

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

**ORDER NO. 94-164
NPDES NO. CA0028720**

RENEWAL OF WASTE DISCHARGE REQUIREMENTS FOR:

**PHILIPS SEMICONDUCTORS
811 E. ARQUES AVENUE FACILITY
SUNNYVALE, SANTA CLARA COUNTY**

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

1. Philips Semiconductors (hereinafter the discharger), by application dated December 15, 1992, has applied for renewal of waste discharge requirements and a permit to discharge waste under the National Pollutant Discharge Elimination System (NPDES). The discharger is currently discharging wastes pursuant to Order No. 88-114, adopted on July 20, 1988, as amended by Order No. 89-124 adopted on July 19, 1989.
2. Prior to January 1993, the semiconductor manufacturing facility located at 811 E. Arques Avenue, Sunnyvale, was referred to as Signetics Company. Signetics Company was formerly a subsidiary of Philips Electronics North American Corporation. In January 1993, the facility name was changed to Philips Semiconductors.
3. Subsurface investigations at the site have detected various chemicals, including 1,1,1-trichloroethane (TCA), trichloroethylene (TCE), 1,1-dichloroethene (DCE), freon, xylene, ethylbenzene, and dichlorobenzene in both soils and groundwater at the site. Some of these chemicals are found in off-site groundwater. Investigations undertaken by the discharger, in cooperation with Advanced Micro Devices, Inc. (AMD) and TRW, Inc. indicated that chemicals from all three companies' sites had migrated in the groundwater to form a merged plume of pollution extending to a depth of 75 feet and a lateral distance over 2,000 feet downgradient of the dischargers facility on 811 E. Arques Avenue.

4. The discharges from the facility include the following:

Waste Number and Description	Average Annual Flow Rate (gpd)
001 Reject water from reverse osmosis water purification system, discharged to storm drain	35,000
002 Extracted groundwater from on-site and off-site wells, discharged to Sunnyvale East Channel	14,000
003 Industrial stormwater runoff, discharged to storm drain (covered under Order No. 92-011)	--

5. Waste 001: Municipal water is treated in a reverse osmosis system supplying manufacturing processes at the Philips facility. The reject discharge rate from this system fluctuates based on production needs for deionized water. However, an annual average 35,000 gpd of reject water is discharged via storm drain to Calabazas creek.
6. Waste 002: Groundwater extracted from on-site wells, and from wells at the Philips facility located at 440 North Wolfe Road, is pumped to a groundwater treatment system located at the 440 North Wolfe Road site at a rate of approximately 144,000 gpd. Up to 90% of the effluent is currently reused at the Philips facilities at 440 North Wolfe Road and at 811 East Arques Avenue. However, the amount reused varies based on seasonal uses and production requirements. A large portion of the water is reused in air scrubbers, which limit air emissions during semiconductor production. Reject water from the scrubbers is discharged to Philips' wastewater neutralization systems prior to discharge to the Sunnyvale POTW. Smaller quantities of water are utilized for landscaping and restroom plumbing (non-potable uses only) at the Philips facilities. Groundwater is primarily treated utilizing three air strippers and two carbon canisters. If the air strippers are taken out of service to perform maintenance, Philips will treat groundwater by using four carbon canisters. Approximately 10% of the effluent, or 14,000 gpd, is discharged to the Sunnyvale East Channel.
7. Waste 003: This discharge is covered under the General Storm Water Permit for Industrial Dischargers in Santa Clara County (Order No.92-011, NPDES Permit No.CA0029718). On-site facilities which trigger this requirement include: chemical and waste storage areas, an underground waste storage tank, and outdoor maintenance activities. Rain water is typically prevented from entering secondary containment vaults. However, any rain water accumulating in secondary containment would be tested prior to discharge. Depending on test results, the rainwater would either be discharged to the

on-site industrial wastewater treatment unit (which discharges to the sanitary sewer), or transported off-site for treatment and disposal. Stormwater runoff from other on-site facilities (e.g. roofs, parking lots, landscaping) is discharged directly to the storm drain.

