental Protection Agency, Region 9 (H-6-3)
 - c. California EPA/DTSC Site Mitigation BranchThe Executive Officer may additionally require copies of correspondence, reports, and documents pertaining to compliance with this Order to be provided to a local repository for public use.
17. The dischargers shall permit the Board or its authorized representative, in accordance with Section 13267(c) of the California Water Code:
 - a. Entry upon premises in which any pollution sources exist or may exist, consistent with the site Health and Safety Plan, or upon premises in which any required records relevant to this Order are kept.
 - b. Access to copy any records required to be kept under the requirements of this Order.
 - c. Inspection of any monitoring equipment or methodology implemented in response to this Order.
 - d. Sampling of any groundwater or soil which is accessible, or may become accessible, as part of any investigation or remedial action program

undertaken by the dischargers.

18. If any hazardous substance, as defined by Section 13050 of the California Water Code, is discharged in or on any waters of the state, or discharged and deposited where it is, or probably will be discharged in or on any waters of the state, the dischargers shall report such discharge to this Board, at (510) 286-1255 on weekdays during office hours (8 am to 5 pm) and to the Office of Emergency Services at (800) 852-7550 during non-business hours. A written report shall be filed with the Board within five working days and shall contain information relative to: the nature of waste or pollutant, quantity involved, duration of incident, cause of spill, SPCC plan in effect (if any), estimated size of affected area, nature of effect, corrective measures taken or planned, schedule of such measures, and persons/ agencies notified.
19. Hewlett-Packard shall provide written notification of any changes in site occupancy or ownership associated with facilities at 395 Page Mill Road and 640 Page Mill Road (so long as Hewlett-Packard is a current occupant or owner of such facilities) described in this Order within one month after such changes. Stanford University shall provide written notification of any changes in site occupancy or ownership associated with facilities at 601 California Avenue and 640 Page Mill Road (so long as Stanford University is a current occupant or owner of such facilities) described in this Order within one month after such changes.
20. The Board will review this Order periodically and may revise the requirements when necessary.
21. This Order supersedes and rescinds the following Board orders:

Discharger/Area	Order No.
Hewlett-Packard/395 Page Mill Road	89-050
Hewlett-Packard/640 Page Mill Road	90-067
Varian Associates/601 California Avenue	90-066

I, Steven R. Ritchie, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on September 21, 1994.



Steven R. Ritchie
Executive Officer

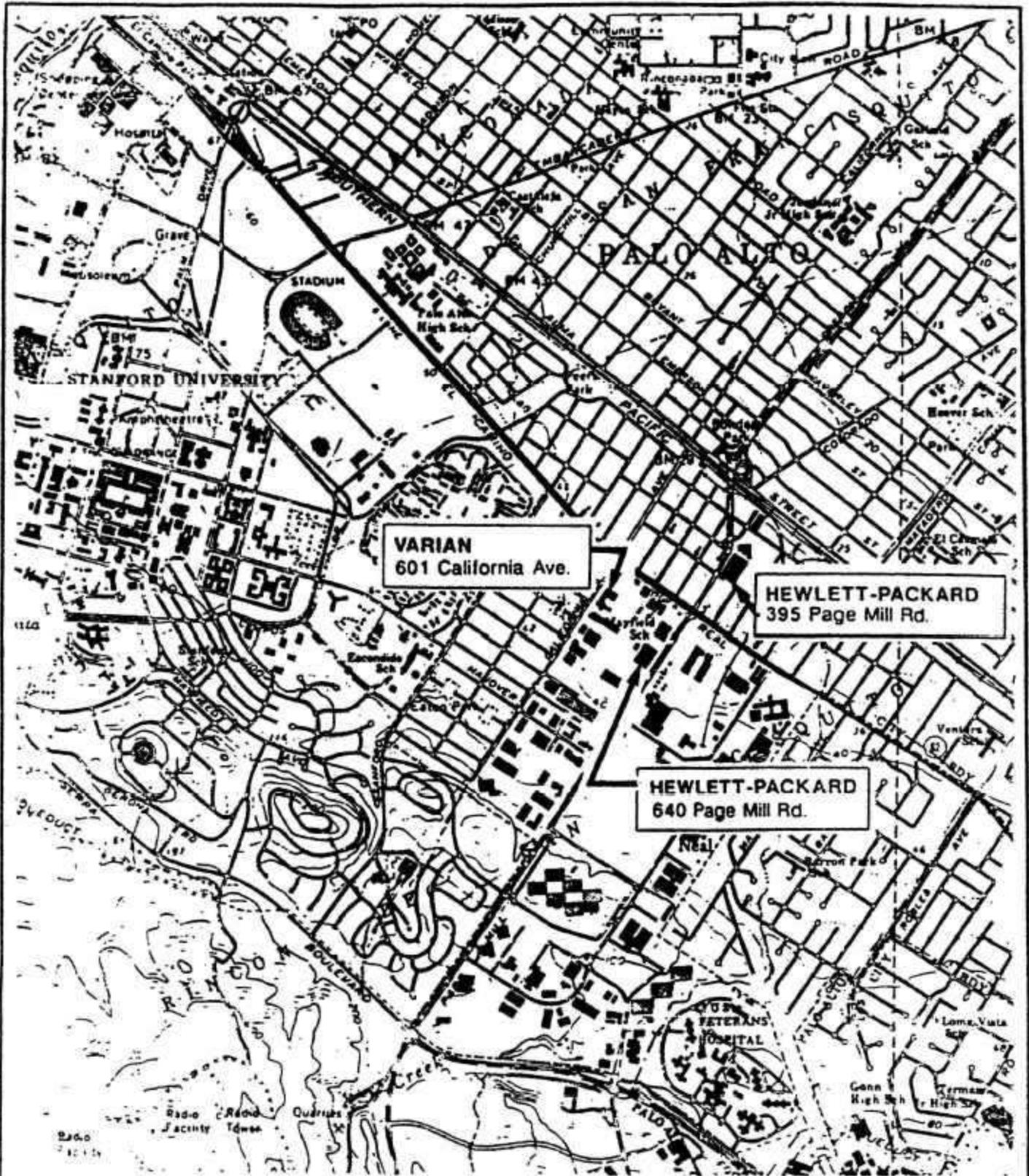
Attachments:

