

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. R2-2012-0003

REVISED FINAL SITE CLEANUP REQUIREMENTS and
RESCISSION OF ORDER Nos. 86-01, 89-028 AND 95-160 for:

HEWLETT PACKARD COMPANY and
STANFORD UNIVERSITY

for the property located at:

3500 DEER CREEK ROAD
PALO ALTO, SANTA CLARA COUNTY

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

- 1. Site Location:** The site is located at 3500 Deer Creek Road in Palo Alto, approximately 2000 feet northeast of Interstate 280. The 24-acre site is bound by Deer Creek on the west and north, Deer Creek Road on the east, and Arastradero Road on the south. The site is situated within a mixed commercial/industrial and residential area.
- 2. Site History:** Stanford University (Stanford) owns the site. The site was initially leased and developed in 1969 by Fairchild Camera and Instrument Corporation (Fairchild); Fairchild constructed Building 25 in 1970. Hewlett Packard company (HP) purchased the lease from Fairchild in 1974, and operated a research and testing laboratory on the property from 1974 to 1999. In 1981, HP constructed a small chemical storage shed southwest of Building 25 and, in 1985, constructed Building 26. Building 24 (initially referred to as the Building 25 Addition) was constructed by HP in 1991. In 1975, HP installed three underground storage tanks (USTs) in one UST pit in the Service Yard west of Building 25. The UST in the center of the backfill was 2,000 gallons in capacity and used to collect waste organic solvents. HP used chlorinated and aromatic volatile organic compounds (VOCs) in its semi-conductor manufacturing processes. The UST containing waste VOCs leaked and released VOCs to soil and groundwater.

West of Building 25 in the Service Yard and northeast of the former UST area, Fairchild installed a concrete-lined acid neutralization sump to neutralize mostly acidic wastewater before its discharge to the sanitary sewer. HP stopped using the sump in 1986. The sump was investigated as a potential source of chemicals released to soil and groundwater beneath the Service Yard. Until 2007, the Department of Toxic Substances Control regulated the sump under federal hazardous waste regulations. On August 23, 2007, Santa Clara Department of Environmental Health oversaw closure of the sump and submitted a leak report to the Regional Water Board and the Department of Toxic Substances Control due to low levels of solvents found in the soil beneath the sump.

In 1999, Agilent Technologies separated from HP and continued operating semiconductor research and testing facilities at the site. Agilent Technologies occupied the site until 2006 and has completed closure activities that were overseen and approved by the Palo Alto Fire Department. The site is currently leased by Tesla Motors, Inc., for electric car research and manufacturing.

3. **Named Dischargers:** HP is named as a discharger because of substantial evidence that it discharged pollutants to soil and groundwater at the site, including its use of VOCs in semiconductor manufacturing; the presence of these same pollutants in soil in the immediate vicinity of the former UST area and Service Yard; and the presence of these same pollutants in groundwater at and downgradient of the former UST area.

Stanford is named as a discharger because it is the current owner of the property on which there is an ongoing discharge of pollutants, it has knowledge of the discharge or the activities that caused the discharge, and it has the legal ability to control the discharge.

Stanford is named as a secondarily-responsible discharger as specified in Provision 11. Stanford is responsible for Task 4 and Provision 9. Except for Task 4, Stanford will be responsible for compliance with the tasks included in this order only if the Regional Water Board or the Executive Officer finds that HP has failed to comply with the requirements of this Order.

If additional information is submitted indicating that other parties caused or permitted any waste to be discharged on the site where it entered or could have entered waters of the State, the Regional Water Board will consider adding those parties to this order.

4. **Regulatory Status:** This site has been subject to the following Regional Water Board orders:
 - Site Cleanup Requirements (Order No. 86-01) adopted on February 19, 1986
 - Site Cleanup Requirements (Order No. 89-028) adopted on February 15, 1989, as amended by Amendment to Site Cleanup Requirements (Order No. 95-160), adopted on July 19, 1995.
5. **Site Hydrogeology:** The site is located in foothills on the northeast side of the Santa Cruz Mountains. Regional groundwater flow is to the northeast, toward San Francisco Bay. Local groundwater flow in the shallow unconfined aquifer is to the west and northwest above the Deer Creek terrace and to the north along the creek. The shallow aquifer exists from the ground surface down to approximately 75 feet below ground surface (bgs). Groundwater seasonally ranges from 6 to 33 feet bgs in the shallow aquifer. A 30-foot thick clay layer underlies the shallow aquifer.

Deer Creek flows as a perennial stream through the western portion of the site. Monthly stream flow monitoring conducted between February 1987 and January 1988 revealed that the creek was a gaining stream under non-pumping conditions. A long-term pumping test in May and June 1987 revealed that the portion of Deer Creek adjacent to the site became a losing stream when groundwater extraction was occurring along the creek terrace. Creek

sampling data collected since 1983 show that VOCs originating from the site were periodically detected in the creek adjacent to and downgradient from the site. VOCs have not been detected in the creek since the fourth quarter of 2008.

