CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. 97-057

ADOPTION OF FINAL SITE CLEANUP REQUIREMENTS AND RESCISSION OF ORDER NOs. 93-048 AND 95-155 FOR:

WESTERN MICROWAVE, INC. AND
SOBRATO DEVELOPMENT COMPANIES

1271 REAMWOOD AVENUE
SUNNYVALE
SANTA CLARA COUNTY

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

1. **Site Location**: The site is located in the northern portion of the City of Sunnyvale, Santa Clara County, California. It is situated on the west side of Reamwood Avenue, approximately 1-1/4 miles north of Interstate Highway 101 and about 1/4 miles south of Highway 237.

   The site comprises the southern half of a 2.4 acre parcel developed with one building (1271 & 1273 Reamwood Avenue). The site and the surrounding area are relatively flat, lying at an elevation of between 5 and 8 feet above mean sea level. The land use in the vicinity was predominantly agricultural, prior to the 1960s. Most development dates from 1960s or later and consists of industrial facilities with associated offices. There are no residential areas between the site and San Francisco Bay.

2. **Site History**: Sobrato Development Companies (Sobrato), which is the owner of the property, developed the 1271/1273 Reamwood Avenue building in 1979. Western Microwave, Inc. (WMI) leased the building from April 1979 to May 1990. WMI subleased the northern portion of the premises to Laselco Pacific and occupied the southern portion of the building for manufacturing microwave components. WMI used different chlorinated and aromatic hydrocarbons and inorganic chemicals in its manufacturing process, as revealed in WMI's chemical use history.

   After May 1990, the southern portion of the building was vacant until De Anza Manufacturing Services leased it in September 1992. De Anza uses no volatile organic compounds in its manufacturing process. The northern portion of the building was also vacant until Micro Lithography, Inc. (MLI) leased it in April 1991.

WMI alleges that MLI is an off-site source. MLI operates a machine shop to manufacture and recycle aluminum frames for its pellicles. In April 1993, MLI submitted site and chemical use history to the Regional Board office. MLI uses various chemicals in its manufacturing and recycling process. However, MLI's chemicals are relatively different than the chemicals used by WMI. None of the MLI key chemicals were discovered either in soil or in groundwater underneath the 1271/1273 Reamwood Avenue site.

WMI discovered a release of volatile organic compounds (VOCs) contamination at the former plating room in 1985. Two additional VOC "hot-spot" areas were also discovered at the northwestern planter area (the northern "hot-spot") in 1992 and at the outdoor and down slope of the former chemical storage area along the western property boundary (the southern "hot-spot") in 1993.

3. **Named Dischargers**: WMI is named as a discharger because it used VOCs during its occupancy of the site from 1979 to 1990. WMI most likely released VOCs at the site because the same VOCs were found in soil and groundwater underneath the site. Sobrato is named as discharger because it is current owner of the site. Sobrato will be responsible for compliance only if the Board or Executive Officer finds that other named dischargers have 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 Board will consider adding that party's name to this order.

4. **Regulatory Status**:

   This site is subject to the following Board orders:

   - Site Cleanup Requirements (Order No. 93-048) adopted May 19, 1993
   - Amendment of Site Cleanup Requirements (Order No. 93-088A) adopted on August 20, 1993 and rescinded by Order No. 95-155 on July 18, 1995
   - NPDES General Permit (Order No. 94-087, adopted July 20, 1994)

5. **Site Hydrogeology**: Surface water bodies in the vicinity of the site include San Francisco Bay, tidal creeks and estuarine wetlands adjacent to the bay that flow from ephemeral freshwater streams from the Santa Cruz mountains to San Francisco Bay. Surface runoff in the site vicinity is controlled by the City of Sunnyvale storm drain system.

   The near-surface deposits in the area are fine grained estuarine deposits consisting of unconsolidated, plastic clays and silty clays, which are rich in organic material and contain lenses and stringers of well-sorted silt and sand, as well as beds of peat.

Groundwater generally exists in the permeable sand and gravel and alluvial fans deposited by east-flowing streams descending from the Santa Cruz Mountains. The regional groundwater gradient, as determined by other studies in the immediate area of site, is northerly. The first shallow water-bearing zone ("A" zone) at the site is encountered at a depth of approximately 8-1/2 feet and extends to about 20 feet below ground surface (bgs). The intermediate water-bearing zone ("B" aquifer) is encountered between 80 to 85 feet bgs. These aquifers are separated from the deeper water-bearing zone ("C" aquifer) by a clay aquitard.

6. **Remedial Investigation:**

Soil: WMI performed soil investigation beneath the plating room in 1985. Soil samples were collected at depths of two and seven feet below the concrete floor. The results indicated soil under the plating room was impacted by VOCs from WMI's activities. As a result, the plating room was closed in 1985.

Sobrato (the owner) collected and analyzed soil samples from 32 locations including the plating room in 1990 and 1991. Soil samples from the former plating room and chemical storage area detected high VOC concentrations, up to 27 ppm and 50 ppm at depths of two and seven feet bgs, respectively.

In 1992 and 1993, WMI conducted additional soil investigation in other suspected source areas. WMI collected soil samples from over 60 soil borings and discovered two VOC "hot-spot" areas. One VOC source was the northwestern planter area (the northern "hot-spot"), and soil samples from this area revealed up to 1200 ppm of total VOCs at four feet bgs. The second VOC source area was down slope of the former chemical storage area along the western property boundary (the southern "hot-spot") and up to 305 ppm of total chlorinated hydrocarbons were measured at two feet bgs. The predominant VOCs detected at the site include PCE, TCE, dichlorobenzenes, ethylbenzene and xylenes, typical chemicals used by WMI. Based on the soil investigation results, WMI was required to conduct comprehensive soil remediation.