- Self-Monitoring Program
- Site Map
- Table 1 Groundwater Cleanup Standards

TABLE 1
SITE CLEANUP REQUIREMENTS
GROUNDWATER CLEANUP STANDARDS
HEWLETT-PACKARD 640 PAGE MILL ROAD
VARIAN 601 CALIFORNIA AVENUE
HEWLETT-PACKARD 395 PAGE MILL ROAD

CHEMICAL	CLEANUP STANDARD ug/L
Acetone	3,500
Benzene	1
1,1-Dichloroethane	5
1,2-Dichloroethane	0.5
1,1-Dichloroethene	6
<i>cis</i> -1,2-Dichloroethene	6
<i>trans</i> -1,2-Dichloroethene	10
Methylene Chloride	5
Tetrachloroethane	5
1,1,1-Trichloroethane	200
1,1,2-Trichloroethane	3
Trichloroethene	5
Freon 113	1,200
1,2-Dichlorobenzene	600
1,2,4-Trichlorobenzene	70

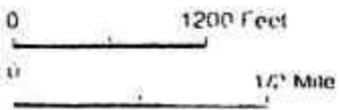
For all chemicals except Acetone, cleanup standards for groundwater are federal or state MCL's, whichever is lower. For acetone, there is no federal or state MCL and the cleanup standard is based on the EPA reference dose and a hypothetical maximum exposure rate.



VARIAN
601 California Ave.

HEWLETT-PACKARD
395 Page Mill Rd.

HEWLETT-PACKARD
640 Page Mill Rd.



STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

Hewlett-Packard 640 Page Mill Road
 Varian Associates 601 California Avenue
 Hewlett Packard 395 Page Mill Road
 Palo Alto

Figure 1 Site Vicinity

DRAWN BY: jmh **DATE:** 9/21/94 **DRWG NO.:** 1

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD SAN FRANCISCO BAY
REGION

GROUNDWATER SELF-MONITORING PROGRAM
FOR

HEWLETT-PACKARD COMPANY

640 Page Mill Road Facility Palo Alto, Santa Clara County
395 Page Mill Road Facility Palo Alto, Santa Clara County

VARIAN ASSOCIATES

601 California Avenue Facility Palo Alto, Santa Clara County

ORDER NO. 94-130

Adopted on September 21, 1994

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

HEWLETT-PACKARD COMPANY
640 Page Mill Road
395 Page Mill Road

VARIAN ASSOCIATES
601 California Avenue

Palo Alto, Santa Clara County

GROUNDWATER SELF-MONITORING PROGRAM

A. GENERAL

Reporting responsibilities of waste dischargers are specified in Sections 13225(a), 13267(b), 13268, 13383 and 13387(b) of the California Water Code and this Regional Board's Resolution No. 73-16.

The principal purposes of a monitoring program by a waste discharger, also referred to as self-monitoring program, are: (1) to document compliance with waste discharge requirements and prohibitions established by this Regional Board, (2) to facilitate self-policing by the waste discharger in the prevention and abatement of pollution arising from waste discharge, (3) to develop or assist in the development of effluent or other limitations, discharge prohibitions, national standards of performance, pretreatment and toxicity standards, and other standards, and (4) to prepare water and waste water quality inventories.

B. SAMPLING AND ANALYTICAL METHODS

Sample collection, storage, and analyses shall be performed according to the EPA Method 8000 series in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods," dated November 1990; or other methods approved and specified by the Executive Officer of this Regional Board.

C. REPORTS TO BE FILED WITH THE REGIONAL BOARD

1. Violations of Requirements

In the event the discharger is unable to comply with the conditions of the site cleanup requirements and prohibitions due to:

- a. Maintenance work, power failures, or breakdown of waste treatment equipment, or
- b. accidents caused by human error or negligence, or
- c. other causes, such as acts of nature, or
- d. poor operation or inadequate system design,

the discharger shall notify the Regional Board office by telephone as soon as he or his agents have knowledge of the incident and confirm this notification in writing within 5 working days of the telephone notification. The written report shall include time, date, and person notified of the incident. The report shall include pertinent information explaining reasons for the noncompliance and shall indicate what steps were taken to prevent the problem from recurring.

2. The discharger shall file a written technical report to be received at least 30 days prior to advertising for bid (or 60 days prior to construction) on any construction project which would cause or aggravate the discharge of waste in violation of requirements; said report shall describe the nature, cost, and scheduling of all action necessary to preclude such discharge.