6. Remedial Investigation: Trichloroethene (TCE), xylene, isopropyl alcohol, methanol and acetone were released from the UST to the underlying soil. Since the release occurred over 30 years ago, degradation byproducts of TCE have also been detected, including: 1,1-dichloroethane (1,1-DCA); 1,1-dichloroethene (1,1-DCE); cis-1,2-dichloroethene (cis-1,2-DCE); trans-1,2-dichloroethene (trans-1,2-DCE); and vinyl chloride. These pollutants have been adequately defined in soil gas, soil, and groundwater.

a. Groundwater: Since the 1980s, groundwater extraction has reduced VOC concentrations substantially. The current maximum groundwater concentrations as of June 2011 exist in the former UST area as follows with the most elevated concentrations in wells B-5 and B-7:

- TCE at 430 micrograms per liter (ug/L)
- Cis-1,2-DCE at 1,200 ug/L
- Vinyl chloride at 230 ug/L
- Toluene at 330 ug/L
- Ethylbenzene at 180 ug/L
- Xylenes at 390 ug/L

The lateral extent of the groundwater plume is adequately characterized and exists entirely onsite, extending approximately 500 feet northeast of the source at the former UST. Groundwater TCE levels in the former UST area increased after enhanced in-situ bioremediation injections, and then subsequently decreased. TCE levels increased from 3,500 ug/L in June 2005 to 110,000 ug/L in June 2006 and then decreased to 3,100 ug/L in December 2009. HP plans to install one additional monitoring well in the source area to monitor the shallow aquifer.

b. Soil: Site Cleanup Requirements (Order No. 95-160), adopted on July 19, 1995, indicated that soil cleanup in the former UST area was complete. Based on soil data from the late 1980s, the current maximum soil concentrations in the former UST area are as follows:

- TCE at 2.9 mg/kg
- Cis-1,2-DCE at 2.5 mg/kg
- Acetone at 410 mg/kg

In 2007, soil sampling and analysis was conducted by Stanford and Agilent, the tenant from 1999 to 2007, in areas of the site outside the former UST area. Sampling was conducted beneath a former acid neutralization system (ANS), beneath the existing buildings, and at several outdoor locations. Maximum soil concentrations detected were as follows:

- TCE at 0.56 milligrams per kilogram (mg/kg)
- Cis-1,2-DCE at 0.05 mg/kg
- 1,1,1-trichloroethane (1,1,1-TCA) at 0.006 mg/kg
- 1,1-dichloroethene (1,1-DCE) at 0.001 mg/kg

c. **Soil Gas:** The current maximum soil gas concentrations in the former UST area are as follows:

- TCE at 33,000 ug/m³
- Cis-1,2-DCE at 77,000 ug/m³
- Vinyl chloride at 4,100 ug/m³
- Benzene at 150 ug/m³

The current maximum soil gas concentrations beneath the existing building are as follows:

- TCE at 4,200 ug/m³
- Cis-1,2-DCE at 180 ug/m³
- Benzene at 92 ug/m³

d. **Indoor Air:** No chlorinated VOCs (CVOCs) were detected in the three indoor air samples collected during the subsurface sampling event; one indoor air sample contained petroleum-related constituents above screening levels. Followup indoor air sampling did not detect CVOCs in indoor air.

7. **Adjacent Sites:** There are no known adjacent contaminated groundwater sites.

8. **Prior Remedial Measures:** After discovery of the VOC release, HP removed the leaking UST in 1981 and a total of 900 cubic yards of contaminated soil up to 36 feet below the ground surface between 1981 and 1988. HP removed an estimated 140 pounds of VOCs through this remedial excavation. In 1987, HP removed an additional estimated 215 pounds of VOCs during a soil vapor extraction pilot test in the former UST area.

Between 1982 and 1998, groundwater extraction and treatment removed an estimated 2,900 pounds of VOCs. Groundwater extraction and treatment was terminated in 1998 in order to assess the viability of monitored natural attenuation (MNA). The MNA findings indicated that the groundwater plume was stable. However, elevated VOCs persisted in and near the source area.

In 2003, HP began enhanced in-situ bioremediation (EISB) and treated in-place approximately 480 pounds of VOCs between 2003 and 2010. In 2010, HP also conducted a short-term dual phase extraction test in the former UST area and removed 2 pounds of VOCs. At present, active groundwater remediation is conducted by continued EISB, which has substantially reduced TCE and other VOC concentrations in most wells. Additional groundwater remediation is needed.

9. **Environmental Risk Assessment**

a. **Screening Levels:** A screening level environmental risk assessment was carried out to evaluate potential environmental concerns related to unidentified soil, soil gas, and groundwater impacts. Chemicals evaluated in the risk assessment are indicated in the tables below.

