

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER NO. 89-58

SITE CLEANUP REQUIREMENTS AND RECISION OF ORDER NO. 87-163 FOR:

SIGNETICS, INC.
811 EAST ARQUES AVENUE
SUNNYVALE
SANTA CLARA COUNTY

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

1. Site Location and Description Signetics owns and operates a facility located at 811 East Arques Avenue, in Sunnyvale, in an area bounded by Fair Oaks and the Bayshore (U.S. 101), Central and Lawrence Expressways. This is an area of Santa Clara County developed as an industrial park, dominated by low rise buildings. The major business activity of the area is semiconductor manufacture and research and development.

This is an area of low topographic relief in the southern portion of the Santa Clara Valley. Surface drainage in the area is to the north, toward San Francisco Bay. Vegetation is limited to grass and shrubs.

2. Regulatory Status Signetics is hereinafter referred to as a discharger because of the releases of hazardous wastes that have occurred at its site. Signetics is also a Responsible Party under the Federal Superfund (CERCLA/SARA). Signetics is a site proposed for inclusion on the National Priorities List (NPL). This Order is intended to outline the tasks required for completion of the Remedial Investigation/Feasibility Study (RI/FS) as required by CERCLA/SARA.
3. Site History Signetics has operated a semiconductor manufacturing facility at the 811 E. Arques Avenue since 1964. The manufacturing processes employed at this location have utilized various organic solvents, acids, corrosives, and metals. Current chemical usage is similar to past patterns, with the exception of the closure of the plating operation at 811 E. Arques, which has eliminated some potential sources of metal pollution, and the elimination of chemicals containing chromium, phenol, trichloroethylene (TCE), and perchloroethylene (PCE).

All storage and treatment facilities have been updated and either relocated above ground or doubly contained. Hazardous

materials from other nearby Signetics facilities are stored at the 811 E. Arques site prior to offsite disposal at an appropriate commercial disposal facility. This site initially came under a Board Order in 1984. That Order was rescinded and replaced by a new Order in 1985 and again in 1988.

4. Geohydrology The sediments present in the subsurface at the Signetics facility are a series of interbedded sands, silts and clays. These sediments probably represent deposition by fluvial systems as they moved from the uplands to the south to empty into the Bay. Consequently the fine materials are dominant with the coarser grained materials frequently restricted to narrow discontinuous bands or channels.

Five aquifers have been identified in the vicinity of the Signetics site. These aquifers have been designated A through B4, with A being the shallowest and B4 the deepest. The A aquifer occurs from 5 to 25 feet below the ground surface. The B4 occurs from 100 to 110 feet below the ground surface.

In static conditions the groundwater flow is generally from south to north beneath the 811 E. Arques site. Water levels under static conditions are usually higher in the B zone aquifers than in the A zone, indicating a potential upward vertical gradient. The horizontal groundwater gradient has been reversed in areas of groundwater extraction and the vertical gradient between these two aquifers has been reversed across a broad area by extraction including the 811 E. Arques site and the 815 Stewart Avenue facility.

5. Soil Pollution Initial investigation of soil pollution began in 1982 following the report of a leak in an underground solvent storage tank. Analyses of soil samples from this initial phase of investigation indicated that onsite soil was polluted with up to 8100 ppb TCE, 16,400 ppb trichloroethane (TCA), 18,100 ppb xylene, and 79,000 ppb butyl acetate.

A follow-up investigation of polluted soil remaining in place after the removal of the solvent storage tank detected a variety of organic solvents. The greatest concentrations detected were for TCE at 63,000 ppb, TCA at 1,700,000 ppb and PCE at 1,000,000 ppb.

Soil investigation carried out on the east side of the 811 E. Arques building in 1982 also detected soil polluted with solvents. Soil pollution was also detected near Signetics' 440 Wolfe and 830 Stewart Avenue Buildings.

6. Groundwater pollution Groundwater pollution by volatile organic chemicals (VOC's) was detected during the initial investigation in 1982. Monitoring has been continuous for selected wells on at least a quarterly basis since 1982.

Groundwater pollution has spread through the upper five aquifers. Additional characterization of the extent of vertical pollution will be required.

The highest initial concentrations of TCE detected in the A aquifer was 34,000 $\mu\text{g}/\text{l}$ in 1982 in well S049A. The highest concentration of TCE in the A aquifer in the most recent round of sampling was 33,000 $\mu\text{g}/\text{l}$ in well S070A with groundwater from well S049A containing 24,000 $\mu\text{g}/\text{l}$ TCE.