Groundwater: WMI conducted shallow groundwater investigation to characterize the site and define the contaminants and their impact to the shallow aquifer. In 1986, groundwater samples detected high VOC concentrations in the shallow aquifer, including tetrachloroethene (PCE) at 7,000 parts per billion (ppb) underneath the plating room. Four shallow groundwater monitoring wells were installed near the southwest corner of the site between 1985 to 1986. An additional monitoring well was installed by Sobrato in 1990 at the southwestern side of the facility downgradient of the Lockheed facility. One monitoring well, which was located inside the plating room of the facility, was destroyed in 1991 during soil remediation activities.

Between 1993 to 1996, WMI performed several groundwater investigations to determine the lateral and vertical extent of the contaminants at the site. Groundwater

grab samples collected underneath the southern "hot-spot" area revealed total VOC concentrations up to 80,000 ppb. The primarily chemicals were PCE, TCE, cis-1,2-DCE, 1,1-DCE, chloroform, 1,2-dichlorobenzene, ethylbenzene and xylenes. Besides the grab groundwater samples collected from various boring locations, WMI installed four piezometers to measure groundwater elevations, one new shallow groundwater monitoring well to monitor downgradient water quality, one "B" zone monitoring well to monitor the deeper aquifer water quality, and five extraction wells (E-1 through E-5) to contain the shallow groundwater plume. Based on the monitoring data, the "B" zone underneath the WMI site is not impacted with VOCs. Extraction well E-4 was destroyed in 1996, during the northern "hot-spot" soil excavation and was replaced by E-6.

7. **Adjacent Sites:**

Former Intersil Facility: This site is located at 1276 Hammerwood Avenue, Sunnyvale, immediately west of WMI. VOC releases were first discovered at this site in 1982. Subsurface investigations at the Intersil site revealed the presence of chlorinated organic solvents in the soil and groundwater. TCE, DCE and other breakdown products and Freon-113 are the primary chemicals at this site. The Board adopted waste discharge requirements for the Intersil site in October 1986, and final site cleanup requirements in November 1993. Intersil operated a groundwater extraction and treatment system from 1987 to 1995. Intersil shifted to a passive remediation system in 1995. The Intersil and WMI sites are cross-gradient to each other, and their pollutant plumes may have commingled, before a slurry wall was built at the boundary of the two properties as part of Intersil's final remedy.

Former Lockheed Facility: Another VOC release also occurred at 1235 Elko Drive, upgradient of the WMI site. Soil and groundwater underneath the site were impacted by contaminants, primarily TCE and 1,2-DCE. Lockheed excavated and removed the contaminated soil and characterized the site. Lockheed implemented groundwater extraction system in 1994, and the Board adopted initial site cleanup requirements for Lockheed site in January 1997. Since the Lockheed site is upgradient of the WMI site, pollutants from the Lockheed site have likely migrated off-site and may have commingled with WMI's VOC plume, particularly at the southern portion of the WMI site.

8. **Interim Remedial Measures:**

Soil Excavation: Sobrato excavated the contaminated soil underneath the plating room in 1991. WMI conducted minor soil excavation at the southern "hot-spot" area in 1994. WMI conducted three phases of extensive soil excavation in 1995 and 1996. Phase I was conducted at the southern "hot-spot" area and was expanded to the saturated zone. Phase II was conducted further north of Phase I and was intended to remove VOC affected soils from the planter area close to the Intersil's slurry wall.

Phase III (the last excavation) was intended to cleanup the northern "hot-spot" area and was extended to about three to four feet away from Intersil's slurry and reactive walls. The table below summarizes the excavation events at the site.

Summary of Soil Excavation at Reamwood Avenue Site			
Date of Excavation	Location	Soil Mass Removed (Tons)	Comment
September 1991	Plating Room	330	Excavated to about 7 Feet Depth
March 1994	Southern Hot-Spot	80	Incomplete
July - August 1995	Southern Hot-Spot	1700	Including Saturated Zone
Oct. - Nov. 1995	Along the Western Planter Area	630	Extension of the Southern Hot-Spot
September 1996	Northern Hot-Spot	800	Including Saturated Zone

The excavated soil was aerated on-site. A portion of the treated soil was used on-site, and the remaining treated soil was disposed of to an appropriate landfill. Most of the excavated saturated zone was backfilled with clean imported gravel, and certain of the excavated areas were backfilled with treated soil. As stated in WMI's remedial action plan, over 220 pounds of VOC mass was removed during the 1995 - 1996 soil excavation.

Based on the confirmatory soil samples, the soil at the planter area near the northern "hot-spot" area still contains VOCs slightly above cleanup levels (1 ppm). Given the small size of the remaining contaminated area, nature and magnitude of the chemicals, and to preserve the integrity of the Board approved final remedy at the Intersil site, further excavation is not appropriate.

Groundwater: WMI initiated IRMs for groundwater at the site in 1995. At the beginning, the IRMs consist of four extraction wells associated with a low-profile air stripper and carbon canister. The system pumping rate was initially between 10 to 20 gallons per minute (gpm). In 1995, WMI installed one additional extraction well (E-5) south of its extraction well E-2. Both extraction wells were installed in the southern "hot-spot" area. Excess extraction at the WMI site reversed the direction of groundwater flow at the Intersil site and started to undermine the effectiveness of its final remedy. Board staff requested WMI to reduce its extraction rate from extraction wells E-2, E-3 and E-5. As a result, WMI terminated extracting from these three

wells in 1996.