As part of the assessment, site data were compared to Environmental Screening Levels (ESLs) compiled by Regional Water Board staff. The presence of chemicals at concentrations above the ESLs indicates that additional evaluation of potential threats to human health and the environment is warranted. Screening levels for groundwater address the following environmental concerns: 1) drinking water impacts (toxicity and taste and odor), 2) impacts to indoor air, and 3) migration and impacts to aquatic habitats. Screening levels for soil address: 1) direct exposure, 2) leaching to groundwater, and 3) nuisance issues. Screening levels for soil gas address potential indoor-air vapor intrusion concerns.

Screening levels for drinking water are based on the lowest of toxicity-based standards (e.g., promulgated primary maximum contaminant levels (MCLs) or equivalent) and standards based on taste and odor concerns (e.g., secondary MCLs or equivalent). Chemical-specific screening levels for other human health concerns (i.e., indoor-air and direct-exposure) are based on a target excess cancer risk of 1×10^{-6} for carcinogens and a target Hazard Quotient of 0.2 for noncarcinogens. Groundwater screening levels for the protection of aquatic habitats are based on promulgated surface water standards (or equivalent). Soil screening levels for potential leaching concerns are intended to prevent impacts to groundwater above target groundwater goals (e.g., drinking water standards). Soil screening levels for nuisance concerns are intended to address potential odor and other aesthetic issues.

The current land use is commercial. Stanford may change the land use to residential or mixed residential/commercial in the future. Both commercial and residential screening levels are used for this assessment.

- b. Groundwater Assessment:** The table below shows current maximum groundwater concentrations for chemicals of concern, and an “X” indicates that the ESL was exceeded. No buildings are currently present over the identified impacted groundwater plume. The “X” for a potential indoor air concern indicates a concern should a building be constructed over the existing groundwater plume in the future.

Chemicals of Concern	Current Maximum Concentration (ug/l)	Results of Screening Assessment		
		Potential Drinking Water Concern	Potential Indoor Air Concern	
			Commercial	Residential
TCE	430	X		
cis-1,2-DCE	1,200	X		
Vinyl Chloride	230	X	X	X
Benzene	<0.5			
Toluene	330	X		
Ethylbenzene	180	X		
Xylenes	390	X		

- c. **Soil Assessment:** Site Cleanup Requirements (Order No. 95-160), adopted on July 19, 1995, indicated that soil cleanup in the former UST area was complete. The table below shows current soil concentrations outside the former UST area.

Chemicals of Concern	Current Maximum Concentration (mg/kg)	Results of Screening Assessment
		Potential Groundwater Leaching Concern
TCE	0.56	X
Cis-1,2-DCE	0.05	
1,1,1-TCA	0.006	
1,1-DCE	0.001	

- d. **Soil Gas Assessment:** The table below shows current maximum soil gas concentrations for chemical of concern and an “X” indicates that the ESL was exceeded. No buildings are currently present over the areas where the maximum soil gas concentrations have been detected; the “X” indicates a potential for indoor air concern should a building be constructed over the groundwater plume in the future.

Chemicals of Concern	Current Maximum Concentration (ug/m ³)	Results of Screening Assessment	
		Potential Indoor Air Concern	
		Residential	Commercial
TCE	33,000	X	X
cis-1,2-DCE	77,000	X	X
Vinyl Chloride	4,100	X	X
Benzene	150	X	

10. **Feasibility Study:** HP’s September 23, 2011, *Revised Remedial Action Plan [Amended]* (Revised RAP) evaluated the following remedial alternatives:

- No Action
- Monitored natural attenuation (MNA)
- In situ chemical oxidation and MNA
- Enhanced in-situ bioremediation (EISB) and MNA

11. **Remedial Action Plan (RAP):** HP’s 1988 RAP recommended soil excavation and groundwater extraction and treatment. After implementing the RAP, HP submitted a RAP addendum in the January 10, 2003, *Enhanced In-Situ Bioremediation Workplan* that recommended EISB. EISB involves the subsurface injection of food-grade carbon substrates that stimulate microbial activity to generate anaerobic and reducing conditions. Under these conditions, chlorinated hydrocarbons such as TCE, cis-1,2-DCE, and vinyl chloride can be reductively dechlorinated to ethenes and ethanes.

HP’s February 13, 2009, *Semi-Annual Self-Monitoring Report for Third and Fourth Quarters 2008* proposed to expand the EISB treatment area and perform an injection in

2009. HP submitted the 2011 Revised RAP that evaluated EISB and other remedial alternatives and formally selected EISB based on the results of prior remediation using this technology. The EISB alternative at well B-5 has involved:

- Injecting carbon substrate consisting of food-grade soybean oil and fresh cheese whey approximately every 18 months, and
- Bioaugmenting the carbon substrate injections with a designed microbial culture as deemed necessary.

The Revised RAP states that bioaugmentation may be performed based on findings of test bioaugmentation in well B-5. Additional monitoring data is needed to assess the value of bioaugmentation at the site. The Revised RAP satisfies the Regional Water Board's requirements.