3. Self Monitoring Reports

Written reports shall be filed regularly for each calendar quarter (unless specified otherwise) and filed no later than the fifteenth day of the following quarter. The next quarterly report is due October 15, 1994. The reports shall be comprised of the following:

- a. Letter of Transmittal:

A letter from the discharger transmitting self-monitoring reports should accompany each report. Such a letter shall include a discussion of requirement violations found during the reporting period and actions taken or planned for correcting any requirement violations. If the discharger has previously submitted a detailed time schedule for correcting requirement violations, a reference to this correspondence will be satisfactory. Monitoring reports and the letter transmitting reports shall be signed by a principal executive officer or a duty authorized representative of that person.

The letter shall contain a statement by the official, under penalty of perjury, that to the best of the signer's knowledge the report is true and correct.

- b. Results of Analyses and Observations

- (1) Results from each required analysis and observation shall be submitted in the quarterly self-monitoring regular reports. Results shall also be submitted for any additional analyses performed by the dischargers at the specific request of the Board. Quarterly water level data shall also be submitted in the quarterly report.
- (2) The quarterly reports shall include the groundwater extraction rates from each extraction well, water level data from the extraction wells, the results of any aquifer tests conducted during the quarter.
- (3) The quarterly reports shall include a discussion of unexpected operational changes which could affect performance of the extraction system, such as flow fluctuations, maintenance shutdown, etc.
- (4) The quarterly report shall also identify the analytical procedures used for analyses either directly in the report or by reference to a standard plan accepted by the Executive Officer. Any special methods shall be identified and should have prior approval of the Board's Executive Officer.
- (5) The discharger shall describe in the quarterly Self- Monitoring Report (SMR) the reasons for significant increases in a pollutant concentration at a well. The description shall include:
 - a) the source of the increase,
 - b) how the discharger determined or will investigate the source of the increase, and
 - (c) what source removal measures have been completed or will be

proposed.

- (6) Original lab results shall be retained and shall be made available for inspection for six years after origination or until after all continuing or impending legal or administrative actions are resolved.
- (7) A map or maps shall accompany the quarterly report, showing all sampling locations and plume contours to final cleanup levels.
- (8) The discharger shall describe in the quarterly monitoring report the effectiveness of the actions taken to regain compliance if compliance is not achieved. The effectiveness evaluation shall include the basis of determining the effectiveness, water surface elevations and water quality data.
- (9) The annual report shall be combined with the fourth quarter regular report and shall include cumulative data for the current year. The annual report for December shall also include minimum, maximum, median, and average water quality data for the year, a summary of water level data, and GC/MS results. The report shall contain both tabular and graphical summaries of historical monitoring data.

d. SMP Revisions:

Additional long term or temporary changes in the sample collection frequency and routine chemical analysis may become warranted as monitoring needs change. These changes shall be based on the following criteria and shall be proposed in a quarterly SMR. The changes shall be implemented no earlier than 45 days after the self-monitoring report is submitted for review unless approved in writing.

Criteria for SMP revision:

- (1) Discontinued analysis for a routine chemical parameter for a specific well after a two-year period of below detection limit values for that parameter.
- (2) Changes in sampling frequency for a specific well after a two-year period of below detection limit values for all chemical parameters from that well.
- (3) Temporary increases in sampling frequency or changes in requested chemical parameters for a well or group of wells because of a change in data needs (e.g., evaluating groundwater extraction effectiveness or other remediation strategies).
- (4) Add routine analysis for a chemical parameter if the parameter appears as an additional chromatographic peak in three consecutive samples from a particular well.
- (5) Alter sampling frequency based on evaluation of collective data base.

D. DESCRIPTION OF SAMPLING STATIONS

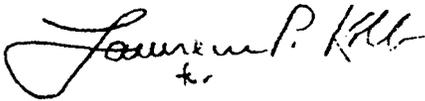
All existing and future monitoring and extraction wells as appropriate. See Table I and Figure 2 (attached) for monitoring and extraction wells installed at the time of the adoption of this SMP.

E. SCHEDULE OF SAMPLING AND ANALYSES

1. The schedule of sampling and analysis shall be that given in Table I (attached).
2. In addition, if a previously undetected compound or peak is detected in a sample from a well, a second sample shall be taken within a week after the results from the first sample are available. All chromatographic peaks detected in two consecutive samples shall be identified and quantified in the quarterly report.
3. Groundwater elevations shall be obtained on a quarterly basis from all wells at the site and submitted in the quarterly report with the sampling results.
4. Well depths shall be determined on an annual basis and compared to the depth of the well as constructed. If greater than ninety percent of screen is covered, the discharger shall clear the screen by the next sampling.

