

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
SAN FRANCISCO BAY REGION

ORDER NO. 90-006  
NPDES NO. CA0029629

WASTE DISCHARGE REQUIREMENTS FOR:

NATIONAL SEMICONDUCTOR CORPORATION  
2900 SEMICONDUCTOR DRIVE  
SANTA CLARA, SANTA CLARA COUNTY

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

1. National Semiconductor Corporation (NSC), hereinafter called the discharger, by application dated August 17, 1989, has applied for issuance of waste discharge requirements under the National Pollutant Discharge Elimination System (NPDES).
2. The discharger owns and operates a semiconductor manufacturing facility at 2900 Semiconductor Drive, Santa Clara, Santa Clara County. The NSC site is bounded by Central Expressway on the north, Lawrence Expressway on the east, Kifer Road on the south, and a line about 1000 feet east of Commercial on the west. The site comprises over 20 buildings containing administrative offices, laboratories and production facilities over an area of approximately 60 acres. NSC has been manufacturing semiconductors at the site since 1967.
3. Virgin solvents and acids used in the semiconductor manufacturing processes were and are stored in aboveground tanks and storage drums while waste solvents have been stored in underground tanks and acid wastes have been neutralized in acid neutralization sumps. Studies by the discharger revealed significant levels of organic chemical pollution in soils and ground water beneath and downgradient of the site. The pollution was caused primarily by leakage from underground tanks, sumps, and pipes.
4. Volatile organic chemicals (VOCs) were detected at concentrations as high as 33,000 parts per billion (ppb) in ground water samples from the initial wells installed near existing underground tanks or sumps suspected of leaking. Results of the initial onsite and subsequent onsite and offsite ground water investigations at the site indicate that 1,1,1-trichloroethane (1,1,1-TCA), trichloroethene (TCE), 1,1-dichloroethene (1,1-DCE), 1,2-DCE, and Freon 113 were consistently detected in all impacted wells. Volatile aromatic compounds (xylenes and ethyl benzene) were also detected in certain onsite wells. Studies have delineated a plume of VOCs in the A and B1 aquifers extending approximately 5000 feet downgradient (north) of the NSC site, ending in the vicinity of U. S. Highway 101, in the City of Sunnyvale.

5. The discharger began ground water remediation in 1985 by installing an extraction and treatment system onsite. This system presently consists of 25 wells, two air stripping towers (Towers 1 and 9) and acid fume scrubbers (for water formerly treated in Tower A).

NSC also operates an offsite extraction and treatment system located along Miraloma Way and East Arques Avenue in the City of Sunnyvale. This system consists of 15 extraction wells and an air stripper on the Herman Christensen property on East Arques Avenue (Tower C).

Currently, NSC is extracting and treating approximately 1.0 million gallons of water per week with its onsite and offsite remediation systems. The treated water from Towers 1, 9 and C is discharged to storm drains tributary to Calabazas Creek, Guadalupe Slough, and South San Francisco Bay, pursuant to NPDES Permit No. CA0028835, Order No. 87-015, adopted by the Board on March 18, 1987. The water from the acid fume scrubbers is discharged to the City of Santa Clara sanitary sewer system.

6. The discharger seeks to minimize further migration of VOCs and contain affected ground water by installing a second offsite ground water extraction and treatment system on the Trammell Crow property at the intersection of Lawrence Expressway and Lakeside Drive (adjacent to U. S. Highway 101) in the City of Sunnyvale. This system will consist of three extraction wells and ozone and carbon adsorption treatment to reduce VOCs in the ground water.

The discharger proposes to discharge from this treatment system an average of 108,000 gallons per day (gpd) and a maximum of 144,000 gpd of treated ground water to a storm drain on Lakeside Drive which is tributary to Calabazas Creek, Guadalupe Slough, and South San Francisco Bay. This discharge is designated Effluent Discharge 005 (E-005) to distinguish it from the discharges from Towers 1, 9, and C that are regulated under NPDES Permit No. CA0028835.

