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MANUAL
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OPERATION AND MAINTENANCE INSTRUCTIONS

FOR

DISPENSARY AND DENTAL CLINIC
Camp LeJeune, North Carolina

CONTRACT NUMBER: N62470-74-C-1455

NCE MANUAL

EATMENT PLANT

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ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VA

prepared by

L. E. WOOTEN and COMPANY

CONSULTING ENGINEERS

RALEIGH, NORTH CAROLINA

JUNE 1985

4019996

MANUAL

741455

OPERATION & MAINTENANCE MANUAL

FOR

COURTHOUSE BAY WASTEWATER TREATMENT PLANT

MARINE CORPS BASE

CAMP LEJEUNE, NORTH CAROLINA

volume 1

ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VA

prepared by

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CONSULTING ENGINEERS

RALEIGH, NORTH CAROLINA

JUNE 1985

11 Jun 1985

Public Works Officer, Marine Corps Base, Camp Lejeune

Base Maintenance Officer

OPERATION & MAINTENANCE MANUAL FOR COURTHOUSE BAY WASTEWATER TREATMENT PLANT

Encl: (1) Subject Manual, Volumes 1 and 2 (2 copies)

1. The subject Operation and Maintenance Manuals are enclosed for your use.

E. L. ROUSE
By direction

Copy to: (w/o encl)
FAC

Blind copy to:
408.1

L. E. WOOTEN and Company ENGINEERS • PLANNERS

120 N. BOYLAN AVENUE RALEIGH, NORTH CAROLINA 27603 TELEPHONE (919) 828-0531

June 5, 1985

Mr. M. L. Bryant
Department of the Navy
Naval Facilities Engineering Command
Gilbert Street, Building N-26
Norfolk, Virginia 23511

Dear Mr. Bryant:

In accordance with our telphone conversation Friday, May 31, 1985, we are sending you one additional copy of the O&M Manual for the Courthouse Bay Wastewater Treatment Plant at Camp Lejeune, North Carolina. By copy of this letter we are sending three set to Eris Rouse, Public Works Department, Camp Lejeune, North Carolina.

Sincerely yours,

L. E. WOOTEN AND COMPANY

By Willis D. Barlow
Willis D. Barlow

WDB/bb

Enclosures

cc: Mr. Eris Rouse (w/encls.)

[illegible] Electric Company [illegible]

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OPERATION & MAINTENANCE MANUAL

FOR

COURTHOUSE BAY WASTEWATER TREATMENT PLANT

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JUNE 1985

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Introduction

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INTRODUCTION

1.0 INTRODUCTION

1.1 HISTORICAL BACKGROUND OF THE TREATMENT FACILITY

The Courthouse Bay Wastewater Treatment Plant was constructed in 1942 to provide primary treatment of wastewater for discharge into Courthouse Bay. The plant consisted of one Imhoff tank, pre and post chlorination facilities and two sludge drying beds. Post chlorination was accomplished in a manhole using the effluent outfall to provide the required contact time for disinfection. In 1956, the treatment plant was expanded with the additional sludge drying bed, and a new chlorine contact tank. In 1968, the plant was upgraded to provide secondary treatment of wastewater flow having average daily flow of 0.525 mgd. The upgrading consisted of adding a trickling filter, secondary clarifier and a new chlorien contact tank.

In 1979, J.E. Sirrine Company of Greenville, S.C. prepared a Utility Study Report for Courthouse Bay Area which recommended expansion and upgrading of the Courthouse Bay Wastewater Treatment Plant. In 1983, L.E. Wooten and Company of Raleigh, N.C. prepared plans and specificatins for upgrading and expansion of the plant to 0.6 mgd and contracts were awarded in March, 1984 to Wilson Construction Company of Huntington, West Virginia, for construction of the project. The upgrading and expansion of the plant was completed in September 1985.

1.2 MANUAL USER GUIDE

Proper operation and maintenance is the key to the success of any properly designed wastewater treatment facility for its optimum performance and to meet its discharge limitations. The primary purpose of this manual is to assist the management and operating personnel in establishing proper

APPENDIX - VII

Design Criteria for the Wastewater Treatment Plant

TABLE 1 - 1

DESIGN DATA OF COURTHOUSE BAY WASTEWATER TREATMENT PLANT

Design Year	1986
Design Population	2206
Design Wastewater Flows:	
Average Daily Flow, gals/day	600,000
Maximum Daily Flow, gals/day	1,135,000
Peak Daily Flow, gals/day	1,482,000
Minimum Daily Flow, gals/day	356,500
Influent Wastewater Characteristics	
BOD5 (Biochemical Oxygen Demand, 5 day)	200
TSS (Total Suspended Solids)	200
Floatable Solids (Such as oil & grease), mg/l	25-40
Total Nitrogen as N, mg/l	32
Organic Nitrogen as N, mg/l	16
Ammonia Nitrogen as N, mg/l	16
Total Phosphorus as P, mg/l	10
Effluent Limitations	
Receiving Stream - Courthouse Bay, a Class "SA" Water	
Flow, monthly average, gals/day	600,000
BOD5, monthly average, mg/l	30
TSS, monthly average, mg/l	30
Fecal Coliform, geometric mean, #/100 ml	70
pH	6.0 to 8.5
Grit Removal	
Number of Units	1
Overflow rate at Max. Daily Flow, gpd/sq.ft.	35,600
Method of grit removal	Mechanical
Comminutor/By-Pass Screen	
Comminutor	
Numer of Units	1
Unit Capacity, mgd	1.482
Unit Horsepower, hp	0.75

TABLE 1 - 1
(Continued)

By-Pass Screen	
Number of Units	1
Screen Opening, inch	1.25
Unit Capacity, mgd	1.482
Equalization Basin	
Number of Basin	1
Basin Volume, gallons	
Type of Aeration	Diffused
Aeration capacity, HP/1000 cu.ft.	
Primary Clarifiers	
Number of Units, 24`-0" dia. x 9`-0" SWD.	2
Unit Volume, gals.	30,454
Total Volume, gals.	60,908
Detention time,hrs, at avg. daily flow	2.436
Unit Surface area, sq. ft.	452
Total surface area, sq. ft.	904
Surface overflow rate, gpd/sq.ft., at Avg. daily flow	664
at Max. daily flow	1,255
Unit weir length ft.	75
Total weir length, ft.	150
Weir overflow rate, gpd/lf, at Avg. daily flow	4,000
at Max. daily flow	7,566
Expected performance, Percent TSS removal	60
Percent BOD5 removal	30
Trickling Filters	
Number of Units, 62 ft. diameter each	2
Depth of filter media in each unit, ft.	7.5
Unit volume, cu. ft.	22,643
Total volume, cu. ft.	45,286
Unit surface area, acres	0.07
Total surface area, acres	0.14
Recirculation ratio	0.5:1.0
Hydraulic loading, mgad, parallel operation	4.28
series operation - each stage	8.57
Organic loading, lb BOD5/1000 cu.ft. at 0.0 percent recirculation	
Parallel operation	15.47
Series operation - 1st stage	30.93
2nd stage	7.42

TABLE 1 - 1
(Continued)

Expected performance, percent BOD removal	
Parallel operation at 0% recirc.	81
50% recirc.	85
Series operation at 0% recirc.	90
50% recirc.	93
Secondary Clarifiers	
Number of units, 26 ft. dia. x 10 ft. SWD	2
Unit volume, gals	39,713
Total volume, gals.	79,426
Detention time, hrs, at avg. daily flow	3.177
Unit surface area, sq. ft.	530
Total surface area, sq. ft.	1060
Surface overflow rate, gpd/sq.ft. at avg. daily flow	566
Unit Weir Length, ft.	81.68
Total Weir length, ft.	163
Weir overflow rate, gpd/lf, at av. daily flow	3672
at max daily flow	6947
Chlorination System	
Chlorine contact tanks:	2
Number of Units	9425
Unit volume, gallons	18,850
Detention time at average daily flow, minutes	45
Chlorine Feed System	
Number of chlorinators	2
Capacity of each chlorinators, lb Cl2/day	0-100
Accessories: One ton container scale, portable amperamatic titrater for chlorine residual, chlorine diffuser, chlorine gas mask, and automatic vacuum switch over system.	
Aerobic Digestion:	
Number of digestion units (Modified Imhoff Tank)	2
Unit volume, cu. ft.	8360
Total Volume, cu. ft.	16720
Solids loading, lb vss/cu. ft./day	0.1
Sludge retention time, days	20
Type of aeration	diffused
Total aeration capacity, cfm/1000 cu. ft.	69
Digester #1 is designed to operate as main digestion unit	

TABLE 1 - 1
(Continued)

Sludge Drying Beds	
Number of Beds: 53`x0"x20`-0" each	8
Unit area, sq. ft.	1060
Total bed area, sq. ft.	8480
Pumps:	
Raw Wastewater Pumps:	
Number of pumps	2
Type	Submersible
Capacity, gpm, each unit @ ft. TDH	RPM
Drive horsepower, hp, each unit	
Electrical Service	
Waste Sludge Pumps:	
Number of pumps	2
Type	Suction lift centrifugal
Capacity, gpm, each unit @ 4 ft, TDH, 870 RPM	200
Drive horsepower, hp, each unit	1
Electrical service 230/460 volts, 3 phase, 60 Hz	
Primary Clarifier Scum Pumps:	
Number of pumps	2
Type - centrifugal, non-clog reversible, submersible grinder	
Capacity, gpm, each unit @ 14 ft. TDH,	50
Drive horsepower, hp, each unit	3
Electrical service, 480 volt, 3 phase, 60 Hz	
Trickling Filter Lift Pumps:	
Number of pumps	3
Type - Two speed, suction lift, centrifugal	
Capacity, gpm, pump No. 1 @ 12. 5 ft. TDH	75
@ 15 ft. TDH	150
pump No. 2 & 3 @ 13 ft. TDH	200
@ 17 ft. TDH	400
Drive horsepower, hp, pump No. 1 - 75 gpm	1
-150 gpm	2
pump No. 2 & 3 -200 gpm	3
400 gpm	5
Electrical Service - 480 volt, 3 phase, 60 Hz.	

TABLE 1 - 1
(Continued)

Secondary Clarifier Sludge Recirculation Pumps	
Number of pumps	2
Type - Two speed, suction lift, centrifugal	
Capacity, gpm, each pump, at 10 ft. TDH, 1150 RPM	100
at 14 ft. TDH, 880 RPM	200
Drive horsepower, hp, each unit @ 1150 RPM	2
@ 880 RPM	1
Electrical service - 480 volt, 3 phase, 60 Hz.	
Aerobic Digester Supernatant Pumps:	
Number of pumps	2
Type - centrifugal, non-clog, submersible	
Capacity, gpm, each pump @ 12 ft. TDH	50
Drive horsepower, hp, each unit	0.5
Electrical Service - 480 volt, 3 phase, 60 Hz	

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Equipment Instruction Manuals
for Operation and Maintenance

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APPENDIX - IX

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APPENDIX - IX

As-built Drawings and Specifications

operation and maintenance techniques that will ensure the optimum operation of the Courthouse Bay wastewater treatment plant.

The manual is presented in eleven (11) major sections which are listed in the Table of Contents. Each of the sections are presented in sufficient detail to allow the reader to use them independently. References have been appended to each section for those who wish to gain further insight into the topics covered.

1.3 OPERATION AND MANAGEMENT RESPONSIBILITIES

1.3.1 Operational Personnel Responsibilities

In order for the plant to operate efficiently and economically, the operational personnel will be responsible for the following:

1. Knowing proper operational procedures
2. Operation of the treatment system effectively
3. Keeping continuously informed of the best operating and maintenance practices
4. Operation of process equipment, valves, pumps, engines and generators
5. Collection and analysis of the plant influent, effluent and the receiving stream samples
6. Monitoring of gauges, meters, and control panels
7. Determination of treatment process condition using laboratory data and flow data
8. Inspection of the plant for overall process condition
9. Recognition of process upset and of critical conditions in unit operations/processes
10. Keeping the Plant Superintendent informed on the need for spare parts, lubricants, and laboratory glassware and chemicals
11. Keeping management advised of potential major problems in operation and maintenance of the system
12. Maintaining the treatment plant units, building and site clean and neat

1.3.2 Plant Superintendent Responsibilities

The Plant Superintendent will be responsible for the administration, operation, and maintenance of the entire plant. His/her responsibilities, in detail, are as follows:

1. Exercise direct authority over all plant functions
2. Develop plans and procedures to ensure efficient operation and maintenance of the plant
3. Based on management objectives and goals, develop staffing requirements, job descriptions, organization charts and personnel assignments
4. Maintain the treatment system`s operational, maintenance, and administrative records
5. Budget for sufficient funds to operate and maintain the treatment facility effectively
6. Provide a good, safe working environment with proper safety equipment and tools for the plant personnel
7. Establish an operator training program for more efficient operation of the plant and advancement of the employee
8. Establish a cost-concious environment with emphasis on reductions in material and energy expenditures
9. Analyze operational data to determine changes and improvements required to accomplish the treatment objectives more efficiently
10. Develop a first aid capability throughout the work force and maintain an injury record and investigative system
11. Maintain a continuous communication capability with operational personnel to identify operational problems and corrective measures
12. Be prepared to discuss plant operation with visitors
13. Maintain good public relations
14. Prepare and submit monthly and annual reports to North Carolina Division of Environmental Management (NCDEM)

15. Keep the field office or the central office of NCDEM informed of emergency operating conditions or any changes in plant operations

16. Ensure that the treatment plant units, building, and site are clean and neat

1.4 TREATMENT PLANT

1.4.1 Treatment Type and Treatment Requirements/Effluent Limitations

The Courthouse Bay Wastewater Treatment Plant is an advanced wastewater treatment plant which is designed to achieve the following treatment requirements (effluent limitations) for the discharge of effluent into Courthouse Bay, a class "SA" water.

Pollutant Parameter	Influent	Effluent Limit	Percent Removal
Flow, mgd	0.400	0.600	-
Biochemical Oxygen Demand (5 day), mg/l	200	30	85
Total Suspended Solids, mg/l	200	30	85
Fecal Coliform, #/100 ml	-	70	-
pH	7.0	6.0 to 8.5	-

1.4.2 Plant Description and Flow Pattern

The Courthouse Bay wastewater treatment plant consists of the following unit operations/processes.

A. Preliminary Treatment

1. Grit Removal
2. Comminuter/By-Pass Screen
3. Equalization Basin

B. Raw Wastewater Pumping

C. Primary Clarifiers

D. Secondary Treatment (Trickling Filter System)

1. Trickling Filters
2. Secondary Clarifiers
3. Filter Lift and Recycle Pumps
4. Waste Sludge Pumps

E. Clorination

F. Sludge Treatment and Disposal

1. Aerobic Sludge Digestion
2. Sludge Dewatering - sludge Drying Beds

The detailed design data and schematic flow diagram of the plant is given in Table 1-1 and Exhibit 1-1, respectively.

TABLE 1 - 1

DESIGN DATA OF COURTHOUSE BAY WASTEWATER TREATMENT PLANT

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Design Population	2206
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Minimum Daily Flow, gals/day	356,500
Influent Wastewater Characteristics	
BOD5 (Biochemical Oxygen Demand, 5 day)	200
TSS (Total Suspended Solids)	200
Floatable Solids (Such as oil & grease), mg/l	25-40
Total Nitrogen as N, mg/l	32
Organic Nitrogen as N, mg/l	16
Ammonia Nitrogen as N, mg/l	16
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Receiving Stream - Courthouse Bay, a Class "SA" Water	
Flow, monthly average, gals/day	600,000
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Fecal Coliform, geometric mean, #/100 ml	70
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Grit Removal	
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Overflow rate at Max. Daily Flow, gpd/sq.ft.	35,600
Method of grit removal	Mechanical
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Comminutor	
Numer of Units	1
Unit Capacity, mgd	1.482
Unit Horsepower, hp	0.75

TABLE 1 - 1
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By-Pass Screen	
Number of Units	1
Screen Opening, inch	1.25
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Basin Volume, gallons	
Type of Aeration	Diffused
Aeration capacity, HP/1000 cu.ft.	
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Number of Units, 24`-0" dia. x 9`-0" SWD.	2
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Detention time,hrs, at avg. daily flow	2.436
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Surface overflow rate, gpd/sq.ft., at Avg. daily flow	664
at Max. daily flow	1,255
Unit weir length ft.	75
Total weir length, ft.	150
Weir overflow rate, gpd/lf, at Avg. daily flow	4,000
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Expected performance, Percent TSS removal	60
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Unit surface area, acres	0.07
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Recirculation ratio	0.5:1.0
Hydraulic loading, mgad, parallel operation	4.28
series operation - each stage	8.57
Organic loading, lb BOD5/1000 cu.ft. at 0.0 percent recirculation	
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Unit Weir Length, ft.	81.68
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Weir overflow rate, gpd/lf, at av. daily flow	3672
at max daily flow	6947
Chlorination System	
Chlorine contact tanks:	2
Number of Units	9425
Unit volume, gallons	18,850
Detention time at average daily flow, minutes	45
Chlorine Feed System	
Number of chlorinators	2
Capacity of each chlorinators, lb Cl2/day	0-100
Accessories: One ton container scale, portable amperamatic titrater for chlorine residual, chlorine diffuser, chlorine gas mask, and automatic vacuum switch over system.	
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Unit volume, cu. ft.	8360
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Solids loading, lb vss/cu. ft./day	0.1
Sludge retention time, days	20
Type of aeration	diffused
Total aeration capacity, cfm/1000 cu. ft.	69
Digester #1 is designed to operate as main digestion unit	

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Sludge Drying Beds	
Number of Beds: 53`x0"x20`-0" each	8
Unit area, sq. ft.	1060
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Pumps:	
Raw Wastewater Pumps:	
Number of pumps	2
Type	Submersible
Capacity, gpm, each unit @ ft. TDH	RPM
Drive horsepower, hp, each unit	
Electrical Service	
Waste Sludge Pumps:	
Number of pumps	2
Type	Suction lift centrifugal
Capacity, gpm, each unit @ 4 ft. TDH, 870 RPM	200
Drive horsepower, hp, each unit	1
Electrical service 230/460 volts, 3 phase, 60 Hz	
Primary Clarifier Scum Pumps:	
Number of pumps	2
Type - centrifugal, non-clog reversible, submersible grinder	
Capacity, gpm, each unit @ 14 ft. TDH,	50
Drive horsepower, hp, each unit	3
Electrical service, 480 volt, 3 phase, 60 Hz	
Trickling Filter Lift Pumps:	
Number of pumps	3
Type - Two speed, suction lift, centrifugal	
Capacity, gpm, pump No. 1 @ 12. 5 ft. TDH	75
@ 15 ft. TDH	150
pump No. 2 & 3 @ 13 ft. TDH	200
@ 17 ft. TDH	400
Drive horsepower, hp, pump No. 1 - 75 gpm	1
-150 gpm	2
pump No. 2 & 3 -200 gpm	3
400 gpm	5
Electrical Service - 480 volt, 3 phase, 60 Hz.	

Secondary Clarifier Sludge Recirculation Pumps

Number of pumps	2
Type - Two speed, suction lift, centrifugal	
Capacity, gpm, each pump, at 10 ft. TDH, 1150 RPM	100
at 14 ft. TDH, 880 RPM	200
Drive horsepower, hp, each unit @ 1150 RPM	2
@ 880 RPM	1
Electrical service - 480 volt, 3 phase, 60 Hz.	

Aerobic Digester Supernatant Pumps:

Number of pumps	2
Type - centrifugal, non-clog, submersible	
Capacity, gpm, each pump @ 12 ft. TDH	50
Drive horsepower, hp, each unit	0.5
Electrical Service - 480 volt, 3 phase, 60 Hz	

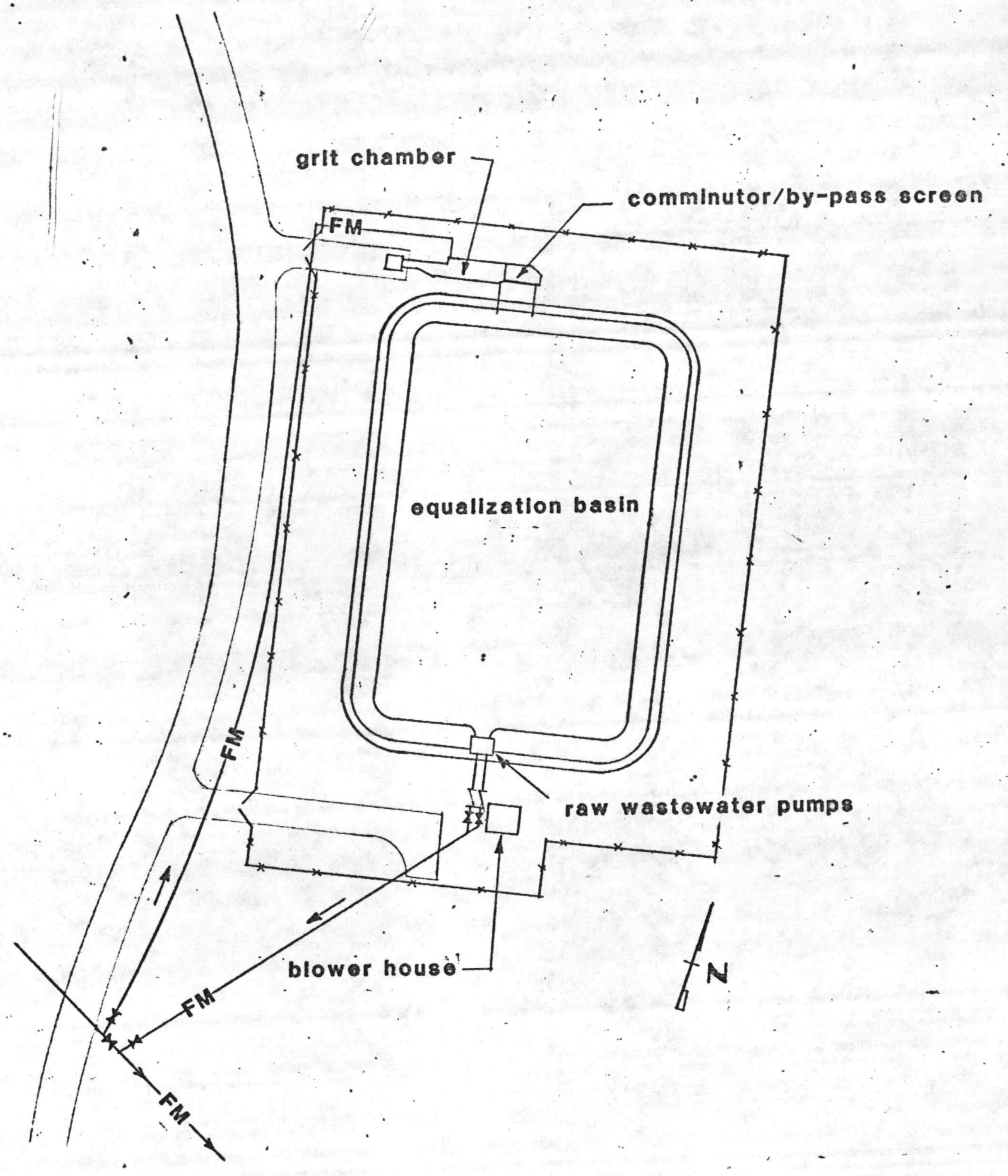
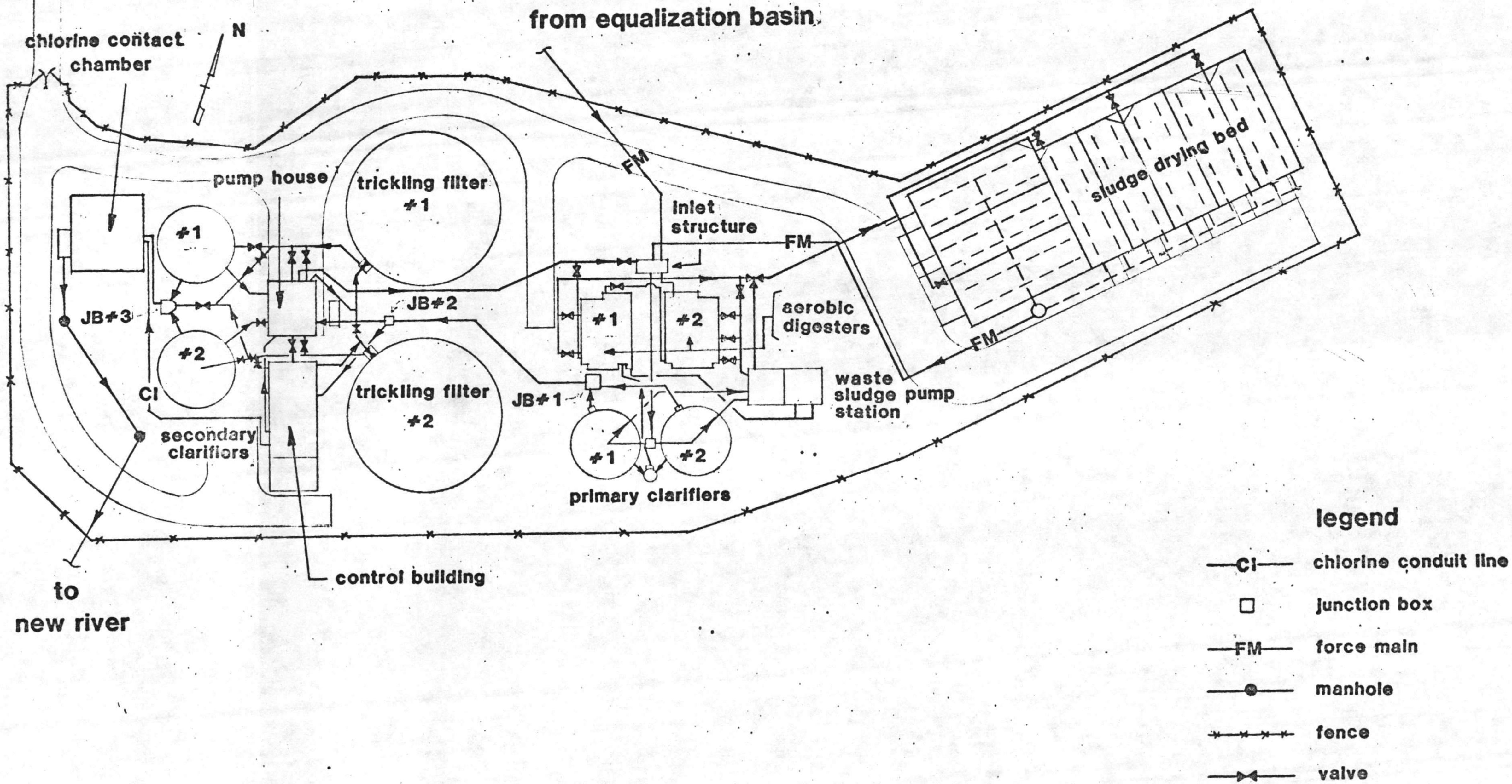


EXHIBIT I-1
SCHEMATIC FLOW DIAGRAM OF
WASTEWATER TREATMENT PLANT



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SCHEMATIC FLOW DIAGRAM OF WASTEWATER TREATMENT PLANT

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2.0 PERMITS AND STANDARDS

2.1 DISCHARGE PERMIT AND PERMIT REQUIREMENTS

2.1.1 Discharge Permit

The Courthouse Bay Wastewater Treatment Plant operates under the NPDES (National Pollution Discharge Elimination System) Permit No. NC0003239, issued on March 28, 1980. The Permit expires on March 26, 1985 A copy of the NPDES Permit is given in Appendix 1.

2.1.2 Permit Requirements

A. Effluent Limitations

The effluent limitations, as given in the NPDES Permit, for the Courthouse Bay Wastewater Treatment Plant are summarized in Table II-1

Monthly and weekly averages, given in Table II-1, are the arithmetic mean of all the composite samples collected in one month and in one week periods, respectively. The arithmetic mean is the summation of the individual values divided by the number of individual values.

The Permit discusses possible revisions to effluent limitations which may be made necessary because of industrial waste discharges into the wastewater treatment plant (Refer Part III of the NPDES Permit, Appendix-1). The Permit also specified that under no circumstances the following waste shall be allowed into the waste treatment system.

1. Wastes which create a fire or explosion hazard in the treatment works.

2. Wastes which will cause corrosive structural damage to treatment works.

3. Solid or viscous substances in amounts which cause obstruction to the flow in sewers or interference with the proper operation of the treatment works.

4. Wastewater at a flow rate and/or pollutant discharge rate which is excessive over relatively short time periods so as to cause a loss of treatment efficiency.

5. Heat in amounts which will inhibit biological activity in the treatment works resulting in interference but in no case heat in such quantities that the temperature at the treatment works influent exceeds 40 C (104 F) unless the treatment works are designed to accomodate such heat.

6. With regard to the effluent requirements listed in Table II-1, it may be necessary for the permittee (United States MCB, Camp Lejeune) to supplement the requirements of the Federal Pretreatment Standards (40 CFR Part 403) to ensure compliance by the permittee with all applicable effluent limitations. Such actions by the permittee may be necessary regarding some or all of the major industrial waste discharges to the waste treatment system.

B. Monitoring and Reporting

"Monitoring" means a program of sample collection and analysis sufficient to determine the volume of influent and effluent flow of a wate pollution control facility; the nature of the waste contained therein; and the effects on receiving waters of waste discharged thereto. The monitoring requirements, as given in the NPDES Permit, for the Courthouse Bay Wastewater Treatment Plant are summarized in Table II-1.

Relating to the implementation of Article 21, Chapter 143, North Carolina General Statutes, the Environmental Management Commission require the owners of each water pollution facility should file the Monthly Monitoring Reports (DEM Forms MR 1.0, MR 1.2 and MR 1.3) to the Division of Environmental Management. Signed copies of the Monthly Monitoring Reports which summarizes the monitoring results for each month, should be submitted in duplicate to the Division of Environmental Management no

later than the 15th day following the completed reporting period. Samples of the DEM Forms No. MR 1.0, MR 1.1, and MR 1.4, along with necessary instructions are given in Appendix-1. The reports should be submitted to the following address:

Division of Environmental Management
Water Quality Section
Post Office Box 27687
Raleigh, North Carolina 27611

The permit also discusses additional monitoring by the permittee. Under the additional monitoring requirements, if the operator monitors any pollutant more frequently than required by the Permit, the results of such monitoring should be included in the Monthly Monitoring Reports. The Division of Environmental Management may also require more frequent monitoring or the monitoring of other pollutants not required in the Permit by written notification.

All records and information resulting from the monitoring activities required by the Permit, including all records of analysis performed and calibration and maintenance of instrumentation and recording from continuous monitoring instrumentation, shall be retained for a minimum of three (3) years, or longer if requested by the Division of Environmenal Management.

C. Change in Discharge

All discharges authorized shall be consistent with the terms and conditions of the NPDES Permit. The discharge of any pollutant identified in the Permit more frequently than or at a level in excess of that authorized shall constitute a violation of the Permit. Any anticipated

facility expansions or process modification which will result in new, different or increased discharge of pollutants must be reported by submission of a new NPDES application or, if such changes will not violate the effluent limitations specified in the Permit, by notice to the DEM of such changes. Following such notice, the Permit may be modified to specify and limit any pollutant not previously limited.

D. Non Compliance Notification

If, for any reason, the plant's discharge does not comply with or will be unable to comply with the effluent limitations specified in the Permit, the Operator in charge should provide the Division of Environmental Management with the following information, in writing, within five (5) days of becoming aware of such condition:

1. A description of the discharge and cause of non-compliance

2. The period of non-compliance, including exact dates and time or if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the non-complying discharge.

The Permittee shall take all reasonable steps to minimize any adverse impact to the receiving stream resulting from non-compliance with any effluent limitations specified in the Permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the non-complying discharge.

E. Facilities Operation

The Permittee shall at all times maintain the treatment facility in good working order and operate as efficiently as possible to achieve compliance with the terms and conditions of the Permit.

F. Expiration of Permit

The present Permit for the Courthouse Bay Wastewater Treatment Plant discharge expires on March 26, 1985. No discharge will be permitted after the expiration date unless the authorization to discharge beyond the expiration date is received. Application for renewal must be filed 180 days prior to the expiration date which corresponds with September 26, 1984. U.S. Marine Corps Base, Camp Lejeune has already filed the renewal application with the N.C. DEM. Concerning the status of the application it was learned that the State is processing the application.

G. Emergency Reporting Procedures

Person responsible for the operation of the Courthouse Bay Wastewater Treatment Plant should report by telephone or telegraph to either field or central offices of the NCDEM normally within a period of 24 hours, or immediately, at the occurrence or first knowledge of the occurrence of any of the following:

1. Any failure of a pump station or the treatment plant resulting in a significant by-passing of influent wastes directly to the receiving water without treatment of all or any portion of the influent.

2. Any occurrence at the plant which results in the discharge of significant amount of wastes which are abnormal in quantity or characteristics, such as the dumping of contents of sludge digester, the known passage of a slug of hazardous substance through the plant or any other unusual circumstances.

A sample wall poster to assist operational personnel in reporting any emergency occurrence is shown on Exhibit I-1.

Following the telephone or telegraph report of the occurrence, a written report must be sent within fifteen (15) days following first knowledge of occurrence. Duplicate signed copies of this report should be sent to the Regional Engineer`s Office at Wilmington, North Carolina. One

copy of the report would be kept on the plant record file. An example of the required report of emergency occurrence is given in Table II-2. The mailing addresses and the telephone numbers of the Regional Engineer's (field) office and central office are given as follows:

1. Regional Engineer
   Division of Environmental Management
   3143 Wrightsville Avenue
   Wilmington, North Carolina 28401
   Telephone Number - (919) 256-4161

2. Division of Environmental Management
   Environmental Operation Section
   Post Office Box 27687
   Raleigh, North Carolina 27611
   Telephone Number - (919) 733-7121

H. Civil and Criminal Liability

Except as provided in the permit conditions on "Bypassing" (PartII A-5) and "Power Failure" (Part II, A-7), civil or criminal penalties may be imposed for noncompliance pursuant to N.C.G.S. 143-215.6 or Section 309 of the Federal Act, 33 USC 1319.

I. Other Permit Requirements

For other premit requirements refer to the NPDES Permit given in Appendix I.

2.2 WATER QUALITY STANDARDS

Water quality standards are environmental requirements adopted by the Environmental Management Commission for the State of North Carolina. The standards are adopted as regulations which define the levels of water quality the Commission determines to be necessary to support the best usage of the waters. Currently, all waters of the State are considered to

have a minimum best usage of fishing, wading, and supporting the propagation of fish and wildlife. All persons discharging wastewaters to the streams and rivers of the State are required by law, to provide treatment which will maintain the level of wastewater quality established for the receiving waters.

The Courthouse Bay Wastewater Treatment Plant discharges its effluent into Courthouse Bay, which is classified as Class "SA" water. The best usage, conditions related to best usage, and applicable water quality standards of class "SA" water are given on the following pages.

WATER QUALITY STANDARDS (Class "SA" Water)

1. Best Usage of Waters. Shellfishing for market purposes and any other usage specified by the "SB" or "SC" classification;

2. Conditions Related to Best Usage. Waters will meet the sanitary and bacteriological standards given in the 1965 revision of the "National Shellfish Sanitation Program Manual of Operations: Part 1, Sanitation of Shellfish Growing Aeas," recommended by the public health service and will be considered safe and suitable for shellfish culture:

3. Quality standards applicable to class SA waters:

   a. floating solids: settleable solids: sludge deposits: none attributable to sewage, industrial wastes or other wastes:

   b. sewage, industrial wastes, or other wastes: none which are not effectively treated to the satisfction of the commission in accordance with the requirements of the division of health services;

   c. pH: range between 6.8 and 8.5;

   d. dissolved oxygen: not less than 5.0 mg/l, except that swamp waters may have lower values if caused by natural conditions;

   e. toxic wastes; oils; deleterious substances; colored or other wastes: except as specified in this Subdivision only such amounts, whether alone or in combination with other substance or wastes as will not make the waters unsafe or unsuitable fo fish and shallfish or their propagation, impair the palatability of same, or impair the waters for any other best usage established for this class:

   f. manganese: not greater than 0.1 mg/l;

   g. organisms of coliform group: total coliform group not to exceed a median MPN or MP of 70/100 ml, and not more than 10 percent of the samples shall exceed an MF count of 230/100 ml (or an MPN of 230/100 ml for a five-tube decimal dilution test or 330/100 ml where a three-tube decimal dilution is used) in those areas most probably exposed to fecal contamination during the most unfavorable hydrographic and pollution conditions:

   h. temperature: shall not be increased above the natural water temperature by more than 0.8 degrees C (1.44 degrees F) durin the months of June, July, and August nor more than 2.2 degrees C (3.96 degrees F) during other months and in no case to exceed 32 degrees C (89.6 degrees F) due to the discharge of heated liquids.

TABLE II-1

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Monthly Ave.	Weekly Ave.	Measurement Frequency	Sample** Type	Sample* Location
Flow	0.6 mgd		Daily	Continuous	I or E
BOD_5	30 mg/l	45 mg/l	Twice/Month	Composite	E
TSS	30 mg/l	45 mg/l	Twice/Month	Composite	E
Total Nitrogen			Twice/Year	Composite	E
Fecal Coliform (Geometric Mean)	70/100 ml	70/100 ml	Twice/Month	Grab	E, U, D
Total Phosphorus			Twice/Year		
Residual Chlorine			Daily	Grab	E
Temperature			Weekly	Grab	E, U, D

* Sample Location: I - Influent; E - Effluent; U - Upstream; D - Downstream

** All upstream and downstream samples shall be grab samples.

The pH shall not be less than 6.0 standard units nor greater than 8.5 standard units and shall be monitored monthly by grab samples at I, E, U, and D. There shall be no discharge of floating solids or visible from in other than trace amounts.

TABLE II - 2

EXAMPLE REPORT OF EMERGENCY OCCURRENCE

Name of Governmental Unit:

U.S. Marine Corps Base
Camp Lejeune, North Carolina 28542

Name, Location, NPDES Permit Number, and Class of Facility:

Courthouse Bay Wastewater Treatment Plant
Camp Lejeune, North Carolina
Permit No: NC0003239
Class: II

Location, Time and Type of Occurrence

Example: Failure of raw wastewater pump station resulting in by-passing of raw wastewater ot the nearby surface water. The pump station remained out of service from 7:00 a.m., June 15, 1985 until 8:00 p.m. of the same day.

Notification:

Regional Supervisor notified at 9:00 a.m., June 15, 1985

Abatement Action:

Example: By-passed raw wastewater was chlorinated. Failure of control system determined to be the main cause of the pump station failure. The control system was repaired and the pump placed back into operation.

IN CASE OF SPILLS OF RAW OR INADEQUATELY TREATED MUNICIPAL WASTEWATER

CALL EITHER

1. REGIONAL ENGINEER
   NC DIVISION OF ENVIRONMENTAL MANAGEMENT
   3143 WRIGHTSVILLE AVE.
   WILMINGTON, NORTH CAROLINA 28401
   TELEPHONE NUMBER: (919) 256-4161

OR

2. DIVISION OF ENVIRONMENTAL MANAGEMENT
   ENVIRONMENTAL OPERATION SECTION
   POST OFFICE BOX 27687
   RALEIGH, NORTH CAROLINA 27611
   TELEPHONE NUMBER: (919) 733-7121

AND GIVE AS MUCH AS POSSIBLE OF THE FOLLOWING INFORMATION:

NAME OF THE FACILITY:

TIME/DATE SPILL STARTED:

SPILL VOLUME AND STRENGTH:

PROVISIONS FOR CHLORINATION:

CONDITIONS SURROUNDING SPILL:

ABATEMENT ACTIONS:

ASSISTANCE REQUIRED:

STREAM SAMPLING PLAN:

EXHIBIT II-1

SAMPLE WALL POSTER FOR REPORTING EMERGENCY

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Personnel

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New Bern, NC
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PERSONNEL

PERSONNEL

3.0 PERSONNEL

3.1 STAFFING REQUIREMENTS

Waste treatment plant should be provided with a staff of qualified personnel that is adequate to operate the plant efficiently and effectively so that the highest level of treatment can be achieved at all times.