I, Steven R. Ritchie, Executive Officer, hereby certify that the foregoing Self-Monitoring Program:

1. Has been developed in accordance with the procedure set forth in this Regional Board's Resolution No. 73-16 in order to obtain data and document compliance with site cleanup requirements established in Regional Board Order No. 94-130
2. May be reviewed at any time subsequent to the effective date upon written notice from the Executive Officer or request from the discharger, and revisions will be ordered by the Executive Officer or Regional Board.
3. Was adopted by the Board on September 21, 1994



Steven R. Ritchie
Executive Officer

Attachments:

- Table 1 - Sampling Schedule
- Figure 1 - Site Vicinity
- Figure 2 - SMP and other wells

TABLE 1
SELF MONITORING PROGRAM
SAMPLING SCHEDULE
HEWLETT-PACKARD 640 PAGE MILL ROAD
VARIAN ASSOCIATES 601 CALIFORNIA AVENUE
HEWLETT-PACKARD 395 PAGE MILL ROAD

WELL NUMBER	8010 + Freon	8020 + Acetone	8240 + Freon (1)	8270 or TPH
017B	S		A	
F21A1U	Q		A	
F22A1U	Q		A	
F23A	Q		A	
O27A1	S		A	
O28A1	Q	S	A	8270, A
F29A1U	S		A	
F30A1U (2)	Q		A	
F32A	S		A	
F33B			A	
F34A	Q		A	
F35B	S		A	
F36A	Q		A	
F37A	S		A	
F38A	S		A	
F39A	Q		A	
F40A	Q		A	
F42A1	Q		A	
F43A1U (2)	Q		A	
F44A	Q		A	
F45A1U (2)	Q	Q	A	
F46A1	Q		A	
F49A1	Q		A	
F51A1	S		A	

WELL NUMBER	8010 + Freon	8020 + Acetone	8240 + Freon (1)	8270 or TPH
O52A2	Q	S	A	
F53A1U	S		A	
F54A1U	S		A	
F57A1U	Q		A	
F58A	S		A	
F59A1U	Q		A	
F61A1U	Q		A	
F62A1	Q		A	
F63A1U/A1	Q		A	
F64A1	Q		A	
F65A1U	Q		A	
F66A			A	
O67A2	S		A	
O68A1	Q	Q	A	
O69A2D			A	
O70A1	Q		A	
F73A1	Q		A	
F74A	Q		A	
F75A1U	Q		A	
F76A2 (3)	Q		A	
F77A1U (3)	Q		A	
F78A1	Q		A	
F79A2D	S		A	
F83A1U	Q		A	
F84A1	S		A	
F85A1	Q		A	
F86A2			A	
F87A2	S		A	
F88A1U	Q		A	

WELL NUMBER	8010 + Freon	8020 + Acetone	8240 + Freon (1)	8270 or TPH
F89A	Q		A	
F90A1U	Q		A	
F91A1	S		A	
F92A2	S		A	
F93A1U	S		A	
F95A	S		A	
F97A	Q		A	
F98A	Q		A	
O100B			A	
F101B			A	
F102B	S		A	
F103B	S		A	
O104A1			A	
O105A2	S	S	A	
F106A1	S	S	A	
F107A2	S	S	A	
O108A1	S	S	A	
O109A2	S	S	A	
O110A1	Q	S	A	
O111A2	Q	S	A	
O112A1	Q	S	A	
O113A2	Q	S	A	
O114A2	Q	S	A	
O115A1	Q	S	A	
O116A1	Q	S	A	8270, Q
O117A2	Q	S	A	8270, S
O118B	Q	S	A	8270, A
O119A1	Q	S	A	8270, S
O120A2	Q	S	A	8270, S

WELL NUMBER	8010 + Freon	8020 + Acetone	8240 + Freon (1)	8270 or TPH
O121A2	S	S	A	
O122A2	S	S	A	
F123A1	Q		A	
F124A2	Q		A	
F125A1	Q		A	
F126A2	Q		A	
F127A1	Q		A	
F128A	S		A	
F129A1	S		A	
F130A1U	Q		A	
F131A1	Q		A	
F132A2	S		A	
F133B	S		A	
F134A1	Q		A	
F135A1	Q		A	
F136A1	S		A	
F137A1	S		A	
F141A1U	Q		A	
F142A1	Q		A	
F143A1U	Q		A	
F144A2	Q		A	
F145A1	Q		A	
F146A1U	Q		A	
F147A1	Q		A	
EW-4	Q		A	
EW-5	Q		A	
EW-6	Q		A	
EW-7	Q		A	
EW-8	Q		A	

WELL NUMBER	8010 + Freon	8020 + Acetone	8240 + Freon (1)	8270 or TPH
EW-9	Q		A	
EW-10	Q		A	
EW-11	Q		A	
EW-13	Q		A	
V8-1	Q		A	
V8-2	Q	S	A	
V8-2X	Q		A	
V8-3	Q		A	
V8-4	Q		A	
V8-5	Q		A	
V8-6	S		A	
V8-7	Q	S	A	
V8-8	Q		A	
V8-8X	Q		A	
V-9	S		A	
V-9X	S		A	
V-10	S		A	
V8-13B	S		A	
V8-14X	Q		A	
V8-22	Q		A	
V-23	Q		A	
V-33A2D	S		A	
W-3A1U	Q		A	
W-4A1U/A1				TPH, A (4)
W-5A1	Q		A	
W-6A1U	S		A	
W-7A1U	Q		A	
W-8A1U	S		A	TPH, A (4)
W-9A1U/A1	S		A	

WELL NUMBER	8010 + Freon	8020 + Acetone	8240 + Freon (1)	8270 or TPH
W-10A1U	Q		A	
W-11A1U	S		A	TPH, A (4)
W-12A1U	Q		A	
W-13A2	Q		A	
W-14A1U/A1	Q		A	
W-16A1	Q		A	
W-17A2	Q		A	
W-19A2	S		A	
W-20B	Q		A	
BP-3 (3)	Q		A	
BW-4	S		A	
MB-2	Q		A	
SH-1	Q		A	
VB-1	Q		A	
OEU-MANHOLE			A	