WMI is currently extracting only from extraction wells E-1 and E-6 located at southern and northern ends of the plume, respectively. The combined average rate is over 5 gpm. Based on the IRMs evaluation data, the two extraction wells have been effective in reducing VOC concentrations and containing off-site migration of the plume. The treated waste water is discharged to the storm drain in accordance with the RWQCB's NPDES General Permit

9. **Feasibility Study**: WMI developed and evaluated a list of possible alternatives for remediating the contaminated shallow groundwater underneath the 1271/1273 Reamwood Avenue site. The screening of technologies was based on their applicability to site characteristics, on the properties of the chemicals, and on reliability and performance of treatment technologies. The remaining technologies such as a) "no further action", b) groundwater extraction and treatment (existing IRMs), c) vapor extraction, d) air sparging, and e) in-situ bioremediation were then further evaluated on the basis of implementability, effectiveness and environmental and public health impacts. WMI selected the existing groundwater extraction and treatment system as a final remedy for the site due to reliability, implementability, performance, institutional and community acceptability, and cost effectiveness.

10. **Cleanup Plan**: The site cleanup requirements (Order No. 93-048 as amended) require WMI to submit a draft remedial action (RAP) by June 1, 1996. WMI submitted a RAP on September 11, 1996, but Board staff found the RAP inadequate. WMI submitted a revised RAP in November 1996. The RAP summarizes the remedial investigation and interim remedial measures, evaluates cleanup alternatives and risk to human health, proposes cleanup standards, and proposes groundwater extraction and treatment as a final remedy.

    The proposed remedy, groundwater extraction and treatment, will adequately protect human health and water quality. The revised RAP addresses all required topics. However, various specific portions of the revised RAP are (i) factually incorrect, (ii) inconsistent with Board policy, or (iii) incompatible with reasonable operation of the adjacent remediation system. In light of WMI's failure to adequately address these points in the revised RAP and in the interest of time, it is appropriate for the Board to modify the RAP - see Agency Addendum (attached).

11. **Risk Assessment**: The shallow groundwater underneath the site is not currently used for domestic supply. Nonetheless, WMI's February 19, 1997, risk assessment addendum assumed that the shallow groundwater beneath the site would in future be used as a domestic water supply. Two scenarios were used to address this issue. Scenario 1 evaluated current site conditions using most recent maximum groundwater VOC concentrations. Scenario 2 evaluated future conditions using final cleanup goals (MCLs). The assessment determined the primary chemicals of interest and their

toxicity and identified potential exposure pathways for both scenarios. Then, the assessment computed risks for carcinogenic and non-carcinogenic chemicals in the groundwater, and compared them to the EPA recommended risk range.

Toxicity Classification for Chemicals of Interest: Six compounds have been consistently detected in shallow groundwater beneath the site; however, the risk assessment included six additional compounds that have been infrequently detected. These compounds are: benzene, chloroform, 1,2-dichlorobenzene (1,2-DCB), 1,1-DCE, cis-1,2-DCE, ethylbenzene, Freon 113, PCE, 1,1,1-TCA, TCE, vinyl chloride, and xylenes. PCE and TCE were widely distributed and found at significantly high concentrations.

Five of the indicator chemicals are classified as carcinogens: benzene, chloroform, PCE, TCE and vinyl chloride. Based on EPA's classification, benzene and vinyl chloride are class "A" carcinogen (sufficient human evidence). Chloroform, PCE, and TCE are class "B2" carcinogens (inferring probable human carcinogen, with inadequate human evidence and sufficient evidence from animal experiments). 1,1-DCE is a class "C" carcinogen (possible human carcinogen, limited evidence of carcinogenicity in animals with inadequate human data). The rest of the compounds such as 1,2-DCB, cis-1,2-DCE, ethylbenzene, Freon 113, 1,1,1-TCA, and xylenes are non-carcinogens (class "D").

Exposure Assessment: Under current use of the site, there appear to be no complete exposure pathways. The level of contaminants in the shallow aquifer are greater than drinking water standards, however, the shallow aquifer is currently not being used for drinking water. The deeper aquifer that is used for drinking water has not been impacted by VOCs.

The assessment assumed that a hypothetical domestic well would be screened in the shallow aquifer for both scenarios - current and future uses. Two potential pathways of exposure were recognized to evaluate the risk assessment. The first hypothetical pathway is the use of shallow groundwater underneath the site as a source of drinking water. Quantification of exposure from this pathway assumes ingestion as an exposure route. The second hypothetical pathway is exposure to VOCs vaporized during showering and cooking by inhalation exposure route. Both exposure routes assume exposure of drinking 2 liters of water per day by 70-kilogram person (U.S.EPA, 1988 & 1989).

Baseline Risk: Quantified public health total risks were determined using the estimated potential chemical intake from the hypothetical drinking water well and inhalation of vapor that were computed utilizing the estimated exposure point concentrations. For scenario 1 (using the current concentration), the excess cancer risk was estimated to be 1×10^{-3}, or 1 excess cancer cases in a population of 1,000.

Using a similar approach for the non-carcinogenic VOCs, a total hazard index (HI) was determined to be about 4.5, with PCE alone accounting for most of the HI.

For comparison, the Board considers the following risk to be acceptable at remediation sites: a hazardous index of 1.0 or less for non-carcinogens, and an excess cancer risk of 10^{-4} or less for carcinogens.