Factors that should be considered in developing a staffing plan include: (1) plant layout, (2) type of unit operations/processes employed at the plant and their methods of process controls and maintenance requirements, (3) level of treatment requirements, and (4) industrial waste discharge to the plant. Recognizing the above factors and based upon the task analysis of each job within the treatment system performed using the EPA publication, "Estimating Staffing for Municipal Wastewater Treatment Facilities, March, 1973", it is suggested that the Courthouse Bay wastewater treatment plant be staffed as follows:

Job Title	Number of Persons
Superintendent (II)	1
Operation/Maintenance Person	1
Laborer/Maintenance Helper	1

The Plant Superindentent will be responsible for the administration, operation, and maintenance of the entire plant. The responsibilities of the Plant Superintendent and Operation/Maintenance person are given in Section 1.3 of this manual.

3.2 JOB DESCRIPTION AND QUALIFICATION PROFILE

Job description and qualification profile for the suggested staff in Section 3.1 are given in Table III-1. It should be noted that descriptions are only intended for the guidance of the management and if the management feels that the applicant can do the work, the qualification listed should not be rigidly followed.

3.3 CERTIFICATION AND TRAINING

North Carolina Statutes, G.S. 90A-39 and 93B-8, require that a wastewater treatment plant must be operated by a certified operator. Such operator must hold a certification of the grade equivalent to the classification assigned to the wastewater treatment plant. Based upon the plant size and treatment processes involved, the Courthouse Bay wastewater treatment plant is classified as Class II facility. Accordingly, a Grade II operator is required for the operation of the plant. To obtain a Grade II certification, the applicant must pass an examination given by the Wastewater Treatment Plant Operators Certification Commission of the NCDEM. The qualifications required to take the examinations for all grades are summarized in Table III-2. Annual school for wastewater treatment plant operators is normally held at University of North Carolina, Chapel Hill, usually in the month of May of each year. This school is jointly sponsored by the North Carolina Division of Environmental Management and University of North Carolina at Chapel Hill. The NCDEM, in cooperation with regional technical institutes and community colleges, also sponsors regional schools for operator trainings. Information for operator`s training schools and for certification examinations can be obtained from the following address:

Chairman, Certification Commission
N. C. Department of Natural and Economic Resources
P.O. Box 27687
Raleigh, North Carolina 27611

A copy of the rules and regulations of the State Certification programs is given in Appendix II.

The Plant Superintendent is responsible to do informal on-the-job training of the operation, maintenance, and laboratory personnel, and to monitor training, experience, and certification levels of the plant personnel. Exhibit III-2 is a suggested form for maintaining a permanent record of operator training.

3.4 PERSONNEL

3.4.1 Management of Time

Proper personnel management is important for efficient and continued plant operation. The Plant Superintendent is responsible for managing the time of all personnel in such a way that all necessary tasks for efficient plant operation are accomplished. Each plant employee is responsible for managing his/her own time to ensure that assigned tasks and emergency work are accomplished in the time available. The following are suggested procedures for personnel management:

1. The Plant Superintendent decides and lists the tasks to be done in the coming week, along with the daily task to be done by each employee and the approximate time required. (See Exhibit III-2 for Sample Weekly Task Assignment Sheets.)

2. At the end of each day, the employee checks off the daily tasks.

3. At the end of the week, the Plant Superintendent collects and reviews the task assignment sheet. Any uncompleted tasks are transferred to the succeeding week's assignment sheet, and the checked off assignment sheets are held for record to prepare monthly and yearly labor summary. (See Exhibit III-3 for Sample Monthly Labor Summary.)

3.4.2 Other Personnel Information

Job applications, Federal and State withholding forms, and other appropriate forms must be filled out for all new employees. A copy of such forms as required by the State and Federal governments can be obtained from the Base personnel office.

3.5 REFERENCES

1. Environmental Protection Agency, Estimating Staffing For Municipal Wastewater Treatment Facilities, March 1973.

2. Department of Natural Resources and Community Development, Raleigh, North Carolina, North Carolina Administrative Code Title 15 DNRCD Chapter 8 Wastewater Treatment Plant Operators Certification Commission, April 1980.

3. Black and Veatch, Estimating Costs and Manpower Requirements For Conventional Wastewater Treatment Facilities, October 1971.

4. California State University, Sacramento, Operation of Wastewater Treatment Plants, Volumes I, II, and III, A Field Study Training Program, 1980.

5. Water Pollution Control Federation, Operation of Wastewater Treatment Plants - Manual of Practice No. 11 1976.

6. The Texas Water Utilities Association, Manual of Wastewater Operations, 1971.

7. New York State Department of Environmental Conservation, Manual of Instruction for Wastewater Treatment Plant Operators Vols. I and II 1978.

TABLE III-1

JOB DESCRIPTION AND QUALIFICATION PROFILE

1. PLANT SUPERINTENDENT

A. Job Description

Responsible for administration, operation, and maintenance of entire plant. Exercises direct authority over all plant functions and personnel, in accordance with approved policies and procedures. Inspects plant regularly. Analyzes and evaluates operation and maintenance functions; initiates or recommends new or improved practices. Develops plans and procedures to insure efficient plant operation. Recommends plant improvements and additions. Coordinates data and prepares or reviews and approves operation reports and budget requests. Controls expenditure of budgeted funds and requests approval for major expenditures, if required. Organizes and directs activities of plant personnel, including training programs. Maintains effective communications and working relationships with employees, government officials, and general public.

B. Qualification Profile

1. Formal Education

Must possess N.C. Grade II WWTP operator's certificate or eligibility for Grade II certification as required by the N.C. WWTP Operator's Certification Commission (Table III-2).

2. General Requirements

a. Knowledge of processes and equipment involved in wastewater treatment, including basic chemical, bacteriological, and biological processes.
b. Understanding of managerial, administrative, and accounting practices and procedures involved in successful plant operation.
c. Knowledge of industrial wastes and their effects on treatment processes and equipment.
d. Ability to prepare or supervise preparation of clear, concise reports and budget recommendations.
e. Ability to plan, direct, and evaluate plant operation and maintenance functions.
f. Ability to establish and maintain effective communications and working relationships.

3. General Educational Development

a. Reasoning

(1) Apply principles of logic to define problems, collect and analyze data, and draw valid conclusions. Deal with a variety of concrete and abstract variables.
(2) Interpret a wide variety of technical instructions, in book, manual, and mathematical or diagrammatic form.

b. Mathematical

Perform ordinary arithmetical, algebraic, and geometric procedures in standard, practical applications.

c. Language
(1) Write and edit operation reports.

(2) Evaluate and interpret engineering and other technical data.
(3) Interview applicants and employees.

4. Interests
Prefers working with people in situations involving organization and supervision of varied activities.

5. Temperament
Prefers situations involving the direction, control, and planning of an entire activity or the activity of others.

6. Physical Demands
Light or sedentary work. Involve plant inspections and and occasional medium work in emergency situations.

7. Working Conditions
Indoor and outdoor. Exposure to weather, fumes, odors, dust, and risk of bodily injury. Possible exposure to toxic conditions.

2. OPERATION/MAINTENANCE PERSON

A. Job Description
Performs any combination of following tasks pertinent to operation and maintenance of plant; observes variations in operating conditions and interprets meter and gauge readings and test results to determine processing requirements. Monitors gauges, meters, and control panels. Operates valves and gates; starts and stops pumps to control and adjust flow and treatment processes. Maintain meter and gauge readings, operation records, laboratory records, and maintenance records. Collect samples and performs routine laboratory tests and analysis. Perform routing maintenance functions and custodial duties. Makes operating and maintenance decisions in absence of supervisory personnel.

B. Qualification Profile
1. Formal Education
Must possess N.C. Grade I WWTP Operator`s Certificate or eligibility for Grade I certification (Table III-2).

2. General Requirements
a. Knowledge of processes and equipment involved in wastewater treatment.
b. Ability to maintain and evaluate records.
c. Ability to perform all required duties.
d. Ability to maintain working relationship with other shift workers.

3. General Educational Development
   a. Reasoning
      (1) Apply knowledge of wastewater treatment to solve practical problems.
      (2) Interpret a variety of written and oral instructions.
   b. Mathematical
      Perform ordinary arithmetical and algebraic procedures in standard, practical applications.
   c. Language
      (1) Establish and maintain communications with supervisors and co-workers.

4. Interests
   Prefer activities of a routine, concrete, organized nature; dealing with things and objects.

5. Temperament
   Workers must adjust to situations involving a variety of duties, including evaluation of information against measurable criteria and precise attainment of set limits or standards.

6. Physical Demands
   Medium work; involving climbing, balancing, stooping, kneeling, crouching, reaching, handling, fingering, talking, hearing, visual acuity, depth perception, and color vision.

7. Working Conditions
   Both inside and outside. Exposed to weather, fumes, odors, and dust. May be exposed to toxic conditions. Definite risk of bodily injury.

TABLE III-2

MINIMUM REQUIREMENTS OF EDUCATION AND EXPERIENCE FOR
CERTIFIED WASTEWATER TREATMENT PLANT OPERATORS

GRADE I

(1) 3 years of acceptable experience in WTP* operation; or,

(2) completion of 8th grade of school and 2 years of acceptable experience in WTP operation; or,

(3) 1 approved training school for WTP operators and 1 year of acceptable experience in WTP operation; or,

(4) graduate of high school, or equivalent GED and 3 months of acceptable experience in WTP operation; or,

(5) graduate of recognized 2 year college or technical institute or college or university and 3 months acceptable experience in wastewater treatment operation.

GRADE II

(1) 1 approved training school for WTP operators and 2 years of acceptable experience in a N.C. Class I, or equivalent WTP or higher; or,

(2) a N. C. Grade I certificate, or equivalent, and 1 year of acceptable operator experience in a N. C. Class I, or equivalent, WTP or higher; or,

(3) graduate of high school, or equivalent GED, and 6 months of acceptable experience in a N.C. Class I, or equivalent, WTP or higher; or,

(4) graduate of a recognized 2 year college or technical school or college or university and 6 months of acceptable experience in wastewater treatment operation.

TABLE III-2
(Continued)

GRADE III

An active N.C. Grade II certificate and one of the following:

(1) 4 years of acceptable experience in a N.C. Class II, or equivalent, wastewater treatment plant or higher;

(2) graduate of high school, or equivalent GED, and 3 years of acceptable experience in a N.C. Class II, or equivalent, WTP or higher;

(3) 2 years of college or associate degree with academic preparation in chemistry, biology, public health, or related fields, and 2 years of acceptable experience in a N. C. Class II, or equivalent, WTP or higher;

(4) graduate of a recognized 2 year college or technical school, with an associate degree in enviromental sciences, and 18 months of acceptable experience in a N.C. Class II, or equivalent, WTP or higher;

(5) graduate of a recognized college or university with a major in natural or physical sciences, engineering or related field, and 1 year of acceptable experience in a N.C. Class II, or equivalent, WTP or higher.

GRADE IV

An active N.C. Grad III certificate and one of the following:

(1) 5 years of acceptable experience in a N.C. Class III, or equivalent, WTP or higher;

(2) graduate of high school, or equivalent GED, and 4 years of acceptable experience in a N.C. Class III, or equivalent, WTP or higher;

(3) 2 years of college or associate degree with academic preparation in chemistry, bacteriology, public health or related fields, and 3 years of acceptable experience in a N.C. Class III, or equivalent, WTP or higher;

(4) graduate of a recognized 2 year college or technical school, with an associate degree in environmental sciences, and 30 months of acceptable experience in a N.C. Class III, or equivalent, WTP or higher;

(5) graduate of a recognized college or university with a major in natural or physical sciences, engineering, or related field, and 2 years of acceptable experience in a N.C. Class III, or equivalent, WTP or higher.

RECORD OF TRAINING

COURTHOUSE BAY WASTEWATER TREATMENT PLANT

Employee Name: ______________________________

Date of Employment: ______________________________

Name of Course or Examination	Date Completed	Remarks

EXHIBIT III-1

SAMPLE WEEKLY TASK ASSIGNMENTS

COURTHOUSE BAY WASTEWATER TREATMENT PLANT

Week ________________ Year __________

Name of Employee: ____

Day		Task Assigned	Completed	Remarks
Monday	1.	Collect influent and effluent sample (1/2 hr.)	X	
	2.	Laboratory analysis: BOD, TSS, Settleable Solids, pH and Temperature (6 hrs.)	X	
	3.	Physical inspection of plant (1-1/2 hrs.)	X	
Tuesday	1.	Collect stream sample (1 hr.)	X	
	2.	Do COD on stream and plant effluent sample (4 hrs.)	X	
	3.	Collect sample from aerobic digester and perform analysis for VSS, and percent solids (3 hrs.)	X	
Wednesday	1.	Do the same task as described for Monday	X	
Thursday	1.	Collect influent and effluent samples and perform lab. analysis (8 hrs.)	X	
Friday	1.	Collect sample from sludge drying bed and perform lab. test on percent solids (5 hrs.)	X	
	2.	Decant sludge tank (3 hrs.)	X	

EXHIBIT III-2

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4.0 OPERATION AND CONTROL OF UNIT OPERATIONS/PROCESSES

4.1 GRIT REMOVAL

4.1.1 Function

Remove grit from influent flow which could damage downstream equipment by its abrasive nature and resulting in abnormal wear.

4.1.2 Description of the Unit Operation/Process

The grit removal facility (Exhibit IV-1) at the plant consists of: a grit collection chamber; an organic return pump manufactured by Cleveland Mixer; and a chain and scraper type grit collecting mechanism manufactured by Envirex. A bypass channel to the grit chamber is provided to facilitate maintenance and repair work on the grit collecting mechanism and organic return pump. The detailed design description of the grit removal facility is summarized below:

Number of units	1
Overflow rate, gpd/sq. ft., at max. daily flow	35,600
Method of grit removal	Mechanical

The grit removal facility employs a physical process in which the grit (consisting of sand, gravel, cinders, egg shells, bone chips, coffee grounds and other large organic and inorganic particles) that have subsiding organic putrescible solids in wastewater is removed.

4.1.3 Relationship To Adjacent Units

The grit removal facility is located ahead of all other units in the treatment plant. The primary objective of grit removal in relation to the adjacent units are: (1) to protect moving mechanical equipment such as comminutor, raw wastewater pumps etc. from abrasion and accompanying

abnormal wear, (2) to reduce clogging in the diffused aeration system in the equalization basin and the plant piping, and (3) to prevent accumulation of grit in the comminution/by-pass screen channels and equalization basin and consequent loss of usable volume.

4.1.4 Operation

A. Start-Up

For start-up procedures, the steps to be followed are summarized as follows:

1. Inspect the grit chamber for proper installation of equipment and electrical controls, in accordance with the manufacturer`s instruction. Refer to the instruction manual given in Appendix VIII.

2. Check grit collection and by-pass channels for pieces of concrete, lumber, etc. If such things are found, they should be removed from the channels.

3. Check Tee rail splices, if any, to see that rails are at same elevation so flights can not hang up on an exposed end.

4. Check concrete floor to see that it does not project above Tee rail top anywhere.

5. Check joint between inclined concrete surface and inclined steel surface. Transition must be smooth and flush.

6. Torque bolts joining all equipment to table value given on the data sheet No. 330-12 in the manufacturer`s Installation, Operation and Maintenance Manual.

7. Check reducer for proper viscosity lubricant. Check also to see that lubricant is at proper operating level.

8. Wipe a thin coat of grease on Tee rails and return tracks for a dry tank run. These surfaces are ordinarily are water wet and require no lubrication.

9. Jog the drive so that each scraper passes under the traction wheel and can be observed for any binding or interferences at that point. Check clearences between scraper channel and scrapers.

10. Watch chain as it moves off the hand shaft sprocket and also as it is picked up by the take-up shaft sprocket. Retension th the chain per instructions given on the data sheets 300-2,032.2 in the Manufacturer`s instruction manual. After the chain has made one complete revolution by jogging the drive, if no binding or interferences are evident, let the unit run for several complete revolutions, observing chain motion and flight movement along all scraping surfaces.

11. Check drive chain for excessive slack and wear on either side of sprockets. Refer to data sheet 330-18 of the Manufacturer`s instruction manual.

12. Check chain guard for fit-up clearance.

13. Check the organic return pump for proper installation and electrical connections. Also, check for propeller rotation clearence.

14. Take off the stop gate SG. 1.1.1 slowly and allow the waste-water to enter into the grit chamber. The step gates SG 1.1.2 and SG 1.1.3 should remain in closed position. As soon as the water depth reaches top of flights, start unit so that solids are removed.

15. When the grit chamber is full to overflowing, check the level of the effluent weir. If the unit is not properly leveled, the weir should be adjusted for proper level.

16. Start the organic return pump and check for proper operation.

17. Check reducer for lubricant leaks past its seals. Listen for unusual noise in reducer.

18. Check temperature of reducer after 5 minutes operation. Hand contact with reducer housing should not be uncomfortable. Meter temperatures can be unconfortable to the hand. To protect against overheating, provide proper overland protection in the starter.

19. Check lubricant level frequently during the first 250 hours operating time. Drain reducer and refill with fresh lubricant after first 250 hours as per manufacturer`s instructions manual.

The grit chamber is now ready for normal operation. Shutdown of the grit chamber should only be done when there is an equipment failure or a maintenance requirement. To shut down the grit chamber, by-pass the influent flow to the by-pass channel by putting stop gate SG 1.1.1 in

closed position and stop gates SG 1.1.2 and SG 1.1.3 in open positions. Run the collector for few minutes after flow has been bypassed to remove grit from the channel. Drain the grit chamber by opening plug valve PV 1.1.1.

B. Normal Operation

Under normal operating conditions, the stop gate SG 1.1.1 should be in open position and stop gates SG 1.1.2 and SG 1.1.3 should be in closed position. The grit removal mechanism convey the grit to the grit container. The grit is washed and dewatered as it is conveyed to the grit container. The overflow weir is set to provide the desired water level. The grit removed should be disposed of at the sanitary landfill site.

C. Alternate Operating Mode

There are no alternate operating modes for the grit removal facility.

D. Emergency Operations and Failsafe Features

The grit collecting mechanism is equipped with a shear pin type torque overload protection device for the purpose of protecting the speed reducer against damage due to overloads. Upon shearing of shear pin the trip lever will contact limit switch and an alarm will sound and the unit will shut down. Normally, alarm or stoppage occurs due to foreign objects such as rocks, tools, etc., being dropped into the grit chamber. To remove obstruction, put the unit back to normal operation. CAUTION: The size and material of the pins furnished with the equipment have been carefully selected and under no circumstances should a pin of greater strength be used such as bolt or half a broken shear pin. A substitution would probably result in damage of equipment should an overload occur.

4.1.5 Control

A. Flow Control

Flow through the grit chamber can be controlled by using the stop gates SG 1.1.1, SG 1.1.2 and SG 1.1.3. Under normal operation the stop gate SG 1.1.1 will remain in open position and stop gates SG 1.1 2 and SG 1.1.3 will remain in closed position. During the maintenance and repair work on the grit collecting equipment the flow should be by-passed to the by-pass channel by closing the stop gate SG 1.1.1 and opening the stop gates SG 1.1.2 and SG 1.1.3.

B. Process Control

Process control for the grit removal facility includes: (1) recording the grit removed in cubic feet, (2) calculating grit removed in cubic feet per million gallons of wastewater processed, and (3) determination of the volatile solids content of the grit. Typical quantity of grit removal is 4.0 cubic feet per million gallons of wastewater processed. The volatile solids content of the grit range from 8 to 46 precent, depending upon operation of the grit removal system.

C. Electrical Control

The major electrical controls for the grit removal equipment are provided at the local control station. The grit collecting mechanism and organic return pump are controlled by their respective ON-OFF (push button) switches.

4.1.6 Common Operating Problems

Common operating problems, their causes and corrective measures are summarized in Table IV-1.

4.1.7 Maintenance

Routine preventive maintenance requirements for the grit removal system are summarized in the Preventive Maintenance Schedule Sheets. In order to carryout the maintenance program effectively, the basic information on equipment data, including spare parts and recommended lubricants should be readily available at the plant. For ease of reference, this information is given on the Equipment Data Sheets.

4.1.8 References

1. The Texas Water Utilities Association, Manual of Wastewater Operations, 1971

2. California State University, Sacramento, Operation of Wastewater Treatment Plants, Volumes I, II & III, A Field Study Training Program, 1980

3. Water Pollution Control Federation, Operation and Wastewater Treatment Plants - MOP No. 11, 1976

4. New York State Department of Environmental Conservation, Manual of Instruction For Wastewater Treatment Plant Operators, Vols. 1 and 2, 1978

5. Department of the Navy, Bureau of Yards and Docks, Training Course in Water and Sewage Plant Operations, June 1965

6. U.S. EPA, Maintenance Management in Wastewater Facilities - Instructor Training Course, September 1982

7. Envirex Inc., Service Manual

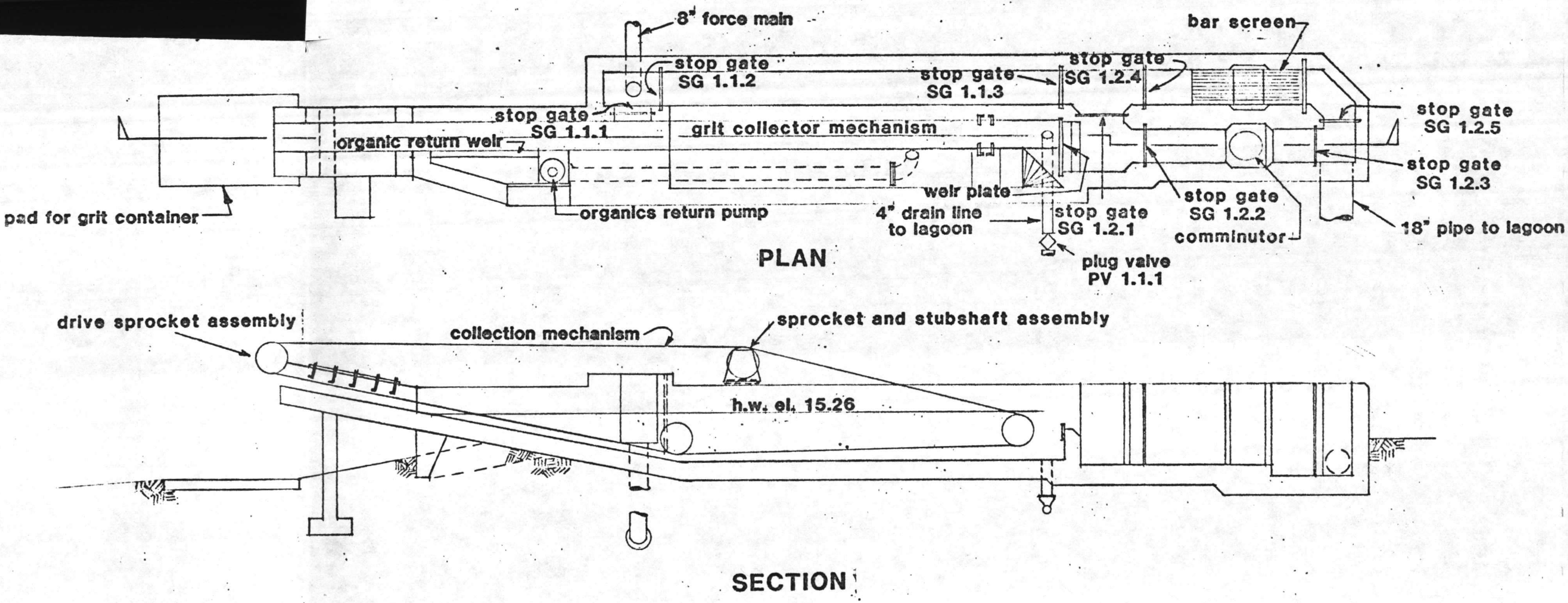


EXHIBIT IV-1

GRIT CHAMBER AND COMMINUTOR/BY-PASS SCREEN FACILITIES

PREVENTIVE MAINTENANCE SCHEDULE

GRIT REMOVAL EQUIPMENT

Equipment Item: Return Run Angles

Manufacturer: Envirex, Inc.

Supplier: Envirex, Inc.

Manual No. or Identification:

DAILY

1. Observe in passing for loose support bolts. Retighten immediately.

SEMI-ANNUALLY

1. When tank is drawn down as recommended elsewhere, use high pressure water and hose off. If angles are worn to 1/2 their original thickness, replace.

PREVENTIVE MAINTENANCE SCHEDULE

GRIT REMOVAL EQUIPMENT

Equipment Item: Main Chains

Manufacturer: Envirex, Inc.

Supplier: Envirex, Inc.

Manual No. or Identification: Data Sheet 330-18 given in Envirex Service Manual

DAILY

1. Observe bucket action on return run. If bucket moves in pulsing manner, check for chain slack. Retension chains. Remove links if take-up has been moved to limit. Return take-up to maximum take-up capacity position.

2. In retensioning chain, do not try to remove all slack. See Data Sheet 330-2.032.2, page 7.

SEMI-ANNUALLY

1. If tank is drained as recommended elsewhere, hose down all submerged equipment and all carrier chain. Examine chain barrels, pins and side bars for wear. Replace badly worn links. If links replaced in one strand, replace same number of links in other strand.

PREVENTIVE MAINTENANCE SCHEDULE

GRIT REMOVAL EQUIPMENT

Equipment Item: Take-Up Bearing - Main Chain

Manufacturer: Envirex, Inc.

Supplier: Envirex, Inc.

Manual No. or Identification: ______

WEEKLY

1. Observe in passing for excessive slack.

2. Remove slack by adjusting position of chain tightener.

MONTHLY

1. Use low pressure, hi volume gun. 7 to 10 pumps of Lithium base #2 grease.

SEMI-ANNUALLY

1. Check alignment of chain tightener sprockets with driven sprockets.

2. Remove links from both chains to retension and move tighteners back to original position for maximum take-up capacity.

3. Replace both sprockets also if new chain if required.

PREVENTIVE MAINTENANCE SCHEDULE

GRIT REMOVAL EQUIPMENT

Equipment Item: Wall Bearings - Submerged

Manufacturer: Envirex, Inc.

Supplier: Envirex, Inc.

Manual No. or Identification: ______________________

MONTHLY

1. If bearing is served by flexline or furnished with grease fitting, grease with same grease gun used elsewhere. Three to four pumps will purge and lubricate these bearings. Use Lithium base #2 grease. Normally these bearings are water lubricated.

SEMI-ANNUALLY

1. If tank is drained as recommended elsewhere, hose down all submerged equipment and examine hold down bolts for tightness.

2. Examine all set collars and set screws. Refer to Torque Table data sheet 330-12.

3. If bearings are furnished with grease fittings, but not served with flexlines, purge with grease immediately upon tank draw down.

4. Check shafts for level.

PREVENTIVE MAINTENANCE SCHEDULE

GRIT REMOVAL EQUIPMENT

Equipment Item: Headshaft Bearings

Manufacturer: Envirex, Inc.

Supplier: Envirex, Inc.

Manual No. or Identification: ______

DAILY

1. Observe anytime housing is open for loose hold down bolts or set collars. Retighten immediately.

MONTHLY

1. Regrease with low pressure, hi volume gun. One ounce of grease requires 7 - 10 pumps of Lithium base #2 grease through flexlines.

PREVENTIVE MAINTENANCE SCHEDULE

GRIT REMOVAL EQUIPMENT

Equipment Item: Cornershaft Sprockets

Manufacturer: Envirex, Inc.

Supplier: Envirex, Inc.

Manual No. or Identification:

WEEKLY

1. If sprockets visible on return run, shut down momentarily and check for loose bolts, setscrews. Torque to table values on data sheet 330-12.

SEMI-ANNUALLY

1. If tank is drained as recommended elsewhere, use high pressure water and hose off all submerged components. Examine for toothwear. If teeth have "hooked" appearance, replace sprockets.

PREVENTIVE MAINTENANCE SCHEDULE

GRIT REMOVAL EQUIPMENT

Equipment Item: Driven Sprocket

Manufacturer: Envirex, Inc.

Supplier: Envirex, Inc.

Manual No. or Identification:

WEEKLY

1. Check for loose bolts.
2. Check for loose setscrews.
3. Refer to torque table data sheet 330-12, given in Envirex Service Manual.

SEMI-ANNUALLY

1. Check alignment with drive sprocket. Observe for tooth wear. If teeth have "hooked" appearance, replace sprocket.

PREVENTIVE MAINTENANCE SCHEDULE

GRIT REMOVAL EQUIPMENT

Equipment Item: Drive Sprocket (Shear Pin Type)

Manufacturer: Envirex, Inc.

Supplier: Envirex, Inc.

Manual No. or Identification: See marked up print of shear pin drawing in Envirex Service Manual

MONTHLY

1. Remove shear pin, rotate sprocket to expose shear faces. Clean up faces and coat with Lithium Base #2 grease. Use grease gun used elsewhere on sprocket bore - 2 pumps, same grease as above.

SEMI-ANNUALLY

1. Examine sprocket teeth for wear. If teeth have "hooked" appearance, replace both sprockets and chain.

NOTE: Use only the proper shear pin in this sprocket. Refer to drive assembly drawing for drawing number of pin.

PREVENTIVE MAINTENANCE SCHEDULE

GRIT REMOVAL EQUIPMENT

Equipment Item: Drive Chain

Manufacturer: Envirex, Inc.

Supplier: Envirex, Inc.

Manual No. or Identification: Refer to Data Sheets 330-18 and 330-54 for instructions to properly tension and trouble shoot

MONTHLY

1. When checking oil level of drive, check drive chain for slack. Move gear reducer on its base to remove excess slack. If reducer movement has been used up, return gear reducer to its original position and remove link(s) in chain, then retension drive. Re-oil with SAE 40 motor oil. Use swab or brush.

SEMI-ANNUALLY

1. Examine chain and sprockets for wear. Flop chain for additional wear. If sprocket teeth have "hooked" appearance, install new sprockets and new chain.

PREVENTIVE MAINTENANCE SCHEDULE

GRIT REMOVAL EQUIPMENT

Equipment Item: Gear Reducer Electric Motor

Manufacturer: Westinghouse

Supplier: Envirex, Inc.

Manual No. or Identification: Instruction Leaflet 2930-11TE Included in Envirex Service Manual

DAILY

1. Observe for looseness on reducer.

ANNUALLY

1. If equipment is in constant use, bearings can be regreased (SPARINGLY). Remove grease relief plug, if furnished. Use low pressure, high volume type gun. 1/4 ounce of grease - 2 pumps - is maximum quantity.

2. Have an electrician inspect, clean and test all electrical circuitry, controls, switches, etc.

PREVENTIVE MAINTENANCE SCHEDULE

GRIT REMOVAL EQUIPMENT

Equipment Item: Gear Reducer

Manufacturer: UniDynamic Winsmith

Supplier: Envirex, Inc.

Manual No. or Identification: Engineering Service Bulletin IL-84, included in Envirex Service Manual

DAILY

1. Practice good housekeeping. Keep area around the facility clean and free of obstacles.
2. Observe in passing for lubricant leakage thru shaft seals.
3. Listen for unusual noises.
4. Observe for looseness on drive support base.

WEEKLY

1. Check oil sump lubricant level.
2. Check housing temperature - hand contact. If main housing is more than warm, check for too little or too much lubricant.

MONTHLY

1. Grease bearings.
2. Check for condensation and/or metal particles in lubricant. If contaminated, drain, flush, drain and refill with seasonal lubricant recommended in manufacturer's bulletin.
3. Clean out vent.
4. Use low pressure, hi volume grease gun on fittings. 2 - 4 pumps every 200 hours operating time.

PREVENTIVE MAINTENANCE SCHEDULE

GRIT REMOVAL EQUIPMENT
(Continued)

Equipment Item: Gear Reducer

QUARTERLY

1. Check manufacturer's bulletin for appropriate seasonal lubricant. Consider using synthetics after checking with manufacturer if ambient temperatures are not extreme.

2. Regrease coupling between motor and reducer unless it is of flexible insert type.

SEMI-ANNUALLY

1. When tank is drained for semi-annual inspection use this down time interval to replace leaking seals or gaskets.

2. Check alignment of reducer and motor shaft if coupling required replacement. See coupling manufacturer's bulletin for procedure and tolerances.

EQUIPMENT DATA SHEET

File No. ________

EQUIPMENT NAME: Grit Collector - Chain and Scraper Type

LOCATION: Preliminary Treatment

FUNCTION: Remove grit from grit collection tank and convey it to grit container for ultimate disposal.

EQUIPMENT DATA

Motor Data

Number of Motors: One (1)

Type:

Model No.:

Speed:

Horsepower: 1.0 HP

Electric Service: 480 volts, 3 phase, 60 cycle

Manufacturer: Westinghouse Electric Corporation
Medium Motor and Gearing Division
Buffalo, New York 14240
Telephone:

Supplier: Heyward, Inc.
717 East Blvd.
Charlotte, North Carolina 28203
Telephone: 704/372-5805

Speed Reducer

Number of Units: One (1)

Model No.: CTD MCID

Manufacturer: UniDynamics Winsmith
Springdale, New York 14141
Telephone: 716/592-9311

Supplier: Heyward, Incorporated

EQUIPMENT DATA SHEET
(Continued)

Chain and Flight Collectors

Manufacturer: Envirex, Inc.
1901 South Prairie Avenue
Waukeshu, WI 53186
Telephone: 414/547-0141

Supplier: Heyward, Incorporated

Organic Return Pump

Number of Units: One (1)

Type: Propeller Mixer Type

Model No.:

Drive Horsepower: 1/2 HP

Electrical Service: 480 volt, 3 phase, 60 cycle

Manufacturer: Cleveland Mixer
P. O. Box 187
Hudson, New Hampshire 03051
Telephone: 603/883-5517

Supplier: Heyward, Incorporated

EQUIPMENT NUMBER

1.1.1.0 Grit Collecting Mechanism

1.1.1.1 Mechanism Drive Motor

1.1.1.2 Speed Reducer

1.1.1.3 Chain and Sprockets

1.1.2.0 Organic Return Pump

EQUIPMENT DATA SHEET
(Continued)

RECOMMENDED SPARE PARTS

Grit Collector

Part Description	Part No.	Quantity
Carrying chain with attachments and attachment pins		20 feet
Headshaft sprocket carrying chain		1
Scraper blades with attaching bolts		4
Headshaft drive chain sprocket		1
Cornershaft sprockets		1
Idler sprockets		1
Wall bearings		1 pair per dia.
Headshaft bearings		1 pair
Drive sprocket - Complete		1
Shear pines		12
Drive chain		1 duplicate of that furnished
Lithium Base #2 Grease		5 cartridges
Oil for Gear Reducer		Provide one filling winter viscosity oil and three summer viscosity fillings.

EQUIPMENT DATA SHEET
(Continued)

Organic Return Pump

Part Description	Part No.	Quantity
Seal	323119	1*
Bearing - Cup	19268	1**
Cone	19150	1**
Gear Case - FGB	C-8663	1
Grease Fitting 1/8 NPT	1610BL	1
Bearing - Cup	L44610	1**
Cone	L44649	1**
Pinion	A-CLS-1196-P	1**
Soc. Hd. Cap Screw	3/8"-16 Thd x 7/8"	4
Adaptor Plate	C-8688	1
Drive Lock Pin	3/16" dia. x 3/4" Lg.	1**
Omit (Not Used)		
Bearing Locknut	TN-05	1
Bearing Lockwasher	TW-105	1**
Flat Washer	70806	1
Breather 1/8 NPT	301370	1
Soc. Hd. Cap Screw	1/4-20 Thd x 3/4"	5
Key	1/4" x 1/4" x 5/8"	1
Spindle (3/4" Bore)	B-8716-1	1*
Spindle (1" Bore)	B-8716-2	1*
Soc. Hd. Set Screw	3/8-16 Thd x 1/2"	1
Helical Gear	A-CLS-1196-G	1**

* Preventive Maintenance
** Major Overhaul

EQUIPMENT DATA SHEET
(Continued)

RECOMMENDED LUBRICANTS

Speed Reducer

Ambient Temperature	-30 to 15° F	16 to 50°F	51 to 110°F
Max. Operating Temp.	150°F	185°F	200°F
Viscosity @ 100°F, SUS		1919 to 2346	2837 to 3467
Compounded with:		3% to 10% fatty or synthetic fatty oil or mild EP additives	
AGMA Lubricant No:		#7 Compound	#8 Compound
Cities Service Co.	CITGO EP Comp. 68	CITGO Cyl. Oil 400-S	CITGO Cyl. Oil 680-7
Fiske Bros. Refining	APG-80	Lubriplate CP Gear Oil #7	Lubriplate CP Gear Oil #8
Gulf Oil Corp.	SL-460 E.P.	Transgear EP 460	Transgear EP 680
Keystone Div.	KSL-365	KSL-366	K-600
Mobil Oil Corp.	SHC-634	Mobil 600W	Mobil 600W Super
Shell Oil Corp.	Omala 68	Omala 460	Omala 680
Sun Oil Corp.	Sunep 1050	Sunep 1110	Sunep 1150
Texaco, Inc.	Meropa 68	Vanguard Cyl. Oil 460	Honor Cyl. Oil 680
American Lub., Inc.		Ind. Gear Oil 140	AGMA #8 Gear Oil
Chevron	NL Gear Comp. 100	NL Gear Comp. 460	NL Gear Comp. 680

EQUIPMENT DATA SHEET
(Continued)

RECOMMENDED LUBRICANTS

Motor Drive

Ball or Roller Bearings

Westinghouse 53701RY grease (Recommended)

Standard Oil of California	- Chevron SRI-1
Texaco, Inc.	- Premium RB
Exxon	- Unirex N2
Shell Oil Company	- Dolium R
American Oil	- Rylon Premium

Sleeve Bearings

SAE #10

TABLE IV-1

GRIT CHAMBER - COMMON OPERATING PROBLEMS, CAUSES AND REMEDIES

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
1. High organic content in the grit.	A. Grit washing is not effective.	1. Run volatile solids test on grit.	1) Trickle flow from washwater into top of conveyor, adjust flow to prevent washout.
	B. Influent flow too low to maintain the desired velocity.	1. Check velocity with dye release in grit chamber.	1) Increase velocity in grit chamber by whatever means possible.
2. Excessive grit.	A. Infiltration into sewer system.	1. Check flow data for infiltration.	1) Locate the source of infiltration and correct.
	B. Industrial sources.	1. Inspect collection lines downstream from industrial plants.	1) Enforce sewer use ordinance.
3. Carryover of grit.	A. High surface overflow rates.	1. Check flow data, check deflector vanes position to have large effective overflow surface area.	1) Make necessary adjustments to increase overflow surface area.
	B. Less detention time.	1. Check detention time.	1) Adjust overflow weir to increase detention time.

TABLE IV-1
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
4. Excessive noise.	A. Misalignment of sprockets.	1. Check the alignment.	1) Correct alignment
	B. Too little or too much slack.	1. Check centers for proper slack or idler take-up.	1) Adjust centers for proper slack or idler take-up.
	C. Inadequate Lubrication.	1. Check lubricating mechanism to be sure oil is reaching working parts.	1) Lubricate properly.
	D. Loose casing or bearings.	1. Check for loose casing or bearings.	1) Draw up all bolts and brace casting if necessary.
	E. Chain or sprocket worn out.	1. Check the wear on chain and sprocket.	1) Replace chain and/or sprocket. (Some sprockets can be reversed.)
	F. Too large a chain pitch size.	1. Check chain drive recommendation chart in catalog.	1) Call Envirex for proper chain pitch size.
5. Wear on chain side bars or link plates and sides of sprocket teeth.	A. Misalignment.	1. Check for proper alignment.	1) Remove chain and correct alignment of sprockets and shafts. See data sheet 330-18 in the Envirex Service Manual.