The highest initial concentration of TCE in the B1 aquifer was 2600 $\mu\text{g}/\text{l}$ in 1982 in well S048B1 and 25,000 $\mu\text{g}/\text{l}$ in 1983 in well S075B1. Currently the highest concentration of TCE in the B1 aquifer is 130,000 $\mu\text{g}/\text{l}$ at well S065B1. The highest concentration of TCE in the B2 aquifer was 13,000 $\mu\text{g}/\text{l}$ at well S048B2 in 1986 and 20,000 $\mu\text{g}/\text{l}$ in 1988 at the same well. The highest initial concentration of TCE in the B3 aquifer was 25,000 $\mu\text{g}/\text{l}$ of TCE in well S101B3 in 1986. Currently the highest concentration of TCE in the B3 is 1200 $\mu\text{g}/\text{l}$, also measured in well S101B3. The single onsite B4 aquifer well at 811 E. Argues has always shown levels of TCE below drinking water standards.

It was determined in 1984 that groundwater pollution had migrated north, downgradient from the Signetics property. This groundwater pollution plume had become commingled with polluted groundwater emanating from point sources identified at Advanced Micro Devices (AMD) Building 901/902 (AMD901/902) and TRW (FEI) Microwave at 825 E. Stewart Drive.

7. Relationship To Other Sites The offsite remediation efforts are conducted in conjunction with AMD and TRW (FEI) Microwave. The workplan for additional work required for the completion of a Remedial Investigation and Feasibility Study (RI/FS) and the RI/FS are being completed as a joint project by AMD, Signetics, and TRW (FEI) Microwave (hereinafter the Companies).

A proposed final workplan was submitted on behalf of the Companies in July 1988 and a revised workplan was submitted February 6, 1989. The workplan includes separate onsite tasks to be completed by each discharger and offsite tasks to be completed jointly by the Companies. Adoption of this Order approves this workplan, as revised, and the tasks outlined for completion of a joint RI/FS. It is anticipated that final remedial actions will be also be proposed as a joint effort of all three companies.

8. Chemicals Of Concern Chemicals detected in water and soil include trichloroethylene (TCE), trichloroethane (TCA), tetrachloroethylene (PCE), trichlorobenzene (TCB) and Freon 113. TCE is the chemical most commonly present and serves as

an indicator chemical for this site. Some priority pollutant metals have been detected in soil. Further investigation of these inorganics will be required.

9. Interim Remedial Actions, Onsite Soil Polluted soil has been removed from three separate locations including soil removed during the construction of the extraction trench at Signetics' 440 Wolfe facility. Migration of pollutants from the water treatment plant and solvent storage tank area has resulted in polluted soil remaining in place beneath and adjacent to the 811 E. Arques Building.
10. Interim Remedial Actions, Onsite Groundwater Signetics operates six separate groundwater extraction systems in the vicinity of 811 E. Arques. In 1982 initial extraction of groundwater in the A aquifer began shortly after the discovery of pollution. This was accomplished with the basement dewatering sumps surrounding the 440 Wolfe Building, downgradient of 811 E. Arques. Similar systems also operate in the northern portion of the 811 Building and the waste water treatment building.

Three other extraction systems were designed and installed specifically to contain polluted groundwater to the Signetics' property. An extraction trench system was installed in the A aquifer north of the 440 Wolfe Road in 1984 and operation began in 1985. Operation of this trench has been continuous with the exception of maintenance.

An extraction trench was installed in the A aquifer north of the 811 E. Arques Building in 1984. The intent of this trench was to intercept polluted groundwater that may have come in contact with the polluted soil remaining in place at the 811 site. After an initial period of effective recovery of polluted groundwater this trench became ineffective. The third groundwater extraction system consists of a series of six wells north of the Signetics facility at 815 E. Stewart Drive. This system was intended to prevent further migration of polluted groundwater downgradient to the north across the Signetics property boundary. The system consists of three A aquifer wells, one B1 aquifer well, and two B2 aquifer wells. Operation of this system began in 1987 and with the exception of downtime for maintenance operation has been continuous to date.

All extracted groundwater is treated by a common treatment system utilizing air stripping and carbon adsorption. The treatment system is located at the 440 Wolf Road Building. The treated groundwater is currently released to surface waters following treatment under NPDES Permit Number CA0028720.

11. Interim Remedial Actions, Offsite Groundwater Two offsite groundwater containment extraction systems have been installed. The Duane Avenue Extraction system, consisting of nine extraction wells, is located just south of Duane Avenue, approximately 1200 to 2100 feet downgradient (north) of the AMD, Signetics, and TRW operable units. This extraction system was installed and began operation in 1986. The Duane Avenue system extracts water from the A, B1, B2, B3 and B4 aquifers.