The baseline risk assessment did not identify soil as an exposure medium. The potential sources of VOCs in soil have been removed in the proximity of the former plating room, near the chemical storage areas (the southern "hot-spot"), and along the western planter area (the northern "hot-spot"). Total VOC concentrations slightly above cleanup action levels (1 mg/kg) still exist sporadically along the planter area close to Intersil's slurry wall and treatment wall. Remediation of this VOC contaminated soil was difficult due to proximity of adjacent slurry wall and treatment wall. This area is an open and isolated, and it is unlikely that the VOC vapors diffused from the subsurface contaminated soil to pose a significant health threat.

Due to excessive risk that will be present at the site pending full remediation, institutional constraints are appropriate to limit on-site exposure to acceptable levels. Institutional constraints include a deed restriction that notifies future owners of subsurface contamination and prohibits the use of shallow groundwater beneath the site as a source of drinking water until cleanup standards are met.

Post-Remediation Risk: Since the estimated risks from Scenario 1 exceeded EPA's recommended risk range, the assessment considered drinking water standards (MCLs) of VOCs as a final cleanup goal for all pollutants at the site. This approach would protect future beneficial uses of the shallow groundwater underneath the facility. Scenario 2 evaluates the potential health risk for use of shallow groundwater at the site as a domestic, potable water supply once MCLs are achieved. For the carcinogenic chemicals, the excess cancer risk predicted by this analysis is about 1.33×10^{-5}, or about one in a population of 100,000. This cancer risk level lies within the EPA's recommended risk range. Likewise, the total HI for all non-carcinogenic compounds was found to be 0.06, below the 1.0 level.

12. **Basis for Cleanup Standards**

a. **General**: State 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.

State 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 Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on June 21, 1995. This updated and consolidated plan represents the Board's master water quality control planning document. The revised Basin Plan was approved by the State Water Resources Control Board and the Office of Administrative Law on July 20, 1995, and November 13, 1995, respectively. A summary of regulatory provisions is contained in 23 CCR 3912. The Basin Plan defines beneficial uses and water quality objectives for waters of the State, including surface waters and groundwaters.

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 TDS, 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:

o Municipal and domestic water supply
o Industrial process water supply
o Industrial service water supply
o Agricultural water supply

At present, there is no known use of groundwater underlying the site for the above purposes. The off-site area is only a few feet above sea level and may be subject to intrusion of salt water to shallow groundwater. TDS concentration in downgradient wells average over 3,000 mg/l, exceeding both the Title 22 limiting concentration of 1,000 mg/l and the 3,000 mg/l TDS maximum for potential sources of drinking water. In addition, the site and its environs are zoned for commercial and light-industrial use, and this use is unlikely to change in the future. Conversion to residential use is even less likely.

The municipal supply is not a potential beneficial use of off-site groundwater, and MCLs do not apply. Given the thickness and low permeability of the aquitard underlying off-site shallow groundwater and given current and expected VOC concentrations in off-site groundwater, no cleanup standards are needed to protect deeper aquifers. Therefore, no cleanup standards are

necessary for off-site groundwater.

c. **Basis for Groundwater Cleanup Standards**: The groundwater cleanup standards for the site are based on applicable water quality objectives and are the more stringent of EPA and California primary maximum contaminant levels (MCLs). Cleanup to this level will result in acceptable residual risk to humans.

d. **Basis for Soil Cleanup Standards**: The soil cleanup standards for the easily accessible area of the site are 1 mg/kg total VOCs and 10 mg/kg total SVOCs. Cleanup to this level is intended to prevent leaching of contaminants to groundwater and will result in acceptable residual risk to humans. VOC residuals slightly above cleanup levels are still remaining at the northwestern planter area. Further remediation of these VOC residues is technically and economically infeasible.

13. **Future Changes to Cleanup Standards**: The goal of this remedial action is to restore the beneficial uses of groundwater underlying and adjacent to the site. 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 discharger may request modification to the cleanup standards or establishment of a non-attainment area, a limited groundwater pollution zone where water quality objectives are exceeded. Conversely, if new technical information indicates that cleanup standards can be surpassed, the Board may decide if further cleanup actions should be taken.

14. **Reuse or Disposal of Extracted Groundwater**: Board Resolution No. 88-160 allows discharges of extracted, treated groundwater from site cleanups to surface waters only if it has been demonstrated that neither reclamation nor discharge to the sanitary sewer is technically and economically feasible.

15. **Basis for 13304 Order**: The dischargers have 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.

16. **Cost Recovery**: Pursuant to California Water Code Section 13304, the dischargers are hereby notified that the Board is entitled to, and may seek reimbursement for, 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, required by this order.

17. **CEQA**: This action is an order to enforce the laws and regulations administered by the Board. As such, this action is categorically exempt from the provisions of the

California Environmental Quality Act (CEQA) pursuant to Section 15321 of the Resources Agency Guidelines.

18. **Notification**: The Board has notified the dischargers and all interested agencies and persons of its intent under California Water Code Section 13304 to prescribe site cleanup requirements for the discharge, and has provided them with an opportunity to submit their written comments.

19. **Public Hearing**: The Board, at a public meeting, heard and considered all comments pertaining to this discharge.

IT IS HEREBY ORDERED, pursuant to Section 13304 of the California Water Code, 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 which 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 which will cause significant adverse migration of wastes or hazardous substances are prohibited.

B. CLEANUP PLAN AND CLEANUP STANDARDS

1. **Implement Cleanup Plan**: The dischargers shall implement the cleanup plan described in findings 10 and as modified by the Agency Addendum (attached).