TABLE IV-1
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
6. Chain climbs sprockets.	A. Poor fitting of chains on sprockets.	1. Check for proper chain fittings on sprockets.	1) Make sure sprocket bottom diameters are not oversized.
	B. Chain worn out.	1. Check chain for wear.	1) Replace chain and sprockets. Some sprockets can be reversed.
	C. Insufficient chain wrap.	1. Check for proper chain wrap.	1) Revise driver arrangement to get more sprocket teeth in contact with chain or use idler take-up to increase wrap.
	D. Excessive chain slack.	1. Check for proper chain slack.	1) Adjust centers or take-up for proper slack.
	E. Material build-up in sprocket tooth pockets.	1. Check for material build-up in sprocket tooth pockets.	1) Remove material build-up. Protect drive from contact with foreign material.

TABLE IV-1
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
7. Broken pins, bushings or rollers.	A. Chain speed too high for pitch and sprocket size.	1. Check for proper chain speed.	1) Use shorter pitch chain of equivalent or greater strength and/or check number of sprocket teeth to be sure it is within recommended limits for speed involved. Select a sprocket with increased number of teeth, if necessary.
	B. Heavy shock or suddenly applied loads.	1. Check for shock loads.	1) Reduce shock loads.
	C. Inadequate lubrication.	1. Check for proper lubrication.	1) Lubricate properly.
	D. Material build-up in sprocket tooth pockets.	1. Check for material build-up.	1) Remove material build-up. See 6E.
	E. Chain or sprocket corrosion.	1. Check for corrosion.	1) Protect from corrosion.
	F. Poorly fitting sprockets.	1. Check sprockets for wear.	1) Correct bottom diameter.

TABLE IV-1
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
8. Chain clings to sprockets.	A. Incorrect application or badly worn sprockets.	1. Check for proper chain size and sprocket wear.	1) Replace chain and sprockets. Some sprockets can be reversed.
	B. Heavy or tacky lubricants.	1. Check for accumulation of lubricant.	1) Clean and lubricate properly.
	C. Material build-up on driver sprocket tooth pockets.	1. Check for material build-up.	1) Remove material build-up.
9. Chain whip.	A. Excessive chain slack.	1. Check for proper chain slack.	1) Install chain take-up or idler or adjust centers.
	B. High pulsating loads.	1. Check for pulsating loads.	1) Reduce load where possible or replace chain with one of suitable strength.
	C. One or more stiff chain joints.	1. Check for stiff chain joints.	1) Remove stiff links or drive back on pins to provide proper clearance between side plates.
	D. Non-uniform chain wear.	1. Check for chain wear.	1) Replace chain.

TABLE IV-1
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
10. Chain got stiff.	A. Inadequate lubrication.	1. Check lubrication frequently.	1) Remove chain if dirty or corroded. Clean and lubricate properly.
	B. Corrosion.	1. Check for corrosion.	1) Protect chain from corrosion.
	C. Excessive overloads.	1. Check for overloads.	1) Reduce overloads.
	D. Material build-up in chain joints.	1. Check for material build-up.	1) Clean and lubricate more often. Protect chain with case.
	E. Peeving of side plate edges.	1. Check for chain interference.	1) Correct the chain interference.
	F. Misalignment.	1. Check sprocket and shaft alignment.	1) Align properly.
11. Broken sprocket teeth.	A. Obstructions or foreign material in chain cases.	1. Check chain and sprocket clearance.	1) Remove foreign material.
	B. Excessive shock loads.	1. Check for shock loads.	1) Reduce excessive shock loads or use steel sprockets.
	C. Chain climbing sprocket teeth.	1. Check for material build-up.	1) Remove material build-up.

TABLE IV-1
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
12. Cotters come out.	A. Vibration.	1. Check for vibration.	1) Reduce vibration.
	B. Obstruction striking cotters.	1. Check for obstruction.	1) Eliminate obstruction.
	C. Cotters not installed properly.	1. Check for proper installation.	1) Correct faulty installation.
13. Chain drive runs too hot.	A. Operating in excess of recommended maximum speed.	1. Check drive for recommended maximum speed for type of lubrication used.	1) Contact Envirex.
	B. Insufficient amount of lubrication.	1. Check for oil level.	1) Provide proper lubrication.
	C. Chain operating too fast for bath lubrication.		1) Use oil stream system of lubrication.
	D. Chain immersed too deeply in oil bath lubricated drive.	1. Check for proper oil level.	1) Adjust oil level to proper height.
	E. Chain or shafts rubbing against an obstruction or seal drag.	1. Check for obstruction.	1) Remove obstruction against which chain rubs.

4.2 COMMINUTION/BYPASS SCREEN

4.2.1 Function

Cut and shred the coarse material contained in the influent wastewater.

4.2.2 Description of Unit Operation/Process

The comminution/bypass screen facility (Exhibit IV-I) at the plant consists of a size 16 comminutor (manufactured by Infilco Degremont Inc.) and a bar screen which is made up of parallel steel bars with 1.25-inch spacing. Both units are mounted in separate channels. The detailed design description of the facility is summarized as follows:

Comminutor:	
Number of units	1
Unit size	16
Unit capacity, mgd	1.482
Size of drive unit, Hp	0.75
Bypass Screen:	
Number of units	1
Width of channel, inch	18
Bar spacing, inch	1.25
Unit capacity, mgd	1.482
Method of cleaning	Manual

The comminution/bypass screen facility employs a physical process where the coarse material, contained in the influent wastewater, is cut and shredded by the comminutor without removing it from the wastewater. The bypass screen is provided to bypass the flow through the bar screen when the comminutor fails to operate or require maintenance.

4.3.3. Relationship to Adjacent Units

Comminuting facility at the plant is preceded by the grit removal system and followed by the equalization basin and raw wastewater pumps. The purpose of locating the comminution facility after the grit removal system is to reduce the wear on the cutting surfaces of the comminutor and thereby increasing the service life of it. The purpose of locating the comminution facility ahead of the equalization basin and raw wastewater pumps is to ensure proper functioning of the equalization basin and to protect the raw wastewater pumps against clogging by rags and large objects.

4.3.4 Operation

A. Start-Up and Shutdown

For start-up procedures, the steps to be followed are summarized as follows:

1. Inspect the comminution/bypass screen facility for proper installation of comminutor and bypass screen, in accordance with the manufacturer`s instruction or plans and specifications. For comminutor, refer to the instruction manual given in Appendix VIII.

2. Check influent, comminution, bypass screen and effluent, channels for pieces of concrete, lumber, etc. If such things are found, they should be removed from the channels.

3. Check stop gates in influent and effluent channels for freedom of movement; check for grouting around drop gates.

4. Check the comminutor and its associated parts to determine if they have been lubricated according to the manufacturer`s instruction.

5. Using a steel bar, move the oscillating arm slowly past the stationary cutter to ensure that there is no interference between the cutter bars and that all moving parts are free.

6. Check the motor wiring, the starter heater elements, and the fuses to ensure that all connections are made as per the manufacturer`s instructions.

7. After ensuring that all parts are functioning properly and that all construction debris has been removed from the comminutor channel, start the motor. Allow the comminutor to run for at least 5 minutes with no wastewater flow in the channel to further ensure that the comminutor is functioning properly.

8. Open the influent and effluent stop gates (SG1.2.2 and SG1.2.3, respectively) gradually to prevent overloading of the comminutor. SG1.2.1, SG1.2.4, and SG1.2.5 should be kept in closed position.

The comminution/bypass screen facilityis now ready for normal operation. Shutdown of the comminutor should only be done when there is an equipment failure or maintenance requirements. To shut down the comminutor, bypass the influent flow by closing the gates SG1.2.2 and SG 1.2.3 and opening the gates SG 1.2.1, SG 1.2.4 and SG 1.2.5 and then press the stop-button switch of the comminutor.

B. Normal Operation

Under the normal operating conditions, the following gate setting should be maintained:

Open - Gates SG 1.2.2 and SG 1.2.3
Close - Gates SG 1.2.1, SG 1.2.4 and SG 1.2.5

C. Alternate Operating Modes

Except for using a bypass screen, there are no alternate operating modes for the comminutor/bypass screen facility.

D. Emergency Operations and Failsafe Features

For efficient comminutor operation, at least one-half of the cutter bars should be submerged at average flow condition. However, when a comminutor is first installed, the flows may be too low to submerge the

cutters to the desired level. If such condition exists, a weir downstream from the comminutor may be used to increase the submergence of the cutters. In using the weir, a careful check should be made on the resulting velocities. Deposition of organic solids will occur if channel velocities drop below 1.0 ft/sec. One method of eliminating low channel velocities is to temporarily line both sides of the approach and exit channels with common brick and mortar until sufficient incresed flow is realized to eliminate the need of a reduced channel width or cross-sectional area.

When the flow exceeds the design capacity of the comminutor, the excess flow can also be bypassed through the bypass screen by installing an overflow weir at the upstream end of the bypass screen channel. Also, when the comminutor fails to operate or requires maintenance, the entire flow can be bypassed through the bypass screen. In such situations, screenings will have to be removed manually. The screenings removed should be disposed of at the sanitary landfill site.

The comminutor is provided with a control system that includes an automatic motor starter reset for power failure protection and an automatic drive motor reversal with time delay for jamming protection in the event of a hard material entrapment in the comminutor.

A. Flow Control

Flow through the Comminutor/Bypass screen facility can be controlled by the stop gates. Under normal operation the stop gates SG 1.2.2 and SG 1.2.3 will remain in open position and the stop gates SG 1.2.1, SG 1.2.4

and SG 1.2.5 will remain in closed position. During the maintenance and repair work on the comminutor the flow should be bypassed to the by-pass screen channel by closing the stop gates SG 1.2.2. and SG 1.2.3 and opening stop gates SG 1.2.1, SG 1.2.4 and SG 1.2.5.

B. Process Control

There are no laboratory controls for the comminutor. Screenings that will be removed by the bypass screen should be volumatrically measured and records must be kept in terms of cubic feet of screenings removed per million gallons of wastewater flow processed.

4.2.6 Common Operating Problems

The most common operating problems, their causes and corrective measures are summarized in Table IV-2.

4.2.7 Maintenance

Routine preventive maintenance requirements for the comminutor/By-pass screen facility are summarized in the Preventive Maintenance Schedule sheets. In order to carry out the maintenance program effectively, the basic information on equipment data, including spare parts and recommended lubricants should be readily available at the plant. For ease of reference this information is given on the equipment data sheets.

4.2.8 References

1. Environmental Protection Agency, Consideratin For Preparation of Operation and Maintenance Manual, EPA 430/9-74-001, 1974

2. EPA, A Planned Maintenance Management Systems For Municipal Facilities, EPA 430/9-74-004, 1974

3. EPA, A Planned Maintenance Management Systems For Municipal Wastewater Treatment Plants, EPA 600/2-73-004, 1973

4. The Texas Water Utilities Association, Manual of Wastewater Operations, 1971

5. California State University, Sacramento, Operation of Wastewater Treatment Plants, Volumes I, II & III, A Field Study Training Program, 1980

6. Water Pollution Control Federation, Operation and Wastewater Treatment Plants - MOP No. 11, 1976

7. New York State Department of Environmental Conservation, Manual of Instruction For Wastewater Treatment Plant Operators, Vols. 1 and 2, 1978

8. Department of the Navy, Bureau of Yards and Docks, Training Course in Water and Sewage Plant Operations, June 1965

9. U.S. EPA, Maintenance Management in Wastewater Facilities - Instructor Training Course, September 1982

10. Infilco Degremont, Inc., Griductor Comminutor Instruction Manual, T810.01, May 1979.

PREVENTIVE MAINTENANCE SCHEDULE

COMMINUTOR/BY-PASS SCREEN

EQUIPMENT ITEM: Comminutor

MANUFACTURER: Infilco-Degremont, Inc.

SUPPLIER: Combs and Associates

MANUFACTURER NO. OR IDENTIFICATION: T 810.01 May 1979

Daily:

1. Practice good housekeeping. Keep area around the facility clean and free of obstacles. Clean up equipment.

2. Check comminutor and drive motor for overheating, excessive noise, wear, vibration, loose bolts, etc.

3. Check for and remove any objects which may cause stoppage of comminutor.

4. Check for proper grinding of coarse object contained in the wastewater.

5. Check that cutter is not jammed.

Weekly:

1. Check oil level in comminutor. If not at center of bull's eye, check the bolted connections and mechanical seal at the oscillating arm for leakage.

2. Check oil level in bearing assembly.

3. Check oil level in gear section of gear motor. Add oil if necessary until oil rises to bottom of threads in the filter elbow.

Monthly:

1. Check the cutter bars for adjustment. Make sure a rubbing fit exists between the oscillating and stationary cutters.

PREVENTIVE MAINTENANCE SCHEDULE

COMMINUTOR/BY-PASS SCREEN
(Continued)

Semi-Annually:

1. Check the cutters for wear and for sharpness. If badly worn, replace.

2. Change oil in comminutor.

Annually:

1. Change oil in gear section of gear motor.

2. Lubricate upper motor bearings.

3. Lubricate all guide bearings. Use light ball bearing grease. Grease bearing while comminutor is in operation. Pump grease slowly until a slight bleed shows up around the bearing seals.

4. Have an electrician inspect, clean, and test all electrical circuitry, controls, and switches.

5. Clean all cutting parts and drive unit thoroughly.

EQUIPMENT DATA SHEET

EQUIPMENT NAME: Comminutor

LOCATION: Preliminary Treatment

FUNCTION: Shreds and grinds the rags and other large floating objects for further processing.

EQUIPMENT DATA:

Comminutor

Number of Units: One (1)

Type: Direct drive

Unit Size: 16

Unit Capacity: 1.482 mgd

Model No.:

Serial No.:

Accessories: One by-pass bar screen

Drive Unit

Number of Units: One (1)

Type: Gear Motor

Speed: 1750 rpm

Model No.:

Unit Horsepower: 0.74 HP

Electrical Service: 460 volt, 3-phase, 60 cycle

Manufacturer: Infilco Degremont, Inc.
Box K7
Richmond, Virginia 23288
Telephone No.: (804) 281-7600

Supplier: Combs and Associates
P. O. Box 32185
Charlotte, North Carolina 28232
Telephone No.: (704) 376-0450

EQUIPMENT DATA SHEET
(Continued)

EQUIPMENT NUMBER

1.2.0.0 Comminutor/By-Pass Screen Facility

1.2.1.0 Comminutor

1.2.2.0 By-pass screen

RECOMMENDED SPARE PARTS

Part Description	Part Number	Quantity
Tooth	25013H01	1
Bearings	39057H01	2
Bearings	39056H01	2
Locknut	53299H22	2
Lockwasher	53299H32	2
Seal	00102H25	2
Seal	00102H26	2
Comb	26162G01	1

RECOMMENDED LUBRICANTS

Rotor Assembly

High grade medium-consistency Lithium or lime-base grease
per ASTM 205-295

EQUIPMENT DATA SHEET
(Continued)

Sterling Helical Gear Reducer

Manufacturer	-20°F to +40°F (-28.9°C to 4.4°C)*	+40°F to +120°F** (4.4°C to 48.9°C)**
Chevron Oil	NL Gear Guard Compound 220	NL Gear Compound 680
Exxon Petroleum	Spartan EP 220	Spartan EP 680
Mobil Oil Company	Mobilgear 630	Mobilgear 636
Shell Oil Corporation	Omala 71	Omala 81
Texaco Oil Company	Meropa 220	Meropa 680
Phillips Petroleum	All Purpose Gear Oil SAE 90	All Purpose Gear Oil SAE 140

* AGMA #5EP1040SUS at 100°F (37.8°C)

** AGMA #8EP3000SUS at 100°F (37.8°C)

TABLE IV-2

COMMINUTOR/BY-PASS SCREEN - COMMON OPERATING PROBLEMS, CAUSES AND REMEDIES

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
1. Large amount of rags and debris accumulated on plant site gives off obnoxious odors and attracts flies and other insects.	A. Inadequate disposal method and scheduling.	1. Estimate volume (cu.ft.) of rags and debris removed each day in proportion to flow.	1) Store rags and debris in closed containers wherever possible.
		2. Determine exposed time the material is allowed to accumulate.	2) Arrange for local sanitation department to pick up rags and debris on daily basis.
		3. Check disposal method used.	
2. Rotation stopped, circuit breaker will not reset.	A. Jammed mechanism.	1. Check for obstruction in comminuting device.	1) Lock local push button in OFF-LOCK-OUT position, open circuit breaker, divert wastewater to by-pass screen channel, and clear obstruction.
3. Rotation stopped, motor runs.	A. Broken coupling.	1. Check coupling.	1) Lock local push button in OFF-LOCK-OUT position, open circuit breaker, divert wastewater to by-pass channel, and replace coupling.

TABLE VI-2
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
4. Motor does not start	A. Incorrectly connected.	1. Check for proper connection.	1) Connect correctly per diagram on motor.
	B. Incorrect power supply.	1. Check for proper power supply.	1) Use only with correct rated power supply.
	C. Fuse out, loose or open connection.	1. Check for fuse or proper circuit connection	1) Replace fuse or correct open circuit condition.
	D. Rotating parts of motor may be jammed mechanically.	1. Check for bent shaft, broken housing, damaged bearing, and foreign material in motor.	1) Correct the problem.
	E. Driven machine may be jammed.	1. Check for jamming.	1) Correct jammed condition.
	F. No power supply.	1. Check for voltage at motor.	1) Work back to power supply and source.
5. Motor starts but does not come up to speed.	A. Same as 4 A, B, C.		
	B. Overload.	1. Check for overload.	1) Reduce load to bring current to rated limit. Use proper fuses and overload protection.

TABLE IV-2
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
6. Motor noisy	A. Same as 4 A, B, C.		
7. Motor runs hot.	A. Same as 4 A, B, C.		
	B. Overload.	1. Check for overload.	1) Reduce load.
	C. Impaired ventilation.	1. Check for obstruction.	1) Remove obstruction.
	D. Frequent start or stop.	1. Check for number of starts or reversal.	1) Reduce number of starts or reversal. 2) Secure proper motor for this duty.
	E. Misalignment between rotor and stator lamination.	1. Check for alignment.	1) Realign.
8. Nosiy operation.	A. Misalignment of coupling or sprocket.	1. Check for alignment.	1) Correct misalignment.
	B. Mechanical unbalance of rotating parts.	1. Check for operation of rotating parts.	1) Correct the unbalanced.
	C. Lack of or improper lubrication.	1. Check for proper lubrication.	1) Use correct lubricant, replace parts as necessary.
	D. Foreign material in lubricant.	1. Check the condition of lubricant.	1) Clean out and replace bearings and/or gears.

TABLE IV-2
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
	E. Overload.	1. Check for overload.	1) Remove overload condition.
	F. Shock loading.	1. Check for shock loading causes.	1) Correct causes and replace parts as necessary.
	G. Mounting acts as amplifier of normal noise.	1. Check for mounting.	1) Isolate motor from base.
	H. Rotor dragging due to worn bearings, shaft or bracket.	1. Check for bearing, shaft and bracket wearings.	1) Replace bearings, shaft or bracket as needed.
9. Bearing failure.	A. Same as 8 A, B, C, and D.		
	B. Entry of water or foreign material into bearing housing.	1. Check for such conditions.	1) Replace bearings and shield against entry of foreign material (water, dust, etc.)
10. Gear Failure.	A. Same as 8 C, D, E, and F.		
11. Oil leak.	A. Improper lubricant.	1. Check for proper lubricant use.	1) Use specified lubricant,
	B. Too much lubricant.	1. Check for proper lubricant procedure.	1) Fill only to level plug.

TABLE IV-2
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
	C. Worn oil seals or shafts.	1. Check for seals and shafts wear.	1) Replace necessary parts.
	D. Loose gear case cover.	1. Check gear case cover for tightness.	1) Tighten bolts, replace gasket, if necessary.
	E. Loose level or drain plugs.	1. Check for loose level or drain plug.	1) Tighten and seal plugs.
	F. Misalign sprocket or coupling.	1. Check for sprocket or coupling alignment.	1) Correct misalignment.
	G. Overload.	1. Check for overload.	1) Reduce overload.
	H. Shock load.	1. Check for shock loads.	1) Remove conditions causing shock loads.

4.3 EQUALIZATION BASIN

(RESERVED)

4.4 PRIMARY CLARIFICATION

4.4.1 Function

Remove or reduce suspended and floatable solids from the influent wastewater flow. Primary clarification also reduces organic loading (BOD) from the wastewater before it goes to the secondary treatment units.

4.4.2 Description of Unit Operation/Process

Two circular clarifiers, 24'-0" dia. x 9'-0" SWD each are provided at the plant (Exhibits IV-5 through IV-10). Each clarifier is equipped with a sludge and scum collecting mechanism (manufactured by Envirex, Inc.). The sludge and scum from the clarifiers are pumped to the aerobic digesters. The detailed design description of the primary clarifiers is summarized below:

Primary Clarifiers:

Number of Units, 24'-0" dia. x 9'-0" SWD.	2
Unit Volume, gals.	30,454
Total Volume, gals.	60,908
Detention time, hrs, at avg. daily flow	2,436
Unit Surface area, sq. ft.	452
Total Surface area, sq. ft.	904
Surface overflow rate, gpd/sq.ft., at Avg. daily flow	664
at Max. daily flow	1,255
Unit weir length, ft.	75
Total weir length, ft.	150
Weir overflow rate, gpd/lf, at Avg. daily flow	4,000
at Max. daily flow	7,566
Expected performance* Percent TSS removal	60
Percent BOD_5 removal	30

Waste Sludge Pumps:

Number of pumps	2
Type	Suction lift centrifugal
Capacity, gpm, each unit @ 4 ft. TDH, 870 RPM	200
Drive horsepower, hp, each unit	1
Electrical Service 230/460 volts, 3 phase, 60 Hz	

*Performance based upon clarifier not preceded by equalization.

Scum Pumps:

Number of pumps	
Type - centrifugal, non-clog reversible, surbmersible grinder	2
Capacity, gpm, each unit @ 14 ft. TDH,	
Drive horsepower, hp, each unit	50
Electrical service, 480 volt, 3 phase, 60 Hz	3

In primary clarifiers, the settleable and floatable solids are separated by using the principles that the solids having higher specific gravity than water will tend to settle, and the solids having lower specific gravity than under will tend to float. The separated settleable and floatable solids are removed for digestion in the aerobic digesters.

4.4.3 Relationship to Adjacent Units

The primary clarifiers at the plant are located downstream of pretreatment and equalization facilities and upstream of the trickling filters. The primary purpose of locating the clarifiers ahead of the trickling filter system is to remove or reduce the settleable and floatable solids from the wastewater which could otherwise cause high organic loadings and poor performance of the trickling filter system.

4.4.4 Operation

A. Start-Up and Shutdown

For Start-up the following procedures should be followed:

Primary Clarifiers:

1. Inspect the inlet structure, Distribution Box #1, and clarifiers for pieces of metal, concrete and other debris. If such things are found, they should be removed and disposed of properly.

2. Check clarifier tank structure for cracks and other indications of structure failure.

3. Check stop gates in the Distribution Box #1 for proper installation and operation.

4. Check effluent weirs for proper level.

5. Check the clarifiers mechanism for lubrication and proper installation as per instruction given in the Manufacturer's Instruction Manual (Appendix VIII).

6. Check electrical components of the clarifier mechanism, scum pumps and waste sludge pumps for operational status. Check out control circuits possibly on "dry-run" basis prior to operation.

7. Check motors for correct voltage connections at the terminal box.

8. Check motors for proper direction of rotation.

9. Check out and calibrate instrumentation, controls, and safety devices.

10. If every thing checks out properly, turn on the clarifiers mechanism and let it run for one revolution to check proper operation of the mechanism.

11. Open the stop gates SG 4.2.1 and SG 4.2.2 in the Distribution Box #1 to allow the wastewater to enter into the clarifiers. When the clarifiers are full to overflowing, check the flow over the weirs and adjust the weirs, if necessary, for uniform overflow.

12. Turn on the clarifiers mechanism and check for proper operation.

The primary clarifiers are now ready for normal operation.

Shutdown of the clarifiers should only be done when there is an equipment failure or a scheduled preventive maintenance requirement. To shutdown a clarifier, the following procedures should be followed:

1. Divert the flow to the other clarifier by closing the influent stop gate of the clarifier being shutdown.

2. Dewater clarifier by pumping the clarifier content to the aerobic digester.

3. Hose down walls, floor, and equipment inside clarifier while dewatering the clarifier.

4. Inspect clarifier in accordance with the Start-up procedures described earlier.

5. Repair or replace all broken or defective parts and/or equipment.

6. Repaint metal surfaces that have lost their protective coating or are showing signs of corrosion.

Waste Sludge Pumps:

1. Clean all debris from wet well, pump station and from the vicinty of pumping equipment.

2. Check all protective coatings for damage and repaint or touch-up as necessary.

3. Provide initial lubrication as per the instruction of the manufacturer. Refer to the manufacturer's instruction manual given in Appendix VIII.

4. Check electrical components for operational status. Check out control circuits possibly on "dry-run" basis prior to operation.

5. Check motors for correct voltage connections at the terminal box.

6. Check motors for proper direction of rotation.

7. Check out and calibrate instrumentation, controls and safety devices.

8. Start the pumps as per the instructions of the manufacturer and inspect for excessive noise and vibration. If the pumps run smooth, they should be placed into normal operation.

9. When pump is in operation, check all the valves and piping associated with the pump for leaks. Correct leaks, if any.

Shutdown of the pumps should only be done when there is a pump failure or a maintenance requirement. The pumps can be shutdown by pressing the STOP button switch. If a pump has to be shutdown for an extended period of time, make sure the pump and its connective piping are drained completely to prevent damage from freezing weather. Also, it is recommended to flush and oil mechanical seal, and to flush and regrease the pump and motor bearings.

Scum Pumps:

1. Clean all debris from the pump manhole.

2. Check all protective coatings for damage and repaint or touch-up as necessary.

3. Provide initial lubrication as per the instruction of the manufacturer. Refer to the manufacturer's instruction manual given in Appendix VIII.

4. Check electrical components for operational status. Check out control circuits possibly on "dry-run" basis prior to operation.

5. Check motors for correct voltage connections and for proper direction of rotation.

6. Check out and calibrate instrumentation, controls and safety devices.

7. Start the pumps and inspect for excessive noise and vibration. If the pumps run smoothly, they should be placed into normal mode of operation.

8. When pump is in operation, check all the valves and piping associated with the pump for leaks. Correct leaks, if any. Check the operation of the level control system while the pump is running.

Shutdown of the pumps should only be done when there is a pump failure or a maintenance requirement. The pumps can be shutdown by placing their respective H-O-A (Hand-Off-Auto) switch in OFF position.

B. Normal Operation

Primary Clarifiers:

Under the normal operating conditions, the influent stop gates of both the clarifiers should be kept in open position. The following items should be scheduled daily as a part of normal operation:

1. Inspect to see that the flow is equally distributed among the available clarifiers. Adjust, if necessary.

2. Check sludge and scum collecting mechanisms for proper operation.

3. Check condition on the water surface. Floating sludge or an abundance of gas bubbles on the surface are evidence of equipment or process failure.

4. Check for changes in the physical appearance of wastewater. If changes are noted, samples should be taken and supervisory personnel should be notified.

5. Check for any significant scum accumulation near scum baffle and scum trough. Remove scum as necessary.

6. Check effluent weirs for solids accumulation. Clean, if necessary, by hosing with water under pressure.

7. Measure sludge blanket levels in clarifiers and remove sludge as necessary.

Waste Sludge Pumps

Under normal operation each pump will be manually alternated on a weekly basis. The HAND-OFF-AUTO Selector switch of the pump in service will be placed in AUTO position while that of the other pump will be in OFF position. Under AUTO position, the pump in service will operate from a 24-hour clock timer that is setable within 15 minute intervals. It is recommended that that timer be set such that more concentrated sludge can be pumped to the aerobic digestor without creating any septic conditions in the primary clarifiers.

Scum Pumps

Under normal operation the scum pumps will be operated on the automatic mode. Under this mode the wet well level control system will automatically control the pumping operation of the "lead" and "lag" pumps. An automatic alternator is provided to alternate the pump after each pumping cycle. The wet well levels at which the level control (mercury float switches) system automatically start and stop the pump are given as follows:

Wet Well Level	Function
8.00	Pump Off
10.00	Pump No. 1 ON
10.50	Pump No. 2 ON
11.00	Sound Alarm

In order for the pumps to be controlled by the level control system and automatically alternated, the HAND-OFF-AUTO selector switch for each of these two pumps should be in "AUTO" position.

C. Alternate Operating Modes

Primary Clarifiers:

There are no alternate operating modes for the primary clarifiers.

Waste Sludge and Scum Pumps:

Other than manual starting and stopping of the pumps, there are no alternate operating modes for the waste sludge and scum pumps.

D. Emergency Operation and Fail Safe Features

Primary Clarifiers:

Sludge and scum collection mechanisms are provided with overload protection device to stop the drive motor and sound an alarm in the event that the design drive motor input power is exceeded. Normally, alarm or stoppage will occur when rocks, tools, etc., are being dropped into the clarifiers. To remove obstruction, divert the flow to the other clarifiers by closing the influent stop gate of the clarifier from which the obstruction needs to be removed. Pump sludge to the digester and dewater the clarifier by pumping remaining liquid to the other clarifiers. After dewatering, check the clarifier floor and sludge sump areas for debris and remove them from the clarifier. Check for proper operation of the sludge collecting mechanisms before placing tank into service.

Waste Sludge Pumps

Over pumping of sludge to the aerobic digester can affect the performance of the aerobic digester as well as spillage of sludge from the digester. In order to avoid this situation, a high water level float switch is provided in the aerobic digester No. 1 which will deactivate the pump upon rise in water level above the preset level in the digester No. 1.

A breakdown of one of the pumping units should also be regarded as an emergency situation. Under this situation, the broken pumping unit should be taken out of service and the standby unit should be placed into operation. The broken unit should be repaired and put back into normal operation as soon as possible.

Scum Pumps

A high level of wastewater in the wet well can be considered as an emergency situation. A high water level alarm circuit is provided at the pump station. When the wet well liquid level rises to the field set high water alarm level, the circuit is activated causing the high water level indicator light to glow and the alarm to sound. When the alarm sounds, the operator should deactivate the alarm and investigate the reason for the alarm condition. For example, a malfunction in the automatic controls would require that the pumps be started manually. A breakdown of a pump would require that the "stand-by" pump be placed into operation.

After the alarm situation is corrected, a complete investigation should be conducted to determine the cause of the alarm condition. For example, a malfunction in the level control system, improper switch settings on the control panel, or mechanical equipment problems may have caused the alarm condition.

The breakdown of one of the pumping units is also an emergency situation. Under this condition, the broken pumping units should be taken out from the service and the "stand-by" unit should be placed into operation. The broken unit should be repaired and put back into normal operation as soon as possible.

4.4.5 Controls

A. Flow Control

Primary Clarifiers:

The flow to the primary clarifiers can be controlled by using stop gates SG 4.2.1 and SG 4.2.2 located in the distribution Box No. 1. The scum and sludge flows from the clarifiers can be controlled by operation of the scum and waste sludge pumps, respectively.

Waste Sludge Pumps

The sludge flow through the pumps can be controlled by the 4-inch gate valve on suction piping and 4-inch gate valve and 4-inch check valve on the discharge piping of each pump.

Scum Pumps

The scum flow through the scum pumps can be controlled by 2-inch gate valve and 2-inch check valve on discharge piping of each pump.

B. Process Control

Primary Clarifiers:

For good operation, the influent flow must be distributed equally between the clarifiers. Unequal flow causes uneven detention periods in the various tanks and always results in a poor overall reduction of TSS and BOD.

Insufficient frequency of sludge removal may cause poor clarifier performance due to the associated problems of sludge septicity, sludge gasification, and subsequent sludge floating. The proper interval of sludge pumping is dependent upon many conditions, and it varies from plant to plant. Generally, experience at the plant dictates the selection of proper frequency of sludge removal. In sludge pumping, all possible efforts should be made to pump thick sludge. This is because the percent solids in sludge affects the volume of sludge to be pumped to digester which might have a direct effect on the digester operation. As a general guide, a good thick primary sludge will contain about 4 to 7 percent dry solids as indicated by the total solids.

Laboratory control tests useful in evaluating the clarifier performance include temperature, pH, settleable solids, suspended solids, and BOD. A brief description of these tests in relation to the clarifier performance is given below:

<u>Temperature:</u> Temperature affects the settling rate of solid particles in clarifier. In general, with increase in water temperature, the settling rate of solid particles in water increases, and with decrease in water temperature, the settling rate of solid particles in water decreases. This is because the density or specific gravity difference between the water and solid particles becomes large at higher temperature and less at lower temperature. The temperature of the clarifier influent varies in the range of 10^{o} to 30^{o} C.

<u>pH:</u> pH of the clarifier influent and effluent should be measured daily. Typical pH values of the clarifier influent range from 6.5 to 8.0 while values of the clarifier effluent pH range from 6.5 to 8.0. If

effluent pH shows lower value than the influent pH, it may be indication of septic condition in the clarifier. If such condition is present, it may require change in sludge pumping frequency.

BOD: BOD tests on the influent and effluent should be performed at least twice a week. Typical BOD values of the clarifier influent range from 150 to 400 mg/l while values of the effluent range from 105 to 150 mg/l. Using the BOD test results, the efficiency of the primary clarifier can be determined as follows:

$$\text{Efficiency, \%} = \frac{BOD_{Inf} - BOD_{Eff}}{BOD_{Inf}} \times 100$$

For example, if the primary clarifier influent and effluent BOD are 200 mg/l and 140 mg/l, respectively, the clarifier efficiency for BOD removal is:

$$= \frac{200 - 140}{200} \times 100 = 30 \text{ percent}$$

Settleable Solids: Settleable solids tests on the influent and effluent should be performed daily. Typical settleable solids values of the clarifier influent range from 5 to 15 ml/l while values of the effluent range from 0.3 to 5 ml/l. The settleable test results can be used for quick measure of the clarifier efficiency.

TSS: TSS tests on the influent and effluent should be performed at least three times a week. Typical TSS values of the clarifier influent range from 150 to 400 mg/l while values of the effluent range from 50 to 150 mg/l. Using the TSS test results, the efficiency of the primary clarifier in terms of suspended solids removal can be determined. For example, if the

primary clarifier influent and effluent TSS are 200 mg/l and 60 mg/l, respectively, the clarifier efficiency for TSS removal is:

$$= \frac{200 - 60}{200} \times 100 = 70 \text{ percent}$$

Waste Sludge and Scum Pumps:

Except throttling of plug valves on the suction and discharge piping of waste sludge pumps and on the discharge piping on scum pumps, there are no process controls for the waste sludge pumps and the scum pumps.

C. Electrical Control

Primary Clarifiers:

The major electrical controls for the primary clarifier equipment are provided on the control panel located near the clarifiers. Each clarifier mechanism is controlled by START-STOP push button switch. Normally, the START switches for each mechanism will be pressed in to provide continuous operation of the clarifier mechanisms. The clarifier mechanism can be stopped by pressing the STOP button.

Waste Sludge Pumps

The major electrical controls for the pumps are located on the control panel provided in the pump station. Each pump is controlled by HAND-OFF-AUTO (H-O-A) selector switch. Normally, the H-O-A selector switch of the pump in service will be in AUTO position while that of the other pump will be in OFF position. Under AUTO position the pump in service will operate from a 24-hour clock timer that is adjustable to within 15 minutes ON-OFF interval.

Scum Pumps

The major electrical controls for the equipment are located on the control panel located in the pump station. Each pump is controlled by a HAND-OFF-AUTO (H-O-A) selector switch. Normally, the H-O-A switches for the "lead" and "lag" pumps will be in the "AUTO" position to provide automatic pump control through the use of the wet well level control system and alternator.

4.4.6 Common Operating Problems

Common operating problems, their causes and corrective measures for the primary clarifiers, waste sludge pumps and scum pumps are summarized in Table IV-4, Table IV-5 and Table IV-6, respectively.

4.4.7 Maintenance

Routine preventive maintenance requirements for the primary clarifiers, waste sludge pumps and scum pumps are summarized in Preventive Maintenance Schedule Sheets. In order to carry out the maintenance program effectively, the basic information on equipment data, including spare parts and recommended lubricants, should be readily available at the plant. For ease of reference, this information is given on the equipment data sheets.

4.4.8 References

1. The Texas Water Utilities Association, Manual of Wastewater Operations, 1971.

2. California State University, Sacramento, Operation of Wastewater Treatment Plants, Volumes I, II & III, A Field Study Training Program, 1980.

3. Water Pollution Control Federation, Operation and Wastewater Treatment Plants - MOP No. 11, 1976.

4. New York State Department of Environmental Conservation, Manual of Instruction For Wastewater Treatment Plant Operators, Vols. 1 and 2, 1978.

5. Department of the Navy, Bureau of Yards and Docks, Training Course in Water and Sewage Plant Operations, June 1965.

6. U.S. EPA, Maintenance Management in Wastewater Facilities - Instructor Training Course, September 1982.

7. Envirex, Inc., Service Manual.

8. Myers, Installation and Servicing Instruction for Scum Pumps.

9. Fairbanks Morse, Installation, Operation and Maintenance - Fairbanks Morse Self-Primary Non-Clog Pumps.

PREVENTIVE MAINTENANCE SCHEDULE

CIRCULAR SLUDGE COLLECTOR

EQUIPMENT ITEM: Final (Circular) Worm Gear Drive, Direct Driven

MANUFACTURER: Envirex, Inc.

SUPPLIER: Envirex, Inc.

MANUAL NO. OR IDENTIFICATION: Refer to Drive Assembly Drawings and Data Sheet 330-2.074.4.2, Pg. 12

*Lubricants: Capacity - 2 quarts

Summer For temperatures 40°F or higher: Mobilube HD80-90 MIL-L-2105C

Winter For temperatures under 40°F: Mobil Delvac Special 10W30 MIL-L-46152 Multi Purpose Gear Oil.

Flushing Oils If condensation is a problem between seasonal oil changes, flush with warm Mobilube 10W30 Motor Oil and drain completely before refilling with proper seasonal lubricant. Schedule additional oil changes at mid-season intervals.

If contaminants, lack of routine maintenance and/or scheduled oil changes result in sludge formation, flush first with kerosene, flush again with warm Mobilube 10W30 Motor Oil, drain completely and then refill with proper seasonal lubricant.

Oil Drain Plug:
Located on outside of worm housing.

Oil Fill Plug:
Located on Top Cover (Vent Plug).

Oil Sight Gauge:
Located on Outside of Worm Gear Housing.

Grease Fittings - 3: (1 on top of worm housing, one on pipe line to steady bearing, one on shear pin coupling hub)

Monthly:

1. Check oil level - sight gauge on side of worm gear housing. Add oil by removing vent plug in top cover. Clean out air vent. Wipe up all spills.

PREVENTIVE MAINTENANCE SCHEDULE
(Continued)

2. Remove plug in bottom of Torque Overload Micro Switch housing and drain off any condensation or oil seepage.

3. Grease worm bearings, steady bearing and shear pin coupling hub. Use low pressure high volume gun. Two pumps for worm bearing and coupling hub bore. Three pumps for steady bearing. Use a major brand Lithium Base #2 grease. Wipe off any grease that passes worm shaft seal adjacent to coupling hub. Wipe off excess grease at coupling.