7. The intent of this Order is to issue a new NPDES permit for the proposed offsite extraction and treatment system (ozone and carbon adsorption) at the intersection of Lawrence Expressway and Lakeside Drive.
8. The Regional Board adopted a revised Water Quality Control Plan for the San Francisco Bay Region (Basin Plan) on December 17, 1986. The Basin Plan contains water quality objectives for Calabazas Creek and South San Francisco Bay.
9. The existing and potential beneficial uses of Calabazas Creek include:
  - Agricultural supply
  - Navigation
  - Contact and non-contact water recreation
  - Warm fresh water and cold fresh water habitat
  - Wildlife habitat

10. The existing and potential beneficial uses of South San Francisco Bay include:
  - Contact and non-contact water recreation
  - Wildlife habitat
  - Preservation of rare and endangered species
  - Estuarine habitat
  - Fish spawning and migration
  - Industrial service supply
  - Shellfishing
  - Navigation
  - Ocean commercial and sport fishing
11. 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".
12. The Basin Plan allows for exceptions to the prohibitions referred to in Finding #11 above when it can be demonstrated that a net environmental benefit can be derived as a result of the discharge.
13. Exceptions to the prohibitions referred to in Finding #11 are warranted because this discharge is an integral part of a program to cleanup polluted ground water and thereby produce an environmental benefit, and because receiving water concentrations are expected to be below levels that would affect beneficial uses. Should studies indicate chronic effects, not currently anticipated, the Board will review the requirements of this Order based upon Section B.1.e.
14. 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 ground water extraction and treatment systems and associated operation, maintenance, and monitoring plans constitute an acceptable control program for minimizing the discharge of toxicants to waters of the State.
15. Effluent limitations of this Order are based on the Basin Plan, State and U. S. Environmental Protection Agency (EPA) plans and policies, and best engineering and geologic judgement. EPA Region IX draft guidance "NPDES Permit Limitations for Discharge of Contaminated Groundwater: Guidance Document" was also considered in the determination of effluent limits.
16. The issuance of waste discharge requirements for this discharge is exempt from the provisions of Chapter 3 (commencing with Section 21100) of Division 13 of the Public Resources Code (CEQA) pursuant to Section 13389 of the California Water Code.

17. The Board has notified the discharger and interested agencies and persons of its intent to issue waste discharge 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, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED that the discharger, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, and the provisions of the Clean Water Act and regulations and guidelines adopted thereunder, shall comply with the following:

A. EFFLUENT LIMITATIONS

1. Effluent Discharge E-005, at the discharge point to the storm drain, shall not contain constituents in excess of the limits contained in Table 1 below:

Table 1

<u>Constituent</u>	<u>Instantaneous Maximum (<math>\mu\text{g/l}</math>)</u>
<u>VOCs</u>	
trichloroethene	5.0
1,1,1-trichloroethane	5.0
1,1-dichloroethane	5.0
1,1-dichloroethene	5.0
(cis + trans)-1,2-dichloroethene	5.0
1,2-dichloroethane	0.5
perchloroethene	5.0
vinyl chloride	0.5
Freon 113	5.0
acetone	50.0
total VOCs	100.0
<u>Aromatics</u>	
xylene	5.0
ethyl benzene	5.0
<u>Others</u>	
isopropanol	1000.0
<u>Metals</u>	
arsenic	20.0
cadmium	10.0
chromium (VI)	11.0
copper	20.0
cyanide	25.0
lead	5.6
mercury	1.0
nickel	7.1
silver	2.3
zinc	58.0

2. The pH of the discharge shall not exceed 8.5 nor be less than 6.5.
3. In any representative set of samples, the discharge shall meet the following limit of quality:

Toxicity: The survival of rainbow trout in 96-hour bioassays of the effluent as discharged shall be a median of 90% survival and a 90 percentile value of not less than 70% survival.