2. **Groundwater Cleanup Standards**: The following groundwater cleanup standards shall be met in all wells identified in the Self-Monitoring Program:

Constituent	Cleanup Standard (ug/l)	Basis (Primary MCLs)
Benzene	1	CALEPA
Chloroform	100	EPA/CALEPA
1,2-Dichlorobenzene	600	EPA
1,3-Dichlorobenzene	600	EPA
1,1-Dichloroethene	6	CALEPA
Cis-1,2-dichloroethene	6	CALEPA
Trans-1,2-dichloroethene	10	CALEPA
Ethylbenzene	680	CALEPA
Freon 113	1,200	CALEPA
Tetrachloroethene	5	EPA/CALEPA
1,1,1-Trichloroethane	200	EPA/CALEPA
Trichloroethene	5	EPA/CALEPA
Vinyl chloride	0.5	CALEPA
Xylenes	1,750	CALEPA

3. **Soil Cleanup Standards:** Soil cleanup standards of 1 mg/kg for total VOCs and 10 mg/kg for SVOCs shall be met in all accessible vadose-zone soils.

C. TASKS

1. PROPOSED INSTITUTIONAL CONSTRAINTS

COMPLIANCE DATE: July 1, 1997

Submit a technical report acceptable to the Executive Officer documenting procedures to be used and implemented by the discharger to prevent or minimize human exposure to soil and groundwater contamination prior to meeting cleanup standards. Such procedures shall include a deed restriction prepared and filed by Sobrato (the owner) prohibiting the use of shallow groundwater as a source of drinking water.

2. **IMPLEMENTATION OF INSTITUTIONAL CONSTRAINTS**

COMPLIANCE DATE: 60 days after Executive Officer approval

Submit a technical report acceptable to the Executive Officer documenting that the proposed institutional constraints have been implemented.

3. **FIVE-YEAR STATUS REPORT**

COMPLIANCE DATE: March 31, 2002

Submit a technical report acceptable to the Executive Officer evaluating the effectiveness of the approved cleanup 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
g. Additional remedial actions proposed to meet cleanup standards (if applicable) including time schedule

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.

4. **PROPOSED CURTAILMENT**

COMPLIANCE DATE: 60 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.

5. **IMPLEMENTATION OF CURTAILMENT**

COMPLIANCE DATE: 60 days after Executive Officer approval

Submit a technical report acceptable to the Executive Officer documenting completion of the tasks identified in Task 4.

6. **EVALUATION OF NEW HEALTH CRITERIA**

COMPLIANCE DATE: 90 days after requested by Executive Officer

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

7. **EVALUATION OF NEW TECHNICAL INFORMATION**

COMPLIANCE DATE: 90 days after requested by Executive Officer

Submit a technical report acceptable to the Executive Officer evaluating new technical information which bears on the approved cleanup plan and cleanup standards for this 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 cleanup plan or cleanup standards.

8. **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 Board may consider revision to 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 California Water Code Section 13050(m).

2. **Good O&M**: 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.

3. **Cost Recovery**: The dischargers shall be liable, pursuant to California Water Code Section 13304, to the Board for 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, required by this Order. If the site addressed by this Order is enrolled in a State 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 discharger 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 California Water Code Section 13267(c), the dischargers shall permit the 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, which 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 which is accessible, or may become accessible, as part of any investigation or remedial action program undertaken by the discharger.

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 Board using approved EPA methods for the type of analysis to be performed. All laboratories shall maintain quality assurance/quality control (QA/QC) records for Board review. This provision does not apply to analyses that can only reasonably be performed on-site (e.g. temperature).

8. **Document Distribution**: Copies of all correspondence, technical reports, and other documents pertaining to compliance with this Order shall be provided to the following agencies:

   a. City of Sunnyvale Department of Public Safety
   b. County of Santa Clara Department of Environmental Health
   c. Santa Clara Valley Water District

   The Executive Officer may modify this distribution list as needed.

9. **Reporting of Changed Owner or Operator**: The discharger 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 Board by calling (510) 286-1255 during regular office hours (Monday through Friday, 8:00 to 5:00).

    A written report shall be filed with the 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 Office of Emergency Services required pursuant to the Health and Safety Code.

11. **Secondarily-Responsible Discharger**: Within 60 days after being notified by the Executive Officer that other named dischargers have failed to comply with this order, Sobrato as property owner shall then be responsible for complying with this order.

12. **Rescission of Existing Order**: This Order supersedes and rescinds Order Nos. 93-048 and 95-155.

13. **Periodic SCR Review**: The Board will review this Order periodically and may revise it when necessary.

I, Loretta K. Barsamian, 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 April 16, 1997.

Loretta K. Barsamian
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
Agency Addendum
Self-Monitoring Program