4. Check all set screws in shear pin coupling and flexible coupling. Check screws in coupling cover.

Quarterly:

1. Check sample of oil for condensation, metal particles and/or sludge. Drain, flush, drain and refill per preceding instructions.

2. Check air gap of torque overload micro switches. See Data Sheet 330-100 for test procedure.

*If temperature variations are not extreme and condensation is not a problem at your location, consider the use of a year round synthetic oil such as one of the Mobil SHC 600 series oils after consulting with the lubricant manufacturer's representative for an oil equivalent to the winter multi-purpose gear lubricant.

Semi-Annually:

1. When tank is drained for semi-annual inspection of rotating machinery, use this down time to replace or retension the drive chain.

2. Retighten any loose bolts.

3. Change oil to proper seasonal viscosity. (See page 3.)

4. Remove shear pin and bump drive to expose shear faces of coupling hub. Clean off all old grease and any corrosion. Wipe with same grease as used elsewhere. Line up coupling hubs and replace shear pin.

5. Remove flexible coupling cover and regrease per Data Sheet 330-23.

NOTE: If a torque overload shut-down occurs, examine "spring plate" for permanent deformation. See manual Data Sheets 300-100 for procedure.

PREVENTIVE MAINTENANCE SCHEDULE

CIRCULAR SLUDGE COLLECTOR

EQUIPMENT ITEM: Bridge

MANUFACTURER: Envirex, Inc.

SUPPLIER: Envirex, Inc.

MANUAL NO. OR IDENTIFICATION: Refer to Assembly Drawing

Semi-Annually:

1. Check all fastenings. Retorque to Table Valves. See Torque Table data sheet 330-12.

2. Examine fastenings at expansion joint at tank wall. Retorque if loose.

PREVENTIVE MAINTENANCE SCHEDULE

CIRCULAR SLUDGE COLLECTOR

EQUIPMENT ITEM: Bottom Scraper Arm

MANUFACTURER: Envirex, Inc.

SUPPLIER: Envirex, Inc.

MANUAL NO. OR IDENTIFICATION: See Service Manual Data Sheets 330-2.074.2.1 and 330-2.074.2.7

Semi-Annually:

1. When tank is drained for semi-annual inspection, hose off with pressure hose to remove all sludge and lime deposits.

2. Examine all joints for loose or missing bolts (and shims).

3. Rotate machinery and test for true plant rotation. Adjust per service manual data sheets 330-2.074.2.7.

4. Examine scraper blades. Replace those badly bent or missing.

5. If a surface skimmer is part of the equipment, check all fastenings. Check bolts securing counterweights.

PREVENTIVE MAINTENANCE SCHEDULE

CIRCULAR SLUDGE COLLECTOR

EQUIPMENT ITEM: Scum baffle, Weirs, and Scum beach

MANUFACTURER: Envirex, Inc.

SUPPLIER: Envirex, Inc.

MANUAL NO. OR IDENTIFICATION: See Data Sheet 330-2.074.2.1

NOTE: The above components, if furnished by others, must be installed concentric with center pier. Elevations of baffles, and/or weirs are to be held per dimensions on General Arrangement drawing.

Semi-Annually:

1. When tank is drained during semi-annual inspection, hose off all non-rotating tank components. Reestablish elevations and replace any missing bolts. Check all grouting and waterproof mastic sealing.

2. Recheck concentricity by watching edge wiper on skimmer blade. If it is not touching baffle in some areas, relocate baffle.

PREVENTIVE MAINTENANCE SCHEDULE

CIRCULAR SLUDGE COLLECTOR

EQUIPMENT ITEM: Scum Trough Skimmer Assembly

MANUFACTURER: Envirex, Inc.

SUPPLIER: Envirex, Inc.

MANUAL NO. OR IDENTIFICATION: Refer to Assembly Drawing and Data Sheets 330-2.074.2.1C through .2.1F

Daily:

1. Check in passing for proper action on scum beach and reentry into tank.

Monthly:

1. If skimmer is optional "pivoted" type, grease all fittings, 2 or 3 pumps with same grease and gun used elsewhere.
2. If chain hung skimmer is used, no lubrication required.

Semi-Annually

1. Hose off with pressure hose and examine all bolted connections. Adjust for submergence. Replace flexible blade if worn or torn. Replace baffle scraper if no longer touching baffles.

PREVENTIVE MAINTENANCE SCHEDULE

CIRCULAR SLUDGE COLLECTOR

EQUIPMENT ITEM: Gear Reducer Etc. Motor

MANUFACTURER: Euro Drive, Inc.

SUPPLIER: Envirex, Inc.

MANUAL NO. OR IDENTIFICATION: Service Manual

Daily:

1. Observe for looseness on reducer.

Annually:

1. If equipment is in constant use, bearings can be regreased (SPARINGLY). Remove grease relief plug if furnished. Use low pressure, high volume type gun. 1/4 ounce of grease - 2 pumps - is maximum quantity.

EQUIPMENT DATA SHEET

File No:__________

EQUIPMENT NAME: Primary Clarifiers

LOCATION: Primary Clarification

FUNCTION: To remove settleable solids from the influent wastewater

EQUIPMENT DATA:

Number of Units: Two (2)
Drive horsepowr for each unit:
Electrical Service:
Manufacturer: Envirex Inc.
1901 South Prairie Ave.
Waukeshu, WI 53186
Telephone: 414/547-0141

Supplier: Heyward Inc.
717 East Blvd.
Charlotte, NC 28203
Telephone: 704/372-5805

EQUIPMENT NUMBER:

4.3.1.0 Sludge Collecting Mechanism - Clarifier #1

4.3.2.0 Sludge Collecting Mechanism - Clarifier #2

RECOMMENDED SPARE PARTS

Part Description	Part No.	Quantity
Shear Pins		12
Shear Pin Coupling, Compl.		1
Limit Switch for Shear Pin Coupling		1

RECOMMENDED LUBRICANTS

Warm Gear
Summer Lube — Mobil HD 80-90 or equivalent
Winter Lube — Mobil Delvac Special SAE low-30 or equivalent

Seals and Beanngs

Major Brand — Lithium #2

EQUIPMENT DATA SHEET

File No:__________

EQUIPMENT NAME: Scum Pumps

LOCATION: Primary Clarification

FUNCTION: Pump scum to the aerobic digester

EQUIPMENT DATA:

Pump Data:

Number of Pumps: Two (2)

Type: Submersible, grinder type

Capacity: 50 gpm @ 14 ft. TDH

Make: Myer

Model No: Myers WG30-43

Serial No:

Size: 3-inch

Type Seal:

Manufacturer: F.E. Myers Co.
400 Orange Street
Ashland, Ohio 44805
Telephone No:

Supplier: Pump and Lighting Company
P.O. Box 2504
Hickory, NC 28601
Telephone No: 704/324-9705

Motor Data

No. of Motors: Two (2)

Type:

EQUIPMENT DATA SHEET
(Continued)

Motor Data (Continued)

Speed: 3450 RPM
Horsepower: 3.0 HP
Electric Service:
Manufacturer: Myer
Supplier: Pump and Lighting Company

EQUIPMENT NUMBER

4.4.1.0 Pump No. 1
4.4.2.0 Pump No. 2

RECOMMENDED SPARE PARTS

Part Description	Part No.	Quantity
"O" Ring	5876A111	1
"O" Ring	5876A112	1
Bearing Ball	8565A22	1
Bearing Ball	8565A23	1

RECOMMENDED LUBRICANTS

EQUIPMENT DATA SHEET

File No.__________

EQUIPMENT NAME: Waste Sludge Pumps

LOCATION: Primary Clarification

FUNCTION: Pump Primary Sludge to the aerobic digestor

EQUIPMENT DATA:

Pump Data

Numer of Pumps: 2

Type: Horizontal Self-priming non-clog centrifugal

Capacity: 200 gpm at 4 ft. TDH and 870 RPM

Make:

Model Number: 5421P

Serial Number:

Size: 4 inch

Type Seal: Mechanical

Manufacturer: Fairbanks Morse
3601 Fairbanks Ave.
Kansas City, Kansas 66110
Telephone: 913/371-5000

Supplier: Pump and Lighting Company
P.O. Box 2504
Hickory, North Carolina 28601
Telephone: 704/324-9705

Motor Data

Number of Motors: 2

Type: O.D.P.

Speed: 1150 RPM

EQUIPMENT DATA SHEET
(Continued)

Horsepowr: 1.0 Hp

Electric Service: 460 Volts, 3 Phase, 60 Cycle

Manufacturer: General Electric

Supplier: Pump and Lighting Company

EQUIPMENT NUMBER

4.5.1.0 Pump No. 1

4.5.2.0 Pump No. 2

RECOMMENDED SPARE PARTS

Part Description	Part No.	Quantity
Thrust Bearing	SKF 6310ZNR	1
Guide Bearing	SKF 6310Z	1
Belts		1 set

RECOMMENDD LUBRICANT

Bearing

Cities Service Petroleum Inc.	-	Trojan Grease M-2
Standard Oil of California	-	Chevron Industrial Grease
Gulf Oil Corp	-	Gulf precision grease No. 2
Texas Company	-	Regal Starfak No. 2

TABLE IV-4

PRIMARY CLARIFIERS - COMMON OPERATING PROBLEMS, CAUSES AND REMEDIES

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
1. Floating sludge	A. Sludge decomposing in tank	1. Check for gas bubbles	1) Remove sludge more frequently or at a higher rate
	B. Sludge collector worn or damaged	1. Inspect sludge collector	1) Repair or replace as necessary
	C. Sludge withdrawal line plugged	1. Sludge output in the sludge sump pit	1) Clear line by reversing flow
2. Black and odorous septic wastewater	A. Sludge collector worn or damaged	1. Inspect sludge collector	1) Repair or replace as necessary
	B. Improper sludge removal pumping cycles	1. Sludge density or percent solids	1) Increase frequency and duration of pumping cycles until sludge density or percent solids decreases to desirable value
	C. Inadequate pretreatment of organic industrial wastes	1. Pretreatment practices	1) Pre-aerate waste
	D. Sewage decomposing in collection lines	1. Retention time and velocity in collection lines	1) Chlorinate in collection lines
	E. Recycle of excessively strong digester supernatant	1. Digester supernatant quality and quantity	1) Provide treatment before recycling
	F. Sludge withdrawal line plugges	1. Sludge output in sludge drawoff line	1) Clean sludge line by reversing flow

TABLE IV-4
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
3. Erratic operation of sludge collecting	A. Broken shear pins, damaged collector	1. Shear pins and sludge collector	1) Repair or replace damaged parts
	B. Rags and debris entangled around collector mechanism	1. Sludge collector	1) Remove debris
	C. Excessive sludge accumulation	1. Check sludge blanket level	1) Increase frequency of sludge pumping
4. Scum overflow	A. Frequency of removal inadequate	1. Scum removal rate	1) Remove scum more frequently
	B. Heavy industrial waste contributions	1. Influent waste	1) Limit industrial waste contribution
	C. Improper level of scum troughs	1. Alignment	1) Adjust alignment
5. Broken and frequent shear pin failure	A. Improper shear pin sizing and flight alignment	1. Pin sizing and flight alignment	1) Change shear pin size and realign flights
	B. Ice formation on walls and surfaces	1. Inspect walls and surfaces	1) Remove or break up ice formation
	C. Excessive loading on mechanical sludge scraper	1. Sludge blanket in clarifier	1) Remove sludge more often
6. Sludge hard to remove from hopper	A. Excessive grit, clay and other easily compacted material	1. Operation of grit removal system	1) Improve operation of grit removal unit

TABLE IV-4
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
	B. Low velocity in withdrawal lines	1. Sludge removal velocity	1) Increase sludge velocity in withdrawal lines
	C. Pipe or pump clogged	1. Check sludge flow from withdrawal lines or sludge drawdown in sludge pit	1) Backflush sludge withdrawal line and unclog pump
7. Undesirable low solids content in sludge	A. Hydraulic overload	1. Influent flow rate	1) Provide more even flow distribution in all tanks
	B. Short circuiting of flow through tanks	1. Dye or other flow tracers	1) Refer No. 8 given below
	C. Overpumping of sludge	1. TSS concentration and frequency and duration of sludge pumping	1) Reduce frequency and duration of pumping cycles
8. Short circuiting of flow through tanks	A. Uneven weir settings	1. Weir settings	1) Change weir settings
9. Excessive growth on surfaces and weirs	A. Accumulation of wastewater solids and resultant growth	1. Inspect surfaces and weirs	1) Frequent and thorough cleaning of surfaces
10. Excessive corrosion on unit	A. Septic wastewater	1. Color and odor of wastewater	1) Paint surfaces with corrosion resistant paint

TABLE IV - 5

WASTE SLUDGE PUMPS - COMMON OPERATING PROBLEMS

PROBLEM	PROBABLE CAUSE	NECESSARY CHECK/ REMEDIES
1. Pump will not start	A. Breakers tripped	
	1. Rating of breakers not correct	1. See electrical drawing for correct breaker size and replace if necessary
	2. Switch contact corroded or shorted	2. Clean contacts
	3. Motor shorted or burned out	3. Inspect and replace as necessary
	4. Contact of the control dirty and arcing	4. Clean contacts
	5. Wiring short-circuited	5. Inspect and replace
	6. Shaft binding or sticking by reason of rubbing propeller or clogging of pump	6. Adjust or replace propeller and clean pump
	B. Loose breaker connection	1. Adjust and tighten
	C. Termnal connection loose or broken	1. Tighten or replace
	D. Level control system not functioning properly	1. Inspect and repair
	E. Control setting not set	1. Make adjustments to control setting as necessary
2. No discharge or insufficient discharge	A. Mixture of air in the water	1. Inspect lines for leaks or adjust control settings
	B. Speed of motor too low	1. Inspect and adjust
	C. Defective motor	1. Replace
	D. Impeller clogged	1. Clean propeller

TABLE IV-5
(Continued)

PROBLEM	PROBABLE CAUSE	NECESSARY CHECK/ REMEDIES
	E. Discharge line clogged	1. Clean and flush line
	F. Pump rotating in wrong direction	1. Inspect and change
	G. Air leaks in suction line	1. Inspect and plug leaks
	H. Valves partially or entirely closed	1. Inspect and adjust valves
	I. Valves stuck or clogged	1. Clean and adjust
	J. Incorrect propeller adjustment	1. Inspect and adjust
	K. Impeller damaged	1. Repair or replace
	L. Seals worn or defective	1. Replace
	M. Impeller turning on the shaft because of broken key	1. Replace key
	N. Loss of suction due to leaky suction line or ineffective seal	1. Inspect & plug leaks. Inspect seal & adjust.
3. Excessive Power Consumption	A. Clogged pumps	1. Clean pump
	B. Mechanical defects such as shaft bent or rotating element binding	1. Replace shaft or inspect for rotating elements binding and adjust
	C. Speed too high	1. Check and adjust
4. Vibration or Noise	A. Inlet clogged	1. Check and adjust
	B. Inlet not submerged	1. Adjust control setting

TABLE IV-5
(Continued)

PROBLEM	PROBABLE CAUSE	NECESSARY CHECK/ REMEDIES
	C. Mechanical defects in pump	1. Inspect and repair or replace
	D. Foundation bolts loose	1. Tighten bolts
	E. Misalignment between driver and pump	1. Align properly
	F. Head lower than rating, pumps too much liquid	1. Check the head and throttle the valve on the discharge piping
5. Excessive Seal Housing Leakage	A. Seal failure	1. Replace mechanical Seal
6. Loss of Section during operation	A. Leaky suction line	1. Inspect and correct leaks
	B. Water Seal plugged	1. Inspect and unplug water seal
	C. Suction lift to high	1. Increase the size of suction line
		2. Lower the pump, if possible
		3. Adjust the control to operate the pump at max level in wet well
	D. Casing gasket defective	1. Replace gasket
7. Overheating		
a. Bearing	A. Misalignment between driver and pump	1. Align properly
	B. Excessive or lack of grease	1. Lubricate properly

TABLE IV-5
(Continued)

PROBLEM	PROBABLE CAUSE	NECESSARY CHECK/ REMEDIES
	C. Shaft bent	1. Replace shaft
	D. Rotating element binds	1. Check and correct
b. Seal Housing	A. Filter system clogged	1. Unplug the filter system
8. Priming	A. Insufficient time allowed	1. Allow sufficient time
	B. Air leaks in suction pipe	1. Check and plug leaks
	C. Mechanical Seal not seated properly	1. Place the mechanical seal properly
	D. Suction lift to high	1. Same as GC
	E. Impeller or prime hole plugged	1. Unplug impeller and prime hole
	F. Speed too low	1. Check speed and make necessary correction
	G. Check valve defective	1. Replace check valve

TABLE IV-6

SCUM PUMPS - COMMON OPERATING PROBLEMS

PROBLEM	PROBABLE CAUSE	NECESSARY CHECK/ REMEDIES
1. No Discharge	A. Pump impeller may be air locked.	1. Start and stop pump for several times to purge air.
		2. Run additional water into basin so that pump will be submerged deeper to clear air.
	B. Pump rotation may be wrong.	1. Check for proper rotation.
	C. Clogged vent hole in pump case.	1. Unplug vent hole.
	D. Pump clogged at grinder inlet.	1. Unclog the pump at grinder inlet.
	E. Discharge gate may be closed.	1. Open discharge gate valve.
	F. Discharge head may be too high.	1. Check elevation and pump curve.
	G. Motor rotor may be loose on shaft.	1. Check and correct.
2. Red light comes on at Control Panel	A. Water has passed the lower seal.	1. Remove pump from the wet well for replacement of lower seal.
3. Overload trips at Control Box and alarm buzzer or red light comes on.	A. High water level.	1. Push in on red reset button to reset overload. If overload trips again after short run, pump has some damage and must be removed from basin for

TABLE IV-6
(Continued)

PROBLEM	PROBABLE CAUSE	NECESSARY CHECK/ REMEDIES
	B. Clogged grinder	1. Remove pump and unclog grinder.
	C. Faulty component in control box.	1. Check and correct electrical connection in control box.
4. Yellow run light stays on continusouly.	A. H-O-A switch may be in HAND position.	1. Put H-O-A switch in AUTO position.
	B. Level control switch may have failed.	1. Check level control system and correct it.
	C. Grinder assembly may be partially clogged causing pump to operate at very reduced capacity.	1. Remove pump and check grinder assembly for clogging. Unclog the assembly, if necessary.
	D. Gate or check valve may be clogged.	1. Check the valves and unclog, if necessary.
5. Circuit breaker trips.	A. Check breakers.	1. Reset breaker by pushing down on handle then back to ON position. If breaker trips again in few seconds, it indicates excessive load probably caused by a short in the motor or control box. Check out control circuits and make necessary corrections.
6. Noisy pump.	A. Grinder assembly may be partially clogged.	1. Remove pump and unclog grinder assembly.

TABLE IV-6
(Continued)

PROBLEM	PROBABLE CAUSE	NECESSARY CHECK/ REMEDIES
	B. Grinder impeller may be rubbing on grinder ring due to bent shaft or misalignment.	1. Check and make necessary corrections.
7. Grease and solids have accumulated around pump and will not pump out basin.	A. Lower weight of the level switch may be set too high.	1. Set button of lower weight even with bottom of inlet flange of grinder. 2. Run pump on hand operation for several minutes with small amount of water running into basin to clean out solids.

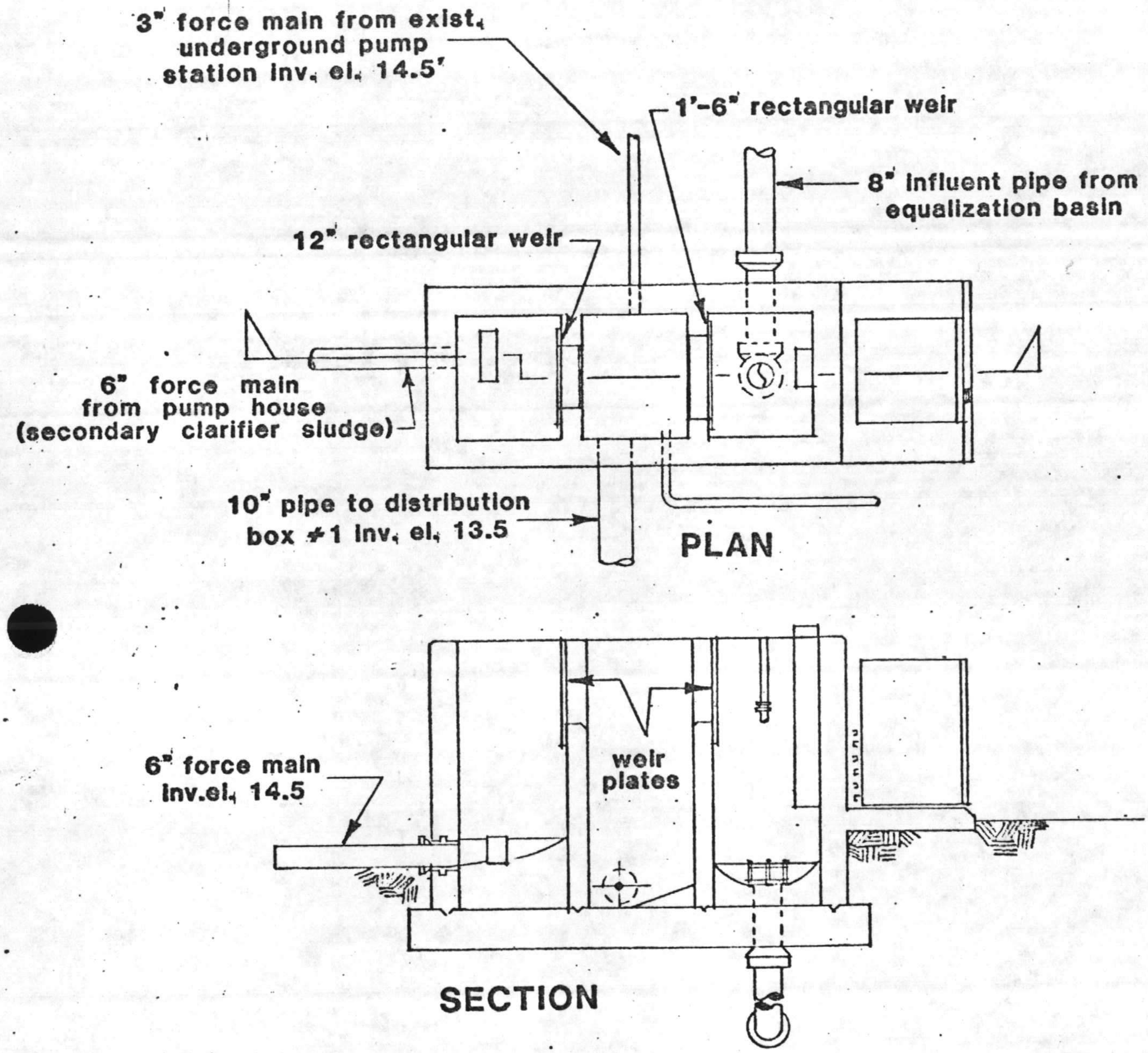
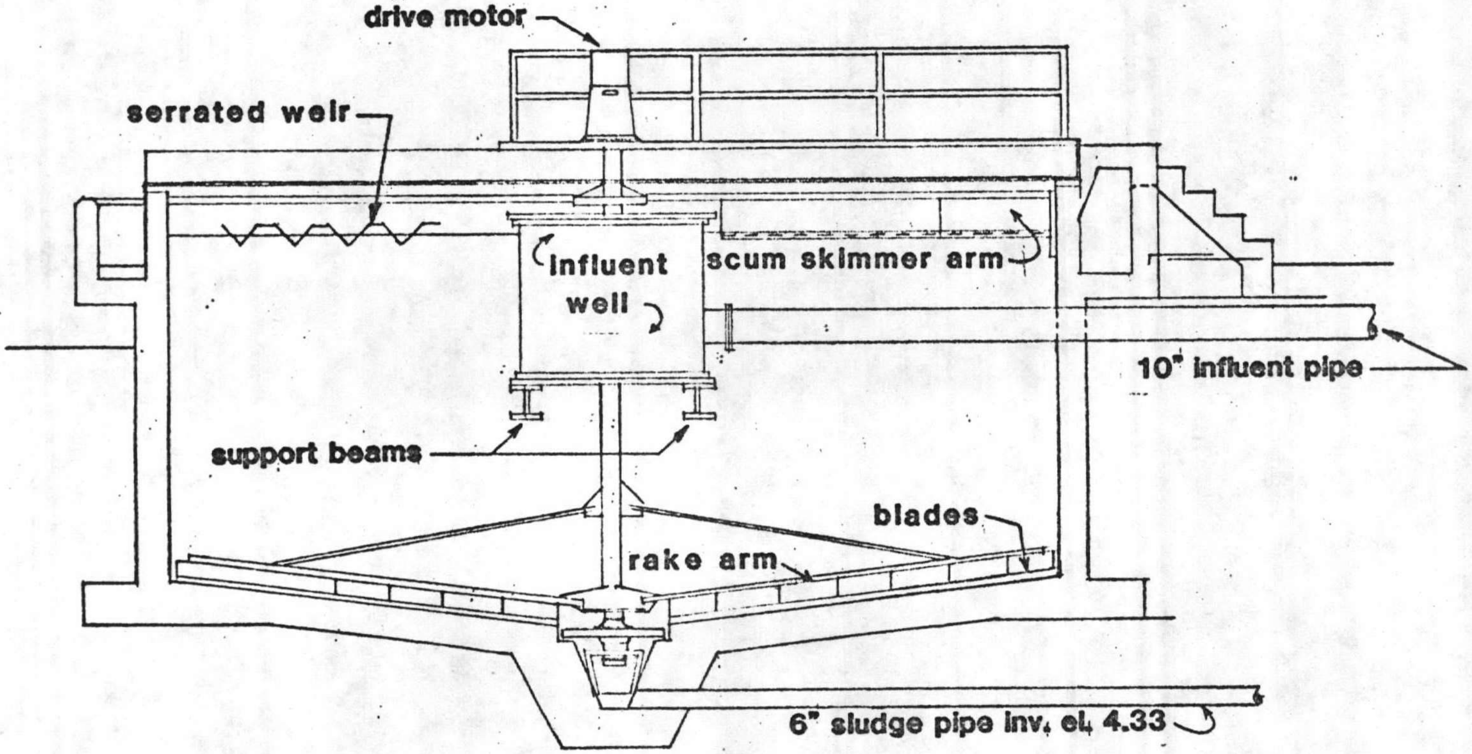


EXHIBIT IV-4

INLET STRUCTURE

(4.1.0.0)



SECTION

EXHIBIT IV-6
PRIMARY CLARIFIERS
(4.3.0.0)

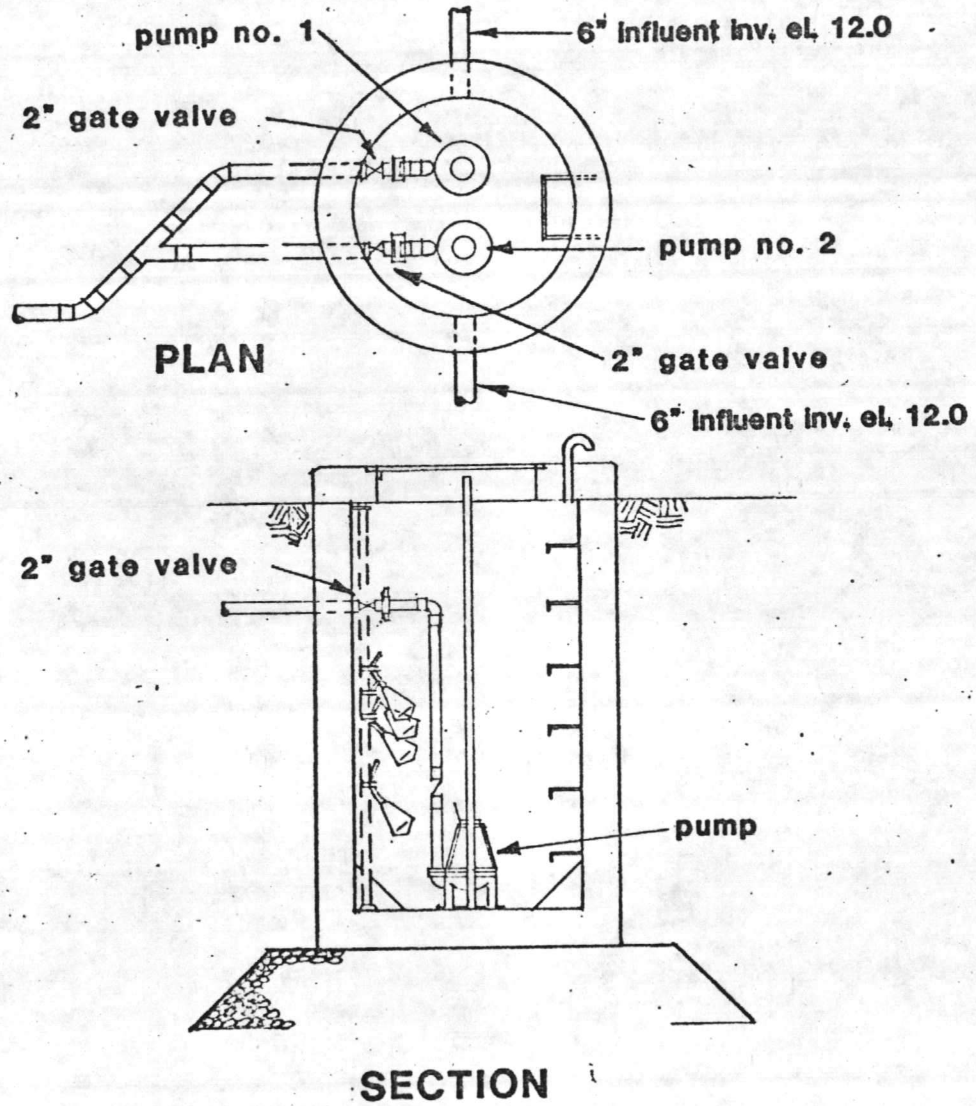


EXHIBIT IV- 7

SCUM PUMP MANHOLE

(4.4.0.0)

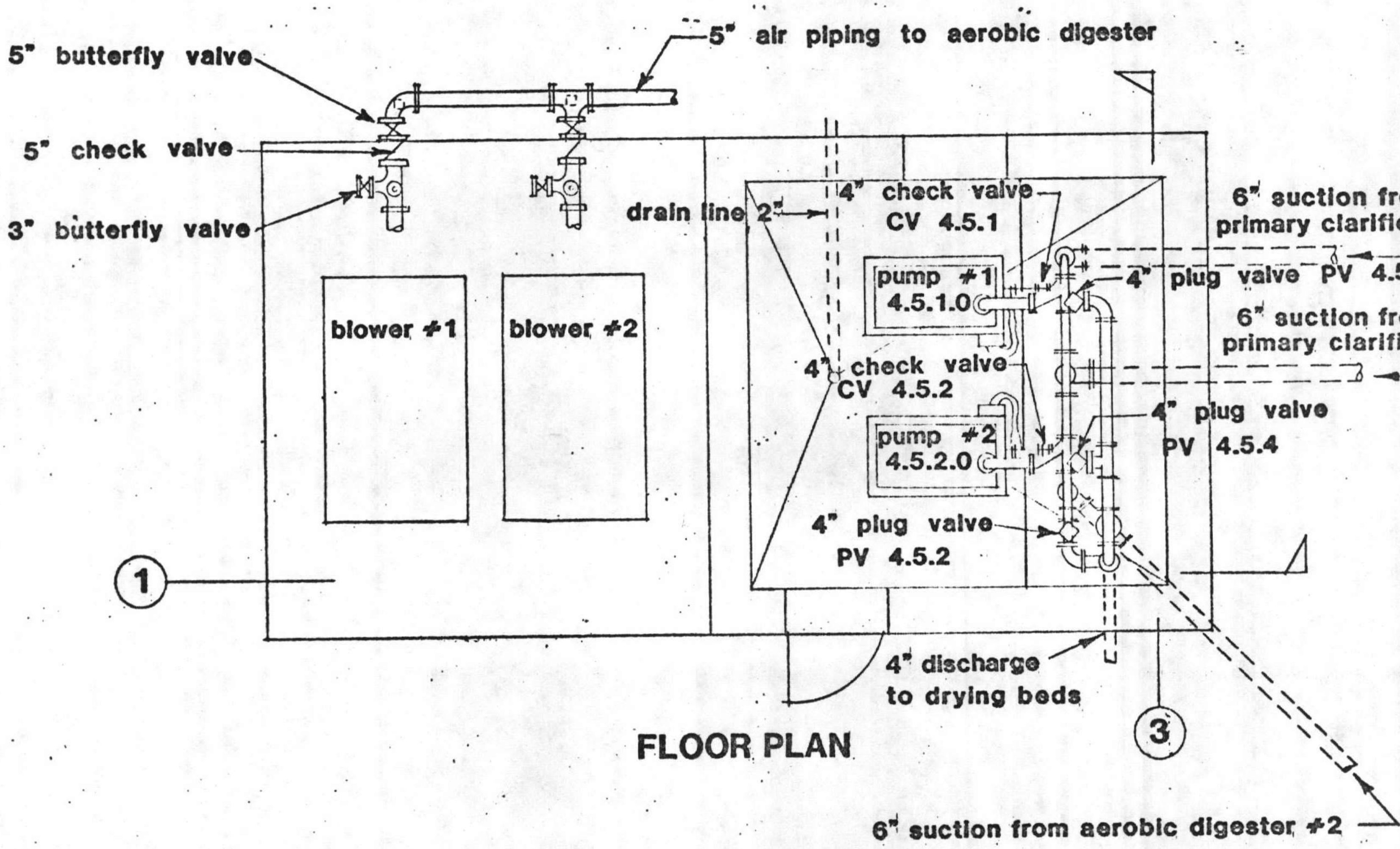
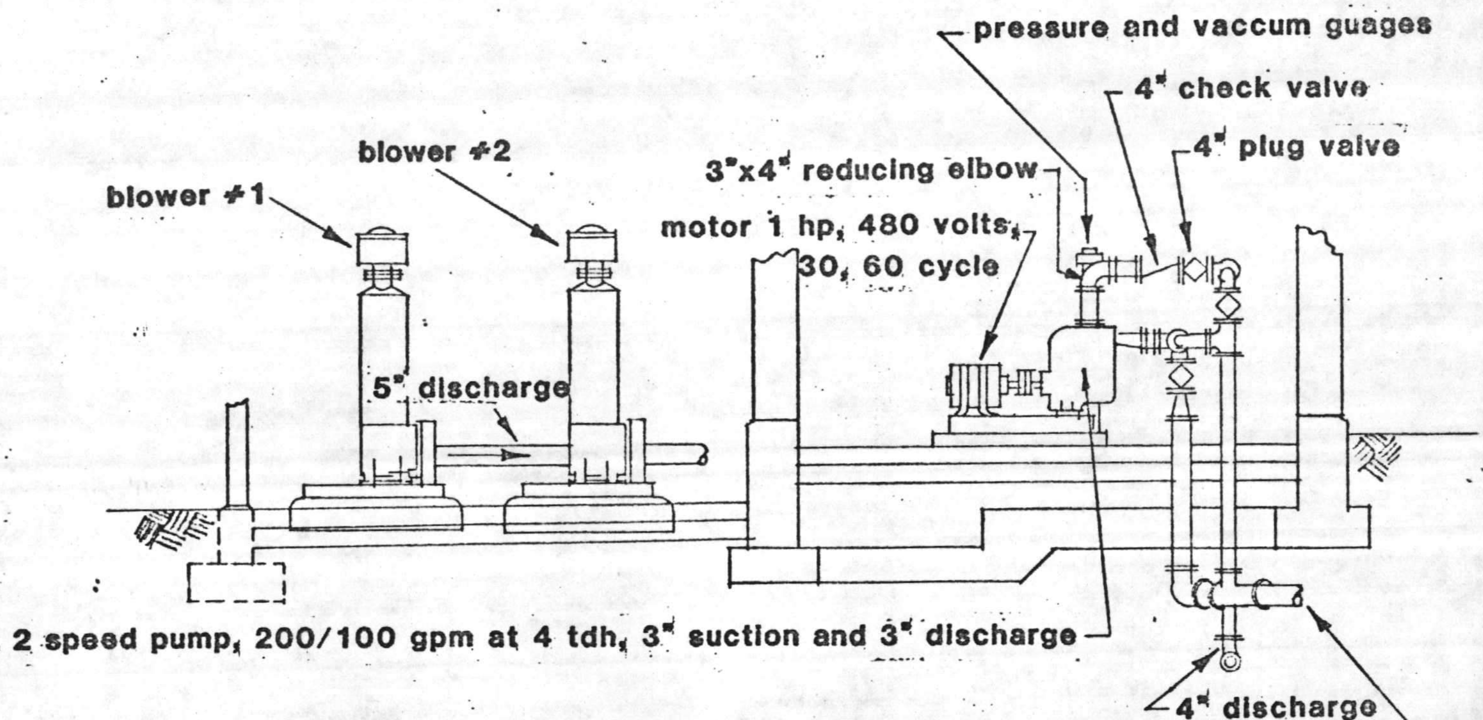


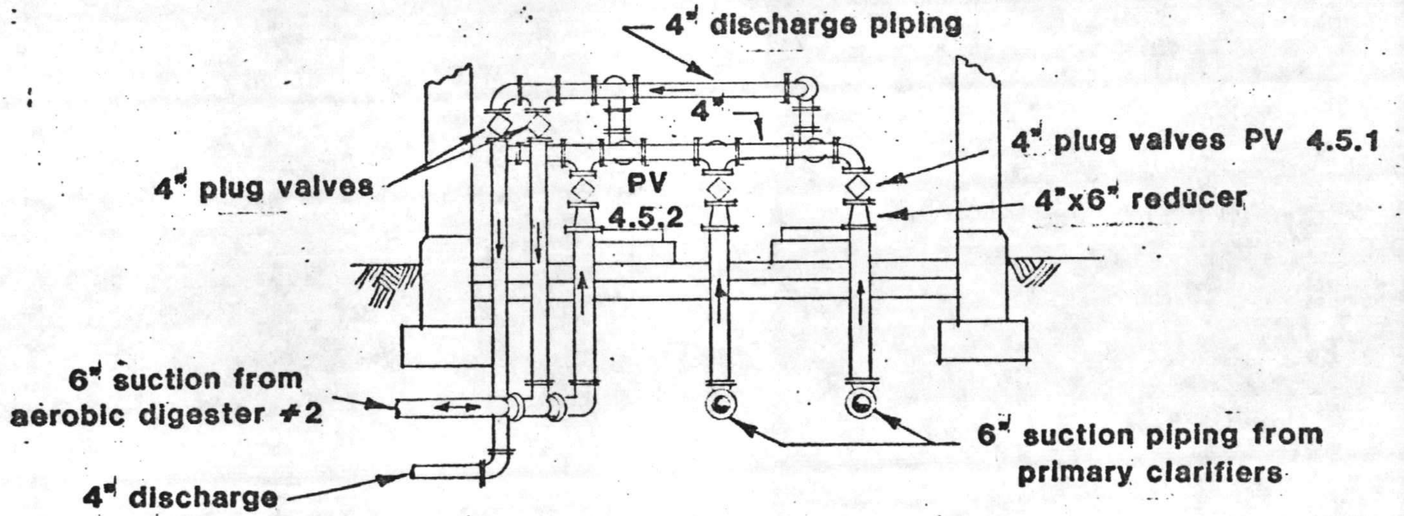
EXHIBIT IV- 8

WASTE SLUDGE PUMP STATION AND BLOWERS

(4.5.0.0)