8. **Surface water discharge:** The wastewaters are discharged via the City of Sunnyvale storm drain system to Calabazas Creek and the Sunnyvale East Channel, both of which are tributary to the Guadalupe Slough and the South San Francisco Bay. These wastes enter the surface waters at the following locations:

Outfall No. and Location	Lat/Long	Wastes Discharged
O-001 Calabazas Creek	37°22'57" 122°00'40"	001,003
O-002 Sunnyvale East Channel	37°23'03" 122°00'42"	002,003

9. **Basin Plan Requirements:** The Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on December 17, 1986. The Board amended its Basin Plan on September 16, 1992, and the State Board approved it on April 27, 1993, with approval from the State Office of Administrative Law pending. Section 1 of the 1992 Basin Plan amendments, "Implementation of Statewide Plans," was remanded by the State Board on June 16, 1994, due to its reliance on two Statewide Plans that are no longer legally in effect. The Basin Plan identifies beneficial uses and water quality objectives for surface and ground waters in the region, as well as discharge prohibitions intended to protect beneficial uses.

10. **Beneficial Uses:** The Basin Plan identifies the following existing and potential beneficial uses of Guadalupe River and its tributaries:

- a) water contact and non-contact recreation
- b) wildlife habitat
- c) cold freshwater and warm freshwater habitat
- d) fish migration and fish spawning
- e) groundwater recharge

The Basin Plan identifies the following existing and potential beneficial uses of groundwater underlying and adjacent to the facility:

- a) industrial process water supply

- b) industrial service water supply
- c) municipal and domestic water supply
- d) agricultural water supply

11. **Basin Plan Prohibitions:** The Basin Plan prohibits discharge of wastewater which has "particular characteristics of concern to beneficial uses" (a) "at any point in San Francisco Bay south of the Dumbarton Bridge" and (b) "at any point where the wastewater does not receive a minimum initial dilution of at least 10:1 or into any nontidal water, dead end slough, similar confined water, or any immediate tributary thereof." An exception to these prohibitions is warranted because (i) this discharge is an integral part of a groundwater remediation program and thereby provides a net environmental benefit and (ii) water reuse and reclamation will be optimized.

The Basin Plan prohibits discharge of "all conservative toxic and deleterious substances, above those levels which can be achieved by a program acceptable to the Board, to waters of the Basin." The discharger's groundwater extraction and treatment system and associated operation, maintenance, and monitoring plan constitutes an acceptable control program for minimizing the discharge of toxicants to waters of the State.

12. **Regional Board Resolution 88-160:** Resolution 88-160 strongly encourages dischargers of extracted groundwater from site cleanup projects to reclaim their effluent, or when not technically or economically feasible, to discharge to a POTW. If neither reclamation nor discharge to a POTW is feasible, and if beneficial uses of the receiving water are not adversely affected, then the Board will approve of the discharge as part of a groundwater cleanup project. This discharge is in compliance with Resolution 88-160, in that reuse has been optimized and discharge to the Sunnyvale POTW is infeasible.

13. **Effluent Limitations**

Effluent limits in this permit are based on the plans, policies, and water quality objectives and criteria of the Basin Plan, "Quality Criteria for Water" (EPA 440/5-86-001, 1986 Gold Book), applicable Federal Regulations (40 CFR Parts 122 and 131), the National Toxics Rule (57 FR 60848, December 22, 1992), State and Federal maximum contaminant levels (MCLs), US EPA Region 9 draft guidance (NPDES Permit Limitations for Discharge of Contaminated Groundwater), Best Available Technology Economically Achievable (BAT), and Best Professional Judgement.

Effluent limits for individual VOCs are the more stringent of 5 ug/l or the current drinking water standard. The technology to achieve the 5 ug/l

maximum is expected to achieve concentrations at or below 0.5 ug/l (the current method detection limit) most of the time.