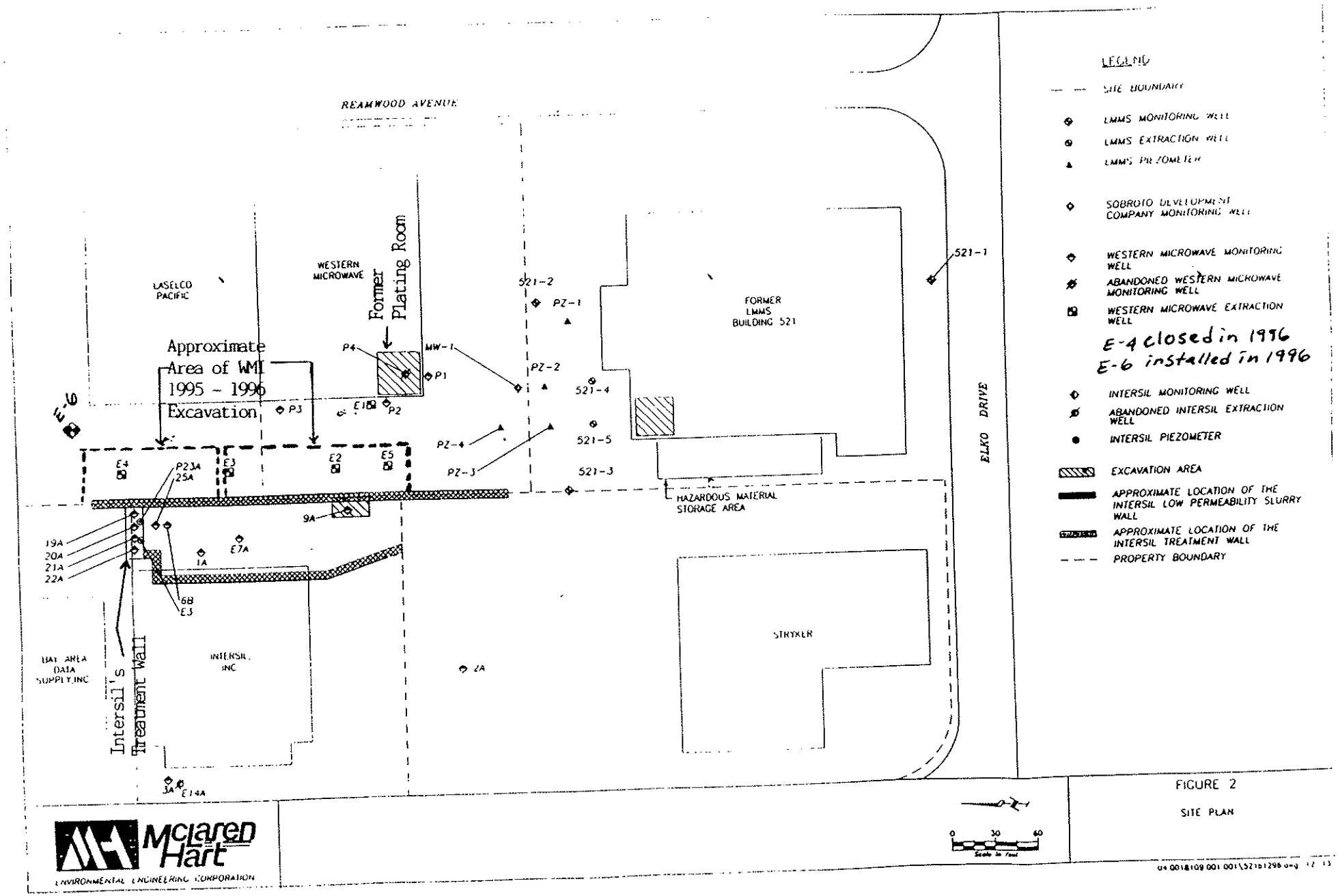

FIGURE 2

SITE PLAN

AGENCY ADDENDUM FOR

WESTERN MICROWAVE, INC.
FINAL REMEDIAL ACTION PLAN

Western Microwave, Inc. (WMI) submitted a revised final remedial action plan (RAP) on November 18, 1996. The Board approves the selected remedial alternative (existing groundwater extraction and treatment systems) as a final remedy for the site. However, the Board does not agree with various interpretations and recommendations contained in WMI's revised RAP. This Agency Addendum modifies WMI's revised RAP as discussed below. Section numbers discussed in this Agency Addendum correspond to sections of WMI's RAP.

I. **Soil Remediation** (Section 7.1)

Language deleted: The last two sentences on Page 28.

Language added: Contaminated soil that remains on-site is located along the northwestern property boundary immediately adjacent to Intersil's slurry wall and treatment wall. Further excavation of this contaminated soil is not necessary for the following reasons:

a) Due to the proximity of the sites, further excavation along the western property boundary will jeopardize the integrity of Intersil's final remedy approved by the Board that consists of slurry wall and treatment wall.

b) The remaining contaminated soil along the western property boundary is limited in size. The VOC concentration levels are slightly higher than the cleanup level (1 ppm) and are unlikely to exacerbate the groundwater situation. Besides, the shallow groundwater underneath the remaining contaminated soil is within the zone of influence of WMI's groundwater extraction system.

c) Based on the investigation results, the predominant chemicals detected in the unexcavated northwestern property boundary area are aromatic hydrocarbons (chemicals that are readily biodegradable). Therefore, implementation of other remedial alternatives such as soil vapor extraction will not be cost effective.

Discussion: WMI proposes no action for the remaining contaminated soil along the western property boundary. It claims that "...any alternative method for soil remediation cannot be limited to the Reamwood site due to the fact that Intersil's slurry wall is not impermeable and any remediation effort on Reamwood site will practically remediate the contaminated soil at Intersil site." We disagree. Intersil had remediated its source areas, and no soil remediation is required for the Hammerwood site. The purpose of the slurry wall is to minimize the lateral groundwater migration between the two properties. It is

designed to have low-permeability and is not required to have high lateral strength characteristics.

During the Phase II soil excavation at the Reamwood site, caving of soil along the western property boundary was observed, which may have been either due to removal of soil immediately adjacent to Intersil's slurry wall or inadvertently direct digging of WMI into the slurry wall material thus reducing the lateral support of the slurry wall.

II. **Groundwater Remediation** (Section 4.2 and 8.0)

Language deleted: The last paragraphs on Pages 18 and 36.

Language added (to Page 18 only): The IRMs evaluation results show that the existing two extraction wells are sufficient in containing the plume and hence reducing VOC concentrations in shallow groundwater.