B. RECEIVING WATER LIMITATIONS

1. The discharge of wastes 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 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 concentrations.
2. The discharge of waste shall not cause the following limits to be exceeded in waters of the State in any place within one foot of the water surface:
  - a. 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.
  - b. 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. When natural factors cause lesser concentration(s) than specified above, the discharge shall not cause further reduction in the concentration of dissolved oxygen.
  - c. Un-ionized ammonia (as N):  
0.025 mg/l annual mean  
0.4 mg/l maximum

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 Water Pollution Control Act and regulations adopted thereunder. If more stringent applicable water quality standards are promulgated or approved pursuant to Section 303 of the Federal Water Pollution Control Act or amendments thereto, the Board will revise and modify this Order in accordance with such more stringent standards.

C. PROVISIONS

1. The discharger shall comply with all sections of this order immediately upon adoption by the Board and upon starting any discharge.
2. The discharger shall comply with the self-monitoring program as adopted by the Board and as may be amended by the Executive Officer.
3. The discharger shall notify the Regional Board if any activity has occurred or will occur which would result in the discharge, on a frequent or routine basis, of any toxic pollutant which is not limited by this Order.
4. Any discharge to a location other than the discharge point(s) specified in this Order will require a modification to this Order or submission of a second NPDES application.
5. The discharger shall comply with all items of the attached "Standard Provisions, Reporting Requirements and Definitions" dated December 1986 and modified January 1987, except items A.10, B.2, B.3, C.8 and C.11.
6. This Order expires January 17, 1995. The discharger must file a report of waste discharge in accordance with Title 23, Chapter 3, Subchapter 9 of the California Administrative Code no later than 180 days in advance of such expiration date as application for issuance of new waste discharge requirements.
7. This Order shall serve as a National Pollutant Discharge Elimination System Permit pursuant to Section 402 of the Clean Water Act or amendments thereto, and shall become effective 10 days after date of its adoption provided the Regional Administrator, Environmental Protection Agency, has no objection. If the Regional Administrator objects to its issuance, the permit shall not become effective until such objection is withdrawn.

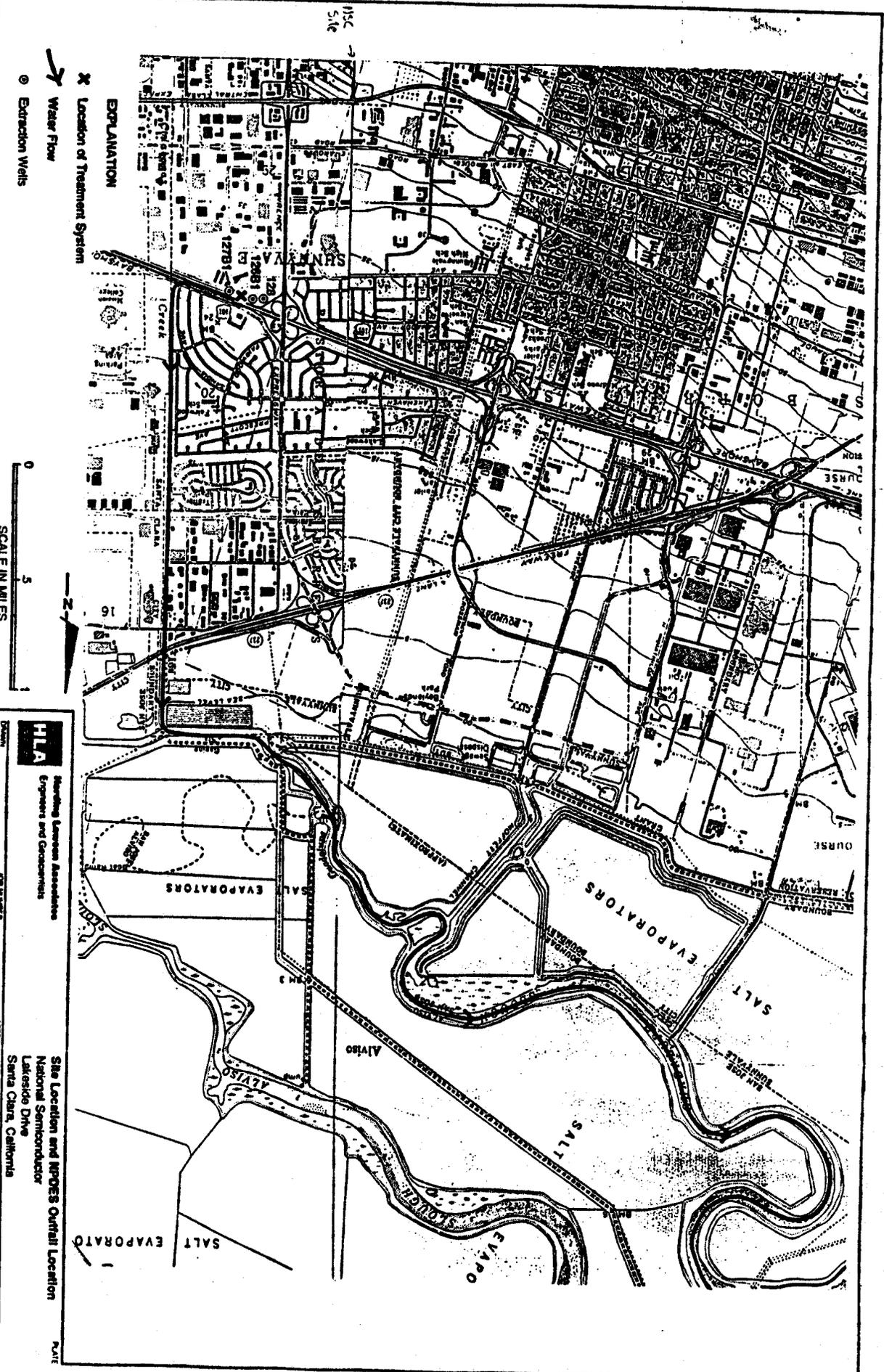
I, Steven R. Ritchie, Executive Officer, do hereby certify that the foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on January 17, 1990.