In the Board's Best Professional Judgement, limited dilution credit (two times the water quality objective) is appropriate in establishing effluent limits for metals, for the following reasons unique to groundwater cleanup discharges. These are temporary discharges, which will cease when groundwater cleanup standards are met. These discharges are likely to often exceed effluent limits for metals which do not provide allowance for dilution, with no feasible way to come into compliance. Source control is not an option since metals are in ambient groundwater, and treatment of low-ppb concentrations of metals is not feasible at numerous small treatment units. Exceedances of water quality standards in receiving waters near these discharges are unlikely and, if present at all, very small in size and duration, due to the relatively small discharge volumes. Finally, these discharges do not contribute significant metals loadings in the region (less than 400 pounds per year, as estimated in the 1993 Board staff study cited above). With respect to mercury, a mass limit in lieu of a concentration limit is appropriate, given that mercury bio-concentrates in fish and shellfish tissue and given that the water quality objective for this constituent is based on human consumption of fish and shellfish. A limit of 1 gram/day represents a *de minimus* level and is consistent with the Board's 1991 general permit for fuels-cleanup discharges.

If violations of effluent limits for metals occur, the discharger will be required to evaluate the feasibility of treatment and/or the impacts of the exceedance to the receiving water. The Executive Officer will consider these evaluations and subsequent actions taken by the discharger when exercising enforcement discretion.

It is the Board's intent to replace concentration limits with mass limits for metals in the future. This will be done on a watershed by watershed basis, thereby assuring that all significant sources in a given watershed are managed properly to protect water quality. The transition to a watershed approach will be possible once non-point sources are better understood.

14. CEQA: This action is an Order to renew an NPDES permit for an existing surface water discharge. This action is exempt from the provisions of the California Environmental Quality Act (CEQA) pursuant to Section 13389 of the California Water Code.
15. The Board has notified dischargers potentially subject to this Order and interested agencies and persons of its intent under Division 7 of the California Water Code to prescribe waste discharge requirements for the

discharge and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

16. The Board, in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED, pursuant to Division 7 of the California Water Code and regulations adopted thereunder and the provisions of the Clean Water Act as amended and regulations and guidelines adopted thereunder, that Philips Semiconductor shall comply with the following:

A. Prohibitions

1. The discharge of waste or hazardous materials in a manner which will degrade the water quality or adversely affect beneficial uses of the waters of the State is prohibited.
2. The discharge shall be limited to the waste streams described in the NPDES permit application and added anti-scaling or anti-biofouling chemicals approved by the Executive Officer which do not adversely affect the environment and comply with the requirements of this Order. Discharges of any other wastes are prohibited.
3. Discharge volume shall not exceed the following maximum flow rates (gallons per day, based on the weekly average flow rate) unless an increase in gallons per day is approved by the Executive Officer:
 - a. Waste 001 (reverse osmosis reject water)
65,000 gallons per day
 - b. Waste 002 (on and off-site treated groundwater)
25,000 gallons per day
4. Discharges authorized by this permit shall not cause or threaten to cause pollution, contamination, or nuisance.

B. Effluent Limitations

The following effluent limits apply to the discharge at the point after full treatment but before the discharger relinquishes control of the discharge.

1. The discharge of an effluent for 001 in excess of the following is prohibited (instantaneous maximum):

- a. Total dissolved solids mg/l 2000
- b. Chlorine mg/l 0.0

2. Waste 002 shall not contain constituents in excess of the following limits:

Constituent	Units	Instantaneous Maximum
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a. Purgeable Halocarbons (as detected by EPA Method 601 or its equivalent)

Trichloroethylene	ug/l	5
1,1,1-Trichloroethane	ug/l	5
Tetrachloroethylene	ug/l	5
1,1-Dichloroethylene	ug/l	5
1,2-Dichloroethane	ug/l	0.5
Vinyl Chloride	ug/l	0.5
1,2-Dichloroethylene	ug/l	5
1,1-Dichloroethane	ug/l	5
Methylene Chloride	ug/l	5
Chloroform	ug/l	5
Trichloroflouromethane	ug/l	5
Freon 113	ug/l	5
Any other	ug/l	5

b. Purgeable Aromatics (as detected by EPA Method 602 or its equivalent)