Discussion: In these sections, WMI states that operation of two extraction wells (E-1 and E-6) will only contain the plume by restricting the migration of contaminated groundwater from leaving the site. It further states that "...without using the other three existing extraction wells (E-2, E-3, and E-5) the residual contamination cannot be effectively remediated." We disagree with WMI's argument because the IRMs evaluation results show that the existing two extraction wells are sufficient in containing the plume and hence reducing VOC concentrations in groundwater.

WMI has conducted extensive source removal including the saturated zone. WMI excessively dewatered the shallow zone during the excavation activities. As a result, VOC concentrations have been reduced in groundwater at the site. VOC mass removal by groundwater extraction has fairly governed by diffusion as chemicals slowly dissociate from soil particles onto groundwater. We believe that the plume is now stabilized, and extracting at higher rates will not speed up cleanup. Excess extraction will lead to dewatering the shallow aquifer. This phenomenon was observed at the site when WMI simultaneously started extracting from its four extraction wells (E-1 through E-4) and dewatering the southern excavated area in 1995. Dewatering reduces the mass transfer of VOCs in groundwater and conversely prolongs cleanup time.

III. **Cleanup Standards** (Section 6.0)

Discussion: WMI identifies only five chemicals and proposes groundwater cleanup standards substantially above their respective EPA or Cal EPA drinking water standards for the five chemicals only. More than five VOCs were detected at the site, and the groundwater underneath the on-site area is considered as a potential source of drinking water. Cleanup standards above the established EPA and/or California drinking water standards will not be protective to human health or the environment. Therefore, WMI's proposed cleanup standards are not acceptable and must be replaced by the cleanup

standards established by the Board in this Order.

IV. **Soil Sampling** (Section 4.1)

Language deleted: Paragraph 3 on Page 14 and paragraph 4 on Pages 14 - 15.

Language added: On December 20, 1994, WMI and the RWQCB split soil samples collected at and near the southern "hot-spot" area, an area that WMI conducted a minor soil excavation in March 1994. The split samples were analyzed for total VOCs by both parties. The RWQCB data (analyzed by Caltest) were consistently and significantly higher than WMI's data. However, despite the discrepancies, both WMI and Caltest data sets showed elevated total VOC concentrations at the southern "hot-spot" area. As a result, WMI conducted an additional extensive soil excavation including the saturated soil at this area (see Figure 16). Approximately 1,700 tons of soil mass were excavated. This excavation is described in detail in a report dated September 7, 1995. Following this excavation, WMI directed Alfa and E_2C consultants to collect sidewall and bottom confirmatory soil samples. These confirmatory samples were analyzed by two different State certified laboratories (Priority Environmental Labs and Anametrix). At this time, the analytic results revealed comparable and consistently low total VOC concentrations.

Discussion: Regarding the December 1994 split soil samples, ALFA (WMI's consultant) argues that "...the values measured by Caltest have never been observed before at this site or at adjacent sites by any of the various consultants using different State certified labs ..." To justify its arguments, WMI directed ALFA and E_2C, Inc. (another consultant) to collect soil samples after the July - August 1995 excavation and analyzed in two different labs. WMI further claims that "...the results of the two labs for samples taken by the two consultants showed levels of contaminants in the same range and consistent with those detected by WMI on 12/20/94." The Caltest results were consistently and significantly higher than WMI's data. However, despite the discrepancies, both WMI and Caltest data sets showed elevated total VOC concentrations at the southern "hot-spot" area. As a result, over 1,700 tons of contaminated soil was removed from the vicinity area in July - August 1995.

The magnitude of VOCs measured by Caltest are within the range of other works at the site. Weber and Associates (directed by WMI) measured about 1200 ppm of total VOC concentrations at four feet bgs at and near the northern "hot-spot" area in May 1992. The July - August 1995 soil samples were collected as confirmatory samples after the extensive excavation. It is inappropriate to compare the analytical results for samples collected before and after the excavation, and Board staff did not expect those two results to be the same. As such, the statement discussed regarding the split samples in the RAP is irrelevant and misleading and should not be considered as part of the RAP.

V. **Extraction Well E-5** (Section 4.2)

Language deleted: Paragraph 3 on Page 17.

Discussion: In this section, WMI states that "...an additional well (E-5) was installed south of extraction well E-2, to control the upgradient plume at the Lockheed site..." This statement is misleading because Lockheed has started groundwater extraction for its shallow groundwater contamination in 1994, one year ahead of WMI. Since then, Lockheed's remedial system was effective enough in containing the plume within the property boundary. WMI installed extraction well E-5 in addition to its two extraction wells (E-1 and E-2) in the middle of the two southern source areas without any technical support. WMI's statement has no technical basis and should not be considered as part of the RAP.

VI. **Slurry Wall** (Sections 4.2)

Language deleted: Fourth paragraph on Pages 17 - 18.

Language added: To excavate the saturated soil, WMI excessively dewatered and extracted shallow groundwater close to Intersil's slurry wall during the fall 1995 soil excavation activities. The slurry wall was designed to be a low-permeability barrier (not impermeable wall) to funnel shallow groundwater from the Intersil site northward to Intersil's treatment wall (final remedy). Therefore, the excess extraction at the WMI site reversed the direction of groundwater flow at the Intersil site and started to undermine the effectiveness of its final remedy. Board staff requested WMI to reduce its extraction rate from extraction wells E-2, E-3 and E-5. As a result, WMI terminated extracting from these three wells in 1996.

Discussion: In this section and elsewhere of the RAP, WMI also states that "...the slurry wall is not impermeable and its permeability is too high to stop the contaminated groundwater from migrating through the wall from the Intersil site to the Reamwood Avenue site." We disagree. Based on the groundwater elevation measurements, the direction of the groundwater flow at the Hammerwood site started shifting when WMI excavated and excessively pumped and dewatered along the western property boundary, an area adjacent to Intersil's slurry wall. The direction of the groundwater flow at the Hammerwood site came to normal when WMI stopped pumping from extraction wells E-2, E-3 and E-5, which are close to the slurry wall and along the property boundary.