HP plans to install two new EISB injection wells (IW-3 and IW-4) south and east of the former UST area to expand the EISB treatment zone within the source area. EISB will be conducted in the source area until interim groundwater cleanup goals specified in the Revised RAP are achieved. A five-year period of MNA will then determine whether MNA will achieve groundwater cleanup standards within a reasonable time frame or if further cleanup effort is necessary.

12. Basis for Cleanup Standards

- a. **General:** State Water Resources Control Board (State Water Board) Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California," applies to this discharge and requires attainment of background levels of water quality, or the highest level of water quality which is reasonable if background levels of water quality cannot be restored. Cleanup levels other than background must be consistent with the maximum benefit to the people of the State, not unreasonably affect present and anticipated beneficial uses of such water, and not result in exceedance of applicable water quality objectives. The previously-cited RAP confirms the Regional Water Board's initial conclusion that background levels of water quality cannot be restored. There is no feasible technology to remediate CVOCs to background levels and there is a need to spend limited funds cost-effectively. This Order and its requirements are consistent with Resolution No. 68-16.

State Water Board Resolution No. 92-49, "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304," applies to this discharge. This Order and its requirements are consistent with the provisions of Resolution No. 92-49, as amended.

- b. **Beneficial Uses:** The Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) is the Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives for waters of the State, including surface waters and groundwater. It also includes programs of implementation to achieve water quality objectives. The Basin Plan was duly adopted by the Regional Water Board and approved by the State Water Board, U.S. EPA, and the Office of Administrative Law where required.

Regional Water Board Resolution No. 89-39, "Sources of Drinking Water," defines potential sources of drinking water to include all groundwater in the region, with limited exceptions for areas of high total dissolved solids, low yield, or naturally-high contaminant levels. Groundwater underlying and adjacent to the site qualifies as a potential source of drinking water.

The Basin Plan designates the following potential beneficial uses of groundwater underlying and adjacent to the site:

- Municipal and domestic water supply
- Industrial process water supply
- Industrial service water supply
- Agricultural water supply
- Freshwater replenishment to surface waters

The existing and potential beneficial uses of Deer Creek include:

- Water contact and non-contact recreation
- Wildlife habitat
- Cold freshwater and warm freshwater habitat
- Fish migration and spawning
- Preservation of rare and endangered species

- c. **Basis for Groundwater Cleanup Standards:** The interim groundwater cleanup goals for the site are the lower of 1) the predicted groundwater-VOC concentrations required to protect human exposure from the vapor intrusion pathway, and 2) the source reduction levels for MNA. The vapor intrusion values were calculated using a Johnson and Ettinger model. The source reduction values were calculated using a natural attenuation model. The final groundwater cleanup standards for the site are based on applicable water quality objectives and are the more stringent of U.S. EPA and California primary MCLs. Cleanup to this level will protect beneficial uses of groundwater and will result in acceptable residual risk to humans.
- d. **Basis for Soil Cleanup Standards:** If soil pollution is discovered during future site redevelopment, soil cleanup standards will be based on the lower of direct exposure or soil leaching considering a residential (unrestricted) land use scenario and will rely on methodology and standards in effect at the time of redevelopment. Cleanup to this level is intended to prevent leaching to groundwater and will result in acceptable residual risk to humans.
- e. **Basis for Soil Gas Cleanup Standards:** The soil gas cleanup standards for the site are intended to prevent vapor intrusion into occupied buildings and will result in acceptable residual risk to humans, considering a residential (unrestricted) land use scenario. The soil gas cleanup standards were calculated using a Johnson and Ettinger model.
13. **Future Changes to Cleanup Standards:** The goals of this remedial action are to restore the beneficial uses of groundwater underlying the site and provide long-term protection of

human health and ecological environment. Results from other sites suggest that full restoration of beneficial uses to groundwater as a result of active remediation at this site may not be possible. If full restoration of beneficial uses is not technologically nor economically achievable within a reasonable period of time, then the dischargers may request modification to the cleanup standards or establishment of a containment zone, a limited groundwater pollution zone where water quality objectives are exceeded. Conversely, if new technical information indicates that cleanup standards can be surpassed, the Regional Water Board may decide that further cleanup actions should be taken.