Q = quarterly

S = semiannually

A = annually

8010 + Freon = EPA method 8010 and Freon 113

8020 + Acetone = EPA method 8020 and Acetone

8240 = EPA method 8240 + Freon 113

8270 = EPA method 8270

TPH = EPA method 8015 and 5520/413

Well Numbering scheme

O = 640 on-site well

F = COE or perimeter well

EW = Extraction well, HP associated or off-site

X = Extraction well, Varian 601 associated

V = Varian 601 associated well

W = HP 395 on-site well

A = A zone well

A1 = A1 zone well

A1U = A1 Upper zone well

A2 = A2 zone well

A2D = A2 Deep zone well

B = B zone well

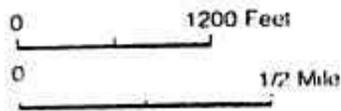
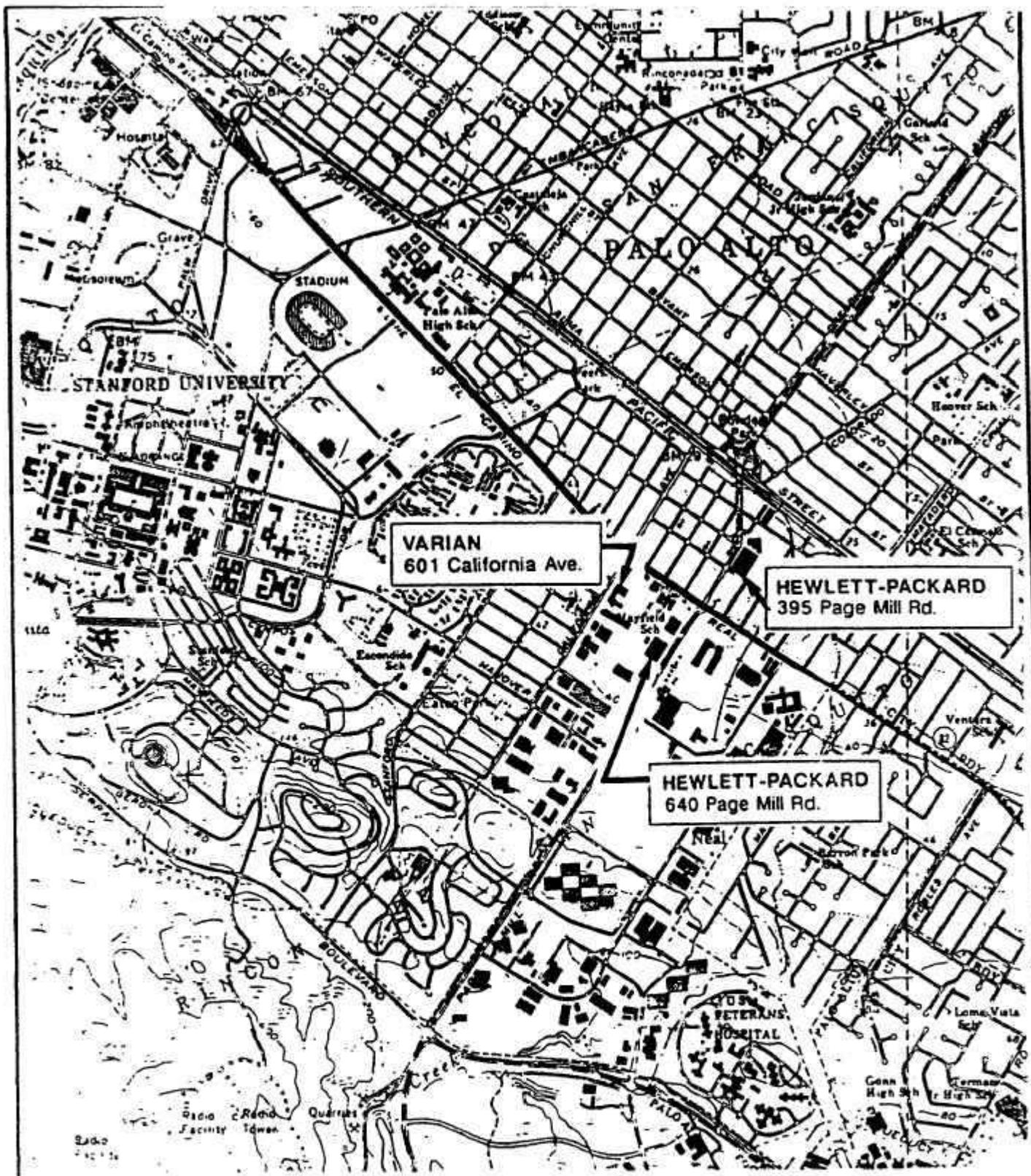
OEU = Oregon Expressway Underpass

(1) Annual EPA Method 8240 analysis is in place of (and not in addition to) quarterly EPA Methods 8010 and 8020 analysis.

(2) Not currently sampled; resume sampling when the A1U zone resaturates.

(3) Not currently sampled; resume sampling if access is obtained.