A second extraction system consisting of fourteen wells, along Alvarado Avenue, approximately 2700 to 4300 feet downgradient (north) of the AMD, Signetics and TRW operable units, was completed in 1988. Operation of the Alvarado Avenue system began in October 1988. This system extracts water from the A, B1, and B2 aquifers. Data has been collected for the evaluation of both extraction systems and a report evaluating the effectiveness of the systems was submitted on March 10, 1989.

All offsite extracted groundwater is transferred by a piping system to AMD's 915 DeGuigne facility where the water is treated. About 80 % of the treated water is utilized as process make-up water by the AMD 915 facility and the remainder is released to surface water under NPDES permit number CA0028797.

12. The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on December 17, 1986. The Basin Plan contains water quality objectives and beneficial uses for South San Francisco Bay and contiguous surface and ground waters.
13. The existing and potential beneficial uses of the groundwater underlying and adjacent to the facility include:
- a. Industrial process water supply
 - b. Industrial service water supply
 - c. Municipal and Domestic water supply
 - d. Agricultural water supply
14. The discharger has caused or permitted, and threatens to cause or permit waste to be discharged or deposited where it is or probably will be discharged to waters of the State and creates or threatens to create a condition of pollution or nuisance.
15. This action is an order to enforce the laws and regulations administered by the Board. This action is categorically exempt from the provisions of the CEQA pursuant to Section 15321 of the Resources Agency Guidelines.
16. Onsite and offsite interim containment and cleanup measures

need to be continued to alleviate the threat to the environment posed by the continued migration of pollutants and to provide a substantive technical basis for designing and evaluating the effectiveness of final cleanup alternatives.

17. The Board has notified the discharger and 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 the opportunity for a public hearing and an opportunity to submit their written views and recommendations.
18. The Board, in a public meeting on April 19, 1989, heard and considered all comments pertaining to the discharge.

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

A. PROHIBITIONS

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

B. SPECIFICATIONS

1. The storage, handling, treatment or disposal of soil or groundwater containing pollutants shall not create a nuisance as defined in Section 13050(m) of the California Water Code.
2. The discharger shall conduct monitoring activities as outlined in the amended sampling plan, approved by the Executive Officer, to define the current local hydrogeologic conditions, and the lateral and vertical extent of soil and groundwater pollution. Should monitoring results show evidence of pollutant migration, additional characterization of pollutant extent may be required.

C. PROVISIONS

1. The discharger shall submit to the Board acceptable monitoring program reports containing results of work performed according to a program as described in the sampling plan, as amended, and approved by the Executive Officer.
2. The discharger shall comply with Prohibitions A.1., A.2., and A.3., and Specifications B.1. and B.2. above, in accordance with the following time schedule and tasks:

COMPLETION DATE/TASK

ON-SITE

a) COMPLETION DATE: June 1, 1989

TASK: SOIL REMEDIATION: Submit a technical report proposing soil remediation alternatives and any pilot or treatability studies proposed for polluted soil remaining in the area near Signetics 811 E. Arques facility.

b) COMPLETION DATE: June 15, 1989

TASK: AMENDED SAMPLING PLAN: Submit an addendum to the Sampling Plan to include sampling of selected wells to analyze for EPA priority pollutant metals, an initial sampling of selected wells for analysis by EPA method 8240 (open scan), and future groundwater samples to be analyzed by appropriate EPA series 8000 analytical technique.

OFFSITE

c) COMPLETION DATE: June 1, 1989

TASK: ADMINISTRATIVE RECORD: Submit a proposal acceptable to the Executive Officer to compile and index an Administrative Record as outlined in EPA Interim Draft Guidance on Administrative Records for Selection Of CERCLA Response Actions.

d) COMPLETION DATE: February 17, 1990

TASK: REMEDIAL INVESTIGATION: Submit a technical report acceptable to the Executive Officer pursuant to the work plan described in Finding 7 as revised, and approved by

the Executive Officer, containing the results of the remedial investigation containing the results of the remedial investigation including complete site characterization (both onsite and offsite), and an evaluation of the installed interim remedial measures.

e) COMPLETION DATE: April 17, 1990

TASK: FEASIBILITY STUDY AND REMEDIAL ACTION PLAN:

Submit a technical report acceptable to the Executive Officer pursuant to the work plan described in Finding 7 as revised, and approved by the Executive Officer, containing the results of the a feasibility study evaluating alternative final remedial measures. The feasibility study should include an evaluation of alternative methods of disposing of extracted and treated groundwater. This evaluation should compare reuse, reinjection and disposal to the sanitary sewer to the current system of release of treated groundwater to surface water through the existing NPDES permit. This evaluation shall include a projection of the cost, effectiveness, and benefit of alternative disposal options. In addition, submit a Remedial Action Plan, as a separate technical report, containing the recommended measures necessary to achieve final cleanup objectives; and the time schedule necessary to implement the recommended final remedial measures.