Total Xylenes	ug/l	5
Ethylbenzene	ug/l	5
Dichlorobenzene	ug/l	5
Any other	ug/l	5

c. Inorganics

Arsenic	ug/l	10
Cadmium	ug/l	2.2 ¹
Chromium (VI)	ug/l	22 ²
Copper	ug/l	23.6 ¹
Lead	ug/l	6.4 ¹
Nickel	ug/l	320 ¹
Selenium	ug/l	10
Silver	ug/l	8.2 ¹
Zinc	ug/l	220 ¹

¹ assumes hardness = 100 mg/l CaCO₃

² dischargers, at their option, may meet this limit as total chromium

3. Waste 002 shall not contain more than 1 gram/day of mercury.
4. The pH of any waste discharge shall not exceed 8.5 nor be less than 6.5.
5. Toxicity: The survival of rainbow trout in 96-hour bioassay of any waste discharge, shall be a three-sample median of 90% survival and shall not be less than 70%.

C. Receiving Water Limitations

1. The discharge of waste shall not cause the following conditions to exist in waters of the State at any place:
 - a) floating, suspended, or deposited macroscopic particulate matter or foam;
 - b) bottom deposits or aquatic growths;
 - c) alteration of temperature, turbidity, or apparent color beyond present natural background levels;
 - d) visible, floating, suspended, or deposited oil or other products of petroleum origin;
 - e) toxic or other deleterious substances to be present in concentrations or quantities which will cause deleterious effects on aquatic biota, wildlife, or waterfowl, or which render any of these unfit for human consumption either at levels created in the receiving waters or as a result of biological concentration.
2. The discharge of waste shall not cause excursions of the following limits in waters of the State in any place within one foot of the water surface:
 - a) Dissolved oxygen: 5.0 mg/l minimum.

The median dissolved oxygen concentration for any three consecutive months shall not be less than 80% of the dissolved oxygen content at saturation.

- b) pH: The pH shall not be depressed below 6.5 nor raised above 8.5, nor caused to vary from normal ambient pH levels by more than 0.5 units. If the receiving water pH does not meet these conditions, the discharger shall demonstrate (by determining the pH at the final effluent sampling point) that it is not attributed to the discharge.
3. This discharge shall not cause a violation of any applicable water quality standard for receiving waters adopted by the Board or the State Water Resources Control Board as required by the Federal Clean Water Act and regulations adopted thereunder. If more stringent applicable water quality standards are promulgated or approved pursuant to Section 303 of the Federal Clean Water Act or amendments thereto, the Board will revise and modify this Order in accordance with such more stringent standards.

D. Provisions

1. The discharger shall comply with all sections of this order effective January 1, 1995.
2. The discharger shall comply with the attached Standard Provisions except items A.7, C.1, C.2, D.2, D.3, E.5, and E.6.c.
3. The discharger shall comply with the attached Self-Monitoring Program.
4. Evaluation of Metals Effluent Limits Violations

If any inorganic effluent limit is exceeded then the discharger shall take three additional samples for that constituent(s) during the following quarter.

Case 1 If the results of the three additional samples for the effluent do not exceed the effluent limit(s) the discharger shall report the results to the Executive Officer in the next Self-Monitoring Report, and shall return to the schedule of sampling and analysis in the Self-Monitoring Program.

Case 2 If the results of any one of the three additional samples exceed the effluent limit(s), the discharger shall perform the following:

- a) Calculate the median and maximum concentration values for the constituent(s) of concern, using the three recent samples and all samples collected and analyzed for that constituent in the previous 12 month period.
- b) Estimate the mass load discharged in the previous 12 month period for the constituent(s) of concern. Report the results in grams per day and in pounds per year, using the average flow rate for the previous 12 month period.
- c) Report the results to the Executive Officer in the next Self-Monitoring Report, and return to the schedule of sampling and analysis in the Self-Monitoring Program.