PARTIAL SECTION #1



PARTIAL SECTION #3

EXHIBIT IV-9

WASTE SLUDGE PUMP STATION AND BLOWERS

(4.5.0.0)

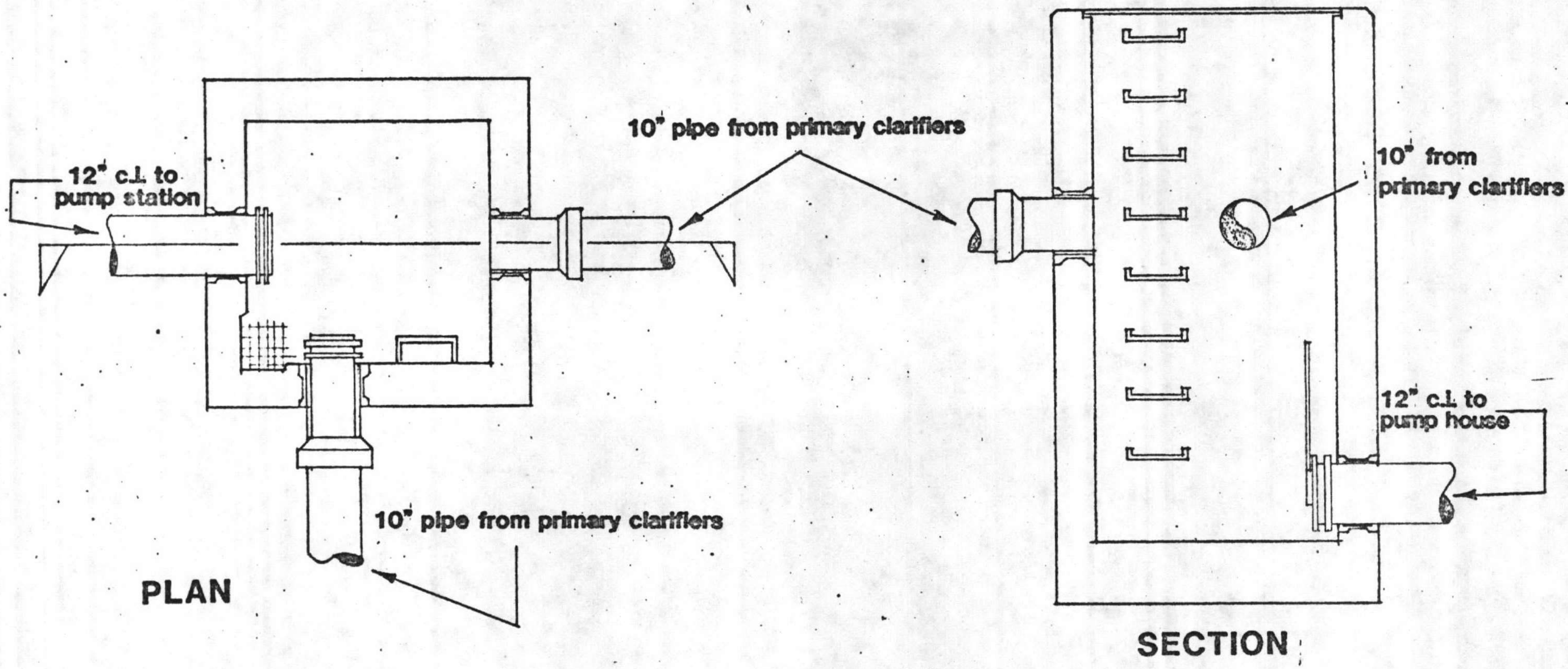


EXHIBIT IV-10

JUNCTION BOX NO. 1

(PRIMARY CLARIFIER EFFLUENT BOX)

(4.6.0.0)

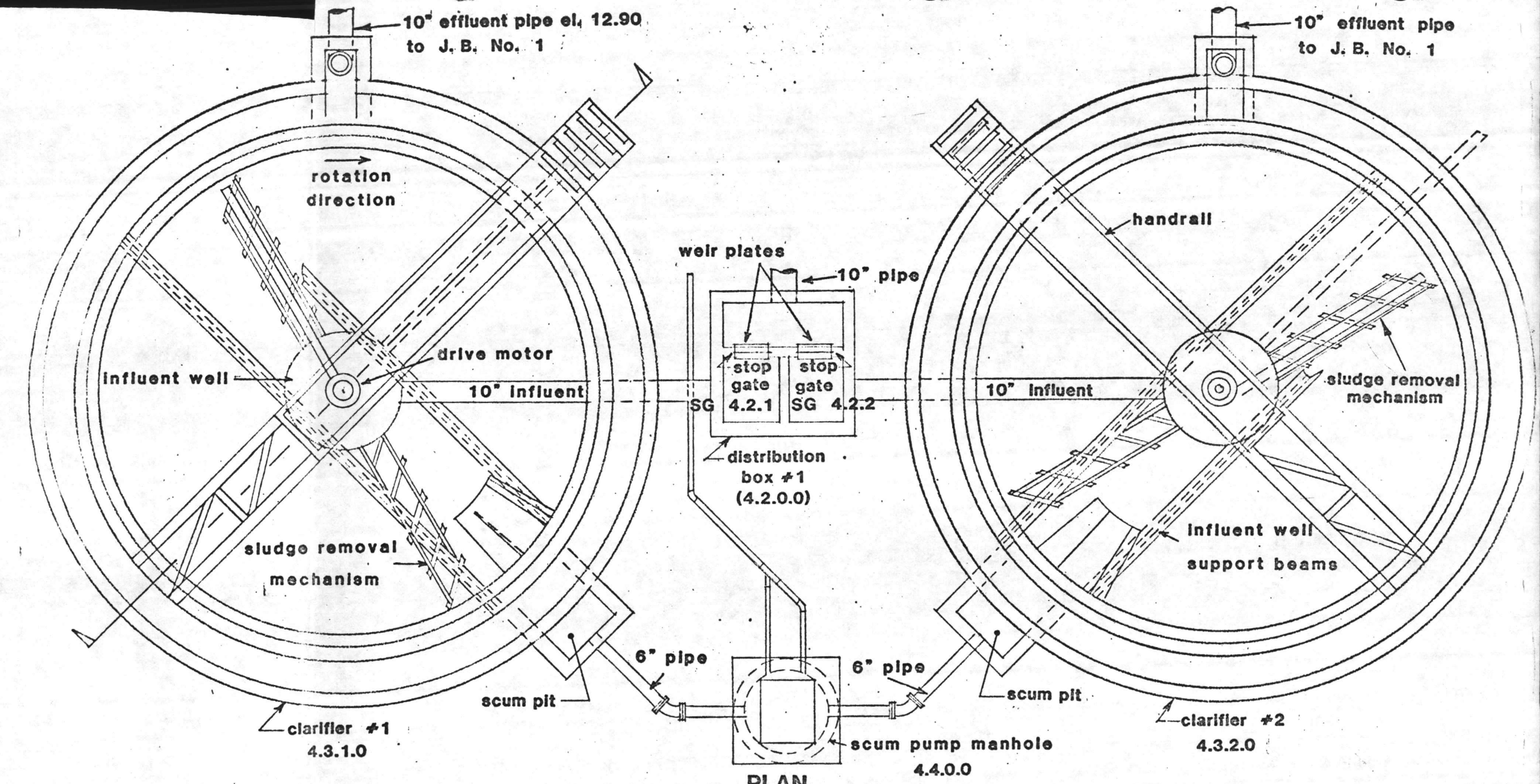


EXHIBIT IV- 5
PRIMARY CLARIFIERS
(4.3.0.0)

4.5 TRICKLING FILTER SYSTEM

4.5.1 Function

To remove soluble and non-settleable oxygen demanding substances (organic matter) from the wastewater.

4.5.2 Description of the Unit Operation/Process

The trickling filter system (Exhibits IV-11 to IV-17) at the plant consists of two trickling filters designed to operate either in parallel or series, trickling filter lift pumps, trickling filter lift and recirculation pumps, clarifiers and secondary sludge wast pumps. The detailed design description of the trickling filter system is summarized below:

Trickling Filters

Number of Units, 62 ft. diameter each	2
Depth of filter media in each unit, ft.	7.5
Unit volume, cu. ft.	22,643
Total volume, cu. ft.	45,286
Unit surface area, acres	0.07
Total surface area, acres	0.14
Recirculation ratio	0.5:1.0
Hydraulic loading, mgad, parallel operation	4.28
series operation - each stage	8.57
Organic loading, lb BOD_5/1000 cu. ft. at 0.0 percent recirculation	
Parallel operation	15.47
Series operation - 1st stage	30.93
2nd stage	7.42
Expected performance, percent BOD removal	
Parallel operation at 0% recirc.	81
50% recirc.	85
Series operation at 0% recirc.	90
50% recirc.	93

Secondary Clarifiers

Number of Units, 26 ft. diameter x 10 ft. SWD	2
Unit volume, gals	39,713
Total volume, gals	79,426
Detention time, hrs, at avg. daily flow	3.177
Unit surface area, sq. ft.	530
Total surface area, sq. ft.	1,060
Surface overflow rate, gpd/sq. ft. at avg. daily flow	566
Unit Weir Length, ft.	81.68
Total Weir Length, ft.	163
Weir Overflow rate, gpd/lf, at avg. daily flow	3,672
at max. daily flow	6,947

Trickling Filter Lift Pumps

Number of pumps		3
Type - Two speed, suction lift, centrifugal		
Capacity, gpm, pump No. 1	@ 12.5 ft. TDH	75
	@ 15 ft. TDH	150
pump No. 2 & 3	@ 13 ft. TDH	200
	@ 17 ft. TDH	400
Drive horsepower, hp, pump No. 1	- 75 gpm	1
	- 150 gpm	2
pump No. 2 & 3	- 200 gpm	3
	- 400 gpm	5
Electrical Service - 480 volt, 3 phase, 60 Hz		

Secondary Clarifier Sludge Recirculation Pumps

Number of pumps		2
Type - Two speed, suction lift, centrifugal		
Capacity, gpm, each pump,	at 10 ft. TDH, 1150 RPM	100
	at 14 ft. TDH, 880 RPM	200
Drive horsepower, hp, each unit	@ 1150 RPM	2
	@ 880 RPM	1
Electrical Service - 480 volt, 3 phase, 60 Hz		

The trickling filter process consists of spraying primary settled wastewater over a bed of crushed rock media to form a biological slime layer. This slime, sometimes called zoogleal film, is composed primarily of bacteria, protozoa and fungi. As the wastewater trickles downward through the media, organic matter and dissolved oxygen are absorbed into the film and at the same time, the metabolic end products carbon dioxide, water, nitrates and sulfates are released. When the slime layer loses its ability to continue clinging to the media, usually due to either the excess thickness of the slime layer resulting from biological growth and/or the scouring effect of the wastewater flow, portions of slime layer slough off into the waste flow. The waste flow containing the metabolic end products and sloughings flows into an underdrain system which supports the media and permits air circulation. The underdrain system has a sloping bottom conveying the waste flow

into the main effluent channel from where it discharges to the wet well of the recirculation pump station. From the wet well, portion of the flow is recycled back to the filter influent head box while the remaining flows to the secondary clarifier. In the secondary clarifiers, the filter sloughings are allowed to settle and later removed by pumping to either primary clarifiers or sludge blending tank. The overflow of effluent from the clarifier flows to the wet well of the intermediate lift pumps.

4.5.3 Relationship to Adjacent Units

The trickling filter system at the plant is located downstream of the primary clarifiers and upstream of the chlorination. Poor operation of the primary clarifiers can cause organic overloading to the trickling filters. Similarly, poor operation of the trickling filter system can cause increased chlorine dose for effluent disinfection. The effluent quality may also be poor and may result in violation of the discharge limitations.

4.5.4 Operation

A. Initial Start-Up

For start-up, the following procedures should be followed:

Trickling Filter Distribution Box

1. Inspect the distribution box for sand, gravel and debris. If such things are found, they should be removed from the box.

2. Check the control stop gates in the distribution box for proper operation.

Trickling Filters

1. Clean all debris from trickling filters and their effluent channels.

2. Check structure of the trickling filters for cracks and other indications of structural failure.

3. Check rotary distributors for proper lubrication.

4. Check the arms of the distributor for even adjustment and level. Rotate the unit by hand and observe for smooth turning. Any vibration or roughness should be corrected before putting the unit in service.

5. Adjust the orifices for maximum spread in accordance with the manufacturer's recommendations.

6. Check painted surfaces of the distributors. Touch up as necessary.

Filter Lift and Secondary Sludge Pumps

1. Clean all debris from wet wells, pump stations and from the vicinity of the pumping equipment.

2. Check all protection coating on pumping equipment and piping for damage and repair as necessary.

3. Provide initial lubrication for all pumping equipment as per the instruction of manufacturer. Refer to the manufacturer's instruction manuals given in Appendix IX.

4. Check electrical components for operational status. Check out control circuits possibly on "dry-run" basis prior to operation.

5. Check motors for correct voltage connections at terminal box.

6. Check motors for proper direction of rotation.

7. Pressurize piping with water and check for leaks, where possible.

8. Check valves for freedom of movement and proper operation.

9. Check out and calibrate instrumentation, controls and safety devices.

Secondary Clarifiers

1. Follow the similar procedures as outlined for the primary clarifiers.

After checking all equipment of the trickling filter system mechanically, start the wastewater flow to the filters by opening control stop gates in the filter distribution box and starting the filter lift pumps. Observe the rotating arm carefully for proper operation, speed of rotation and even distribution of the waste over the media. Time the speed of rotation,

record the flow rate and log them for future reference. Start the pumping equipment only after making sure that adequate wastewater is present in wet wells.

To shutdown a trickling filter, the following procedure should be followed:

1. Open the end gates on the distributor arms of the filter to be shutdown in order to flush the arms for a few minutes. Be very careful when opening the end gates because the distributor arms are moving. Do not flip the lever too far or the lever can hit the media, be damaged, and stop the rotation.

2. Stop the influent flow to the filter to be shutdown by closing appropriate gate and/or valves on the influent line of the filter. The filter distributor will stop rotating because no water is flowing out the outlet orifices.

3. Check the remaining units of the trickling filter system for proper operation, particularly wet wells and distribution structures between the filters and clarifiers for normal water levels and position of flow control valves.

4. Once the distributor arm has stopped rotating, remove debris and rags from the distributor arm orifice plates. Also remove from the top of media any debris and rags which could have been dumped during flushing of the distributor arms.

If a filter is to be taken out of service for several days or longer period, the following procedures should be followed:

1. Close the underdrain outlet gates to prevent flow from other units entering the underdrain channel.

2. Drain the underdrain channel to prevent odors and insects from developing in the stagnant wastewater.

3. Hose down the distributor arms, side wall, vent ducts, and underdrain channels.

4. Remove any grit or debris from the main underdrain collection channel. Inspect the underdrains and remove any debris in order to prevent stoppages.

5. Check the oil level in the distributor turntable for proper level and for the possible presence of water.

6. Inspect the turntable seal.

Shutdown of filter lift and recirculation pumps and secondary waste sludge pumps should only be done when there is an equipment failure or maintenance requirement. The pumps can be shutdown by pressing the respective STOP button switch. If a pump has to be shutdown for an extended period of time, make sure the pump and its connection piping are drained completely to prevent damage from freezing weather. Also, it is recommended to flush and oil mechanical seal and to flush and regrease the pump and motor bearings.

To shutdown a secondary clarifier, follow the procedures similar to those described for the primary clarifiers.

B. Normal Operation

The filters should be operated in series and the following items should be scheduled daily as a part of the normal operation:

1. Inspect for any indication of ponding on filters.
2. Check for filter flies and indication of odor problems.
3. Inspect for plugged orifices.
4. Observe for roughness or vibration of the distributor arms and leakage past the seal.
5. Observe for proper operation of the pumping equipment.
6. Inspect to see that the flow is evenly distributed between the available filters and clarifiers.
7. Check for proper operation of the sludge collecting mechanism.
8. Check conditions on the water surface in clarifiers. Floating sludge or an abundance of gas bubbles on the surface are evidence of equipment or process failure.
9. Check clarifiers effluent weirs for solids accumulation. Clean, if necessary, by hosing with water under pressure.
10. Measure sludge blanket levels in clarifiers and remove sludge as necessary.

C. Alternate Operating Modes

The filters are designed to operate either in parallel or series. Due to the two types of recirculation (one recirculation of the filter effluent to the trickling filters and another recirculation of underflow from the secondary clarifiers to primary clarifiers), it is possible to alter the flow regime for optimizing trickling filter performance.

D. Emergency Operation and Failsafe Features

The trickling filter equipment (distributor) has no failsafe features. Operational problems which may arise are usually connected with insufficient flow through the system which causes the distributor arm to stop. This condition can be attributed to the following problems:

1. Failure of Filter Lift Pumps: If one pump fails, switch to second pump while repairing the failed pump. If both pumps fail, trickling filter operation will cease until the pumps are repaired.

2. Clogging of Distributor Orifices: This is due to solids overflowing from the primary clarifiers. Cleaning the orifices by flushing with water or by using a hand rod will allow normal flow distribution.

3. Clogging of Vent Pipes: Air pockets will be formed if vent pipes are clogged, causing restricted flow. Flush the vent pipes with water.

Should the trickling filter recirculation pumps fail to operate, flow will continue to final clarifiers. Recirculation pumps failure may affect the overall trickling filter efficiency in terms of BOD removal and, accordingly, efforts should be made to put the recirculation pumps back to normal operation.

Sludge collection mechanisms in the secondary clarifiers are provided with overload protection device to stop the drive motor and sound an alarm in the event that the design drive motor input power is exceeded.

Normally, alarm or stoppage will occur when rocks, tools, etc., are being dropped into the clarifiers. To remove obstruction, divert the flow to the other clarifiers by closing the influent stop gate of the clarifier from which the obstruction needs to be removed. Dewater the clarifier by pumping the clarifier content to the primary clarifiers. After dewatering, check the clarifier floor and sludge sump areas for debris and remove them from the clarifier. Check for proper operation of the sludge collecting mechanisms before placing tank into service.

4.5.5 Controls

A. Flow Control

Flow to the filters can be controlled by operation of the filter lift pumps and valves provided in the piping system.

B. Process Control

The process controls, normally used in the operation of the trickling filter system, are listed and discussed as follows:

1. Recirculation Rates
2. Sludge Removal Rates
3. Hydraulic Loadings
4. Organic Loading
5. Laboratory Control Tests

1. Recirculation Rates

The recirculation scheme employed at the plant includes: (1) proportional recirculation of filtered effluent to the filter influent to ensure desired hydraulic load on filters, and (2) return of secondary clarifier underflow to the primary clarifiers to prevent septic conditions during periods of low influent wastewater flow. The primary objective of

providing recirculation is to improve filter performance and to minimize operational problems. Some of the advantages of recirculation are listed below:

a. Maintain biological growth throughout synthetic media depth.

b. May improve operation of primary and secondary clarifiers during low flow periods by reducing septicity.

c. Dilute high strength of toxic wastes to make them treatable.

d. Minimizes hydraulic and organic loading variations.

e. Improve distribution of the wastewater over the filter surface.

f. Minimizes odors, ponding, and filter fly breeding by increasing hydraulic loading to encourage continuous sloughing and reduce slime thickness.

g. Prevent biological growth from drying out during low flows.

In order to properly select the recirculation mode and rates, it is important that the operator be aware of the following adverse effects of the recirculation:

a. Recirculation reduces the wastewater temperature and therefore lowers the rate of biological activity. In extremely cold weather conditions, recirculation may increase the potential for ice formation.

b. Recirculation through a clarifier unit at rates exceeding hydraulic design limits may reduce efficiency.

c. Recirculation increases operational costs due to higher pumping rates.

d. If recirculation is excessive, it may decrease the organic removal efficiency of the process.

2. Sludge Removal Rates

The filter system at the plant is designed to return underflow (sludge) from the secondary clarifier to the primary clarifiers for resettling with primary sludge. Return of secondary sludge to the primary clarifier is a

method commonly practiced to thicken the secondary sludge and reduce the volume of water pumped to the sludge handling facilities. The sludge removal from the secondary clarifier may be intermittent or continuous. Consideration to remove the sludge before it becomes septic in the clarifier should be made. Usually, visual inspection of the sludge characteristics is sufficient to determine if the withdrawal rate should be increased or decreased. Trickling filter sludge is usually a dark brown, humus material with little or no odor when aerobic.

3. <u>Hydraulic Loading</u>

The trickling filter system is designed with hydraulic loading parameter as one of the criteria for process control and operation. Hydraulic loading on a trickling filter is the amount of wastewater applied, including recirculation, per day over the surface area of the media. Hydraulic loading is expressed as gallons per day per square foot of surface area (gpd/sq.ft.) or million gallons per day per acre of surface area (mgad). The filters at the plant are designed for the following hydraulic loadings:

Hydraulic Loading, mgad,	parallel operation	4.28
	series operation, each stage	8.57

In the design and operation of a trickling filter system, the filters and the following clarifiers are considered as one unit. The process control parameter for clarifiers is generally based on the surface overflow rate. The design surface overflow rate for the clarifiers is 566 gpd/sq.ft. Operation of the trickling filter system within the above parameter is essential if design performance is to be achieved and discharge requirements met on a consistent basis.

4. Organic Loading

The trickling filter system is also designed with organic loading parameter as criteria for process control and operation. Organic loading to a trickling filter is the amount of BOD applied per unit volume of filter media per day. The organic loading is commonly expressed as pounds of BOD applied per day per 1000 cu.ft. of filter media (lb. BOD/day/1000 cu.ft.). The filters at the plant are designed for the following organic loadings:

Organic loadings, lb. BOD/1000 cu.ft./day at zero percent recirculation

Parallel Operation		15.47
Series Operation -	1st stage	30.93
	2nd stage	7.42

Operation of the filters within the above parameter is essential to achieve the design performance.

5. Laboratory Control Tests

Laboratory tests that provide information of value in evaluating the performance of a trickling filter are pH, Temperature, Dissolved Oxygen, BOD, TSS and microscopic examination of filter humus.

pH: The pH measurements are valuable in process control because pH is one of the environmental factors that affect the activity and health of microorganisms. Sudden changes or abnormal pH values may be indicative of adverse industrial discharge of a strongly acid or alkaline waste. Such discharges will cause excessive sloughing of filter growth and may result in increase in clarifier effluent suspended solids and overall poor performance of the trickling filter system. Typical pH values expected at the trickling filter plant are summarized below:

Location	pH
Primary Clarifier Effluent	6.8 - 8.0
Secondary Clarifier Effluent	7.0 - 8.5

Temperature: In process control, accurate temperature measurements are helpful in evaluating process performance because temperature is one of the most important factors affecting microbial growth and subsequent performance of the trickling filter system. Generally, the rate of microbial growth doubles for every 10°C increase in temperature within the specific temperature range of microorganisms.

Dissolved Oxygen: The significance of the DO test in process control is in its measurement of the DO available for and essential to aerobic decomposition of the organic matter. DO tests should be made periodically on samples taken from trickling filter prior to settling. A zero or near zero DO would indicate improper ventilation and anaerobic condition within the filter.

BOD: BOD analysis should be run on composite samples of raw influent, primary clarifier effluent and final settling tank effluent. The BOD reduction between the raw influent and final settling tank effluent indicates how the plant is operating as a total trickling filter system in terms of percent BOD removal. BOD values of primary effluent should be used to determine organic loading to filters.

TSS: TSS analysis should be performed on the same samples taken for BOD. An increase in filter effluent solids not accomplished by an increase in primary effluent solids might be an indication of filter sloughing.

4.5.6 Common Operating Problems

The operating problems commonly experienced in the trickling filter system, their probable causes and corrective measures are summarized in Table IV-7 through IV-10.

4.5.7 Maintenance

Routine preventive maintenance requirements for the trickling filter system are summarized in the Preventive Maintenance Schedule Sheets. In order to carry out the maintenance program effectively, the basic information on equipment data, including spare parts and recommended lubricant, should be readily available at the plant. For ease of reference, this information is given on the Equipment Data Sheets.

4.5.8 REFERENCES

1. Environmental Protection Agency, Consideration For Preparation of Operation and Maintenance Manual, EPA 430/9-74-001, 1974.
2. EPA, Maintenance Management Systems For Municipal Wastewater Facilities, EPA 430/9-74-004, 1974.
3. EPA, A Planned Maintenance Management Systems For Municipal Wastewater Treatment Plants, EPA 600/2-73-004, 1973.
4. The Texas Water Utilities Association, Manual of Wastewater Operations, 1971.
5. California State University, Sacramento, Operation of Wastewater Treatment Plants, Volumes I, II & III, A Field Study Training Program, 1980.
6. Water Pollution Control Federation, Operation and Wastewater Treatment Plants - MOP No. 11, 1976.
7. New York State Department of Environmental Conservation, Manual of Instruction For Wastewater Treatment Plant Operators, Vols. 1 and 2, 1978.
8. Department of the Navy, Bureau of Yards and Docks, Training Course in Water and Sewage Plant Operations, June 1965.
9. U.S. EPA, Maintenance Management in Wastewater Facilities - Instructor Training Course, September 1982.
10. Envirex, Inc., Service Manual - Trickling Filter and Secondary Clarifiers.
11. Fairbanks Morse, Installation, Operation and Maintenance - Sludge Recirculation Pumps.
12. Fairbanks Morse, Installation, Operation and Maintenance - Trickling Filter Lift Pumps.

PREVENTIVE MAINTENANCE SCHEDULE

CIRCULAR SLUDGE COLLECTOR

EQUIPMENT ITEM: Final (Circular) Worm Gear Drive, Direct Driven

MANUFACTURER: Envirex, Inc.

SUPPLIER: Envirex, Inc.

MANUAL NO. OR IDENTIFICATION: Refer to Drive Assembly Drawings and Data Sheet 330-2.074.4.2, Pg. 12

*Lubricants: Capacity - 2 quarts

Summer — For temperatures 40°F or higher: Mobilube HD80-90 MIL-L-2105C

Winter — For temperatures under 40°F: Mobil Delvac Special 10W30 MIL-L-46152 Multi Purpose Gear Oil.

Flushing Oils — If condensation is a problem between seasonal oil changes, flush with warm Mobilube 10W30 Motor Oil and drain completely before refilling with proper seasonal lubricant. Schedule additional oil changes at mid-season intervals.

If contaminants, lack of routine maintenance and/or scheduled oil changes result in sludge formation, flush first with kerosene, flush again with warm Mobilube 10W30 Motor Oil, drain completely and then refill with proper seasonal lubricant.

Oil Drain Plug:
Located on outside of worm housing.

Oil Fill Plug:
Located on Top Cover (Vent Plug).

Oil Sight Gauge:
Located on Outside of Worm Gear Housing.

Grease Fittings - 3: (1 on top of worm housing, one on pipe line to steady bearing, one on shear pin coupling hub)

Monthly:

1. Check oil level - sight gauge on side of worm gear housing. Add oil by removing vent plug in top cover. Clean out air vent. Wipe up all spills.

2. Remove plug in bottom of Torque Overload Micro Switch housing and drain off any condensation or oil seepage.

3. Grease worm bearings, steady bearing and shear pin coupling hub. Use low pressure high volume gun. Two pumps for worm bearing and coupling hub bore. Three pumps for steady bearing. Use a major brand Lithium Base #2 grease. Wipe off any grease that passes worm shaft seal adjacent to coupling hub. Wipe off excess grease at coupling.

4. Check all set screws in shear pin coupling and flexible coupling. Check screws in coupling cover.

Quarterly:

1. Check sample of oil for condensation, metal particles and/or sludge. Drain, flush, drain and refill per preceding instructions.

2. Check air gap of torque overload micro switches. See Data Sheet 330-100 for test procedure.

*If temperature variations are not extreme and condensation is not a problem at your location, consider the use of a year round synthetic oil such as one of the Mobil SHC 600 series oils after consulting with the lubricant manufacturer's representative for an oil equivalent to the winter multi-purpose gear lubricant.

Semi-Annually:

1. When tank is drained for semi-annual inspection of rotating machinery, use this down time to replace or retension the drive chain.

2. Retighten any loose bolts.

3. Change oil to proper seasonal viscosity. (See page 3.)

4. Remove shear pin and bump drive to expose shear faces of coupling hub. Clean off all old grease and any corrosion. Wipe with same grease as used elsewhere. Line up coupling hubs and replace shear pin.

5. Remove flexible coupling cover and regrease per Data Sheet 330-23.

NOTE: If a torque overload shut-down occurs, examine "spring plate" for permanent deformation. See manual Data Sheets 300-100 for procedure.

PREVENTIVE MAINTENANCE SCHEDULE

CIRCULAR SLUDGE COLLECTOR

EQUIPMENT ITEM: Bridge

MANUFACTURER: Envirex, Inc.

SUPPLIER: Envirex, Inc.

MANUAL NO. OR IDENTIFICATION: Refer to Assembly Drawing

Semi-Annually:

1. Check all fastenings. Retorque to Table Valves. See Torque Table data sheet 330-12.

2. Examine fastenings at expansion joint at tank wall. Retorque if loose.

PREVENTIVE MAINTENANCE SCHEDULE

CIRCULAR SLUDGE COLLECTOR

EQUIPMENT ITEM: Bottom Scraper Arm

MANUFACTURER: Envirex, Inc.

SUPPLIER: Envirex, Inc.

MANUAL NO. OR IDENTIFICATION: See Service Manual Data Sheets 330-2.074.2.1 and 330-2.074.2.7

Semi-Annually:

1. When tank is drained for semi-annual inspection, hose off with pressure hose to remove all sludge and lime deposits.

2. Examine all joints for loose or missing bolts (and shims).

3. Rotate machinery and test for true plant rotation. Adjust per service manual data sheets 330-2.074.2.7.

4. Examine scraper blades. Replace those badly bent or missing.

5. If a surface skimmer is part of the equipment, check all fastenings. Check bolts securing counterweights.

PREVENTIVE MAINTENANCE SCHEDULE

CIRCULAR SLUDGE COLLECTOR

EQUIPMENT ITEM: Scum baffle, Weirs, and Scum beach

MANUFACTURER: Envirex, Inc.

SUPPLIER: Envirex, Inc.

MANUAL NO. OR IDENTIFICATION: See Data Sheet 330-2.074.2.1

NOTE: The above components, if furnished by others, must be installed concentric with center pier. Elevations of baffles, and/or weirs are to be held per dimensions on General Arrangement drawing.

Semi-Annually:

1. When tank is drained during semi-annual inspection, hose off all non-rotating tank components. Reestablish elevations and replace any missing bolts. Check all grouting and waterproof mastic sealing.

2. Recheck concentricity by watching edge wiper on skimmer blade. If it is not touching baffle in some areas, relocate baffle.

PREVENTIVE MAINTENANCE SCHEDULE

CIRCULAR SLUDGE COLLECTOR

EQUIPMENT ITEM: Scum Trough Skimmer Assembly

MANUFACTURER: Envirex, Inc.

SUPPLIER: Envirex, Inc.

MANUAL NO. OR IDENTIFICATION: Refer to Assembly Drawing and Data Sheets 330-2.074.2.1C through .2.1F

Daily:

1. Check in passing for proper action on scum beach and reentry into tank.

Monthly:

1. If skimmer is optional "pivoted" type, grease all fittings, 2 or 3 pumps with same grease and gun used elsewhere.

2. If chain hung skimmer is used, no lubrication required.

Semi-Annually

1. Hose off with pressure hose and examine all bolted connections. Adjust for submergence. Replace flexible blade if worn or torn. Replace baffle scraper if no longer touching baffles.

PREVENTIVE MAINTENANCE SCHEDULE

CIRCULAR SLUDGE COLLECTOR

EQUIPMENT ITEM: Gear Reducer Etc. Motor

MANUFACTURER: Euro Drive, Inc.

SUPPLIER: Envirex, Inc.

MANUAL NO. OR IDENTIFICATION: Service Manual

Daily:

1. Observe for looseness on reducer.

Annually:

1. If equipment is in constant use, bearings can be regreased (SPARINGLY). Remove grease relief plug if furnished. Use low pressure, high volume type gun. 1/4 ounce of grease - 2 pumps - is maximum quantity.

TABLE IV-7

TRICKLING FILTER SYSTEM - COMMON OPERATING PROBLEMS, CAUSES AND REMEDIES

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
1. Filter ponding	A. Media too small or not uniform in size	1. Check size of the media for uniformity	1) Replace media
	B. Rock media broken due to temperature extremes	1. Fines clogging filter voids	1) Replace media
	C. Improper operation of primary clarifiers	1. Excessive suspended solids in filter influent	1) Improve operation of primary clarifiers
	D. Excessive biological growth	1. Slime growth clogging filter voids	1) Flush media with high pressure steam of water and/or dose with chlorine to control slime growth
	E. Excessive organic loading	1. Check loading rates	1) Increase recirculation or flood the filter to loosen and remove surface accumulation
	F. Accumulation of leaves, debris, etc.	1. Inspect filter	1) Remove debris from filter media
2. Filter flies	A. Excessive biological growth on filters	1. Visual inspection	1) Remove excessive growth by flushing the media with high pressure steam and/or dosing with chlorine to control slime growth

TABLE IV-7

TRICKLING FILTER SYSTEM - COMMON OPERATING PROBLEMS, CAUSES AND REMEDIES
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
	B. Plant grounds provide breeding place for flies	1. Inspect grounds	1) Maintain grounds so as not to provide a sanctuary for flies
	C. Hydraulic loading too low to wash filter or fly larves	1. Hydraulic loading should be greater than 200 gpd/sq.ft.	1) Prevent completion of fly life cycle by following remedies: a. Increase recirculation b. Flood filter for several hours at regular intervals c. Chlorinate to produce a residual chlorine of 0.5 to 1.0 mg/l d. Apply an insecticide to filter walls and areas breading flies
	D. Poor distribution of wastewater especially along filter walls	1. Visual inspection	1) Unclog spray orifices

TABLE IV-7

TRICKLING FILTER SYSTEM - COMMON OPERATING PROBLEMS, CAUSES AND REMEDIES
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
3. Odors	A. Excessive organic loading	1. Check organic loading	1) Maintain aerobic condition in all treatment units by adding forced air ventilation equipment
			2) Chlorinate filter influent when plant flow is low
			3) Increase recirculation rate to dilute organic strength and improve oxygen transfer
	B. Poor ventilation due to clogged vent pipes or filter drain	1. Check vent pipe and filter drain	1) Clear vents and drain system of obstruction
			2) If underdrain system is flowing more than half full, reduce hydraulic loading
	C. Poor ventilation due to excessive biological growth filling media pores	1. Inspect media voids	1) Increase recirculation rates to filter

TABLE IV- 7

TRICKLING FILTER SYSTEM - COMMON OPERATING PROBLEMS, CAUSES AND REMEDIES
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
	D. Poor housekeeping	1. Visual inspection	1) Remove debris from filter media and wash down distributor splash plates and walls above media
	E. Septic filter influent	1. Check influent for H_2S	1) Correct upstream system by aeration or controlled pre-chlorination
4. Ice build-up on filter media	A. Climate	1. Air and wastewater temperature	1) Decrease recirculation
			2) Adjust orifices and splash plates for coarse spray
			3) Partially open dump gates at outer end of distributor arms to provide a stream rather than a spray
	B. Uneven distribution during freezing weather	1. Visual inspection	1) Adjust distributors for more even flow. Remove debris if it has clogged orifices.