- 14. Future Site Redevelopment:** During demolition and redevelopment of the current buildings, previously inaccessible contaminated soil and soil gas could be encountered. If such contaminated soil or soil gas is encountered, then investigation, risk assessment, and remediation are needed in a manner that is protective of human health and the environment and is consistent with the cleanup standards described in Finding 12.
- 15. Risk Management:** The Regional Water Board considers the following human health risks to be acceptable at remediation sites: a cumulative hazard index of 1.0 or less for non-carcinogens and a cumulative excess cancer risk of 10^{-6} to 10^{-4} or less for carcinogens. The screening level evaluation for this site found contamination-related risks in excess of these acceptable levels. Active remediation will reduce these risks over time. However, risk management measures are needed at this site during active remediation to assure protection of human health. Risk management measures include: 1) a deed restriction that notifies future owners that drinking of groundwater is prohibited, 2) a risk management plan (RMP) that provides for controls so that residential and sensitive uses are constructed in a manner that is protective of such uses, and 3) potential soil removal during future site redevelopment. The Covenant and Environmental Restriction on Property recorded on September 21, 2009, and the September 23, 2011, *Revised Risk Management Plan* (Revised RMP) satisfy the Regional Water Board's risk management requirements.
- 16. Basis for 13304 Order:** Water Code section 13304 authorizes the Regional Water Board to issue orders requiring a discharger to cleanup and abate waste where the discharger has caused or permitted waste to be discharged or deposited where it is or probably will be discharged into waters of the State and creates or threatens to create a condition of pollution or nuisance.
- 17. Cost Recovery:** Pursuant to Water Code section 13304, the dischargers are hereby notified that the Regional Water Board is entitled to, and may seek reimbursement for, all reasonable costs actually incurred by the Regional Water Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, required by this Order.
- 18. CEQA:** The project is adoption of an order (final site cleanup requirements) and actions to be taken by the dischargers to comply with the order, namely implementing the approved cleanup plan and conducting monitoring activities. All cleanup and monitoring activities will occur in the subsurface. Cleanup plan implementation involves mainly adding benign chemicals to the subsurface for in-situ remediation. The project will have no potential for

significant environmental effects and the activities are intended to support site cleanup. The project is therefore exempt from the provisions of the California Environmental Quality Act (CEQA) under the general rule that “CEQA applies only to projects that have the potential for causing a significant effect on the environment” (14 CCR section 15061(b)(3), also known as the “common sense” exemption).

- 19. **Notification:** The Regional Water Board has notified the dischargers and all interested agencies and persons of its intent under Water Code section 13304 to prescribe site cleanup requirements for the discharge, and has provided them with an opportunity to submit their written comments.
- 20. **Public Hearing:** The Regional Water Board, at a public meeting, heard and considered all comments pertaining to this discharge.

IT IS HEREBY ORDERED, pursuant to California Water Code section 13304, that the dischargers (or their agents, successors, or assigns) shall cleanup and abate the effects described in the above findings as follows:

A. PROHIBITIONS

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

B. REMEDIAL ACTION PLAN AND CLEANUP STANDARDS

- 1. **Implement Revised RAP:** The dischargers shall implement the revised RAP described in finding 11.
- 2. **Interim Groundwater Cleanup Goals:** The following interim groundwater cleanup goals shall be met in source area wells B-4, B-5, B-7, B-9, B-10, B-11, B-28, B-29, EW-1, EW-2, and W-1 before the selected EISB remedial alternative is curtailed.

Constituent	Goals (ug/L)	Basis
TCE	216	Pre-MNA Source Reduction
Cis-1,2-DCE	479	Pre-MNA Source Reduction
Vinyl Chloride	3	Vapor Intrusion Risk Assessment

3. **Groundwater Cleanup Standards:** The following groundwater cleanup standards shall be met in all wells identified in the Self-Monitoring Program and any other wells that may be subsequently installed.

Constituent	Standard (ug/L)	Basis
TCE	5	CA Primary MCL
Cis-1,2-DCE	6	CA Primary MCL
Trans-1,2-DCE	10	CA Primary MCL
Vinyl Chloride	0.5	CA Primary MCL
1,1-DCE	6	CA Primary MCL
1,1-DCA	5	CA Primary MCL
Freon 113	1,200	CA Primary MCL
1,2,4-TCB	5	CA Primary MCL
Benzene	1	CA Primary MCL
Toluene	150	CA Primary MCL
Ethylbenzene	300	CA Primary MCL
Xylenes	1,750	CA Primary MCL

Note: MCL = Maximum Contaminant Level

4. **Soil Cleanup Standards:** In case of redevelopment, cleanup standards for VOC-impacted vadose-zone soil encountered during future site redevelopment shall be the ESLs for unrestricted land use current at the time of residential redevelopment, or other cleanup standards approved by the Regional Water Board.
5. **Soil Gas Cleanup Standards:** The following soil gas cleanup standards shall be met in all shallow soil gas at a depth of five feet below ground surface, including surface grades of excavations involved with redevelopment.

Constituent	Standard (ug/m ³)	Basis
TCE	3,061	Vapor Intrusion – Residential
Cis-1,2-DCE	96,380	Vapor Intrusion – Residential
Vinyl Chloride	65	Vapor Intrusion – Residential
Benzene	196	Vapor Intrusion – Residential

Note: Values from site specific vapor intrusion evaluation from HP's September 23, 2011, *Revised Remedial Action Plan (Amended)*

C. TASKS

1. **WORKPLAN FOR NEW MONITORING AND INJECTION WELLS**

COMPLIANCE DATE: January 31, 2012

Submit a technical report acceptable to the Executive Officer that proposes installing one new monitoring well near the source area and two injection wells in the source area to expand the EISB injection network.