Case 3 If the results of two or three of the additional samples exceed the effluent limit(s), the discharger shall perform the following:

- a) Calculate median and maximum concentration values and mass load for the constituent(s) of concern, as described in Case 2 above.
- b) Perform a cost analysis for treatment of the discharge for the constituent(s) of concern. The analysis should include, but need not be limited to, a discussion of various treatment technologies or pre-treatment filtration options, the cost and technical feasibility of increased treatment to reduce the constituent(s) of concern, and the amount of reduction in terms of concentration and average annual mass load. A joint effort may be undertaken and submitted by more than one discharger to evaluate cost and feasibility of treatment technologies or options.

If the results of the cost analysis indicates that metals treatment of the discharge does not appear to be a feasible option, then:

- c) Perform an evaluation of the potential adverse impacts to the beneficial uses of the receiving water. The evaluation should include, but need not be limited to, description of the beneficial uses specific to the receiving water, physical and chemical characteristics of the water body

and sediment, and the physical, chemical, or biological effects from the constituent(s) on the beneficial uses, including effects related to hardness for metals with hardness-dependent objectives.

If exceedances are only for metals with hardness-dependent objectives, then the discharger may conduct a hardness study prior to completing this task. The hardness study should assess receiving water hardness (as CaCO_3) and compute a "no effect" concentration for affected metals, using (i) the minimum of a statistically significant number of hardness samples, and (ii) hardness-dependent formula for US EPA freshwater criteria. If effluent metals concentrations fall below the computed "no effect" concentration, then the discharger need not complete the remainder of this task.

If the receiving water study finds that the discharge is having potential adverse impacts to beneficial uses of the receiving water, then:

- d) Evaluate control measures other than treatment to reduce the constituent(s) of concern in the discharge, such as re-evaluating options for re-use, discharge to POTW, or alternatives to groundwater extraction.
- e) Within 180 days of the discharger receiving results of the consecutive sampling, report the results of tasks (a) through (d) above to the Executive Officer, including:
 - the proposed method to eliminate or minimize future non-compliance, or
 - provide a rationale for why no change to the existing program should take place, and
 - return to the schedule of sampling and analysis in the Self-Monitoring Program.

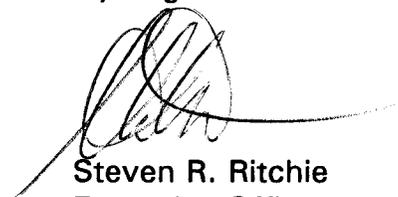
The discharger may be required to perform additional evaluations or take additional actions to minimize noncompliance, as deemed necessary by the Executive Officer.

If a violation of the same effluent limit occurs less than 60 months after completion of the required tasks in Cases 1, 2, or 3, then the Executive Officer may waive the evaluation required above. This

waiver will not apply if a different inorganic constituent exceeds the effluent limit. In that case, the discharger shall perform an evaluation for that constituent(s).

5. This permit may be modified prior to the expiration date to include effluent limitations for toxic constituents determined to be present in significant amounts in the discharge through the Self-Monitoring Program included as part of this Order.
6. This Order expires November 16, 1999. The discharger must file a report of waste discharge in accordance with 23 CCR Subchapter 9 not later than 180 days in advance of this expiration date as application for NPDES permit renewal.
7. This Order shall serve as a National Pollutant Discharge Elimination System permit pursuant to Section 402 of the Federal Clean Water Act, or amendments thereto, and shall become effective January 1, 1995 provided the Regional Administrator, U. S. Environmental Protection Agency, has no objection. If the Regional Administrator objects to its issuance after January 1, 1995, the permit shall not become effective until such objection is withdrawn.
8. This order supersedes and rescinds Orders 88-114 and 89-124, effective January 1, 1995.

I, Steven R. Ritchie, Executive Officer, do hereby certify 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 November 16, 1994.



Steven R. Ritchie
Executive Officer

Attachment: Standard Provisions (August 1993)
Self-Monitoring Program (Parts A and B)

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

SELF MONITORING PROGRAM

FOR

**PHILIPS SEMICONDUCTOR CORPORATION
811 EAST ARQUES AVENUE
SUNNYVALE, SANTA CLARA COUNTY**

NPDES NO. CA0028720

ORDER NO. 94-164

CONSISTS OF

**PART A (AUGUST 1993) AND
PART B (ADOPTED NOVEMBER 16, 1994)**

PART B

I. DESCRIPTION OF SAMPLING STATIONS

A. Influent

<u>Station</u>	<u>Description</u>
I-002	At a point in the 440 Wolfe groundwater treatment system immediately prior to treatment and discharge/reuse.