TABLE IV-7

TRICKLING FILTER SYSTEM - COMMON OPERATING PROBLEMS, CAUSES AND REMEDIES
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
5. Uneven distribution of flow to filter surface	A. Clogging of distributor orifices	1. Ponding in some areas with concurrent drying in other areas	1) Remove and clean distributor nozzles and flush distributor piping
	B. Inadequate hydraulic load to filter	1. Hydraulic loading rate	1) Maintain adequate hydraulic load
	C. Seal leak	1. Seal	1) Replace seal
6. Snails, moss and roaches	A. Climatic condition	1. Visual inspection	1) Chlorinate to produce residual of 0.5 to 1.0 mg/l
			2) Flush filter with maximum recirculation rate
7. Increase in clarifier effluent suspended solids	A. Excessive sloughing from filter due to seasonal change	1. Seasonal changes affecting micro-organisms	1) Polymer addition to clarifier influent
	B. Excessive sloughing due to organic loading	1. Organic loading	1) Increase clarifier underflow rate
	C. Excessive sloughing due to pH or toxic conditions	1. pH, toxic substances	1) Maintain pH between 6.5 and 8.5
	D. Denitrification in clarifier	1. Check effluent for nitrification and see if sludge floats in clump	1) Increase clarifier underflow rate

TABLE IV-7

TRICKLING FILTER SYSTEM - COMMON OPERATING PROBLEMS, CAUSES AND REMEDIES
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
	E. Clarifier hydraulically overloaded	1. Clarifier overflow rate (should not exceed 1200 gpd/sq.ft.)	1) If due to recirculation, reduce recirculation rate during peak flow periods
	F. Clarifier equipment malfunction	1. Check for broken sludge collection equipment	1) Repair or replace broken equipment
		2. Uneven flows over effluent weirs	1) Adjust weirs to an equal elevation
	G. Temperature currents in clarifier	1. Temperature profile of clarifier	1) Install baffles to stop short circuiting

TABLE IV - 8

TRICKLING FILTER LIFT PUMPS - COMMON OPERATING PROBLEMS

PROBLEM	PROBABLE CAUSE	NECESSARY CHECK/ REMEDIES
1. Pump will not start	A. Breakers tripped	
	1. Rating of breakers not correct	1. See electrical drawing for correct breaker size and replace if necessary
	2. Switch contact corroded or shorted	2. Clean contacts
	3. Motor shorted or burned out	3. Inspect and replace as necessary
	4. Contact of the control dirty and arcing	4. Clean contacts
	5. Wiring short-circuited	5. Inspect and replace
	6. Shaft binding or sticking by reason of rubbing propeller or clogging of pump	6. Adjust or replace propeller and clean pump
	B. Loose breaker connection	1. Adjust and tighten
	C. Termnal connection loose or broken	1. Tighten or replace
	D. Level control system not functioning properly	1. Inspect and repair
	E. Control setting not set	1. Make adjustments to control setting as necessary
2. No discharge or insufficient discharge	A. Mixture of air in the water	1. Inspect lines for leaks or adjust control settings
	B. Speed of motor too low	1. Inspect and adjust
	C. Defective motor	1. Replace
	D. Impeller clogged	1. Clean propeller

TABLE IV-8
(Continued)

PROBLEM	PROBABLE CAUSE	NECESSARY CHECK/ REMEDIES
	E. Discharge line clogged	1. Clean and flush line
	F. Pump rotating in wrong direction	1. Inspect and change
	G. Air leaks in suction line	1. Inspect and plug leaks
	H. Valves partially or entirely closed	1. Inspect and adjust valves
	I. Valves stuck or clogged	1. Clean and adjust
	J. Incorrect propeller adjustment	1. Inspect and adjust
	K. Impeller damaged	1. Repair or replace
	L. Seals worn or defective	1. Replace
	M. Impeller turning on the shaft because of broken key	1. Replace key
	N. Loss of suction due to leaky suction line or ineffective seal	1. Inspect & plug leaks. Inspect seal & adjust.
3. Excessive Power Consumption	A. Clogged pumps	1. Clean pump
	B. Mechanical defects such as shaft bent or rotating element binding	1. Replace shaft or inspect for rotating elements binding and adjust
	C. Speed too high	1. Check and adjust
4. Vibration or Noise	A. Inlet clogged	1. Check and adjust
	B. Inlet not submerged	1. Adjust control setting

TABLE IV-8
(Continued)

PROBLEM	PROBABLE CAUSE	NECESSARY CHECK/ REMEDIES
	C. Mechanical defects in pump	1. Inspect and repair or replace
	D. Foundation bolts loose	1. Tighten bolts
	E. Misalignment between driver and pump	1. Align properly
	F. Head lower than rating, pumps too much liquid	1. Check the head and throttle the valve on the discharge piping
5. Excessive Seal Housing Leakage	A. Seal failure	1. Replace mechanical Seal
6. Loss of Section during operation	A. Leaky suction line	1. Inspect and correct leaks
	B. Water Seal plugged	1. Inspect and unplug water seal
	C. Suction lift to high	1. Increase the size of suction line
		2. Lower the pump, if possible
		3. Adjust the control to operate the pump at max level in wet well
	D. Casing gasket defective	1. Replace gasket
7. Overheating		
a. Bearing	A. Misalignment between driver and pump	1. Align properly
	B. Excessive or lack of grease	1. Lubricate properly

TABLE IV-8
(Continued)

PROBLEM	PROBABLE CAUSE	NECESSARY CHECK/ REMEDIES
	C. Shaft bent	1. Replace shaft
	D. Rotating element binds	1. Check and correct
b. Seal Housing	A. Filter system clogged	1. Unplug the filter system
8. Priming	A. Insufficient time allowed	1. Allow sufficient time
	B. Air leaks in suction pipe	1. Check and plug leaks
	C. Mechanical Seal not seated properly	1. Place the mechanical seal properly
	D. Suction lift to high	1. Same as GC
	E. Impeller or prime hole plugged	1. Unplug impeller and prime hole
	F. Speed too low	1. Check speed and make necessary correction
	G. Check valve defective	1. Replace check valve

TABLE IV - 9

SECONDARY SLUDGE PUMPS: COMMON OPERATING PROBLEM

PROBLEM	PROBABLE CAUSE	NECESSARY CHECK/ REMEDIES
1. Pump will not start	A. Breakers tripped	1. See electrical drawing for correct breaker size and replace if necessary
	1. Rating of breakers not correct	
	2. Switch contact corroded or shorted	2. Clean contacts
	3. Motor shorted or burned out	3. Inspect and replace as necessary
	4. Contact of the control dirty and arcing	4. Clean contacts
	5. Wiring short-circuited	5. Inspect and replace
	6. Shaft binding or sticking by reason of rubbing propeller or clogging of pump	6. Adjust or replace propeller and clean pump
	B. Loose breaker connection	1. Adjust and tighten
	C. Termnal connection loose or broken	1. Tighten or replace
	D. Level control system not functioning properly	1. Inspect and repair
	E. Control setting not set	1. Make adjustments to control setting as necessary
2. No discharge or insufficient discharge	A. Mixture of air in the water	1. Inspect lines for leaks or adjust control settings
	B. Speed of motor too low	1. Inspect and adjust
	C. Defective motor	1. Replace
	D. Impeller clogged	1. Clean propeller

TABLE IV-9
(Continued)

PROBLEM	PROBABLE CAUSE	NECESSARY CHECK/ REMEDIES
	E. Discharge line clogged	1. Clean and flush line
	F. Pump rotating in wrong direction	1. Inspect and change
	G. Air leaks in suction line	1. Inspect and plug leaks
	H. Valves partially or entirely closed	1. Inspect and adjust valves
	I. Valves stuck or clogged	1. Clean and adjust
	J. Incorrect propeller adjustment	1. Inspect and adjust
	K. Impeller damaged	1. Repair or replace
	L. Seals worn or defective	1. Replace
	M. Impeller turning on the shaft because of broken key	1. Replace key
	N. Loss of suction due to leaky suction line or ineffective seal	1. Inspect & plug leaks. Inspect seal & adjust.
3. Excessive Power Consumption	A. Clogged pumps	1. Clean pump
	B. Mechanical defects such as shaft bent or rotating element binding	1. Replace shaft or inspect for rotating elements binding and adjust
	C. Speed too high	1. Check and adjust
4. Vibration or Noise	A. Inlet clogged	1. Check and adjust
	B. Inlet not submerged	1. Adjust control setting

TABLE IV-9
(Continued)

PROBLEM	PROBABLE CAUSE	NECESSARY CHECK/ REMEDIES
	C. Mechanical defects in pump	1. Inspect and repair or replace
	D. Foundation bolts loose	1. Tighten bolts
	E. Misalignment between driver and pump	1. Align properly
	F. Head lower than rating, pumps too much liquid	1. Check the head and throttle the valve on the discharge piping
5. Excessive Seal Housing Leakage	A. Seal failure	1. Replace mechanical Seal
6. Loss of Section during operation	A. Leaky suction line	1. Inspect and correct leaks
	B. Water Seal plugged	1. Inspect and unplug water seal
	C. Suction lift to high	1. Increase the size of suction line
		2. Lower the pump, if possible
		3. Adjust the control to operate the pump at max level in wet well
	D. Casing gasket defective	1. Replace gasket
7. Overheating		
a. Bearing	A. Misalignment between driver and pump	1. Align properly
	B. Excessive or lack of grease	1. Lubricate properly

TABLE IV-9
(Continued)

PROBLEM	PROBABLE CAUSE	NECESSARY CHECK/ REMEDIES
	C. Shaft bent	1. Replace shaft
	D. Rotating element binds	1. Check and correct
b. Seal Housing	A. Filter system clogged	1. Unplug the filter system
8. Priming	A. Insufficient time allowed	1. Allow sufficient time
	B. Air leaks in suction pipe	1. Check and plug leaks
	C. Mechanical Seal not seated properly	1. Place the mechanical seal properly
	D. Suction lift to high	1. Same as GC
	E. Impeller or prime hole plugged	1. Unplug impeller and prime hole
	F. Speed too low	1. Check speed and make necessary correction
	G. Check valve defective	1. Replace check valve

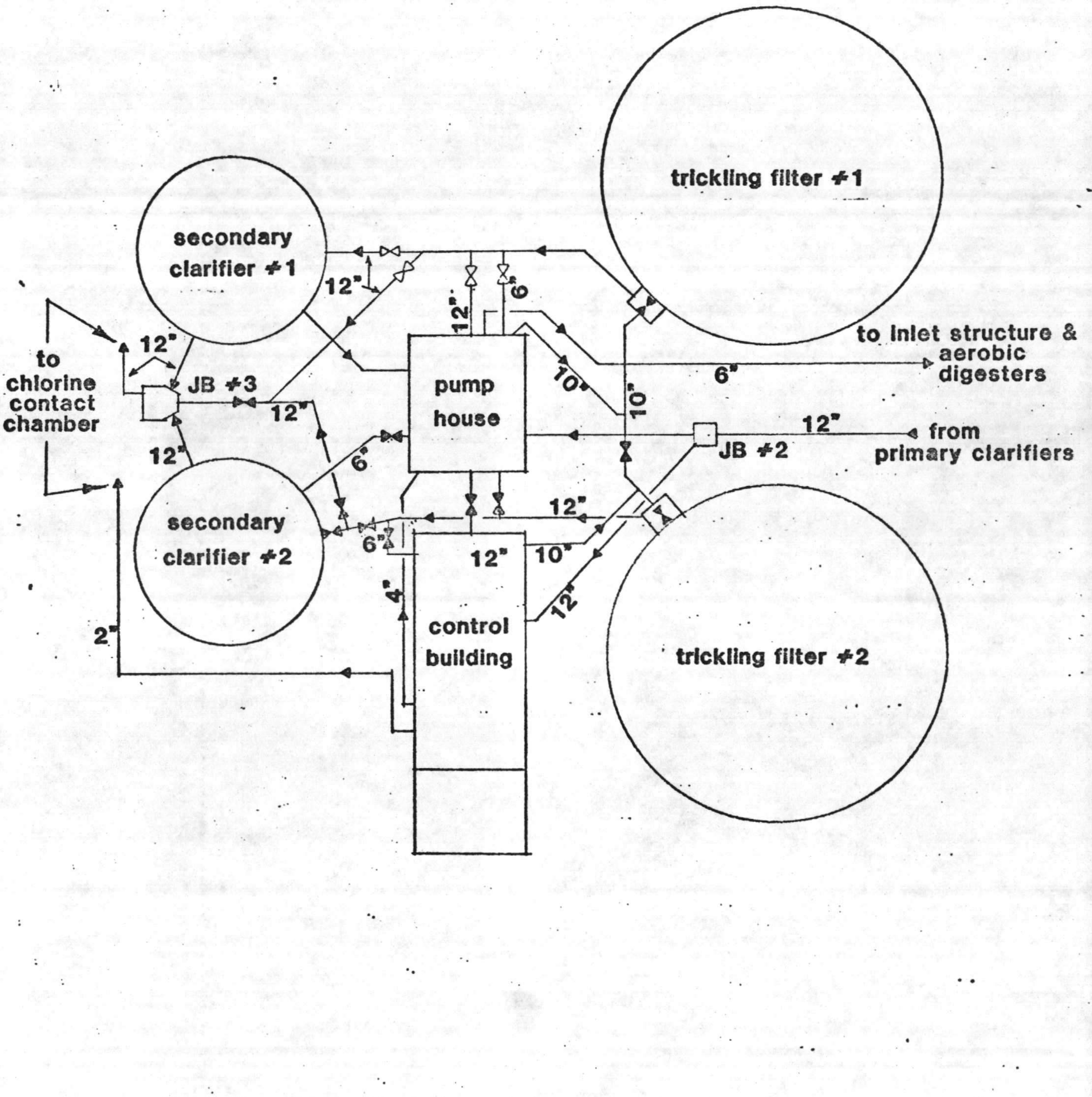
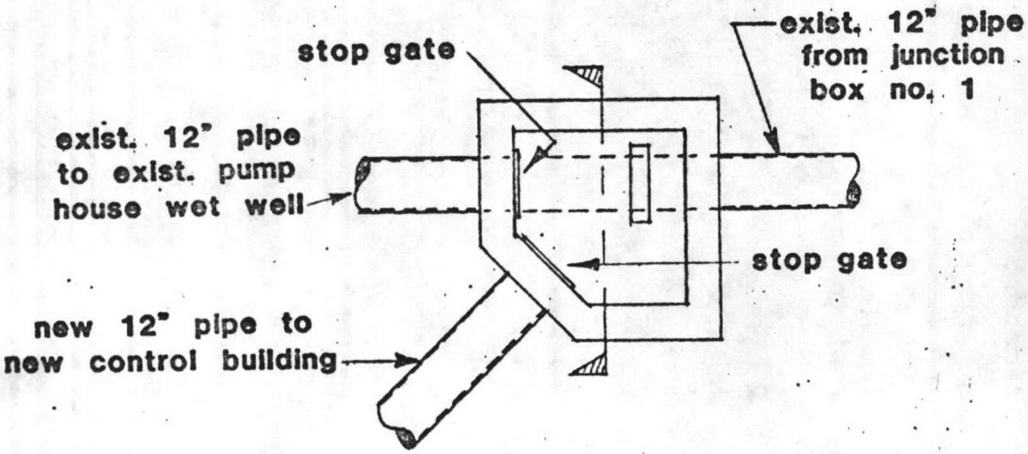
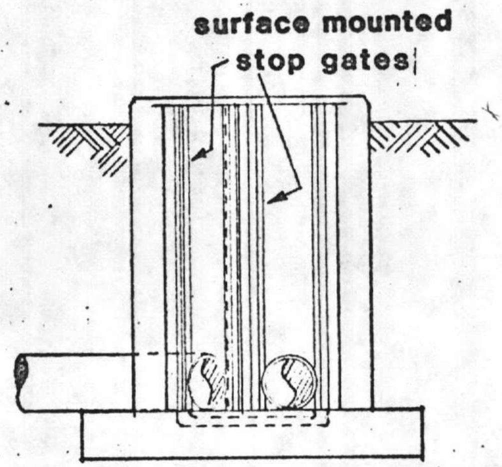


EXHIBIT IV-11
SCHEMATIC FLOW DIAGRAM
TRICKLING FILTER SYSTEM



PLAN



SECTION

EXHIBIT IV-12

SPLITTER BOX (JB NO. 2)

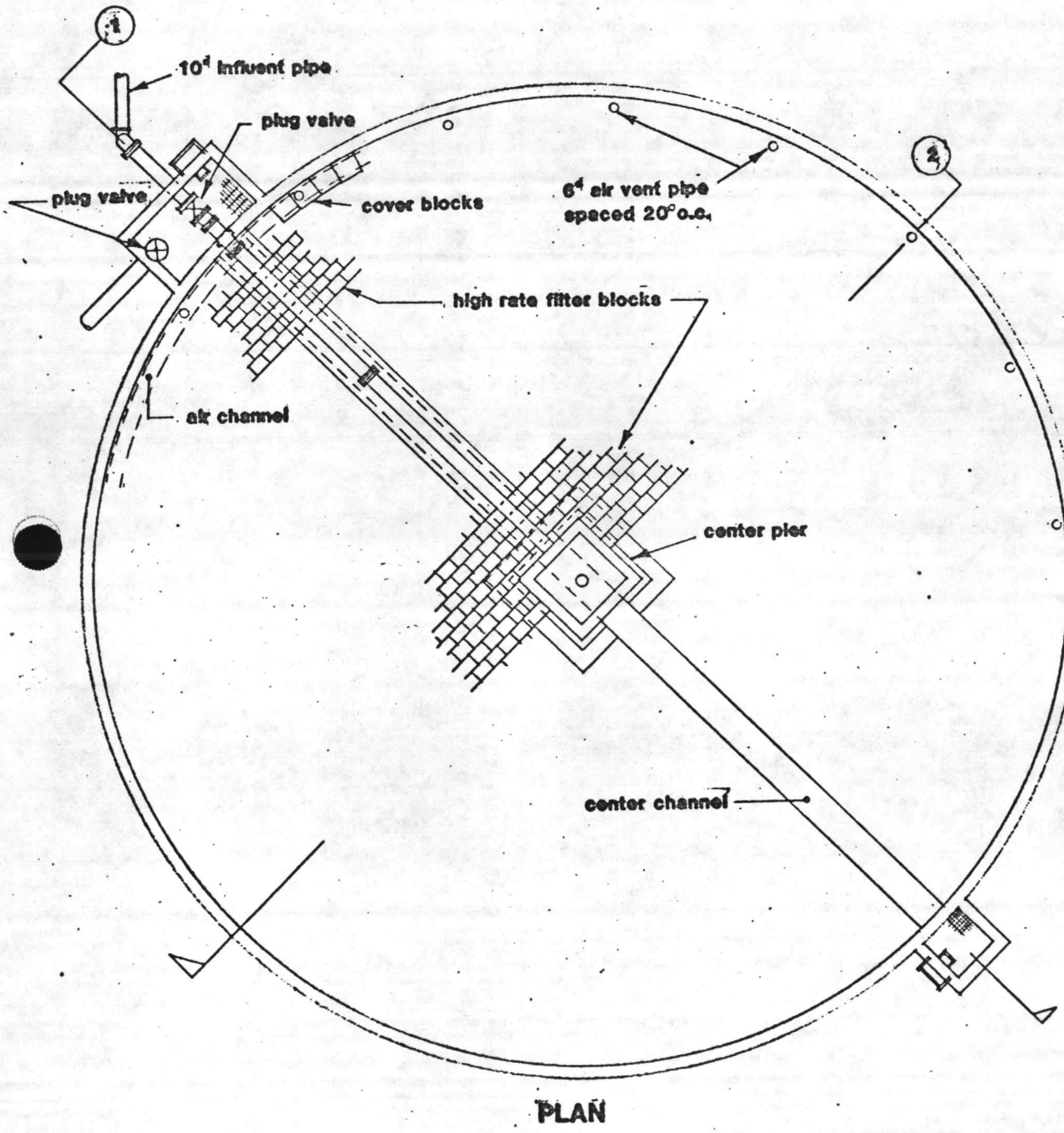
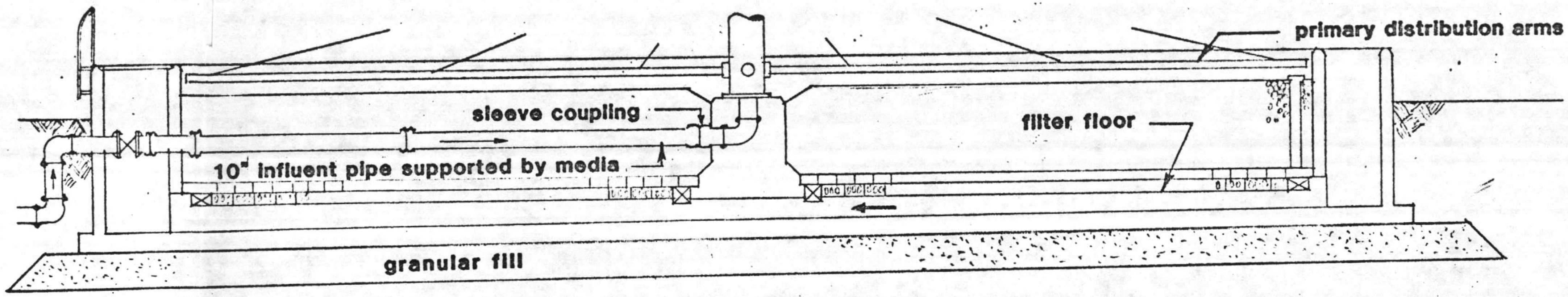
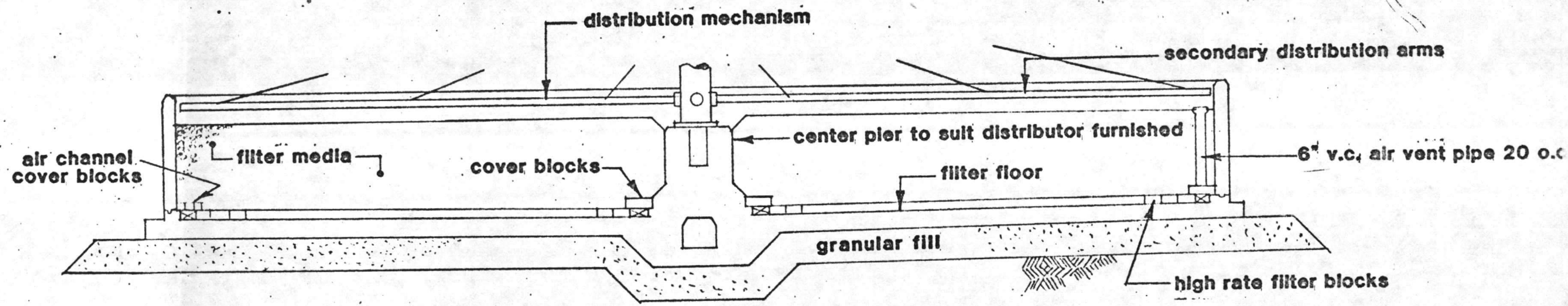


EXHIBIT IV-13
TRICKLING FILTER



SECTION #1



SECTION #2

EXHIBIT IV-14

TRICKLING FILTER

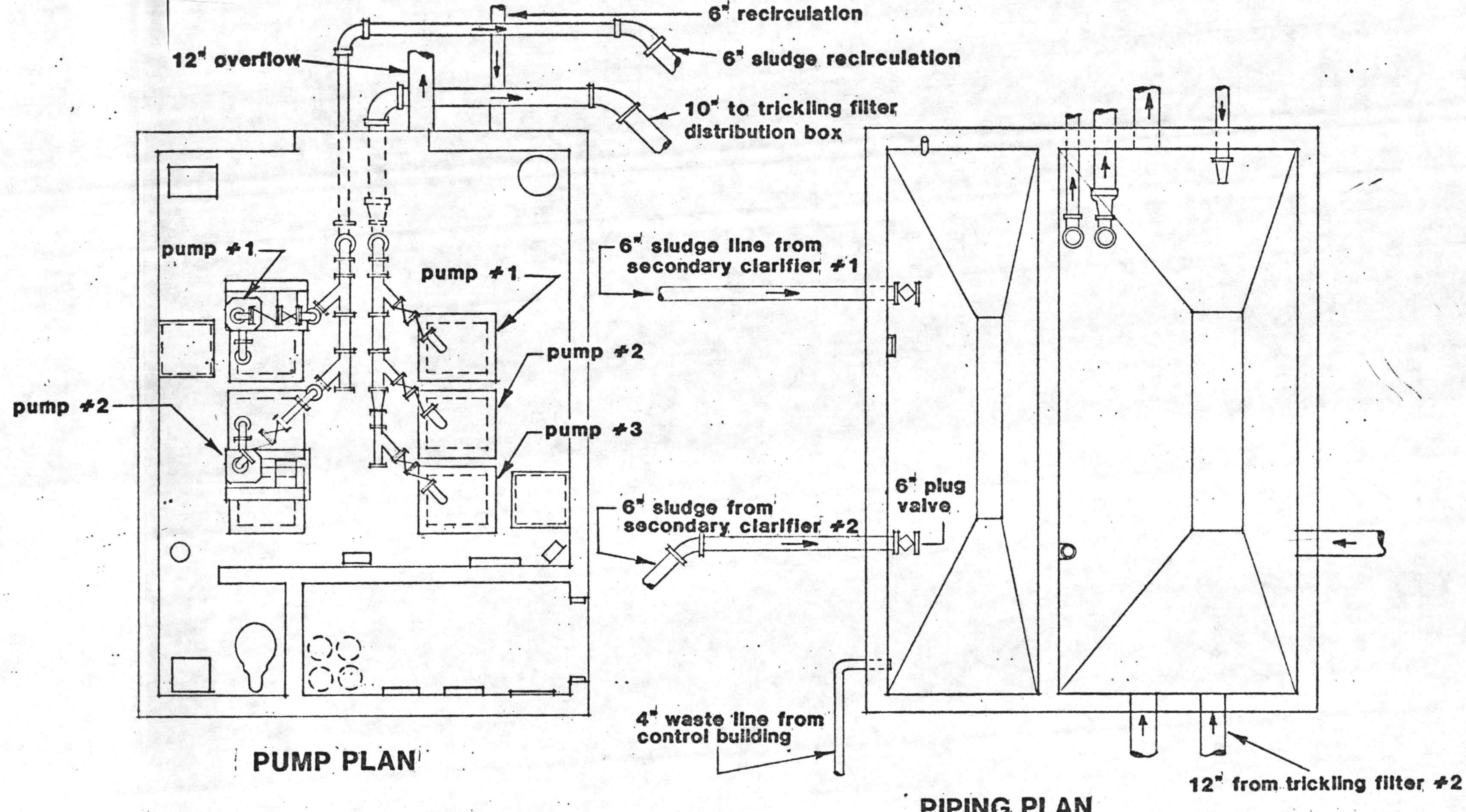
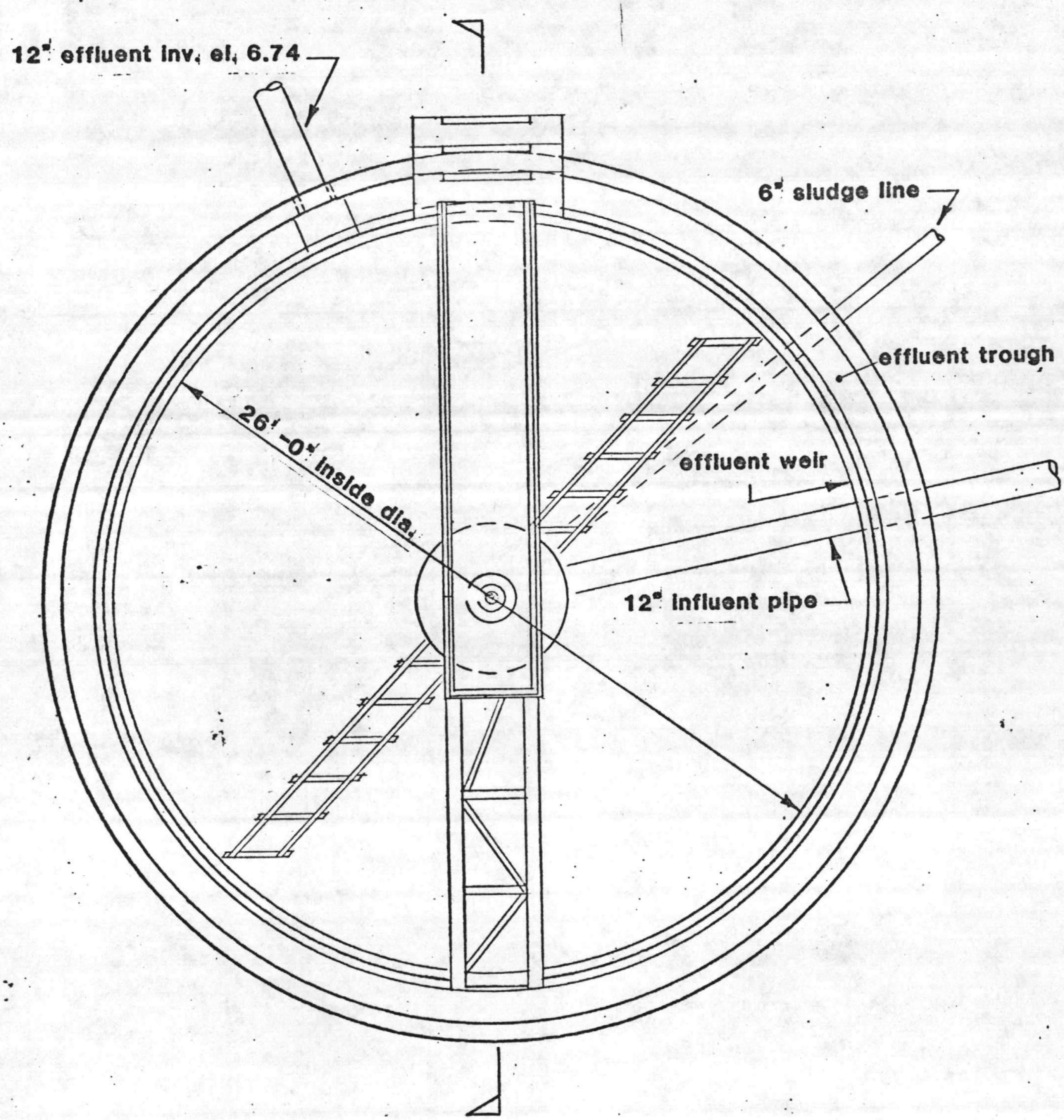
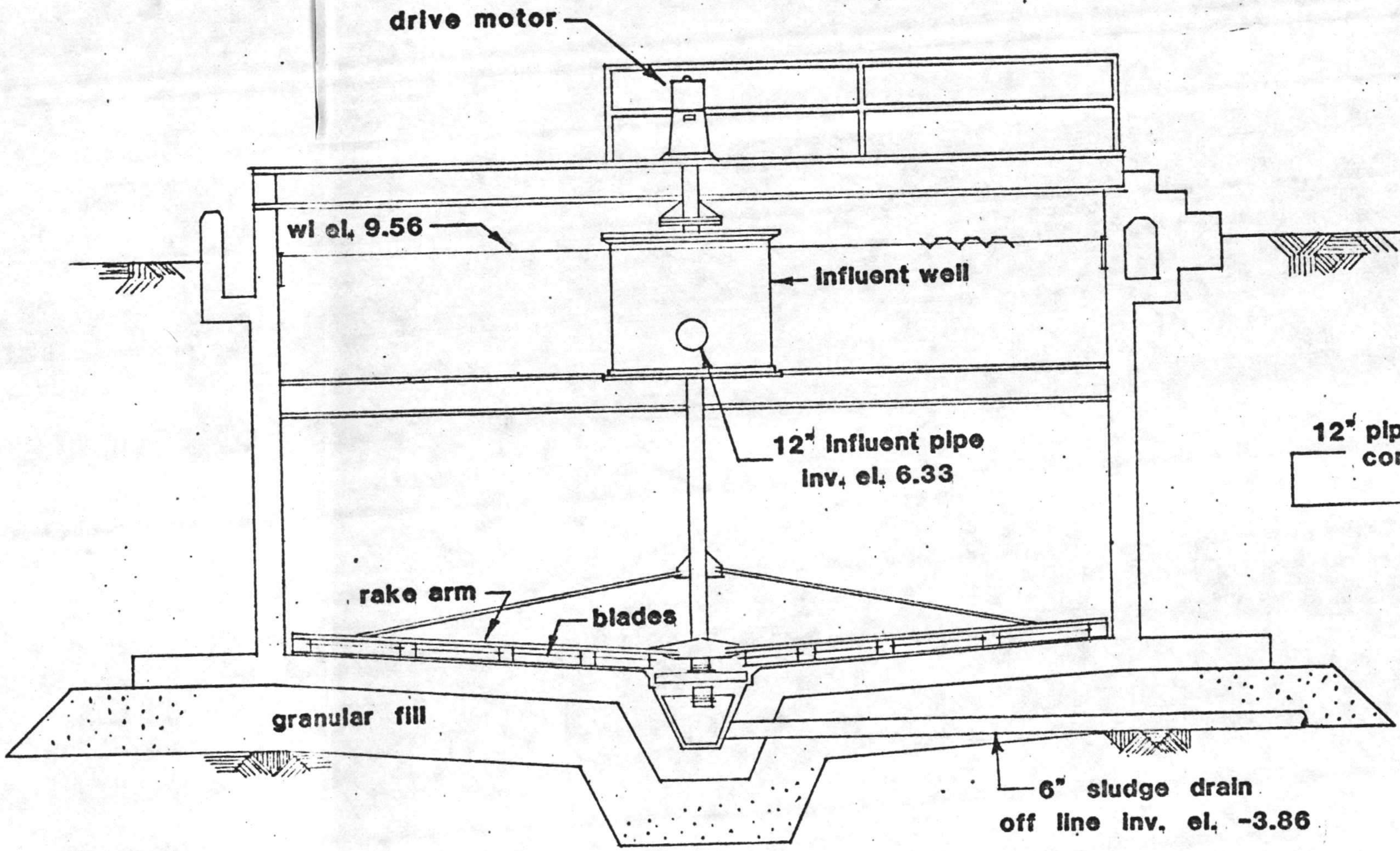


EXHIBIT IV-15
PUMP HOUSE



PLAN

EXHIBIT IV-16
SECONDARY CLARIFIER



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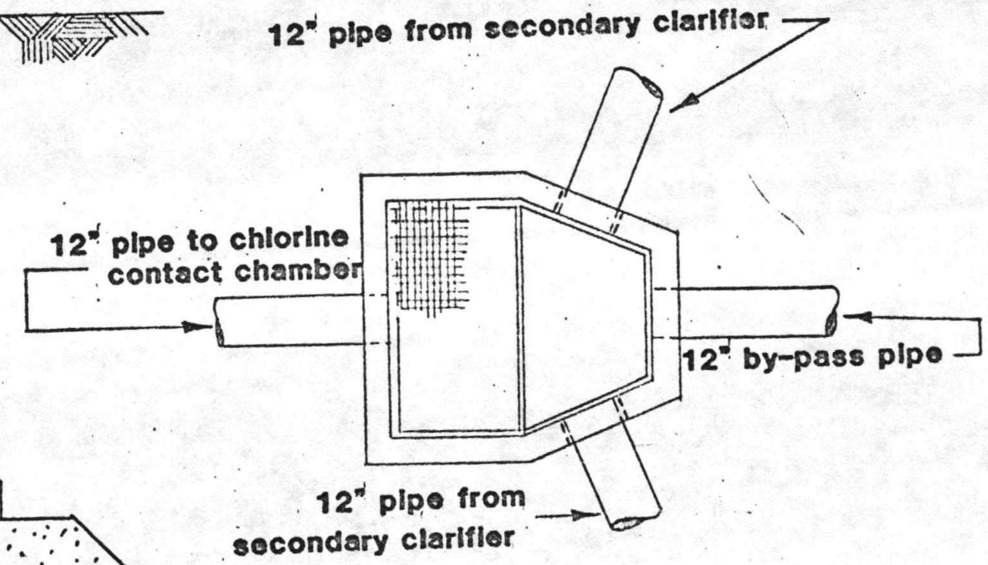


JUNCTION BOX #3
SECONDARY CLARIFIER EFFLUENT BOX

EXHIBIT IV-17
SECONDARY CLARIFIER

4.6 CHLORINATION

4.6.1 Function

For disinfection of the plant effluent prior to discharge into the receiving stream.

4.6.2 Description of the Unit Operation/Process

The chlorination system (Exhibits IV-18 through IV 21) at the plant consists of chlorine handling and feed system and chlorine contact tanks. The chlorine feed system consists of two chlorinators, flexible connectors, chlorine gas piping, chlorine solution piping, chlorine diffusers, automatic changeover system, dual manifold assembly, and electrical transmitter. The chlorination system is designed to feed the chlorine at the influent end of chlorine contact tanks. The detailed design description of the chlorination system is summarized as follows:

Chlorine Contact Tanks:	
Number of tanks	2
Unit capacity, gals.	9,425
Total Capacity, gals.	18,850
Dentention time at average daily flow, minute	45
Chlorine Feed System	
Number of Chlorinators	2
Chlorine Feed rate, lbs/day	0-100
Number of one ton cylinders	3

Chlorination is the process of adding chlorine to wastewater for disinfection. At the plant, chlorine is added at the influent end of the chlorine contact tank to destroy fecal colliform bacteria, pathogens or viruses. After adding chlorine the wastewater then flows into the chlorine contact tank where it is usually held for about 45 minutes at design flow to allow the chlorine to react with the fecal coliform and/or pathogens (disease causing organism). The destruction of pathogens by chlorination is dependent upon water temperature, pH, time of contact, degree of mixing,

turbidity, presence of interfering substances and the concentration of chlorine available. The anticipated chlorine dose for disinfecting plant effluent is in the range of 8-12 mg/l.

4.6.3 Relationship to Adjacent Units

Biological upset in the trickling filter process and improper operation of the secondary clarifier will result in more chlorine requirement for disinfection.

4.6.4 Operation

A. Initial Start-up

For initial start-up the following procedure should be followed.

1. Connect the chlorinators to the chlorine cylinders according to the manufacturer's instruction given in Appendix VIII.

2. Turn on the injector water supply.

3. Turn on the chlorine gas supply to the chlorinator. Check for leaks.

4. Adjust the chlorine feed rate to achieve desired chlorine residual (0.5 mg/l) in the chlorine contact tanks effluent.

For shutdown of chlorination, turn off the injector water supply and chlorine gas supply.

B. Normal Operation

During normal operation, the chlorine feed system operates automatically to produce the required amount of chlorine solution and distribute it to the point of application, that is, in the influent end of chlorine contact tank. The amount of chlorine solution delivered to the diffusers is controlled by flow signals from the final effluent flow meter.

C. Alternate Operating Modes

The chlorinators may be operated manually as well as automatically. Generally, manual operation will only be required during initial system checkout and calibration. To operate the chlorinators manually, set the safety stack regulator to manual, disconnect the flow rate valve operator linkage, and pull outward on the manual control knob. The flow rate valve can now be adjusted as necessary. Refer to manufacturer's instruction manual given in Appendix VIII for more detailed information on manual operation and calibration.

The semiautomatic changeover system is not designed to be operated manually. However, it is possible to cause both electrically actuated valves to be open thereby allowing chlorine gas to flow from both supply systems. This is accomplished by rapidly switching the system selector switch from system #1 to system #2 without pausing at the reset position and observing the red (empty) light illuminated.

Distribution of chlorine solution to the contact basin and filter influent diffusers is accomplished through the solution distribution panel. The panel is manually controlled through several possible combinations of valve settings.

D. Emergency Operation and Fail-Safe Features

The chlorinators are equipped with several valves to protect the various components should abnormal conditions occur. The vacuum regulator valve acts as a shutoff valve when the ejector water supply is stopped and the vacuum in the chlorinator falls off. Should a major vacuum leak develop the flow meter tube be broken or removed, or if ejector vacuum fails for any

reason, the vacuum regulator valve will also close. A pressure relief valve is provided to protect the regulator stack diaphragms if a pressure rather than a vacuum develops in the regulator. A vacuum breaker is provided to protect the regulator diaphragms when abnormally high vacuum conditions occur. Whenever the ejector water supply is stopped, the stack isolating valve closes to prevent water vapor from diffusing into the regulator chamber. An atmospheric relief valve allows residual vacuum in the stack and vent line during shutdown and alsp prevents any residual vacuum from defeating the purpose of the emergency overflow. The emergency overflow prevents water or Cl_2 solution from completely flooding the safety stack regulator in the event that the backflow check valve fails or operates sluggishly.

The gas supply piping incorporates a pressure reducing and shutoff valve which maintains a constant pressure in the downstream piping system. This aids in preventing the formation of liquid chlorine in the supply lines. Additionally, the valve will shut off Cl_2 gas supply should a supply line leak occur which reduces the pressure below a preset point. A bypass line and valve are provided so that the chlorinator can be operated should shutoff valve fail or require servicing.

A chlorine gas leak detector is mounted in the chlorine building and will sense at least one part per million chlorine gas in the atmosphere. The detector is wired so that when a leak occurs the exhaust fan starts, the chlorine shutoff valves are closed, and audible and visual alarms are activated in the main contorl building. When an alarm indication is

received or anytime a chlorine leak is suspected, maintenance personnel responding to the emergency must wear self contained breathing apparatus provided in a case mounted outside of the entrance to the chlorine building. All personnel should be instructed in the proper use of this mask since inhalation of chlorine gas can be fatal.

The following procedures should be followed in handling emergencies related to chlorination facilities.

1. Self-contained positive pressure helments, with their own compressed air supply and full pacepiece, should be available for emergency use. The canister type mask is specifically not recommended. The helments should be located at readily accessible points, away form the area(s) likely to be contaminated with chlorine gas. Spare air supply cylinders should also be on site for use during prolonged emergencies. Helments and breathing air supply tanks should be routinely inspected and maintained in good condition. They should be cleaned after each use, and also cleaned routinely at regular intervals. The needed air supply tanks should be refilled at stations where proper air compressor equipment is used to filter out oil in a contaminated air environment. Specifications for properly designed positive pressure helments for chlorine service can be obtained from the U.S. Bureau of Mines or OSHA. In addition, potential users of these helments, as well as users of other emergency equipment, should have formal training in their use and should also be required to have regular practice sessions.

2. A strong solution of aqueous ammonia (18 Baume or higher) should be available for use in locating the source of leaks. Dense white clouds of ammonium chloride are formed by the reaction of the ammonia and chlorine, thus confirming the source of the chlorine leak.

3. Repair of any chlorine leak should be performed by the least two people wearing self-contained air breathing equipment. If such repairs must be made below grade, persons entering the area must also wear safety harnesses which are connected to ropes extending to a higher level where additional people are stationed to assist in emergency rescue operations.

4. Piping and valves in chlorine room should be color coded and properly labeled for rapid identification.

5. If a container is leaking chlorine, it should be turned, if possible, so that gas instead of liquid escapes. The quantity of chlorine that escapes from a gas leak is about one-fifteenth the amount that escapes from a liquid leak through the same size hole.

6. If possible, a leaking container should be moved to an isolated spot where it will do least harm.

7. Never immerse or throw a leaking chlorine container into a body of water. The leak will be aggravated and the container may float when still partially full of liquid chlorine, allowing chlorine gas evaluation at the surface.

8. Emergency kits should be readily available for the quick repair of chlorine leaks. Information on emergency kits is available from the Chlorine Institute, New York.

9. In the event of an emergency, technical assistance can be obtained by calling CHEMTREC (Manufacturing Chemists Association, Chemical Transportation Emergency Center) at 800-424-9300. This is a 24-hour toll-free service.

4.6.5 Process Controls

Process control for chlorination includes measurement of chlorine residual present in the plant effluent. Gnerally, a chlorine residual of 0.5 mg/l should be maintained in the effluent at all times to ensure proper bacteria kill. The desired chlorine residual value for the plant will be the mg/l of the chlorine residual that must be maintained in the plant effluent to achieve the fecal coliform standard required by the discharge permit (Monthly average #1000/100 ml).