2. **COMPLETION OF MONITORING AND INJECTION WELLS**

COMPLIANCE DATE: March 31, 2012

Submit a technical report acceptable to the Executive Officer documenting the installation of necessary tasks in Task 1 workplan.

3. **RAP IMPLEMENTATION REPORT**

COMPLIANCE DATE: 60 days after RAP implementation or
December 31, 2012, whichever comes first

Submit a RAP Implementation Report acceptable to the Executive Officer. The RAP Implementation Report must certify that remedial actions have been implemented and that remedial systems have been constructed and started up in accordance with the approved RAP. Alternatively, the RAP Implementation Report requirements can be met by incorporating RAP implementation data into the semi-annual groundwater self-monitoring reports. Reports containing RAP implementation data shall be entitled to include RAP implementation language.

4. **RISK MANAGEMENT PLAN IMPLEMENTATION REPORT**

COMPLIANCE DATE: January 31, 2013, and every year thereafter

Submit a technical report acceptable to the Executive Officer that documents the implementation of the *Revised RMP* over the previous 12-month period ending on December 31. The report should include a detailed comparison of RMP elements and implementation actions taken. The report should provide a detailed discussion of any instances of implementation actions falling short of RMP requirements, including an assessment of any potential human health or environment effects resulting from these shortfalls. The report may propose changes to the *Revised RMP*, although those changes shall not take effect until approved by the Executive Officer.

5. FIVE-YEAR STATUS REPORT

COMPLIANCE DATE: January 31, 2017, and every five years thereafter

Submit a technical report acceptable to the Executive Officer evaluating the effectiveness of the approved remedial action plan. The report should include:

- a. Summary of effectiveness in controlling contaminant migration and protecting human health and the environment,
- b. Comparison of contaminant concentration trends with cleanup standards,
- c. Comparison of anticipated versus actual costs of cleanup activities,
- d. Performance data (e.g., groundwater volume extracted, chemical mass removed, mass removed per million gallons extracted),
- e. Cost effectiveness data (e.g., cost per pound of contaminant removed),
- f. Summary of additional investigations (including results) and significant modifications to remediation systems, and
- g. Additional remedial actions, including new or innovative technologies, proposed to meet cleanup standards, including implementation time schedules.

If cleanup standards have not been met and are not projected to be met within a reasonable time, the report should assess the technical practicability of meeting cleanup standards and may propose an alternative cleanup strategy.

6. PROPOSED CURTAILMENT

COMPLIANCE DATE: 90 days prior to proposed curtailment

Submit a technical report acceptable to the Executive Officer containing a proposal to curtail remediation. Curtailment includes system closure (e.g., well abandonment), system suspension (e.g., cease extraction but wells retained), and significant system modification (e.g., major reduction in extraction rates, closure of individual extraction wells within extraction network). The report should include the rationale for curtailment. Proposals for final closure should demonstrate that cleanup standards have been met, contaminant concentrations are stable, and contaminant migration potential is minimal.

7. IMPLEMENTATION OF PROPOSED CURTAILMENT

COMPLIANCE DATE: 120 days after Executive Officer approval of Task 6

Submit a technical report acceptable to the Executive Officer documenting the completion of the tasks identified in Task 6.

8. EVALUATION OF NEW HEALTH CRITERIA

COMPLIANCE DATE: 90 days after required by Executive Officer

Submit a technical report acceptable to the Executive Officer evaluating the effect on the approved remedial action plan of revising one or more cleanup standards in response to any revision of drinking water standards, maximum contaminant levels, or other health-based criteria.

9. EVALUATION OF NEW TECHNICAL INFORMATION

COMPLIANCE DATE: 90 days after required by Executive Officer

Submit a technical report acceptable to the Executive Officer evaluating new technical information that bears on the approved remedial action plan and cleanup standards for the site. In the case of a new cleanup technology, the report should evaluate the technology using the same criteria used in the feasibility study. Such technical reports shall not be requested unless the Executive Officer determines that the new information is reasonably likely to warrant a revision in the approved remedial action plan or cleanup standards.

- 10. Delayed Compliance:** If the dischargers are delayed, interrupted, or prevented from meeting one or more of the completion dates specified for the above tasks, the dischargers shall promptly notify the Executive Officer and the Regional Water Board may consider revision of this Order.