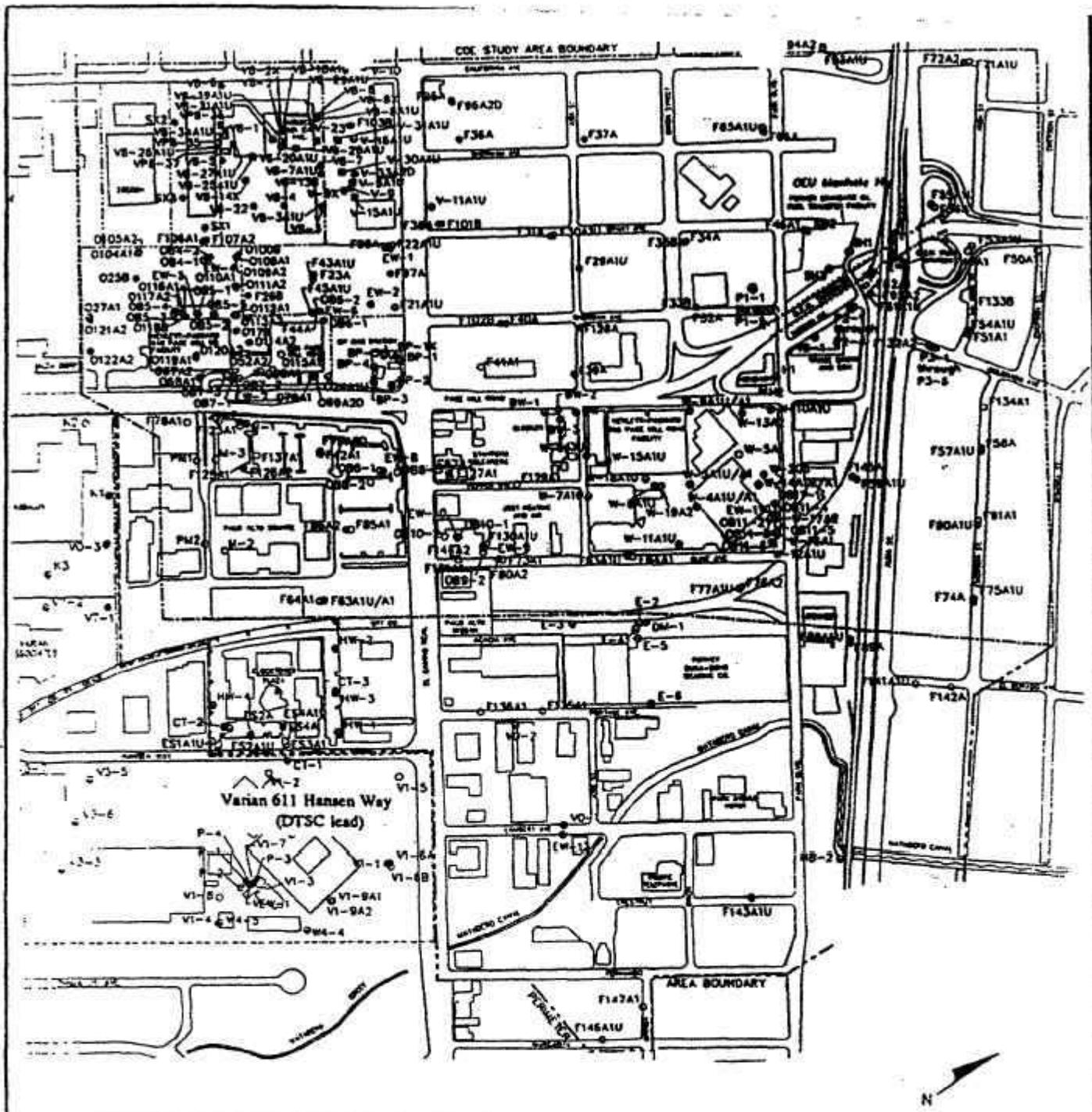
(4) Sample only if TPH is left behind in soil at concentrations greater than 100 parts per million after site redevelopment.



STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

Hewlett-Packard 640 Page Mill Road
 Varian Associates 601 California Avenue
 Hewlett-Packard 395 Page Mill Road
 Palo Alto
 Figure 1 Site Vicinity

DRAWN BY: jmh **DATE:** 9/21/94 **DRWG. NO. 1**



EXPLANATION	
W-12A1U	A1U Zone Monitoring Well
W-4A1U/A1	A1U/A1 Zone Monitoring Well
O28A	A Aquifer Monitoring Well
F21A1	A1 Zone Monitoring Well
F88A2	A2 Zone Monitoring Well
F26B	B Aquifer Monitoring Well
EW-2	Ground Water Extraction Well
VB-29A1U	Vapor Extraction System Well

NOTE
 "D" suffix indicates well screened in deep subunit.
 "O" prefix indicates observation well for extraction pumping.
 "F" prefix indicates observation well for Oregon Express-wal Subaron pumping.

STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

Hewlett-Packard 640 Page Mill Road
 Varian Associates 601 California Avenue
 Hewlett-Packard 395 Page Mill Road
 Palo Alto

Figure 2 SMP and Other Wells

DRAWN BY:	DATE: 9/21/94	DRWG. NO. 2
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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

SAN FRANCISCO BAY REGION
2101 WEBSTER STREET, SUIT 500
OAKLAND, CA 94612
(510) 286-1255



October 21, 1994
File No. 2189.8063A(JMH)
.8131
.8249

Robin Ross
Hewlett-Packard
1501 Page Mill Road MS 5U
Palo Alto, CA 94304

Paula Kakimoto
Stanford Management Company
2770 Sand Hill Road
Menlo Park, CA 94025

Bo Gustincic
Varian Associates
3120 Hansen Way MS D-095
Palo Alto, CA 94303-0883

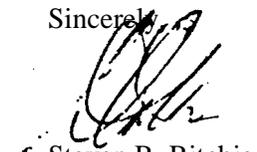
RE: CORRECTION OF SELF MONITORING REPORT FOR ORDER NO. 94-130, 640 PAGE MILL ROAD, 601 CALIFORNIA AVENUE, AND 395 PAGE MILL ROAD, PALO ALTO, SANTA CLARA COUNTY

Dear Addressees:

Attached is a corrected copy of the Self Monitoring Report approved at the September 21, 1994 Regional Board meeting. An incorrect, older version of the SMP was inadvertently sent out with the Site Cleanup Requirements after the Order was adopted. The corrected SMP is what the Board voted on at the September 21, 1994 Board meeting. Please discard only the seven page text you currently have (the tables and figures are unchanged) and replace it with the text provided.

Please call John Hillenbrand of my staff at (510) 286-0671 if you have any questions.

Sincerely,


Steven R. Ritchie
Executive Officer

Attachment
cc w/attachment: Mailing list

Mailing List

Will Beckett
Barron Park Association Foundation
4189 Baker Avenue
Palo Alto, CA 94306

John Joynt
Barron Park Foundation
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Menlo Park, CA 94025

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San Jose CA 95118

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U.S. EPA Region IX
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San Francisco, CA 94105

Belinda Wei
U.S. EPA Region IX
75 Hawthorn Street
San Francisco, CA 94105

Dr. Inge Harding-Barlow
3717 Laguna Avenue
Palo Alto, CA 94306

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD SAN
FRANCISCO BAY REGION

GROUNDWATER SELF-MONITORING PROGRAM
FOR

HEWLETT-PACKARD COMPANY

640 Page Mill Road Facility Palo Alto, Santa Clara
County

395 Page Mill Road Facility Palo Alto, Santa Clara
County

VARIAN ASSOCIATES

601 California Avenue Facility Palo Alto, Santa Clara
County

ORDER NO. 94- 130

Adopted on September 21, 1994

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

HEWLETT-PACKARD COMPANY
640 Page Mill Road
395 Page Mill Road

VARIAN ASSOCIATES
601 California Avenue

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GROUNDWATER SELF-MONITORING PROGRAM

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B. SAMPLING AND ANALYTICAL METHODS

Sample collection, storage, and analyses shall be performed according to the EPA Method 8000 series in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods," dated November 1992; or other methods proposed by the dischargers and approved by the Executive Officer of this Regional Board.

C. REPORTS TO BE FILED WITH THE REGIONAL BOARD

1. Violations of Requirements

In the event the discharger is unable to comply with the conditions of the site cleanup requirements and prohibitions due to:

- a. Maintenance work, power failures, or breakdown of waste treatment equipment, or
- b. accidents caused by human error or negligence, or
- c. other causes, such as acts of nature, or
- d. poor operation or inadequate system design,

the dischargers shall notify the Regional Board office by telephone expeditiously after obtaining knowledge of the incident and confirm this notification in writing within 5 working days of the telephone notification. The written report shall include time, date, and person notified of the incident. The report shall include pertinent information explaining reasons for the noncompliance and shall indicate what steps were taken to prevent the problem from recurring.

2. The dischargers shall file a written technical report to be received at least 30 days prior to advertising for bid (or 60 days prior to construction) on any construction project undertaken by those dischargers which would cause or aggravate the discharge of waste in violation of requirements; said report shall describe the nature, cost, and scheduling of all action necessary to preclude such discharge.

3. Self-Monitoring Reports

Written reports shall be filed regularly for each quarter (quarters are three months in duration with the First Quarter of each year beginning in March) and filed no later than 45 days after the end of the quarter. The next quarterly report is due October 15, 1994. The reports shall be comprised of the following:

- a. Letter of Transmittal:

A letter from the discharger transmitting self-monitoring reports should accompany each report. Such a letter shall include a discussion of requirement violations found during the reporting period and actions taken or planned for correcting any requirement violations. If the discharger has previously submitted a detailed time schedule for correcting requirement violations, a reference to this correspondence will be satisfactory. Monitoring reports and the letter transmitting reports shall be signed by a principal executive officer or a duly authorized representative of that person.

The letter shall contain a statement by the official, under penalty of perjury, that to the best of the signer's knowledge the report is true and correct.

- b. Results of Analyses and Observations

- (1) Results from each required analysis and observation made during the quarter shall be submitted in the associated quarterly self-monitoring regular report. Results shall also be submitted for any additional SMP analyses performed during the quarter by the dischargers at the specific request of the Board. Quarterly water level data shall also be submitted in the quarterly report in tabular format. Potentiometric surface maps for the A1 Upper, A1, and A2 Zones, and the B Aquifer shall also be submitted in the quarterly reports.

A discussion of data presentation techniques shall be included in the annual report (see Section C.3.b.(9)) unless changes in these techniques have occurred. The quarterly reports may reference the discussion in the annual report.