3. All Technical reports submitted must be acceptable to the Executive Officer. The submittal of technical reports evaluating interim and final remedial measures shall include a projection of the cost, effectiveness, benefits, and impact on public health and the environment.
4. The remedial investigation and feasibility study shall consider the guidance provided by Subpart F of the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300); Section 25356.1 (c) of the California Health and Safety Code; CERCLA guidance documents with reference to Remedial Investigation, Feasibility Studies, and Removal Actions; and the State Water Resources Control Board's Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California".
5. If the discharger is delayed, interrupted or prevented from meeting one or more of the completion dates specified in this Order, the discharger shall notify the Executive Officer prior to the deadline for the completion date.

6. Technical reports on compliance with the Prohibitions, Specifications, and Provisions of this Order, and progress on completion tasks as identified in the workplan as revised, shall be submitted on a quarterly basis, according to the schedule below, commencing with the report for the second quarter 1989, due July 31, 1989.

Quarter	1st quarter	2nd Quarter	3rd Quarter	4th Quarter
Period	Jan-March	April-June	July-Sept	Oct-Dec
Due Date	April 30	July 31	October 31	January 31

The quarterly reports shall include;

- a. a summary of work completed since the previous quarterly report,
 - b. appropriately scaled and labeled maps showing the location of all monitoring wells, extraction wells, and existing structures,
 - c. updated water table and piezometric surface maps for all affected water bearing zones, and isoconcentration maps for key pollutants in all affected water bearing zones, shall be included at a minimum in the reports for the second and fourth quarters, or in the event of significant changes,
 - d. a summary tabulation of all well construction data, groundwater levels and chemical analysis results for all site monitor wells
 - e. a summary tabulation of volume of extracted groundwater and chemical analysis for all site groundwater extraction wells,
 - f. identification of potential problems which will cause or threaten to cause noncompliance with this Order and what actions are being taken or planned to prevent these obstacles from resulting in noncompliance with this Order,
 - g. in the event of noncompliance with the Provisions and specifications of this Order, the report shall include written justification for noncompliance and proposed actions to achieve compliance.
7. All hydrogeological plans, specifications, reports, and documents shall be signed by or stamped with the seal of a registered geologist, engineering geologist or professional engineer.
8. 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 records for Board review.

9. The discharger 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.
10. Copies of all correspondence, reports, and documents pertaining to compliance with the Prohibitions, Specifications, and Provisions of this Order, shall be provided to the following agencies:
 - a. Santa Clara Valley Water District
 - b. Santa Clara County Health Department
 - c. City of Sunnyvale
 - d. State Department of Health Services/TSCD
 - e. U. S. EPA Region IX
 - f. U. S. EPA Region IX Contractor, as identified by Region IX personnel

The Executive Officer may additionally require copies of correspondence, reports and documents pertaining to compliance with the Prohibitions, Specifications, and Provisions of this Order to be provided to the U.S. Environmental Protection Agency, Region IX, and to a local repository for public use.

11. The discharger shall permit the Board or its authorized representative, in accordance with Section 13267(c) of the California Water Code:
 - a. Entry upon premises in which any pollution sources exist, or may 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 terms and conditions of this Order.
 - c. Inspection of any monitoring equipment or methodology implemented in response to this Order.
 - d. Sampling of any groundwater or soil which is accessible, or may become accessible, as part of any investigation or remedial action program undertaken by the discharger.
12. The discharger shall file a report on any changes in site occupancy and ownership associated with the facility described in this Order.
13. If any hazardous substance is discharged in or on any

waters of the state, or discharged and deposited where it is, or probably will be discharged in or on any waters of the state, the discharger shall report such discharge to this Regional Board, at (415) 464-1255 on weekdays during office hours from 8 a.m. to 5 p.m., and to the Office of Emergency Services at (800) 852-7550 during non-business hours. A written report shall be filed with the Regional Board within five (5) working days and shall contain information relative to: the nature of waste or pollutant, quantity involved, duration of incident, cause of spill, Spill Prevention, Control, and Countermeasure Plan (SPCC) in effect, if any, estimated size of affected area, nature of effect, corrective measures that have been taken or planned, and a schedule of these activities, and persons/agencies notified.