There are still two extraction wells at the Reamwood site that are pumping at a combined average rate of 5 to 7 gallons per minute. The recent WMI's capture zone analysis indicated that these wells are effectively containing the groundwater plume at the Reamwood site without influencing the direction of groundwater flow at the Hammerwood site. Intersil implemented its final remedy that constitutes a passive treatment wall and a slurry wall in 1995. The purpose of the slurry wall was to rout affected groundwater from the 1276 Hammerwood site northward through the treatment wall at the north end of the Hammerwood site. The slurry wall was designed to have

a low-permeability (about 5 x 10^{-6} centimeter per second). However, it has been observed that excessive pumping at the Reamwood site changes the groundwater flow at the Hammerwood site. This change will eventually undermine the effectiveness of Intersil's treatment wall. WMI should not resume pumping from the extraction wells adjacent to the slurry wall unless the slurry wall is properly fixed and adequate hydraulic conductivity test results revealed no adverse effect on the groundwater flow underneath the Hammerwood site.

VII. **Off-site VOC Migration** (Section 4.2.1)

Language deleted: The last sentence on Page 19.

Language Added: Low VOC concentrations have seldom been detected in groundwater samples collected from Intersil's monitoring well 11A, an off-site and downgradient well of the two sites. Higher VOC concentrations have been detected in groundwater samples collected from off-site monitoring well 10A, which is located about 130 feet north of the joint property line boundary. However, based on the existing data generated by Intersil, the shallow groundwater underneath the off-site area is not considered as a potential source of drinking water. The off-site shallow groundwater contains high TDS concentrations (>3000 mg/l) due to its proximity to San Francisco Bay and is probably subject to salt water intrusion. Therefore, no cleanup standards are necessary for off-site groundwater.

Discussion: Regarding the off-site VOC migration, WMI states that "...no chemicals have been detected in the off-site monitoring wells 11A, 12A, and 13A, located downgradient, [N]orth of Reamwood site." This statement is incorrect. The monitoring well immediately downgradient of WMI and Intersil sites detected VOC concentrations above MCLs, but the very far downgradient monitoring wells measured below MCLs or non-detect. The off-site groundwater immediately downgradient of the sites is within WMI's groundwater extraction capture zone. The very far off-site shallow groundwater is brackish and does not meet drinking water standards, due to its proximity to San Francisco Bay. As a result, remediation of the off-site shallow groundwater is not appropriate.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

SELF-MONITORING PROGRAM FOR:

WESTERN MICROWAVE, INC. AND
SOBRATO DEVELOPMENT COMPANIES

for the property located at

1271 REAMWOOD AVENUE
SUNNYVALE
SANTA CLARA COUNTY

1. **Authority and Purpose**: The Board requests the technical reports required in this Self-Monitoring Program pursuant to Water Code Sections 13267 and 13304. This Self-Monitoring Program is intended to document compliance with Board Order No. 97-057 (site cleanup requirements).

2. **Monitoring**: The dischargers shall measure groundwater elevations quarterly in all monitoring wells and piezometer wells, and shall collect and analyze representative samples of groundwater according to the following table:

Well #	Sampling Frequency	Analyses	Well #	Sampling Frequency	Analyses
P-1	A	8010/8240	E-1	Q	8010/8240
P-2	Q	8010/8240	E-2	Q	8010/8240
P-3	SA	8010/8240	E-3	Q	8010/8240
P-5	Q	8010/8240	E-5	Q	8010/8240
B	A	8240	E-6	Q	8010/8240

Key: Q = Quarterly
SA = Semi-Annually
A = Annually
8010 = EPA Method 8010 or equivalent
8020 = EPA Method 8020 or equivalent
8240 = EPA Method 8240 or equivalent
8010/8240 = EPA Method 8240 in lieu of 8010 for fourth quarter

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. **Quarterly Monitoring Reports:** The dischargers shall submit quarterly monitoring reports to the Board no later than 30 days following the end of the quarter (e.g. report for first quarter of the year due April 30). The first quarterly monitoring report shall be due on July 31, 1997. 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/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. Historical groundwater elevations shall be included in the fourth quarterly report 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 fourth quarterly report 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. Groundwater Extraction: If applicable, the report shall include groundwater extraction results in tabular form, for each extraction well and for the site as a whole, expressed in gallons per minute and total groundwater volume for the quarter. The report shall also include contaminant removal results, from groundwater extraction wells and from other remediation systems (e.g. soil vapor extraction), expressed in units of chemical mass per day and mass for the quarter. Historical mass removal results shall be included in the fourth quarterly report each year.

   e. Status Report: The quarterly report shall describe relevant work completed during the reporting period (e.g. site investigation, interim remedial measures)

and work planned for the following quarter.

5. **Violation Reports:** If the dischargers violate requirements in the Site Cleanup Requirements, then the dischargers shall notify the Board office by telephone as soon as practicable once the dischargers have knowledge of the violation. 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 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 agent 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 Board upon request.

8. **SMP Revisions:** Revisions to the Self-Monitoring Program may be ordered by the Executive Officer, either on her/his own initiative or at the request of the dischargers. Prior to making SMP 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.

I, Loretta K. Barsamian, Executive Officer, hereby certify that this Self-Monitoring Program was adopted by the Board on April 16, 1997.

Loretta K. Barsamian

Loretta K. Barsamian
Executive Officer