STEVEN R. RITCHIE  
Executive Officer

Attachments:

Self-Monitoring Program  
Site Map



**EXPLANATION**

X Location of Treatment System

→ Water Flow

⊙ Extraction Wells



**HLA**  
 Harding Lawson Associates  
 Engineers and Geoscientists

**Site Location and NPDES Outfall Location**  
 National Semiconductor  
 Lakeside Drive  
 Santa Clara, California

JOB NUMBER  
 19018.009.02

APPROVED  
 8/89

DATE  
 8/89

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
SAN FRANCISCO BAY REGION

SELF-MONITORING PROGRAM

FOR:

NATIONAL SEMICONDUCTOR CORPORATION  
2900 Semiconductor Drive  
Santa Clara, Santa Clara County

NPDES NO. CA0029629

ORDER NO. 90-006

CONSISTS OF:

PART A Dated December 1986 and modified January 1987

PART B Adopted January 17, 1990

PART B

NATIONAL SEMICONDUCTOR CORPORATION  
2900 SEMICONDUCTOR DRIVE  
SANTA CLARA, SANTA CLARA COUNTY

I. DESCRIPTION OF SAMPLING STATIONS

A. INFLUENT

<u>Station</u>	<u>Description</u>
I-005	At a point in the ground water extraction system immediately prior to treatment in the ozone & carbon adsorption units.

B. EFFLUENT

<u>Station</u>	<u>Description</u>
E-005	At a point immediately following treatment in the ozone & carbon adsorption units on the Trammell Crow property.

C. RECEIVING WATERS

<u>Station</u>	<u>Description</u>
R-003	At a point in Calabazas Creek at least 100 feet but no more than 200 feet downstream from the storm drain discharge point of E-005 into Calabazas Creek.

II. SCHEDULE OF SAMPLING AND ANALYSIS

The schedule of sampling and analysis is provided in the attached Table A.