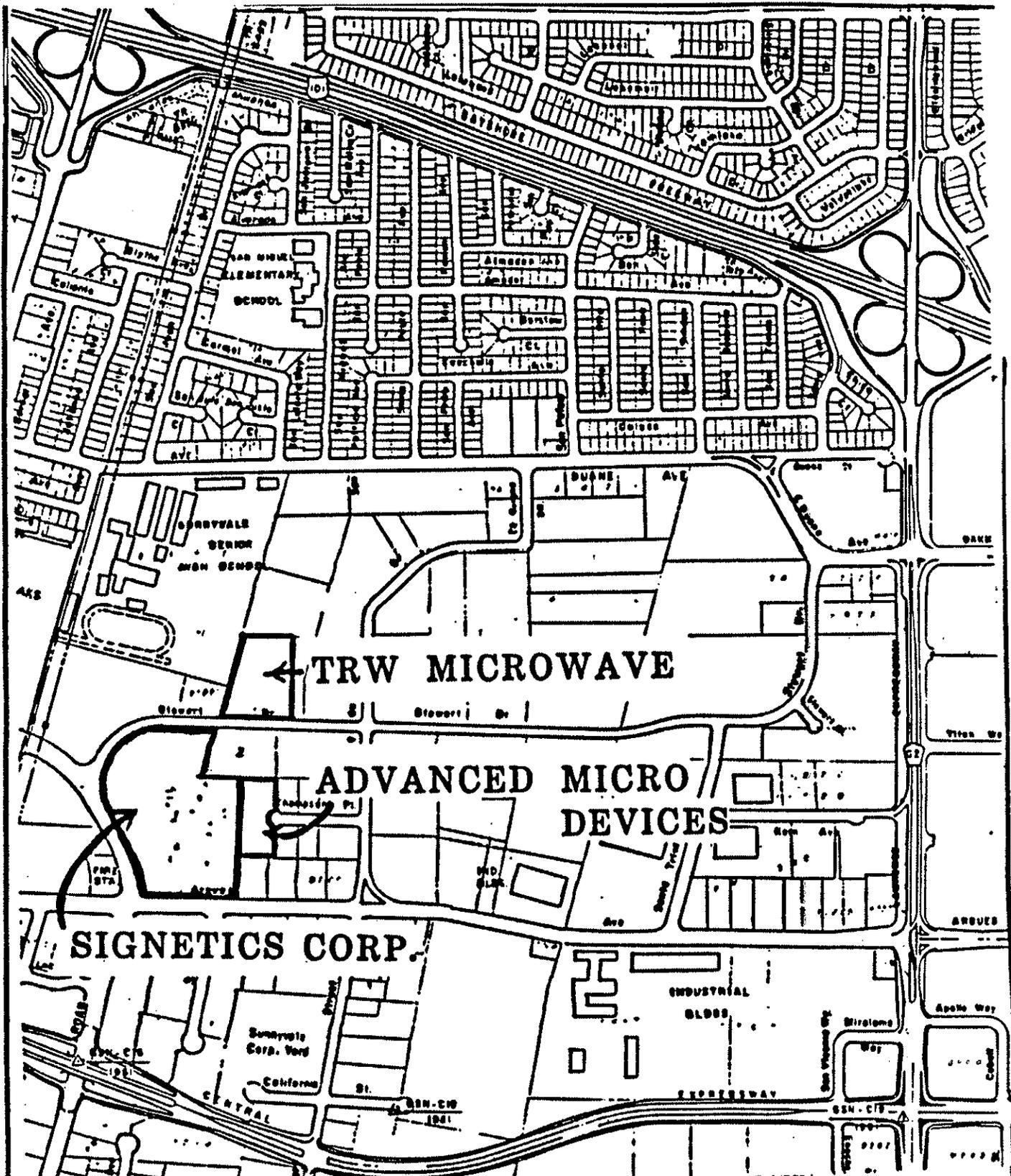
14. The Board will review this Order periodically and may revise the requirements when necessary.

I, Steven R. Ritchie Executive Officer, do hereby certify that the foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on April 19, 1989.



Steven R. Ritchie
Executive Officer

Attachments: Site location map



ADDRESSES:

- TRW Microwave Inc.,
825 Stewart Drive, Sunnyvale
- Advanced Micro Devices Inc.
901 Thompson Place, Sunnyvale
- Signetics Corporation
811 E. Arques Avenue, Sunnyvale

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

LOCATION MAP:
Advanced Micro Devices Inc., Sunnyvale
Signetics Corporation, Sunnyvale
TRW Microwave Inc., Sunnyvale

DRAWN BY: **DATE:** 2/2/87 **DRWG. NO.**