The following formula can be used to determine the chlorine feed rate:

Chlorine Feed, lbs/day = Desired chlorine, mg/l x 8.34 x Average daily flow, mgd

Example: (1) Average daily flow = 0.5 mgd
(2) Desired chlorine dose - 8 mg/l
Determine chlorine feed rate in lbs/Cl_2/day

Chlorine Feed Rate, lbs Cl_2/day =
= 8 mg/l x 8.34 x 0.5 mgd
= 33.36 lbs/day

The chlorine feed rate can be adjusted manually by operating the rate valve on the chlorinator.

4.6.6 Common Operating Problems

Common operating problems, their causes and corrective measures are summarized in Table IV-11.

4.6.7 Maintenance

Routine preventive maintenance requirements for the chlorination system are summarized in the preventive maintenance sheets. In order to carry out maintenance programs effectively, The basic information on equipment data, including spare parts should be readilly available at the plant. For ease of reference this information is given on the equipment data sheet.

4.6.8 References

1. Environmental Protection Agency, Consideration For Preparation of Operation and Maintenance Manual, EPA 430/9-74-001, 1974
2. EPA, Maintenance Management Systems For Municipal Wastewater Facilities, EPA 430/9-74-004, 1974
3. EPA, A Planned Maintenance Management Systems For Municipal Wastewater Treatment Plants, EPA 600/2-73-004, 1973
4. The Texas Water Utilities Association, Manual of Wastewater Operations, 1971
5. California State University, Sacramento, Operation of Wastewater Treatment Plants, Volumes, I, II & III, A Field Study Training Program, 1980.
6. Water Pollution Control Federation, Operation and Maintenance of Wastewater Treatment Plants - MOP No. 11, 1976

7. New York State Department of Environmental Conservation, Manual of Instruction For Wastewater Treatment Plant Operators, Vols. 1 and 2, 1978

8. Department of the Navy, Bureau of Yards and Docks, Training Course in Water and Sewage Plant Operations, June 1965

9. U.S. EPA, Maintenance Management in Wastewater Facilities - Instructor Training Course, September 1982

10. George, Clifford White, Handbook of chlorination, Nostrand Reinhold Co., 1972

11. Fisher and Porter, Chlorinator Instruction Manual

PREVENTIVE MAINTENANCE SCHEDULE
CHLORINATION

EQUIPMENT NAME: Chlorinator

MANUFACTURER: Fisher and Porter

SUPPLIER: Combs and Associates

MANUAL NO. OR IDENTIFICATION: ______________________________

____

Daily

1. Practice good housekeeping. Keep area around the chlorine feed system and chlorine contact tanks clean and free of obstacles. Clean-up chlorination equipment.

2. Check for proper operation of gas inlet block heater.

3. Inspect and clean gas inlet filter.

Monthly

1. Check flexible connectors for cracks or crimps causing leak or stoppage of gas flow.

Semi-Annually

1. Inspect and clean flow rate valve

Annually

1. Clean and inspect safety stack vacuum regulator valve for wear or damage.

2. Inspect and clean all components of ejector.

3. Inspect and clean gas supply system pressure reducing valve.

EQUIPMENT DATA SHEET

EQUIPMENT NAME: Chlorinator

LOCATION: Control Building

FUNCTION: Feed chlorine to disinfect plant effluent prior to discharge into the receiving stream.

EQUIPMENT DATA:

Number of Chlorinators: Two (2)

Type:

Unit Capacity: 0 - 100 lb Cl_2/day, each

Model No:

Serial No:

Accessories:

Manufacturer: Fisher and Porter

Supplier: Combs and Associates
P.O. Box 32185
Charlotte, N.C. 28232
Telephone: 704/376-0450

EQUIPMENT NUMBER

6.1.0.0	Chlorinators
6.1.1.0	Chlorinator No. 1
6.1.2.0	Chlorinator No. 2
6.2.0.0	Chlorine Handling Facilities
6.2.1.0	Hoist
6.2.2.0	Scale

RECOMMENDED SPARE PARTS:

Part Description	Part No.	Quantity

TABLE IV-11

CHLORINATION SYSTEM - COMMON OPERATING PROBLEMS, CAUSES AND REMEDIES

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
1. Low chlorine gas pressure at chlorinator	A. Insufficient number of cylinders connected to system	1. Reduce feed rate and note if pressure rises appreciably after short period of time.	1) Connect enough cylinders to the system so that chlorine feed rate does not exceed the withdrawal rate for the cylinders.
	B. Stoppage or flow restriction between cylinders and chlorinators	1. Reduce feed rate and note if icing and cooling effect on supply lines continues	1) Disassemble chlorine header system at point where cooling begins, locate stoppage and clean with solvent.
2. No chlorine gas pressure at chlorinator	A. Chlorine cylinders emply or not connected to system	1. Visual inspection	1) Connect cylinder or replace empty cylinders.
	B. Plugged or damaged pressure reducing valves	1. Inspect valves	1) Repair the reducing valve after shutting off cylinder valves and decreasing gas in the header system.
3. Chlorinator will not feed any chlorine	A. Pressure reducing valve in chlorinator is dirty	1. Visual inspection	1) a. Disassemble chlorinator and clean valve stem and seat. b. Precede valve with a filter sediment trap

TABLE IV-11

CHLORINATION SYSTEM - COMMON OPERATING PROBLEMS, CAUSES AND REMEDIES
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
	B. Chlorine cylinder hotter than chlorine control apparatus	1. Cylinder area temperature	1) a. Reduce temperature in cylinder area b. Do not connect a new cylinder which has been sitting in the sun.
4. Chlorine gas escaping from chlorine pressure reducing valve (CPRV)	A. Main diaphragm of CPRV ruptured due to: 1. Improper assembly or fatigue 2. Corrosion	1. Place ammonia bottle near termination of CPRV vent line to confirm leak	1) a. Disassemble valve and diaphragm b. Inspect chlorine supply system for moisture intrusion.
5. Inability to maintain chlorine feed rate without icing of chlorine system	A. Insufficient evaporator capacity	1. Reduce feed rate to about 75% of evaporator capacity. If this eliminates problem, 5A is the cause.	
	B. External CPRV cartridge is clogged.	1. Inspect cartridge	1) Flush and clean cartridge.
6. Chlorination system unable to maintain water bath temperature sufficient to keep CPRV open	A. Heating element malfunction	1. Evaporator water bath temperature	1) Remove and replace heating element

TABLE IV-11

CHLORINATION SYSTEM - COMMON OPERATING PROBLEMS, CAUSES AND REMEDIES
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
7. Inability to obtain maximum feed rate from chlorinator	A. Inadequate chlorine gas pressure	1. Gas pressure	1) Increase pressure, reduce empty or low cylinder
	B. Water pump injector clogged with deposits	1. Inspect injector	1) Clean injector parts using muratic acid. Rinse with fresh water and replace in service.
	C. Leak in vacuum relief valve	1. Disconnect vent line at chlorinator; place hand over vent connection to vacuum relief valve. Observe if this results in more vacuum and higher chlorine feed rate.	1) Disassemble vacuum relief valve and replace all springs.
	D. Vacuum leak in joints, gaskets, tubing, etc., in chlorinator system	1. Moisten joints with ammonia solution, or put paper containing orthotolidine at each joint in order to detect leak	1) Repair all vacuum leaks by tightening joints, replacing gaskets, tubing and/or compression nuts.
8. Inability to maintain adequate chlorine feed rate	A. Malfunction or deterioration of water supply pump	1. Inspect pump	1) Overhaul pump (if turbine pump is used, try closing down needle valve to maintain proper discharge pressure)

TABLE IV-11

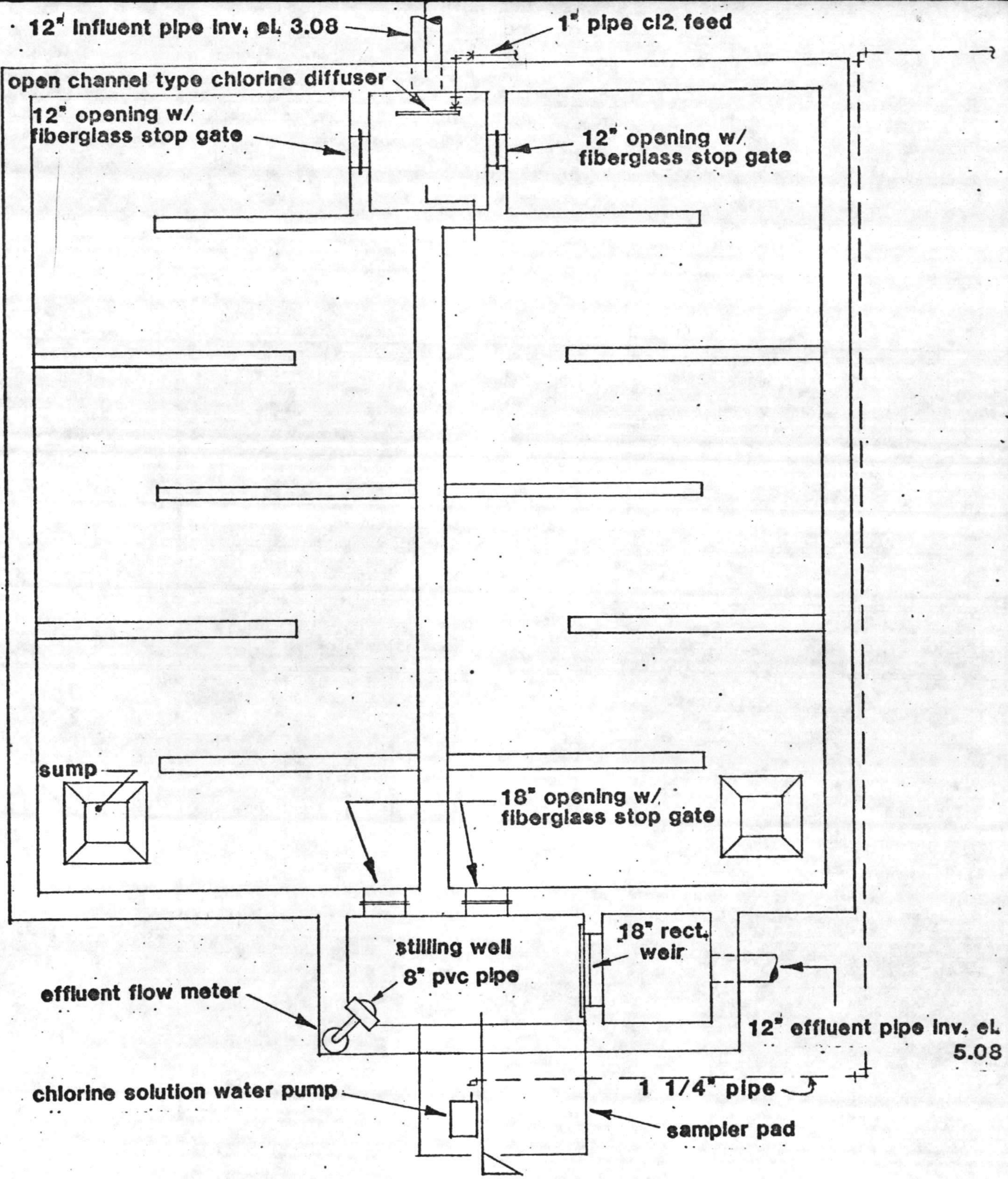
CHLORINATION SYSTEM - COMMON OPERATING PROBLEMS, CAUSES AND REMEDIES
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
9. Wide variation in chlorine residual produced in effluent	A. Chlorine flow proportion meter capacity inadequate to meet plant flow	1. Check chlorine meter capacity against plant flow meter capacity	1) Replace with higher capacity chlorinator meter
	B. Malfunctioning automatic controls		1) Call manufacturer's field service personnel
	C. Solids settled in chlorine contact chamber	1. Solids in contact chamber	1) Clean chlorine contact chamber
	D. Flow proportioning control device not zeroed or spanned correctly	1. Check zero and span of control device on chlorinator	1) Re-zero and span the device in accordance with manufacturer's instructions
10. Coliform counts fail to meet required standards for disinfection	A. Inadequate chlorination equipment capacity	1. Check capacity of the equipment	1) Replace equipment as necessary to provide treatment based on maximum flow through plant.
	B. Inadequate chlorine residual control	1. Continuously record residual in effluent	1) Use chlorine residual analyzer to monitor and control the chlorine dosage automatically

TABLE IV- 11

CHLORINATION SYSTEM - COMMON OPERATING PROBLEMS, CAUSES AND REMEDIES
(Continued)

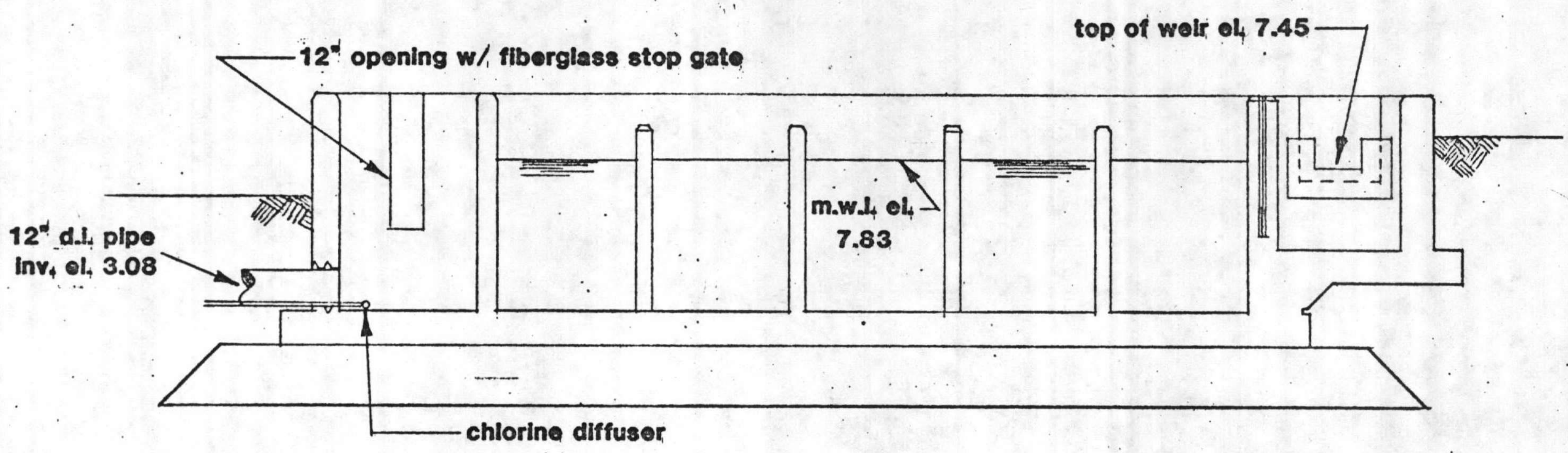
PROBLEM/OPERATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
11. Coliform counts fail to meet required standards	A. Solids build-up in contact chamber	1. Visual inspection	1) Clean contact chamber to reduce solids build-up
	B. Chlorine residual too low	1. Chlorine residual	1) Increase contact time and/or increase chlorine feed rate
12. Chlorine residual too high in plant effluent to meet requirements	A. Chlorine residual too high	1. Determine toxicity level by bioassay procedures	1) Install dechlorination facility



PLAN

EXHIBIT IV-18

CHLORINE CONTACT CHAMBER



SECTION

EXHIBIT IV-19

CHLORINE CONTACT CHAMBER

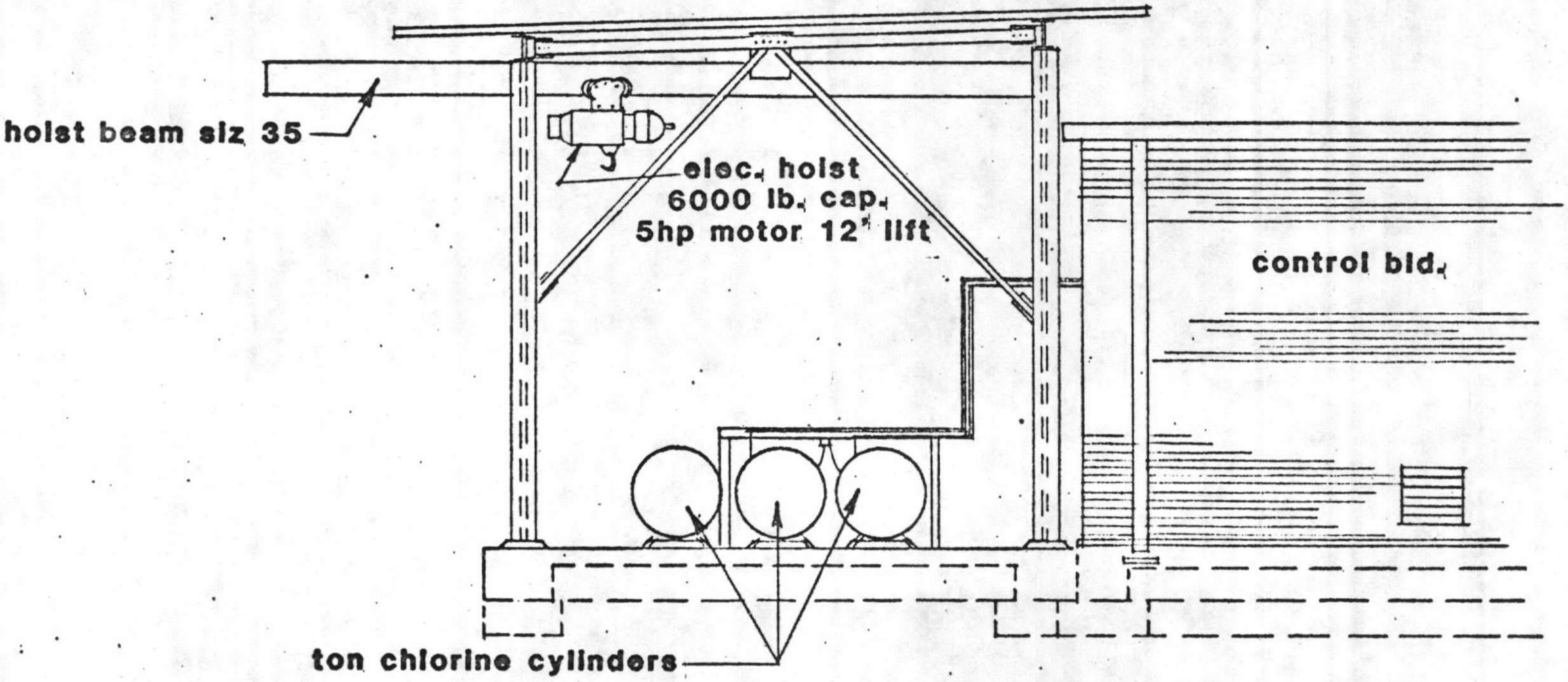


EXHIBIT IV-20

CHLORINATION

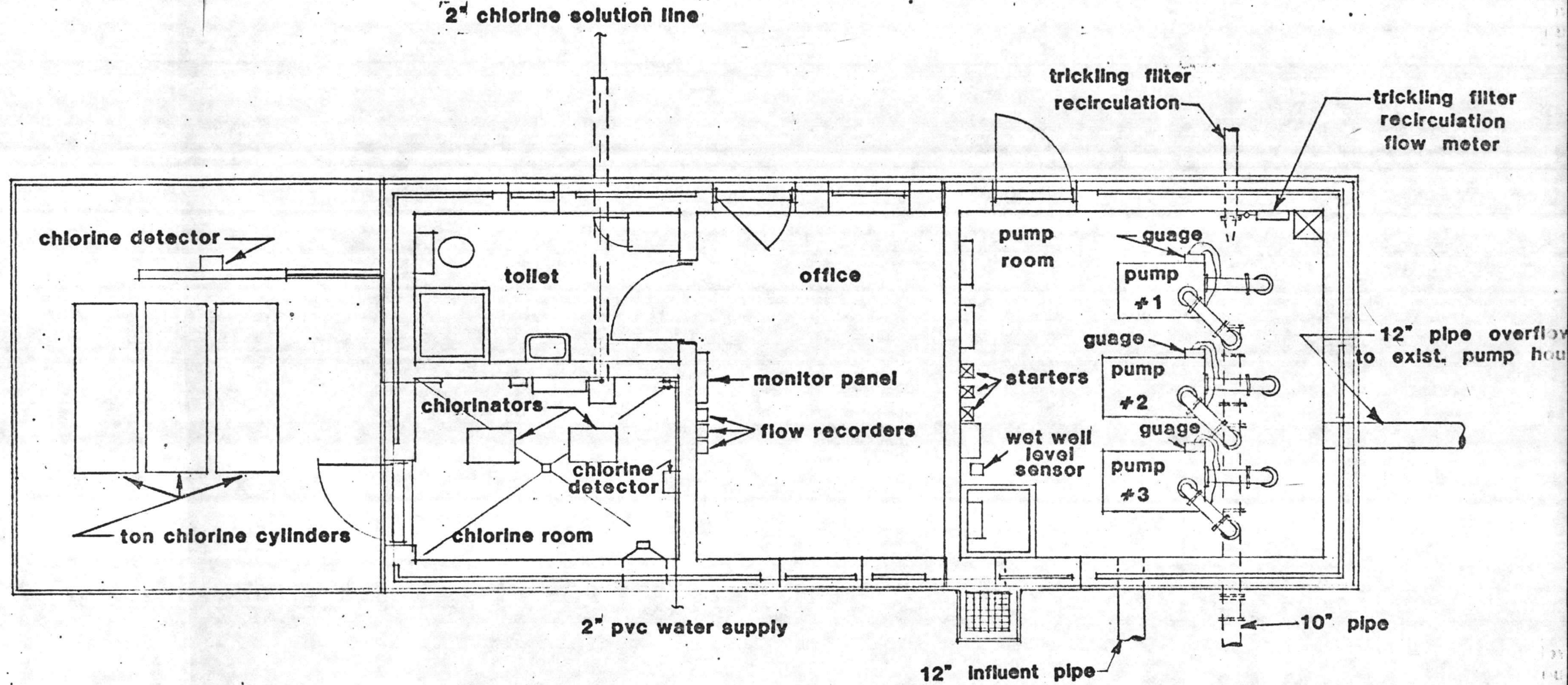


EXHIBIT IV-21
CHLORINATION/CONTROL BUILDING PUMP ROOM

4.7 AEROBIC SLUDGE DIGESTION

4.7.1 Function

Stabilize primary and secondary sludges so that they will not cause odors or other nuisance condition in dewatering and ultimate disposal.

4.7.2 Description of the Unit Operation/Process

The aerobic digestion facility (Exhibit IV-22 and IV-23) at the plant is designed to control odor and stabilize and thicken primary and secondary sludges. The digestion facility utilizes existing Imhoff tanks, modified to be used as the aerobic digestion facility. The detailed design description of the aerobic digestion facility is summarized below:

Number of digestion Units (Modified Imhoff Tank)	2
Unit Volume, cu.ft.	8360
Total Volume, cu.ft.	16720
Solids loading, lb VSS/cu.ft./day	0.1
Sludge retention time, days	20
Type of Aeration Course bubble diffused	
Total aeration capacity, cfm/1000 cu.ft.	69

The aerobic digestion at the plant is provided for stabilization of combined primary and secondary sludge. In the digestion tank the sludge is aerated for a period of about 20 days. As the aeration takes place the organisms consume the food (organic matter) in the sludge. Later the food supply decreases and the organisms begin to digest their own cell tissues for energy. The organisms convert this cell tissue to carbon dioxide, water and ammonia. The ammonia is subsequently converted to nitrate as the stablization of sludge proceeds. The aeration in the tank is then turned off and the solids are allowed to settle by providing quiscent condition. The supernatant (decant) is recycled back to the plant for reprocessing and the settled sludge is discharged to the drying beds for dewatering.

4.7.3 Relationship to Adjacent Units

The aerobic sludge digestion operation is important for handling combined primary and secondary sludge so that the primary clarification and trickling filter system performance remains at optimum level at all times. Similarly, thickening of sludge into the digestion tank is also important for proper sludge dewatering on sand beds. Sludge that is not properly thickened may take a long time for sludge to dewater to a point where it can be handled for ultimate disposal.

4.7.4 Operation

A. Initial Start-Up

For start-up, the following procedures should be followed.

1. Check aeration tank for pieces of concrete, lumber etc. if such things are found they should be removed from the tank.

2. Inspect for proper installation of the aeration system, as per the manufacturer's instruction given in Appendix IX.

3. Check all valves for their proper operation.

4. Pump the sludge to the aerobic digestion tank. When the tank is filled with sludge to desired level turn ON the aeration system.

For shutdown, the following procedures should be followed.

1. Shut OFF the aeration system.

2. Allow the sludge to settle, decant as much supernatant as possible.

3. Draw off the thickened sludge to one of the empty drying bed.

4. Wash down the tank and the aerator.

5. Drain the tank and follow the manufacturer's recommendation for the long term storage of the aeration system.

B. Normal Operation

Under normal operating conditions, the following procedures should followed.

1. Inspect the aerobic digestion tanks twice per day.

2. Operate the aerobic digestion system in the batch flow mode described below.

   a. Pump the waste sludge to the Aerobic Digestion Tank #1. The overflow from the tank will go to the aerobic digestion tank #2.

   b. When there is sufficient volume in the aerobic digestion tank No. 2 turn off the aeration in it and allow the solids to settle. This solid-liquid seperation should be limited to three to four hours to avoid septic condition and rising sludge at the surface.

   c. Remove as much supernatant as possible by using the appropriate decant valves. Sample the supernatant (decant) and analyze for pH, BOD5 and TSS.

   d. Remove the thickened sludge by opening appropriate valve. When removing the sludge make sure that valve of the sludge drying bed to be filled is open. Sample sludge and analyze for percent TSS, VSS, pH and oxygen uptake rate.

   e. Add new sludge to the aerobic digestion tank No. 1 and turn on the aeration system in tank No. 2. Repeat the above steps when there is sufficient sludge volume accumulated in the aerobic digestion tank No. 2.

C. Alternate Operating Mode

There is no alternate operating mode for the aerobic sludge digestion tanks.

D. Emergency Operation and Failsafe Measures

The aeration blower is protected with an overload protection. Short interruption due to power or aeration system failure should not greatly affect the aerobic sludge digestion operation.

4.7.5 Control

A. Flow Control

Waste sludge to the aerobic sludge digestion is controlled by the waste sludge pumps. Flow of the supernatant (decant) is controlled by the valves provided in the sludge draw-off line and also the individual valves to the sludge drying beds.

B. Process Control

The process control for the aerobic sludge digestion should include monitoring of dissolved oxygen in the aeration tank, volume and TSS and VSS concentration of the sludge fed and the thickened sludge discharged to the beds, and the oxygen uptake of the sludge.

C. Electrical Control

The electrical control for the aeration blowers is located on the control panel near the blowers. The START-STOP switches for one of the blower will normally be in the START position to provide continuous operation of the blower. The other blower will be used as a standby unit. The blower can be turned off by pressing STOP switch.

4.7.6 Common Operating Problem

The operational problems commonly experienced in the aerobic sludge digestion, their probable cause and corrective measures are summarized in Tables IV-12 and IV-13.

4.7.7 Maintenance

Maintenance requirements for the aerobic sludge digestion system include good housekeeping, periodically hosing down the side wall of the tank and periodic inspection and lubrication of the aeration system as recommended in the preventive maintenance schedule sheet. The equipment data sheets.

4.7.8 REFERENCES

1. Environmental Protection Agency, Consideration For Preparation of Operation and Maintenance Manual, EPA 430/9-74-001, 1974

2. EPA, Maintenance Management Systems For Municipal Wastewater Facilities, EPA 430/9-74-004, 1974

3. EPA, A Planned Maintenance Management Systems For Municipal Wastewater Treatment Plants, EPA 600/2-73-004, 1973

4. The Texas Water Utilities Association, Manual of Wastewater Operations, 1971

5. California State University, Sacramento, Operation of Wastewater Treatment Plants, Volumes I, II & III, A Field Study Training Program, 1980

6. Water Pollution Control Federation, Operation and Wastewater Treatment Plants - MOP No. 11, 1976

7. New York State Department of Environmental Conservation, Manual of Instruction For Wastewater Treatment Plant Operators, Vols. 1 and 2, 1978

8. Department of the Navy, Bureau of Yards and Docks, Training Course in Water and Sewage Plant Operations, June 1965

9. U.S. EPA, Maintenance Management in Wastewater Facilities - Instructor Training Course, September 1982

10. Envirex, Service Manual - Aeration System

11. U.S. - EPA, Process Design Manual - Sludge Treatment and Disposal, 1974

EQUIPMENT DATA SHEET

EQUIPMENT NAME: Aeration Blowers

LOCATION:

FUNCTION: Provide necessary air for odor control and stabilization of the combined primary and secondary sludge.

EQUIPMENT DATA

Blower Data

Number of Units: Two (2)

Type: Centrifugal

Capacity:

Make:

Model No.:

Installed:

Warranty Expired:

Motor Data

Number of Units: Two (2)

Motor:

Make:

Model No:

Installed:

Warranty Expired:

Accessories:

Manufacturer:

Supplier:

EQUIPMENT NO.

RECOMMENDED SPARE PARTS

Part Description	Part No.	Quantity

RECOMMENDED LUBRICANT

Item	Manufacturer	Manufacturer's Brand Name

TABLE IV-12

AEROBIC SLUDGE DIGESTION - COMMON OPERATING PROBLEMS, CAUSES AND REMEDIES

PROBLEM OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
1. Excessive foaming	A. Organic overload	1. Organic load)volatile solids and volume of sludge fed)	Reduce feed rate
	B. Excessive aeration	1. Dissolved oxygen	1. Reduce aeration rate by reducing liquid depth
2. Low dissolved oxygen	A. Liquid level not proper for the aerator	1. Check aerator specification	1. Establish proper liquid depth
	B. Oxygen overload	1. Refer to 1A	1. Refer to 1A
3. Sludge has objectionable odor	A. Inadequate aeration	1. DO should be 1.0 to 2.0 mgll	1. Increase aeration or reduce feed rate
4. pH in digester has dropped to undesirable level (below 6.5)	A. Nitrification is occuring and wastewater alkalinity is low	1. pH of Supernatant	1. Add sodium bicarbonate or time or sodium hydroxide to sludge feed.

TABLE IV-13

AEROBIC DIGESTER SUPERNATANT PUMPS - COMMON OPERATING PROBLEMS

PROBLEM	PROBABLE CAUSE	NECESSARY CHECK/ REMEDIES
1. No Discharge	A. Pump impeller may be air locked.	1. Start and stop pump for several times to purge air.
		2. Run additional water into basin so that pump will be submerged deeper to clear air.
	B. Pump rotation may be wrong.	1. Check for proper rotation.
	C. Clogged vent hole in pump case.	1. Unplug vent hole.
	D. Pump clogged at grinder inlet.	1. Unclog the pump at grinder inlet.
	E. Discharge gate may be closed.	1. Open discharge gate valve.
	F. Discharge head may be too high.	1. Check elevation and pump curve.
	G. Motor rotor may be loose on shaft.	1. Check and correct.
2. Red light comes on at Control Panel	A. Water has passed the lower seal.	1. Remove pump from the wet well for replacement of lower seal.
3. Overload trips at Control Box and alarm buzzer or red light comes on.	A. High water level.	1. Push in on red reset button to reset overload. If overload trips again after short run, pump has some damage and must be removed from basin for

TABLE IV- 13
(Continued)

PROBLEM	PROBABLE CAUSE	NECESSARY CHECK/ REMEDIES
	B. Clogged grinder	1. Remove pump and unclog grinder.
	C. Faulty component in control box.	1. Check and correct electrical connection in control box.
4. Yellow run light stays on continusouly.	A. H-O-A switch may be in HAND position.	1. Put H-O-A switch in AUTO position.
	B. Level control switch may have failed.	1. Check level control system and correct it.
	C. Grinder assembly may be partially clogged causing pump to operate at very reduced capacity.	1. Remove pump and check grinder assembly for clogging. Unclog the assembly, if necessary.
	D. Gate or check valve may be clogged.	1. Check the valves and unclog, if necessary.
5. Circuit breaker trips.	A. Check breakers.	1. Reset breaker by pushing down on handle then back to ON position. If breaker trips again in few seconds, it indicates excessive load probably caused by a short in the motor or control box. Check out control circuits and make necessary corrections.
6. Noisy pump.	A. Grinder assembly may be partially clogged.	1. Remove pump and unclog grinder assembly.

TABLE IV-13
(Continued)

PROBLEM	PROBABLE CAUSE	NECESSARY CHECK/ REMEDIES
	B. Grinder impeller may be rubbing on grinder ring due to bent shaft or misalignment.	1. Check and make necessary corrections.
7. Grease and solids have accumulated around pump and will not pump out basin.	A. Lower weight of the level switch may be set too high.	1. Set button of lower weight even with bottom of inlet flange of grinder.
		2. Run pump on hand operation for several minutes with small amount of water running into basin to clean out solids.

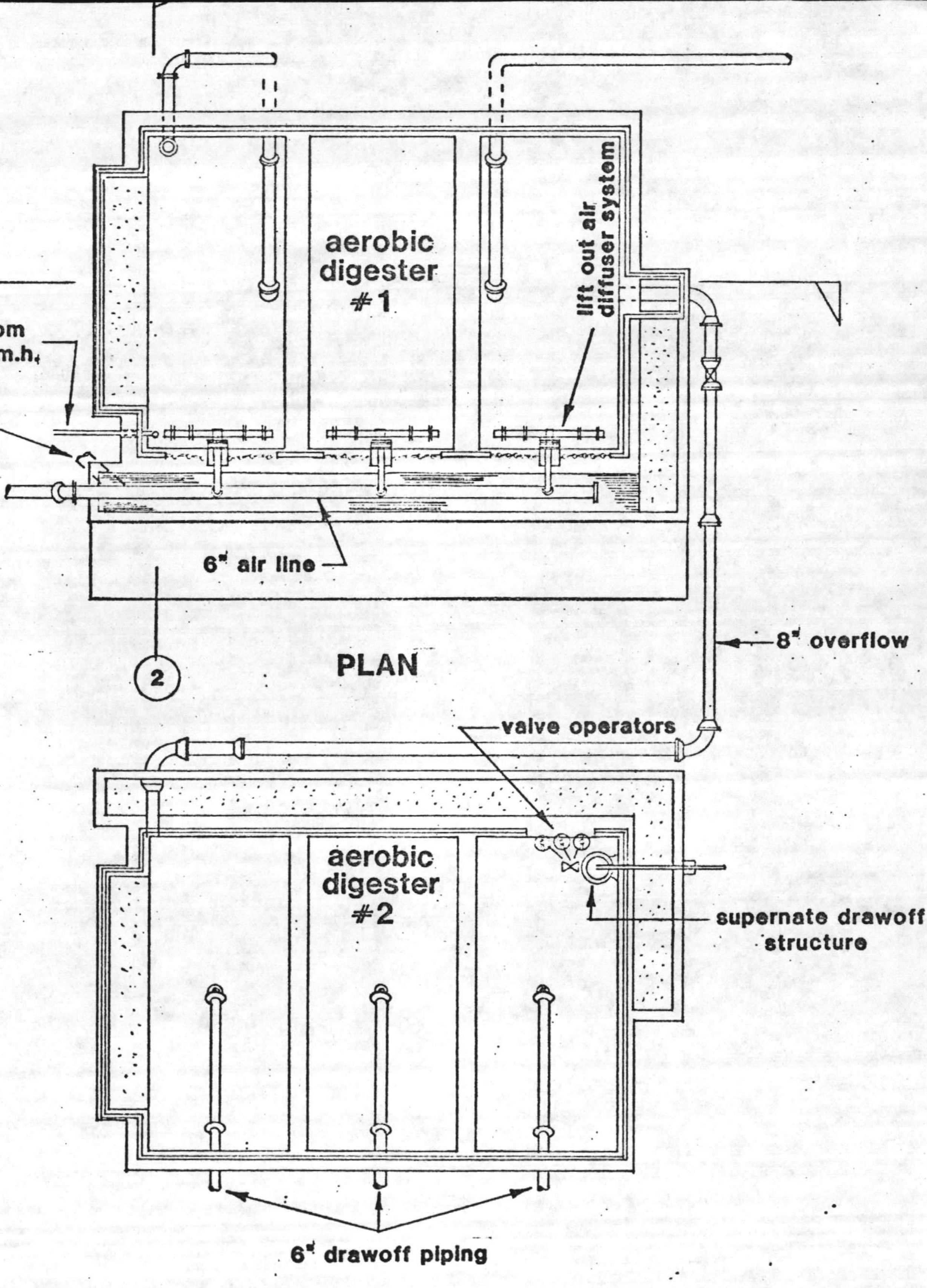
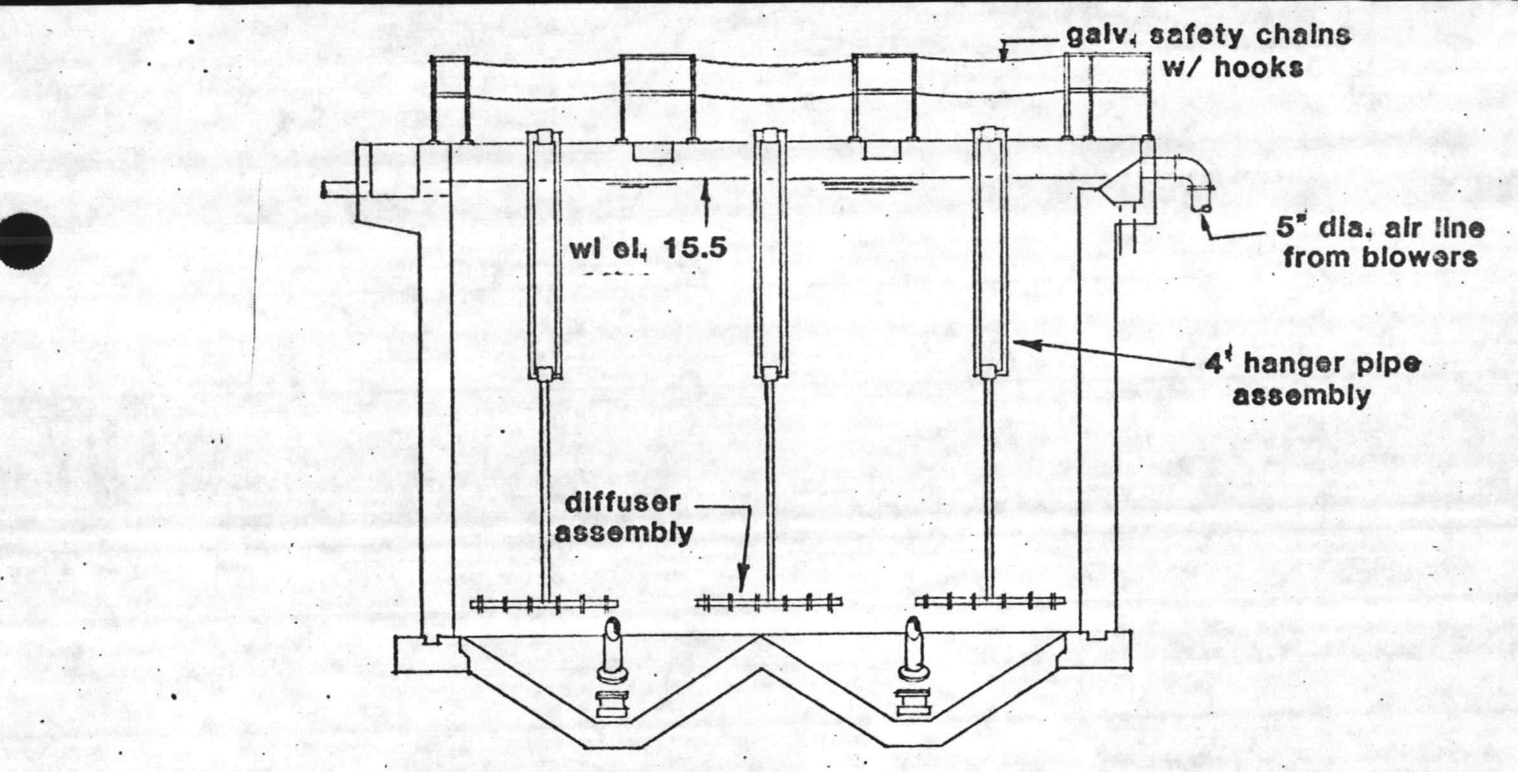
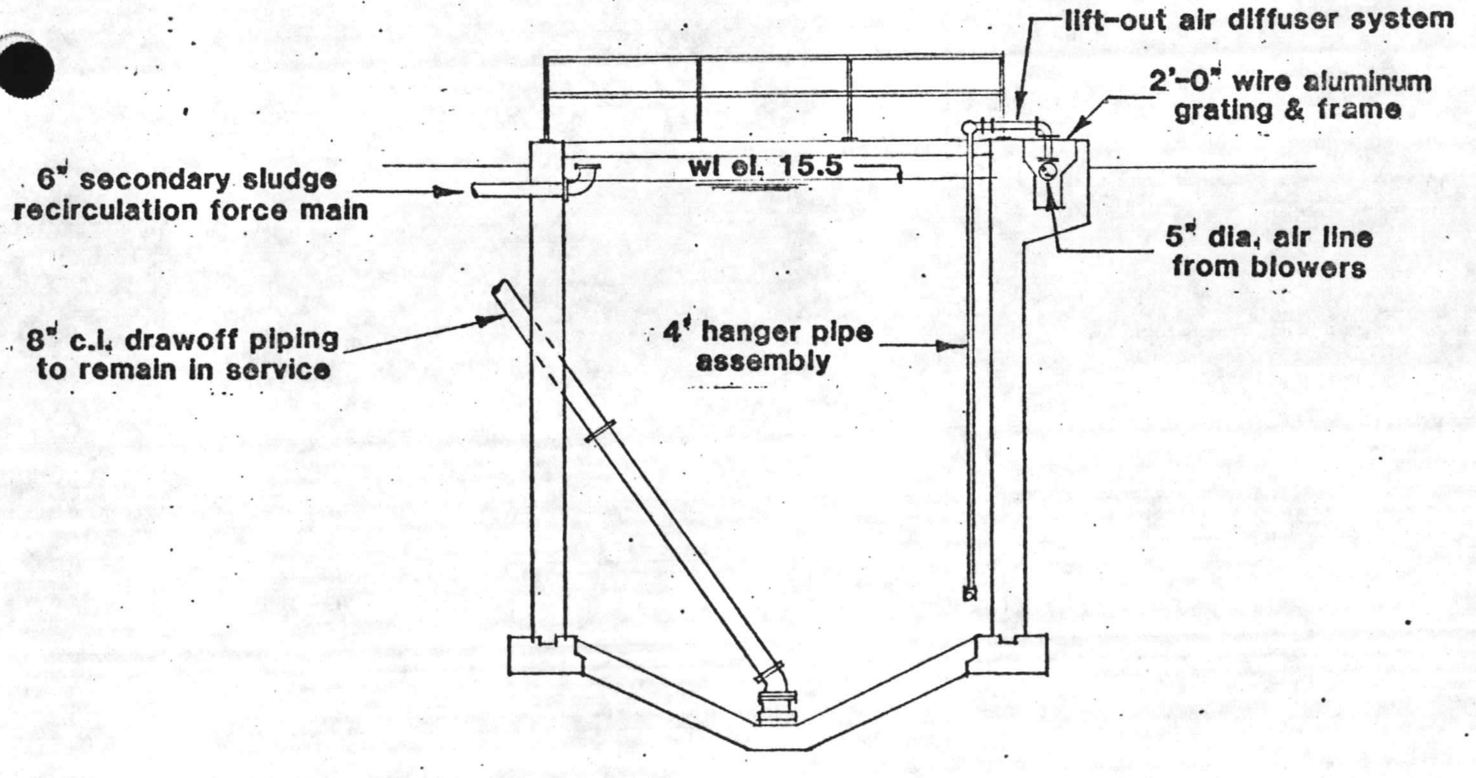


EXHIBIT IV-22

AEROBIC DIGESTER



SECTION #1



SECTION #2

EXHIBIT IV-23
AEROBIC DIGESTER

4.8 SLUDGE DRYING BEDS

4.8.1 Function

To dewater anaerobically digested sludge to a degree where it can be handled and disposed of at the land application sites.