III. MODIFICATIONS TO PART A, DATED DECEMBER 1986 AND MODIFIED JANUARY 1987

All items of Self-Monitoring Program Part A, dated December 1986 and as modified January 1987 shall be complied with except for the following:

- A. Additions to Part A: Section G.4.d.5: "Results from each required analysis and observation shall be submitted as laboratory originated data summary sheets in the quarterly self-monitoring reports. All chromatographic peaks for purgeable halocarbons and/or volatile organics shall be identified and quantified for all effluent samples. If previously unquantified peaks are identified in any effluent sample, then these peaks shall be confirmed based on analyses using chemical standards necessary to achieve proper identification and quantification. Results shall also be submitted for any additional analyses performed by the dischargers at the specific request of the Board for parameters for which effluent limits have been established and provided to the dischargers by the Board."
- B. Deletions from Part A: Sections D.2.b., D.2.g., D.3.b., E.1.e.1, E.1.f., E.2.b., E.3., E.4., E.5., F.2.b., G.2., G.4.b., and G.4.f.
- C. Modifications to Part A: For the following, the discharger shall comply with the Sections as changed and reported herein:
1. Section D.2.a. is changed to read:  
  
"Samples of effluent and receiving waters shall be collected at times coincident with influent sampling unless otherwise stipulated. The Regional Board or Executive Officer may approve an alternative sampling plan if it is demonstrated that expected operating conditions warrant a deviation from the standard sampling plan."
  2. Section D.2.d. is changed to read:  
  
"If two consecutive samples of any one constituent or parameter monitored on a weekly or monthly basis in a 30-day period exceed the effluent limit or are otherwise out of compliance, or if the required sampling frequency is once per month or less (quarterly, annually or other) and the sample or parameter exceeds the limit or is otherwise out of compliance, the discharger shall implement procedure(s) acceptable to or approved by the Board's Executive Officer, on a case by case basis."

3. Section D.2.e. is changed to read:

"If any instantaneous maximum limit is exceeded, within 24 hours of receiving the analytical results indicating the violation, a confirmation sample shall be taken and analyzed with 24 hour turn-around time. If the instantaneous maximum is violated in the second sample, the discharge shall terminate immediately, and shall not resume until the cause of the violation is found and corrected and/or the Board's Executive Officer authorizes resumption of the discharge."

4. In Section F.1, the phrase "(at the waste treatment plant)" is changed to read, "(at the locations of the various extraction and treatment systems)".
5. Monthly written reports required in Section G.4 shall be filed monthly by the thirtieth day of the following month.
6. Section G.4.e is changed to read:

"Summary tabulations of the data shall include, for each constituent, total number of analyses, maximum, minimum, and average values for each period. Total flow data shall also be included. This information shall be prepared in a format similar to EPA Form 3320-1. This information shall be submitted only to the Regional Board:

Executive Officer  
California Regional Water Quality Control Board  
1800 Harrison Street, Suite 700  
Oakland, CA 94612"

7. The Annual Report required in Section G.5. shall be submitted by January 30 of each year in place of the monthly report due on the same day.

#### IV. MISCELLANEOUS REPORTING

If any chemicals or additives are proposed to be used in the operation and/or maintenance of the ground water extraction/treatment system, the discharger shall obtain the Executive Officer's concurrence prior to use. The details concerning such approved use shall be reported in the next periodic report submitted to the Board.

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

1. Has been developed in accordance with the procedure set forth in this Regional Board's Resolution No. 73-16 in order to obtain data and document compliance with waste discharge requirements established in Regional Board Order No. 90-006.
2. Was adopted by the Board on January 17, 1990.
3. May be reviewed at any time subsequent to the effective date upon written notice from the Executive Officer or request from the dischargers, and revisions will be ordered by the Executive Officer or Regional Board.