D. PROVISIONS

- 1. No Nuisance:** The storage, handling, treatment, or disposal of polluted soil or groundwater shall not create a nuisance as defined in Water Code section 13050(m).
- 2. Good O&M:** The dischargers shall operate as efficiently as possible and maintain in good working order any facility or control system installed to achieve compliance with the requirements of this Order.
- 3. Cost Recovery:** The dischargers shall be liable, pursuant to Water Code section 13304, to the Regional Water Board for all reasonable costs actually incurred by the Regional Water Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, required by this Order. If the site addressed by this Order is enrolled in a State Water Board-managed reimbursement program, reimbursement shall be made pursuant to this Order and according to the procedures established in that program. Any disputes raised by the dischargers over reimbursement amounts or methods used in that program shall be consistent with the dispute resolution procedures for that program.
- 4. Access to Site and Records:** In accordance with Water Code section 13267(c), the dischargers shall permit the Regional Water Board or its authorized representative:

- a. Entry upon premises in which any pollution source exists, or may potentially exist, or in which any required records are kept that are relevant to this Order.
 - b. Access to copy any records required to be kept under the requirements of this Order.
 - c. Inspection of any monitoring or remediation facilities installed in response to this Order.
 - d. Sampling of any groundwater or soil that is accessible, or may become accessible, as part of any investigation or remedial action program undertaken by the dischargers.
- 5. Self-Monitoring Program:** The dischargers shall comply with the Self-Monitoring Program as attached to this Order and as may be amended by the Executive Officer.
- 6. Contractor / Consultant Qualifications:** All technical documents shall be signed by and stamped with the seal of a California registered geologist, a California certified engineering geologist, or a California registered civil engineer.
- 7. Lab Qualifications:** All samples shall be analyzed by State-certified laboratories or laboratories accepted by the Regional Water Board using approved U.S. EPA methods for the type of analysis to be performed. All laboratories shall maintain quality assurance/quality control (QA/QC) records for Regional Water Board review. This provision does not apply to analyses that can only reasonably be performed onsite (e.g., temperature).
- 8. Document Distribution:** Electronic copies of all correspondence, technical reports, and other documents pertaining to compliance with this Order shall be provided to the following agencies:
- a. Santa Clara Valley Water District
 - b. City of Palo Alto Fire Department
- The Executive Officer may modify this distribution list as needed.
- 9. Reporting of Changed Owner or Operator:** Stanford shall file a technical report on any changes in site occupancy or ownership associated with the property described in this Order.
- 10. Reporting of Hazardous Substance Release:** If any hazardous substance is discharged in or on any waters of the State, or discharged or deposited where it is, or probably will be, discharged in or on any waters of the State, the dischargers shall report such discharge to the Regional Water Board by calling (510) 622-2369 during regular office hours (Monday through Friday, 8:00 to 5:00).

A written report shall be filed with the Regional Water Board within five working days. The report shall describe: the nature of the hazardous substance, estimated quantity involved, duration of incident, cause of release, estimated size of affected

area, nature of effect, corrective actions taken or planned, schedule of corrective actions planned, and persons/agencies notified.

This reporting is in addition to reporting to the California Emergency Management Agency required pursuant to the Health and Safety Code.

- 11. **Secondarily Responsible Discharger:** Within 60 days after being notified by the Executive Office that HP has failed to comply with this Order, Stanford as property owner shall then be responsible for complying with this Order. Task deadlines above will be automatically adjusted to add 60 days. This provision does not apply to Task 4 or Provision 9.
- 12. **Rescission of Existing Orders:** This Order supercedes and rescinds Order Nos. 86-01, 89-028 and 95-160.
- 13. **Periodic SCR Review:** The Regional Water Board will review this Order periodically and may revise it when necessary.

I, Bruce H. Wolfe, 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 January 18, 2012.

Bruce H. Wolfe
Executive Officer

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FAILURE TO COMPLY WITH THE REQUIREMENTS OF THIS ORDER MAY SUBJECT YOU TO ENFORCEMENT ACTION, INCLUDING BUT NOT LIMITED TO: IMPOSITION OF ADMINISTRATIVE CIVIL LIABILITY UNDER WATER CODE SECTIONS 13268 OR 13350, OR REFERRAL TO THE ATTORNEY GENERAL FOR INJUNCTIVE RELIEF OR CIVIL OR CRIMINAL LIABILITY

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Attachments: Site Map
Self-Monitoring Program

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

SELF-MONITORING PROGRAM for:

HEWLETT PACKARD COMPANY and
STANFORD UNIVERSITY

for the property located at:

3500 DEER CREEK ROAD
PALO ALTO, SANTA CLARA COUNTY

1. **Authority and Purpose:** The Regional Water Board requires the technical reports in this Self-Monitoring Program pursuant to Water Code sections 13267 and 13304. This Self-Monitoring Program is intended to document compliance with Regional Water Board Order No. R2-2012-0003 (site cleanup requirements).