B. Effluent

<u>Station</u>	<u>Description</u>
E-001	At a point in the reverse osmosis water treatment system immediately following treatment but before any discharge.
E-002	At a point in the on-site groundwater treatment system immediately following treatment but before any discharge/reuse.

C. Receiving Waters

<u>Station</u>	<u>Description</u>
C-001	At a point in Sunnyvale East Channel at least 50 feet upstream from the point of groundwater discharge into the receiving water, or if access is limited, at the first point upstream which is accessible.
C-002	At a point in the Sunnyvale East Channel at least 50 feet downstream from the point of groundwater discharge to the channel, or if access is limited, at the first point downstream which is accessible.

II. SCHEDULE OF SAMPLING AND ANALYSIS

The schedule of sampling and analysis shall be that given below. All samples shall be grab samples:

Parameter or Constituent	I-002	E-001	E-002	C-001 and C-002
Flow Rate (gal/day)		W	W	
pH (units)	M	M	M	A
Dissolved Oxygen (mg/l and % Saturation)				A
Temperature (°C)		M	M	A
Fish Toxicity ¹		A	A	
Halogenated VOCs (Method 601 ²)	M		M	
Aromatic VOCs (Method 602 ²)	M		M	
Halogenated/Aromatic VOCs (Method 624 ²)	A		A	
Metals ³			A	
Total residual chlorine ⁴ (mg/l)		M	M	
Total dissolved solids (mg/l)		M	Q	A
Standard Observations		M	M	A
Turbidity		M	M	
Hardness (mg/l CaCO ₃)		A	A	A

Key: W = Weekly
M = Monthly
Q = Quarterly
A = Annually

- Using 96-hour, static bioassay in undiluted waste.
- Or equivalent method. EPA Method 624 to be performed annually in lieu of EPA 601 and 602 analysis.
- Maximum method detection limit for metals as follows: cadmium 2 ug/l, mercury 0.2 ug/l, zinc 10 ug/l, and other metals 5 ug/l.
- Monitoring only required during periods when chlorine is used in treatment units tributary to the sampling station.
- Sampling only required at influent and effluent stations if there is a discharge for that sampling interval.
- RO reject water monitoring for pH, temperature, total residual chlorine,

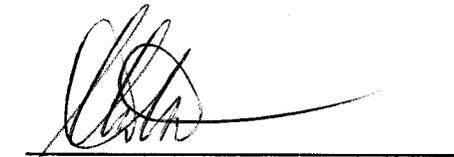
and total dissolved solids may be done in the field.

III. MODIFICATION OF PART A

All items in Part A (August 1993) shall be complied with except: C.5, D.2-D.5, F.4, and F.5. With respect to section C, grab samples are to be collected in place of composite samples. Section F.4 (submittal of SMRs) is modified to provide for quarterly SMRs due 30 days after the end of the calendar quarter. Section F.5 (annual reports) is modified to allow 30 days after the end of the calendar year for report submittal.