  
STEVEN R. RITCHIE  
Executive Officer

Attachments: Table A  
Site Map

**TABLE A**  
**SCHEDULE FOR SAMPLING, MEASUREMENTS, AND ANALYSIS**

Sampling Station	I-5	E-5	R-3											
TYPE OF SAMPLE	G	G	G											
Flow Rate (mgd)		W												
BOD, 5-day, 20°C, or COD (mg/l & kg/day)		Y												
Chlorine Residual & Dosage (mg/l & kg/day)														
Settleable Matter (ml/1-hr. & cu. ft./day)		Q	Q											
Total Suspended Matter (mg/l & kg/day)														
Oil and Grease (mg/l & kg/day)														
Coliform (Total or Fecal) (MPN/100 ml) per req't														
Fish Tox'y 96-hr. TL & Surv'l in undiluted waste		Y												
Ammonia Nitrogen (mg/l & kg/day)		V												
Nitrate Nitrogen (mg/l & kg/day)														
Nitrite Nitrogen (mg/l & kg/day)														
Total Organic Nitrogen (mg/l & kg/day)														
Total Phosphate (mg/l & kg/day)														
Turbidity (Jackson Turbidity Units)														
pH (units)		Q	Q											
Dissolved Oxygen (mg/l and % Saturation)		Q	Q											
Temperature (°C)		Q	Q											
Apparent Color (color units)														
Secchi Disc (inches)														
Sulfides (if DO < 5.0 mg/l) Total & Dissolved (mg/l)														
Arsenic (mg/l & kg/day)		M/Q												
Cadmium (mg/l & kg/day)		M/Q												
Chromium, Total (mg/l & kg/day)		M/Q												
Copper (mg/l & kg/day)		M/Q												
Cyanide (mg/l & kg/day)		M/Q												
Silver (mg/l & kg/day)		M/Q												
Lead (mg/l & kg/day)		M/Q												

Revised: December 19, 1989  
Adopted: January 17, 1990

**TABLE A (continued)**

**SCHEDULE FOR SAMPLING, MEASUREMENTS, AND ANALYSIS**

Sampling Station	I-5	E-5	R-3										
<b>TYPE OF SAMPLE</b>	G	G	G										
Mercury (mg/l & kg/day)		M/Q											
Nickel (mg/l & kg/day)		M/Q											
Zinc (mg/l & kg/day)		M/Q											
Phenolic Compounds (mg/l & kg/day)													
All Applicable Standard Observations													
Bottom Sediment Analyses and Observations													
Total Ident. Chlor. Hydro- carbons (mg/l & kg/day)													
EPA Method 601 with Freon 113	M/Q	W/M	W/M										
EPA Method 602	M/Q	W/M	W/M										
EPA Method 624	Y	Y	Y										
DAI/FID (Direct Aqueous Inj (GC) w/ Flame Ion Det)	Q	Q	Q										
Acetone	Q	Q	Q										

**LEGEND FOR TABLE**

**TYPES OF SAMPLES**

- G = grab sample
- C-24 = composite sample - 24-hour
- C-X = composite sample - X hours  
(used when discharge does not  
continue for 24-hour period)
- Cont = continuous sampling
- DI = depth-intergrated sample
- BS = bottom sediment sample
- O = observation

**TYPES OF STATIONS**

- I = treatment facility influent stations
- E = waste effluent stations
- C = receiving water stations
- P = treatment facilities perimeter stations
- L = basin and/or pond levee stations
- B = bottom sediment stations
- G = groundwaters stations

**FREQUENCY OF SAMPLING**

- E = each occurrence
- H = once each hour
- D = once each day
- W = once each week
- M = once each month
- Y = once each year
- V = varies; total ammonia  
nitrogen shall be ana-  
lyzed and unionized am-  
monia calculated whenever  
fish bioassay test re-  
sults fail to meet the  
specified percent survival

- 2/H = twice per hour
- 2/W = 2 days per week
- 5/W = 5 days per week
- 2/M = 2 days per month
- 2/y = once in March and  
once in September
- Q = quarterly, once in  
March, June, Sept.  
and December
- W/M = weekly for first three  
months after startup of  
operations and reduced  
to monthly thereafter

- 2H = every 2 hours
- 2D = every 2 days
- 2W = every 2 weeks
- 3M = every 3 months
- Cont = continuous
- M/Q = monthly for first  
six months after  
startup of opera-  
tions and reduced  
to quarterly there-  
after