2. **Monitoring:** The dischargers shall measure groundwater elevations semi-annually in all monitoring wells, and shall collect and analyze representative samples of groundwater and surface water according to the following table:

Sample Location	Second Quarter	Fourth Quarter
B-4	CVOC; AVOC; MEE; TOC ⁽¹⁾	CVOC; AVOC; MEE; TOC
B-5	CVOC; AVOC; MEE; TOC	CVOC; AVOC; MEE; TOC
B-7	CVOC	CVOC
B-8	NS	CVOC
B-9	CVOC	CVOC
B-10	CVOC; MEE; TOC	CVOC; MEE; TOC
B-11	CVOC; MEE	CVOC; MEE
B-12	NS	CVOC
B-13	CVOC; AVOC; MEE; TOC	CVOC; AVOC; MEE; TOC
B-14	NS	CVOC; MEE
B-16	CVOC; MEE	CVOC; MEE
B-19	CVOC; MEE	CVOC; MEE
B-20	CVOC; MEE	CVOC; MEE
B-21	CVOC; MEE	CVOC; MEE
B-25	NS	CVOC
B-26	CVOC; MEE	CVOC; MEE
B-27	CVOC	CVOC
B-28	CVOC; MEE; TOC	CVOC; MEE; TOC
B-29 **	CVOC; MEE; TOC	CVOC; MEE; TOC
EW-1	CVOC; MEE; TOC	CVOC; MEE; TOC

EW-2	CVOC; AVOC; MEE; TOC	CVOC; AVOC; MEE; TOC
EW-3	CVOC; MEE	CVOC; MEE
W-1	CVOC; MEE; TOC	CVOC; MEE; TOC
IW-1	TOC	TOC
IW-2	TOC	TOC
D-1	CVOC	CVOC
D-2	CVOC	CVOC
D-4	CVOC	CVOC

Notes:

TOC analysis in all wells will be discontinued once active EISB is complete.

** Well B-29 is a proposed new monitoring well located halfway between existing wells B-5 and B-12

Abbreviations:

CVOC = chlorinated volatile organic compounds by US EPA Method 8260B

AVOC = aromatic volatile organic compounds by US EPA Method 8260B

MEE = Methane, ethane, and ethene US EPA Method RSK-175 or equivalent.

TOC = total organic carbon by US EPA Method 5310B

The dischargers shall sample any new monitoring or extraction wells quarterly and analyze groundwater samples for the same constituents as shown in the above table. The dischargers may propose changes in the above table; any proposed changes are subject to Executive Officer approval.

3. Semi-Annual Monitoring Reports: The dischargers shall submit semi-annual monitoring reports to the Regional Water Board no later than 45 days following the end of the semi-annual reporting period. Semi-annual monitoring reports shall be due on August 15, for the reporting period January 1 through June 30, and on February 15, for the reporting period July 1 through December 31. Reports shall be submitted electronically to the GeoTracker web site (<https://geotracker.waterboards.ca.gov>) and in hard copy to the Regional Water Board. The reports shall include:

- a. **Transmittal Letter:** The transmittal letter shall discuss any violations during the reporting period and actions taken or planned to correct the problem. The letter shall be signed by the dischargers' principal executive officer or his or her duly authorized representative, and shall include a statement by the official, under penalty of perjury, that the report is true and correct to the best of the official's knowledge.
- b. **Groundwater Elevations:** Groundwater elevation data shall be presented in tabular form, and a groundwater elevation map should be prepared for each monitored water-bearing zone. For all data submitted after the RAP approval date, historical groundwater elevations shall be included in the semi-annual self-monitoring report submitted on February 15 and August 15 of each year.
- c. **Groundwater Analyses:** Groundwater sampling data shall be presented in tabular form, and an isoconcentration map should be prepared for one or more key contaminants for each monitored water-bearing zone, as appropriate. The report

shall indicate the analytical method used, detection limits obtained for each reported constituent, and a summary of QA/QC data. Historical groundwater sampling results shall be included in the semi-annual self-monitoring report submitted on February 15 and August 15 of each year. The report shall describe any significant increases in contaminant concentrations since the last report, and any measures proposed to address the increases. Supporting data, such as lab data sheets, need not be included (however, see record keeping - below).

- d. **Status Report:** The report shall describe relevant work completed during the reporting period (e.g., site investigation, interim remedial measures) and work planned for the following reporting period.
5. **Violation Reports:** If the dischargers violate requirements in the Site Cleanup Requirements, then the dischargers shall notify the Regional Water Board office by telephone as soon as practicable once the dischargers have knowledge of the violation. Regional Water Board staff may, depending on violation severity, require the dischargers to submit a separate technical report on the violation within five working days of telephone notification.
6. **Other Reports:** The dischargers shall notify the Regional Water Board in writing prior to any site activities, such as construction or underground tank removal, which have the potential to cause further migration of contaminants or which would provide new opportunities for site investigation.
7. **Record Keeping:** The dischargers or their agents shall retain data generated for the above reports, including lab results and QA/QC data, for a minimum of six years after origination and shall make them available to the Regional Water Board upon request.
8. **SMP Revisions:** Revisions to the Self-Monitoring Program may be ordered by the Executive Officer, either on his or her own initiative or at the request of the dischargers. Prior to making Self-Monitoring Program revisions, the Executive Officer will consider the burden, including costs, of associated self-monitoring reports relative to the benefits to be obtained from these reports.