- (2) The quarterly reports shall include the groundwater extraction rates from each extraction well, water level data from the extraction wells, the available results of any aquifer tests conducted during the quarter.
- (3) The quarterly reports shall include a discussion of unexpected operational changes which could affect performance of the extraction system, such as flow fluctuations, maintenance shutdown, etc.
- (4) The quarterly report shall also identify the analytical procedures used for analyses either directly in the report or by reference to a standard plan accepted by the Executive Officer. Any special methods

shall be identified and should have prior approval of the Board's Executive Officer.

- (5) The discharger shall describe in the quarterly Self-Monitoring Report (SMR) the reasons for significant increases in a pollutant concentration at a well. The description shall include:
 - a) the source of the increase,
 - b) how the discharger determined or will investigate the source of the increase, and
 - c) what source removal measures have been completed or will be proposed.
- (6) Original lab results shall be retained and shall be made available for inspection for six years after origination or until after all continuing or impending legal or administrative actions are resolved.
- (7) A trichloroethene (TCE) isoconcentration map for the A1 Upper, A1, and A2 Zones shall accompany the quarterly report, showing all sampling locations for the quarter and plume contours to final cleanup levels. Isoconcentration maps for TCE, 1,1,1,-trichloroethane (TCA), 1,1-dichloroethene (1,1-DCE), and tetrachloroethene (PCE) in the A1 Upper, A1, and A2 Zones shall accompany the annual report and show all sampling locations for the quarter and plume contours to final cleanup levels. If EPA Method 8240 results are non-detect for a well, then the isoconcentration maps included in the annual report will use the lowest reported value or detection limit for the year previous. In addition, maps showing the results of aromatic and semivolatile testing in the A Aquifer, and volatile and semivolatile testing in the B Aquifer shall accompany the annual report.
- (8) The discharger shall describe in the quarterly monitoring report the effectiveness of the actions taken to regain compliance if compliance is not achieved. The effectiveness evaluation shall include the basis of determining the effectiveness, the water surface elevations and the water quality data.
- (9) The annual report shall be combined with the fourth quarter regular report and shall include cumulative water quality and water level data for the current year. The annual report for December shall also include minimum, maximum, and average water quality data for the year, a summary of water level data, and analytical results. The report shall clearly reference the location of tabular summaries of historical monitoring data.

c. SMP Revisions:

Additional long term or temporary changes in the sample collection frequency and routine chemical analysis may become warranted as monitoring needs change. Dischargers may submit a proposed revision to the SMP with the annual report.

D. DESCRIPTION OF SAMPLING STATIONS

All existing and future monitoring and extraction wells as appropriate. See Table I and Figure 2 (attached) for monitoring and extraction wells included in the SMP and installed

at the time of the adoption of this SMP.

E. SCHEDULE OF SAMPLING AND ANALYSES

1. The schedule of sampling and analysis shall be that given in Table I (attached).

2. In addition, if a historically undetected EPA Method target compound (according to the analytical schedule presented in Table 1 for each well) is detected in a sample from a well, and the following conditions are met, a second sample shall be taken within two weeks after the results from the first sample are available. These results will be presented either in the SMR for the current quarter or in a supplement to follow the SMR, whichever is practical. The conditions requiring a resampling are as follows:
 - a) For wells located at the edge of a plume:
 - i) The historically undetected compound is detected at a concentration at or above one-half the site cleanup standard for the compound; and
 - ii) The historically undetected compound is not a recognized laboratory contaminant.

 - b) For all other wells:
 - i) The historically undetected compound is detected at a concentration at least 10 times the site cleanup standard for the compound; and
 - ii) The historically undetected compound is not a recognized laboratory contaminant; and
 - iii) The historically undetected compound is not a common daughter product of detected compounds. Daughter products present expected change, not an unexpected change in the contaminant plume.

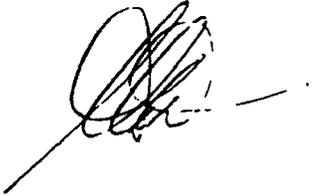
This rapid resampling requirement may be waived by RWQCB staff if RWQCB staff decides, based on information presented by the discharger to RWQCB staff within the two week period after the results from the first sample are available, not to require rapid resampling. In this situation, the well would be monitored for the historically undetected compound in the next regular sampling period.

3. Groundwater elevations shall be obtained on a quarterly basis from all wells at the site and submitted in the quarterly report with the sampling results.

4. Well depths of those wells sampled as part of the SMP shall be determined on an annual basis and compared to the depth of the well as constructed. If greater than ninety percent of screen is covered, the discharger shall clear the screen by the next sampling.

I, Steven R. Ritchie, Executive Officer, hereby certify that the foregoing Self-Monitoring Program:

1. Has been developed in accordance with the procedure set forth in this Regional Board's Resolution No. 73-16 in order to obtain data and document compliance with site cleanup requirements established in Regional Board Order No. 94- 130
2. May be reviewed at any time subsequent to the effective date upon written notice from the Executive Officer or request from the discharger, and revisions will be ordered by the Executive Officer or Regional Board.
3. Was adopted by the Board on September 21, 1994

A handwritten signature in black ink, appearing to read "S. Ritchie", with a long horizontal line extending to the right.

Executive Officer

Attachments: Table 1 - Sampling Schedule
Figure 1 - General Location Map
Figure 2 - Well Location Map