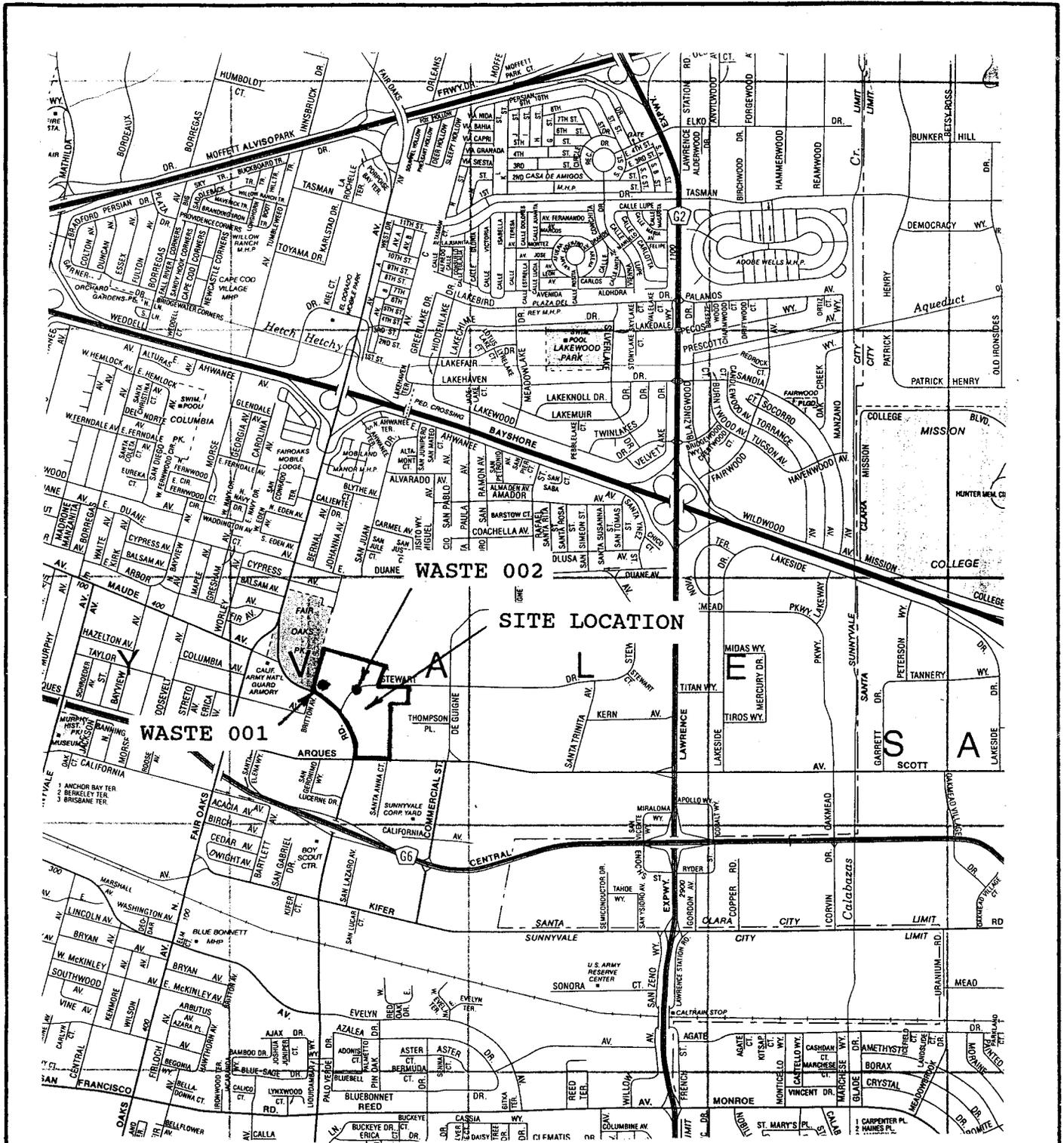
I, Steven R. Ritchie, Executive Officer, hereby certify that the foregoing Self-Monitoring Program:

1. Has been developed in accordance with the procedure set forth in Regional Board Resolution No. 73-16 in order to obtain data and document compliance with waste discharge requirements established in Regional Board Order No. 94-164.
2. Was adopted by the Board on November 16, 1994.
3. May be revised by the Executive Officer pursuant to EPA regulations (40 CFR 122.36); other revisions may be ordered by the Board.



Steven R. Ritchie
Executive Officer

Attachment: Part A (August 1993)



no scale

NORTH

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

DISCHARGE LOCATION MAP

PHILIPS SEMICONDUCTORS
 811 E. ARQUES AVENUE
 SUNNYVALE, SANTA CLARA COUNTY

DRAWN BY: CSF DATE: 10/94 DRWG. NO.