4.8.2 Description of the Unit Operation/Process

The sludge drying beds (Exhibits IV-24) at the plant consist of eight beds providing a total bed area of 8,480 sq. ft. and a pump station which recycles the bed underdrainage at the headworks of the plant. The detailed design description of the sludge drying beds is summarized below:

Sludge Drying Beds:	
Number of beds, 53'-0" x 20'-0", each	8
Unit bed area, sq. ft.	1060
Total bed area, sq. ft.	8480
Underdrainage Pump Station:	
Number of pumps, gpm capacity, each	2

The drying of sludge on the conventional beds is accomplished by allowing the water to drain from the sludge mass through the supporting sand to the drainage piping and natural evaporation to the air. On conventional beds, it takes about two to three weeks for the sludge to dewater to a liftable point.

4.8.3 Relationship to Adjacent Units

The digested sludge from the aerobic digestion system is discharged to the sand beds for dewatering. After the sludge is dewatered to a point where it can be handled, it is removed from the beds manually and trucked to the landfill site for ultimate disposal. Proper digestion of sludge is important prior to disposing it to beds because improperly digested sludge can cause odor problems and may take a long time to dewater.

4.8.4 Operation

A. Initial Start-Up

For initial start-up of the sludge drying beds, the following procedures should be followed:

1. All lines should be clear of debris and valves checked for free operation.

2. The sand surface should be level and all irregularities raked.

3. Clear all debris from surfce of bed.

4. Install stoplogs at vehicle entrance to drying beds.

5. Check drainage return system and piping.

6. Start flow of liquid sludge into bed. Stop flow when the liquid is approximately 8 to 12 inches deep throughout the bed.

B. Normal Operation

Under normal operation, the following procedures should be followed:

1. Inspect the beds every few days noting any odors or insect problems.

2. Remove weed growth, if any.

3. When sludge is dry (normally 3 weeks or longer depending on weather conditions and depth of sludge), remove the sludge, taking care not to damage the sand and gravel layers. Remove as little sand with the sludge as possible.

4. Vehicles and equipment should not be operated directly on the sand but should be operated on planks laid on top of the bed.

5. After the sludge is moved, inspect the bed, rake the surface of the same to level it and to remove any debris, and add make up sand if necessary.

6. The bed is ready for the next application of sludge.

C. Alternate Operating Modes

D. Emergency Operation and Failsafe Features

Drying of sludge on beds depends upon good weather conditions. Accordingly, if adverse weather conditions prevail for a long period, it may result in that the beds might be loaded to their full capacity leaving no space for additional sludge being generated at the plant. Such condition can be considered as an emergency condition. Under such condition, the digested sludge or partially dewatered sludge should be trucked to a suitable land application site to provide space for handling of excess sludge generated at the plant. Another alternative is to condition the sludge with polymer to enhance dewatering process.

4.8.5 Control

A. Flow Controls

Sludge flow to the individual beds can be controlled by the respective gate valve and stop gate.

B. Process Control

Process controls of the sludge bed dewatering system include analysis of percent solids and moisture in the feed and dewatered sludge, analysis of suspended solids and BOD in the drainage that is recycled back to the influent end of the plant.

C. Electrical Control

Electrical control for the underdrainage pump station is provided in the local control station. Each pump is controlled by HAND-OFF-AUTO (H-O-A) selector switch. Normally, the H-O-A switches for the "lead" and "lag" pumps will be in the AUTO position to provide automatic pump control and alternator.

4.8.6 Common Operating Problems

The operating problems commonly experienced in the sludge drying beds, their probable causes, and corrective measures are summarized in Table IV-14.

4.8.7 Maintenance

In conventional beds, during each sludge removal cycle some sand is also removed form the bed. The amount depends on the method of removing the dried sludge. The sand depth should be checked periodically from an established reference point such as the top of the bed wall until a pattern is established. Sand should be added when the depth has decreased to 3 or 4 inches. The surface of the sand should be leveled and raked prior to each sludge application.

Weed growth in the drying beds should be controlled either by spraying with weed killer or hand pulling. The drainage system should be inspected and maintained so that free drainage takes place from the drying beds. It can be inspected for proper operation shortly after new sludge is placed in a bed.

Sludge lines and valves should be regularly inspected and maintained as leaky valves may allow wet sludge to enter a bed during the drying process. Sludge lines must be drained after use in winter to prevent damage from freezing.

4.8.8 REFERENCES

1. Environmental Protection Agency, Consideration For Preparation of Operation and Maintenance Manual, EPA 430/9-74

2. EPA, Maintenance Management Systems For Municipal Wastewater Facilities, EPA 430/9-74-004, 1974

3. EPA, A Planned Maintenance Management Systems For Municipal Wastewater Treatment Plants, EPA 600/2-73-004, 1973

4. The Texas Water Utilities Associatio, Manual of Wastewater Operations, 1971

5. California State University, Sacramento, Operation of Wastewater Treatment Plants, Volumes I, II & III, A Field Study Training Program, 1980

6. Water Pollution control Federation, Operation and Wastewater Treatment Plants - MOP No. 11, 1976

7. New York State Department of Environmental Conservation, Manual of Instruction For Wastewater Treatment Plant Operators, Vols. 1 and 2, 1978

8. Department of the Navy, Bureau of Yards and Docks, Training Course in Water and Sewage Plant Operations, June 1965

9. U.S. EPA, Maintenance Management in Wastewater Facilities - Instructor Training Course, September 1982

10. Water Pollution Control Federation, Sludge Dewatering, MOP No. 20, 1969.

11. Environmental Protection Agency, Process Design Manual, Sludge Treatment and Disposal, 1974.

12. Environmental Protection Agency, Operation Manual-Sludge Handling and Conditioning, February, 1978.

TABLE IV- 14

SLUDGE DRYING BEDS - COMMON OPERATING PROBLEMS, CAUSES, AND REMEDIES*

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
1. Excessive dewatering time	A. Applied sludge depth is too great	1. Typically, 8 inches of applied sludge is satisfactory	1) When bed has dried, remove sludge and clean. Apply a smaller depth of sludge and measure the draw down over a 3 day period. Next application, apply twice the 3 day draw down.
	B. Sludge applied to improperly cleaned bed	1. Note condition of any emply beds	1) After sludge has dried, remove sludge and dirty sand and replace with 0.5-1 inch of clean sand.
	C. Underdrain system has plugged or lines are broken		1) Backflush beds slowly by hooking clean water source to underdrain piping. Check sand bed and replace media as needed. Drain underdrain lines during freezing weather to keep them from freezing.
	D. Beds undersized	1. Effects of adding polymer	1) Normally 5-30 lbs/ton of dry solids of cationic polymer provides improved dewatering rates.

TABLE IV-14

SLUDGE DRYING BEDS - COMMON OPERATING PROBLEMS, CAUSES, AND REMEDIES*
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
	E. Weather conditions	1. Temperature, precipitation	1) Cover or enclose bed to protect from weather
2. Sludge feed lines are plugged	A. Accumulation of grit and solids in lines		1) Open valves fully at start of sludge application to clean lines; flush lines with water if necessary.
3. Very thin sludge being drawn from digester	A. "Coning" occurring in digester with water being pulled out and sludge left behind		1) Reduce rate of withdrawal from digester.
4. Flies breeding in sludge beds			1) Break sludge crust and use larvicides such as borax or calcium borate or kill adult flies with suitable insecticide.
5. Odors when sludge is applied	A. Inadequate digestion of sludge	1. Operation of digestion process (see appropriate section of this manual)	1) Establish correct operation of digestion process

TABLE IV-14

SLUDGE DRYING BEDS - COMMON OPERATING PROBLEMS, CAUSES, AND REMEDIES*
(Continued)

PROBLEM/OBSERVATION	PROBABLE CAUSE	NECESSARY CHECK	REMEDIES
			2) As temporary solution, add lime to sludge. Lime may control odors but may tend to clog sand.

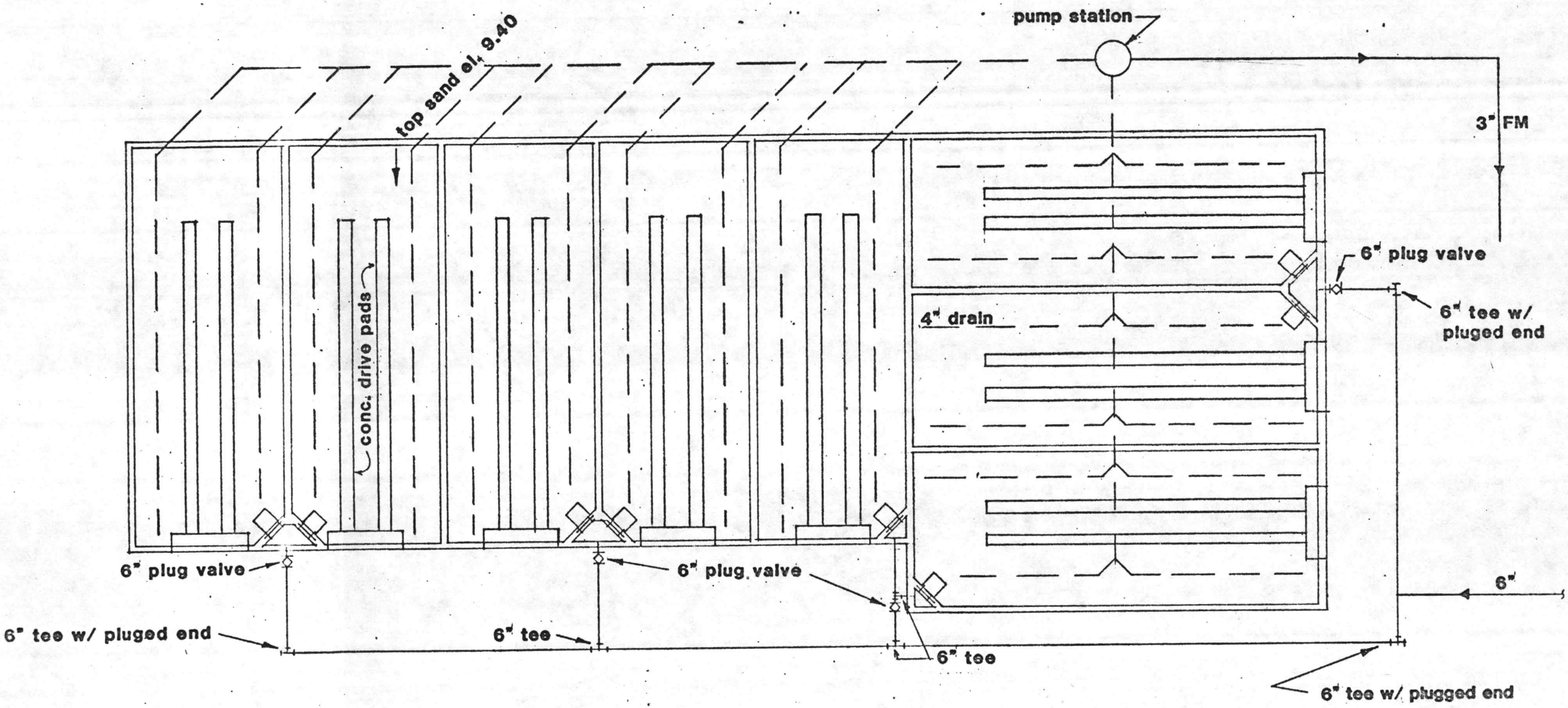


EXHIBIT IV-24

SLUDGE DRYING BEDS

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LABORATORY

LABORATORY

5. LABORATORY TESTING

5.1 GENERAL

Sampling and laboratory testing are the means by which decisions on process control adjustments and impacts on receiving stream water quality can be made. By relating the laboratory test results to plant operation, the operator can select the most effective operational parameters, determine the efficiency of his treatment processes, identify developing problems before they seriously affect effluent quality, and assess impacts on receiving stream water quality.

5.2 RECOMMENDED LABORATORY EQUIPMENT, GLASSWARE AND CHEMICALS

A list of recommended equipment, glassware and chemicals to be provided at the Courthouse Bay wastewater treatment plant for performing the tests required by the NPDES Permit and for process controls is given in Appendix IV. The list was prepared in accordance with the guidelines given in the EPA publication - Estimating Laboratory Needs For Municipal Wastewater Treatment Facilities.

5.3 SAMPLING

5.3.1 Importance and Type of Sampling

Good sampling procedures are the key to meaningful laboratory analysis. A typical sample represents only a small fraction of the total flow, and, therefore, a great care must be exercised to ensure that the sample be representative. If this is not accomplished, the subsequent analytical data is worthless for process control.

The two most common types of samples are known as grab sample and composite sample, and either may be collected manually or automatically. The wastewater treatment plant is equipped with automatic samplers for collection of plant influent and effluent samples.

Grab Sample: It is a single sample taken from the wastestream at any time of the day. This type of sample is taken when wastewater does not flow continuously, when appearance of discharge changes rapidly, and when making sure that the composite sample is not masking extreme conditions of the waste. The volume of a grab sample to be taken depends on the total number of separate analyses that must be made; however, a quart is usually sufficient. Examples of the laboratory tests that require grab samples for monitoring and process control are: pH, dissolved oxygen, temperature, residual chlorine, etc.

Composite Sample: A combination of individual samples taken at selected time intervals for some specified period to minimize the effect of variability of the individual sample. Samples may be of equal volume or proportional to flow at time of sampling. Examples of the laboratory tests that require composite samples for monitoring and process control are: BOD , COD, TSS, NH -N, etc.

5.3.2 Sample Handling

The following is a list of general guidelines that can be used to collect a representative sample for laboratory analysis:

1. Sampling point should be readily accessible and adequate safety precautions should be observed.

2. Sample container and sampling device should be clean and uncontaminated. Before the sample is taken, the container should be rinsed several times with the wastewater.

3. Sample should be taken at a place where the wastewater is well mixed, such as a location in the inlet structure with hydraulic turbulence. Weirs tend to enhance the settling of solids immediately upstream and the accumulation of floating oil or grease immediately downstream. Such locations should be avoided as a sample source.

4. The sample should be taken in the center of the channel of flow where the velocity is highest and the possibility of solids have settled is a minimum. In order to avoid an excess of floating materials, the mouth of the collecting container should be placed a few inches below the water surface.

5. Large or unusual particles, 1/4-inch effective diameter or greater, should be excluded when sampling.

6. Any floating materials, growth, etc., which may have accumulation at sampling location should not be collected when sampling.

7. The volume of the sample obtained should be sufficient to perform all the required analyses plus an additional amount for repeating any doubtful abalyses.

8. Sampling of wastewater with immiscible fluids, such as a mixture of oil and water, requires special attention. At places in the wastewater where oil floats, it is simple to obtain a sample of the oil to analyze, but difficult to determine the quantity of oil flowing per day. A method commonly used to estimate total volume is to divert the wastewater into a container. After separating the two fluids, it is possible to measure the thickness of the oil layer and thus ascertain the volume of oil present. Another problem with oil is adherence to the sampling device which will require frequent cleaning.

9. Considerations should be given to the relationship between plant's daily flow variation and detention time through the units so that influent and effluent samples approximately relate to the same waste.

10. Each sample should be labelled with an identification card containing, as a minimum, the following information:

    a. Designation or location of sample collection.

    b. Date and time of collection.

    c. Indication of grab or composite sample with appropriate time and volume information.

    d. Notation of information that may change before laboratory analyses are made. This would include temperature, pH, and appearance.

11. Sample should be stored in a manner that ensures that the characteristics to be analyzed are not altered. Refrigeration to 4'C in some instances may be necessary. When the storage of sample interferes with particular analysis, it is preferred to take separate samples for such analysis which may require special preservation technique.

The volume of sample and the preservation techniques required for determination of various constituents in wastewater are given in Table V-1.

5.3.3 Compositing of Samples

The preferred sampling procedure except for certain laboratory tests which must be run immediately (Dissolved Oxygen, Temperature, pH), is to collect hourly samples for 24 hours with the volume of sample in proportion to the wastewater flow rate. When available and where possible, automatic sampling devices should be employed for compositing sample. The Courthouse Bay wastewater treatment plant is equipped with automatic samplers for collecting composite samples of influent and effluent. The samplers are paced with the flow metering systems.

When the hourly grab samples are taken manually, they should be immediately refrigerated to preserve them from continued bacterial decomposition. Table V-1 summarizes the recommended preservation technique for samples collected for various laboratory tests. When all the samples from a specific location have been collected for a 24-hour period, the samples should be combined or composited together according to flow to form a single 24-hour composite sample. The following steps must be observed in preparing a composite sample:

1. The rate of wastewater flow must be metered at the time of collection of each grab sample for compositing.

2. Each grab sample must then be taken and measured out in direct proportion to the volume of the flow at that time.

Table V-2 illustrates an example for preparing a 24-hour composite sample taking into consideration the hourly plant flow.

TABLE V-1

SAMPLING AND PRESERVATION
FOR ANALYSIS OF VARIOUS WASTEWATER CONSTITUENTS

Measurement	Vol. Req. (ml)	Container*	Preservative	Holding Time
Physical Properties				
Color	50	P,G	Cool, 4°C	24 Hrs.
Conductance	100	P,G	Cool, 4°C	24 Hrs.
Hardness	100	P,G	Cool, 4°C HNO_3 to pH 2	6 Mos.
Odor	200	G only	Cool, 4°C	24 Hrs.
pH	25	P,G	Det. on site	6 Hrs.
Residue				
Filterable	100	P,G	Cool, 4°C	7 Days
Non-Filterable	100	P,G	Cool, 4°C	7 Days
Total	100	P,G	Cool, 4°C	7 Days
Volatile	100	P,G	Cool, 4°C	7 Days
Settleable Matter	1000	P,G	None Req.	24 Hrs.
Temperature	1000	P,G	Det. on site	No Holding
Turbidity	100	P,G	Cool, 4°C	7 Days
Metals				
Dissolved	200	P,G.	Filter on site HNO_3 to pH<2	6 Mos.
Suspended	200		Filter on site	6 Mos.
Total	100	P,G	HNO_3 to pH<2	6 Mos.
Mercury Dissolved	100	P,G	Filter on site HNO_3 to pH<2	38 Days (Glass) 13 Days (Hard Plastic)

TABLE V- 1
(Continued)

Measurement	Vol. Req. (ml)	Container*	Preservative	Holding Time
Total	100	P,G	HNO_3 to pH<2	38 Days (Glass) 13 Days (Hard Plastic)
Inorganics, Non-Metallics				
Acidity	100	P,G	None Req.	24 Hrs.
Alkalinity	100	P,G	Cool, 4°C	24 Hrs.
Bromide	100	P,G	Cool, 4°C	24 Hrs.
Chloride	50	P,G	None Req.	7 Days
Chlorine	200	P,G	Det. on site	No Holding
Cyanides	500	P,G	Cool, 4°C NaOH to pH 12	24 Hrs.
Fluoride	300	P,G	None Req.	7 Days
Iodide	100	P,G	Cool, 4°C	24 Hrs.
Nitrogen				
Ammonia	400	P,G	Cool, 4°C H_2SO_4 to pH<2	24 Hrs.
Kjeldahl, Total	500	P,G	Cool, 4°C H_2SO_4 to pH<2	24 Hrs.
Nitrate plus Nitrite	100	P,G	Cool, 4°C H_2SO_4 to pH<2	24 Hrs.
Nitrate	100	P,G	Cool, 4°C	24 Hrs.
Nitrite	50	P,G	Cool, 4°C	48 Hrs.
Dissolved Oxygen				
Probe	300	G Only	Det. on site	No Holding
Winkler	300	G Only	Fix on site	4-8 Hours

TABLE V- 1
(Continued)

Measurement	Vol. Req. (ml)	Container*	Preservative	Holding Time
Phosphorus				
Orthophosphate, Dissolved	50	P,G	Filter on site Cool, $4^{o}C$	24 Hrs.
Hydrolyzable	50	P,G	Cool, $4^{o}C$ H_2SO_4 to pH<2	24 Hrs.
Total	50	P,G	Cool, $4^{o}C$ H_2SO_4 to pH<2	24 Hrs.
Total, Dissolved	50	P,G	Filter on site Cool, $4^{o}C$ H_2SO_4 to pH<2	24 Hrs.
Silica	50	P only	Cool, $4^{o}C$	7 Days
Sulfate	50	P,G	Cool, $4^{o}C$	7 Days
Sulfide	500	P,G	2 ml zinc acetate	24 Hrs.
Sulfite	50	P,G	Det. on site	No Holding
Organics				
BOD	1000	P,G	Cool, $4^{o}C$	24 Hrs.
COD	50	P,G	H_2SO_4 to pH<2	7 Days
Oil & Grease	1000	G Only	Cool, $4^{o}C$ H_2SO_4 or HCl to pH<2	24 Hrs.
Organic carbon	25	P,G	Cool, $4^{o}C$ H_2SO_4 or HCl to pH<2	24 Hrs.
Phenolics	500	G Only	Cool, $4^{o}C$ H_3PO_4 to pH 4 1.0 g $CuSO_4$/l	24 Hrs.
MBAS	250	P,G	Cool, $4^{o}C$	24 Hrs.
NTA	50	P,G	Cool, $4^{o}C$	24 Hrs.

TABLE V-2

24-HOUR PROPORTIONAL COMPOSITE SAMPLE

Time	Flow, mgd	Factor	Sample Vol., ml
6:00 AM	1.0	100	100
7:00 AM	1.0	100	100
8:00 AM	1.2	100	120
9:00 AM	1.2	100	120
10:00 AM	1.4	100	140
11:00 AM	1.4	100	140
12:00 Noon	1.4	100	140
1:00 PM	1.6	100	160
2:00 PM	1.6	100	160
3:00 PM	1.8	100	180
4:00 PM	1.6	100	160
5:00 PM	1.6	100	160
6:00 PM	1.4	100	140
7:00 PM	1.4	100	140
8:00 PM	1.3	100	130
9:00 PM	1.2	100	120
10:00 PM	1.0	100	100
11:00 PM	1.0	100	100
12:00 Midnight	0.8	100	80
1:00 AM	0.8	100	80
2:00 AM	0.8	100	80
3:00 AM	0.5	100	50
4:00 AM	0.5	100	50
5:00 AM	0.8	100	80

Total Volume of Composite Sample = 2830 ml

5.3.4 Sludge Sampling

In sampling sludge for process control tests, the sample should be taken as a composite by mixing small equal portions taken out every 30 seconds. If only a single portion of sludge is taken for sample, it may not be representative because the sludge sample may be too thick or too thin, depending upon the moment the sample was taken. A composite sample will prevent this possibility.

5.4 LABORATORY TESTS AND THEIR INTERPRETATION

The laboratory tests which are required by the NPDES Permit (marked with an asterisk - *) and for process controls are discussed below. The discussion also includes significance of each test parameter in plant operation and/or process controls. Detailed procedures in performing the tests can be found in the following publications:

1. Standard Methods For Examination of Water and Wastewater, 16th Edition, APHA, WPCF, AWWA, 1984.

2. Methods For Chemical Analysis of Water and Wastes, EPA-600/4-79-020, March 1979.

3. Self-Monitoring Procedures: Basic Parameters For Municipal Effluents - Student Reference Manual, EPA-430/1-74-015.

5.4.1 Flow*

Flow measurement is an important factor in process control. For example, flow measurement is helpful in computing hydraulic and organic loadings, F/M ratios, oxygen requirements, detention periods, recycle flows, or sludge wasting rates. The measurement of the plant flow also provides a basis for computing costs of billing, estimating chemical needs, predicting the future need for plant expansion or modification, and evaluating the effect of the plant effluent on the receiving stream.

The Courthouse Bay wastewater treatment plant is equipped with automatic flow metering devices for effluent, and trickling filter recirculation.

5.4.2 Bio-Chemical Oxygen Demand, 5 Day at 20'C (BOD)

The BOD test is used to determine the oxygen required to stabilize biologically the organic matter present in the wastewater. It is the principal test to determine the strength, in terms of oxygen required, of domestic wastewater. It is widely used to evaluate the organic loading and related performance of various treatment processes and to estimate the effects of pollution on receiving streams. BOD test results are usually reported in milligrams per liter (mg/l) of oxygen consumed at the end of a five-day test period. These results are referred to as the 5-day BOD and should not be confused with the ultimate BOD of the sample. Expected ranges of the BOD tests for various samples are given as follows:

Sample	BOD, mg/l Min.	Max.	Average
Plant Influent	100	450	200
Primary Clarifier Effluent	120	315	140
Final Effluent	15	50	25
Aerobic Digester Supernatant	10	60	20
Sludge Drying Beds Underdrainage Return	5	65	20

Sudden increase in BOD values may be indicative of an adverse industrial waste discharge of a strong organic waste. Such discharge might organically shock load the biological processes (trickling filter and nitrification systems) and subsequently, will upset the plant performance.

When performing BOD analyses, the following procedures should be followed in conjunction with the procedures outlined in Standard Methods:

1. A minimum of two dilutions per sample should be used. Only analyses with oxygen depletions of greater than 2 mg/l but with no less than a residual of 2 mg/l after 5 days of incubation at 20'C should be used to calculate the BOD.

2. Samples should be well mixed before dilutions are made. A wide tip pipette should be used for making the dilutions.

3. Samples and dilution water must be carefully added to the BOD bottle to avoid aeration and the possibility of entraining bubbles in the solution.

4. If the BOD value of the more dilute sample is always greater, this may indicate that there is some toxic material in the wastewater, which is inhibiting the bacteria. A series of dilutions should be set up and run. If the BOD is increasing with higher dilution, this may indicate a condition known as a toxic sludge. Further analyses should be conducted to determine the nature of the toxic material, and if it appears that the concentration of the toxicant is significant, efforts should be initiated to identify the source and reduce the concentration of the toxicant in the wastewater.

5. Use of a primary standard is strongly recommended. The standard should be made of glucose - glutamic acid mixture - and it should be made up at a BOD near those levels in the treatment plant influent. The primary standard should be made up and analyzed weekly. Any significant variation (more than + 20%) should cause the operator to be suspicious. Efforts should be undertaken to review the laboratory procedure and find out what is causing the problem. Each operator should analyze the standard, and the results should be within + 10%). Operators not falling within this range should review their laboratory techniques and make the appropriate adjustments.

6. Wastewaters that have been partially nitrified may produce high BOD results. The increased oxygen demand results from the oxidation of ammonia to nitrate. The use of allylthiourea in the dilution water will inhibit the nitrifiers and alleviate this problem.

5.4.3 Chemical Oxygen Demand (COD)

The COD test is based on the fact that practically all organic compounds can be oxidized by the action of strong oxidizing agents under acid conditions. During the test, organic matter is converted to carbon dioxide and water regardless of the biological assimilability of the substances. As a result, COD values can be much greater than BOD values if large amounts of biologically resistant organic matter are present. The test is widely used in the operation of industrial wastewater treatment facilities because it is rapid (3-4 hours); it is not subject to interferences from toxic materials; and it is not affected by ammonia oxidation. Expected ranges of COD test results for various samples are given as follows:

Sample	COD, mg/l Min.	Max.	Ave.
Plant Influent	150	700	400
Plant Effluent	25	60	45

The COD removal of a biological process is directly relatable to the amount of biological growth that can result from this removal. The COD analysis suffers from the disadvantages that it does not measure the rate of biodegradibility, and therefore, it is difficult to predict the efforts of effluents on oxygen resources of receiving waters and the treatability of a particular wastewater.

When performing the COD test, the following procedures should be followed in conjunction with those outlined in Standard Methods:

1. Initially, the analyst should run triplicate samples to establish the variability of his analyses. Once this variability is established, samples can be analyzed without replication.

2. Use a wide tip pipette to ensure that a representative sample is taken.

3. Glassware used to the COD analyses must be washed with hydrochloric acid, hot washed, and rinsed three times with distilled water.

4. If a sample mixture turns green during or immediately following the heating period, the analysis is not valid and should be re-examined in a more dilute sample. If the problem re-occurs, then the laboratory technique should be re-evaluated and the sample should be checked for likely interferences, such as high chloride concentration or the presence of a strong base.

5. A primary standard consisting of potassium acid phatalate should be analyzed on a weekly basis to ensure that the analyses are consistent. The COD concentration of the standard should be near the level of the COD of the wastewater. (See Standard Methods.)

5.4.4 Fecal Coliform*

Fecal coliform bacteria are indicators of fecal pollution of water because the normal habitat of these bacteria is generally the intestine of man and animals. Fecal coliform bacteria determination is useful in evaluation of chlorination efficiency, stream pollution survey, and for determining the sanitary qualityof waters from lakes, rivers, creeks, and wells. Numerical coliform criteria for Class "C" waters requires that the fecal coliforms not exceed a log mean of 1000/100 ml (MPN or MF count) based upon at least five consecutive samples examined during any 30-day period; nor exceed 2000/100 ml in any more than 20 percent of the samples examined during such period. The procedures for performing the fecal coliform test is given in Standard Methods. Expected ranges of the fecal coliform test results for various samples are given as follows:

Sample	Fecal Coliform, #/100 ml Min.	Max.	Ave.
Plant Influent	1 x 10	100 x 10	30 x 10
Plant Effluent			2000

5.4.5 Settleable Solids*

The term settleable solids is applied to solids in suspensions that will settle, under quiescent conditions, because of the influence of gravity. This test is of value in providing a quick and efficient check of a settling tank. Additionally, a rough estimate of the volume of solids removed by the settling tank can be made. Only a trace of settleable solids should remain in the secondary effluent. Poor settleable solids removal may indicate the following related problems which may occur in settling tanks: (1) hydraulic overload, (2) irregular flow distributions to multiple units, (3) excessively high velocity currents, (4) effluent weirs of uneven height or short circuiting, (5) improper sampling technique, and (6) improper sludge removal pumping rates.

Expected ranges of settleable solids test results for various samples are:

Sample	Settleable Solids, ml/liter Min.	Max.	Ave.
Plant Influent	2	7	5
Plant Effluent	-	-	Trace

When performing the settleable solids test, the following procedures should be followed in conjunction with those outlined in Standard Methods:

1. Take a sample volume greater than one liter. Use grab samples for this analysis.

2. Fill the Imhoff cone exactly to the one liter mark in one rapid pouring without stopping.

3. After the sample has settled for 45 minutes, either gently tap the sides of the cone or gently spin the cone between the palms of your hands to settle those solids adhering to the sides of the cone above the compacted settled layer at the bottom of the cone.

4. Read and record the volume of settled matter (ml/l) at the end of one hour. Read the graduation at the average solids depth and not at a peak or void area on the surface of the settled solids.

5.4.6 Total Suspended Solids (TSS*)

The undissolved substances in wastewater are usually referred to as suspended solids. The significance of the suspended solids test is generally dependent on the type of treatment process and the location of measurements within the process application. Results of the suspended solids test have the following uses in process control: (1) evaluating the organic strength of the wastewater, (2) evaluating clarifier and sludge drying beds solids loading, (3) calculating suspended solids removal and the efficiency of clarifier, and overall plant, and (4) estimating the solids inventory.

Expected ranges of the TSS test results for various samples are:

Sample	TSS (MLSS), mg/l Min.	Max.	Ave.
Plant Influent	100	375	200
Plant Effluent	15	50	25

For test procedures refer to Standard Methods For the Examination of Water and Wastewater, 16th Edition, WPCF, 1984.

5.4.7 Volatile Suspended Solids (VSS)

The VSS test measures the amount of organic matter present in the solid portion of wastewater or sludge. This test is an index of amount of organic matter present in the suspended solid portion of wastewater.

The test has the same significance as the total suspended solids test with two additional applications which are the determination of volatile suspended solids loading and removal in the aerobic digestion. Expected ranges of the VSS reduction in the aerobic digestion system are 35 to 45 percent.

When performing the suspended solids test, the following procedures should be followed in conjunction with the procedures outlined in Standard Methods:

1. The sample must be thoroughly mixed prior to taking a sample aliquot.

2. Do not use a small-tipped pipette to measure the sample aliquot. A wide-tipped pipette should be utilized to permit passage of the larger solids and to facilitate rinsing. An alternate method of obtaining a sample aliquot would be to pour it into a graduated cylinder.

3. Rinse all adhering solids from graduated cylinder (or pipette) with distilled water. Pour rinse water through the filter.

4. Test results that appear faulty or questionable should be disregarded.

5. It is important to always maintain a temperature of between 103-105'C in the drying oven. The temperature must be monitored and recorded in a record book.

6. Be sure that the filter is properly seated in the filtration apparatus before pouring the sample. This is easily accomplished by wetting the filter with distilled water, then applying vacuum to the filtration apparatus.

7. Samples containing high solids levels may require more than one hour to completely dry. This is especially true of return sludge samples.

8. Be consistent in the length of time the filter apparatus and paper are allowed to cool in the dessicator both before and after filtering.

9. Use Whatman GF/C filters and a millipore filter apparatus with sintered glass seat for this analysis.

5.4.8 Hydrogen Ion Concentration (pH)*

The intensity of acidity or alkalinity of a solution is numerically expressed by its pH. The pH scale is usually represented by ranging from 0 to 14, with pH 7.0 representing absolute neutrality. Acid conditions increase as pH values decrease, and alkaline conditions increase as the pH values increase. The electrometric method (pH meter) is preferred in all applications because it is not as subject to interference by color, turbidity, colloidal matter, various oxidants, and reductants as is the less expensive colorimetric method.

The pH measurements are valuable in process control because pH is one of the environmental factors that affect the activity and health of micro-organisms. Sudden changes or abnormal pH values may be indicative of an adverse industrial discharge of a strongly acid or alkaline waste. Such discharges are detrimental to biological processes as well as to the collection system and treatment equipment and should be either stopped or neutralized prior to discharge. Generally, the pH of the secondary effluent will be close to 7.0. A pH drop may be noticeable in a biological process achieving nitrification because alkalinity is destroyed during the nitrification process. Expected ranges of the pH test results for various samples are:

Sample	pH
Plant Influent	6.5 - 8.0
Trickling Filter Effluent	6.8 - 7.2

When performing the pH test, the following procedures should be followed in conjunction with the procedures outlined in Standard Methods:

1. Grab samples should be used for pH measurement. The pH test should be performed on the samples immediately following collection before the temperature or dissolved gas content can change significantly. Do not heat or stir the pH sample as the change in temperature or dissolved gas content will affect the pH value.

2. Do not contaminate the buffer by pouring the used buffer solution back into the buffer container.

3. Calibrate the pH meter daily with a buffer solution.

4. Avoid fouling the electrodes with oil or grease.

5. Erratic results or drifting should prompt an investigation of the electrodes.

5.4.9 Temperature ('C)*

The temperature measurements are valuable in process control because temperature is one of the most important factors affecting microbial growth. Generally, the rate of microbial growth doubles for every 10'C increase in temperature, within the specific temperature range of the microbe. Temperature measurements can be helpful in detecting infiltration/inflow problems and illegal industrial discharges. Expected ranges of temperature test results for various samples are:

Sample	Temperature 'C
Plant Influent	12 - 30
Plant Effluent	20 - 30

When obtaining the temperatures of a sample, the following procedures should be followed in conjunction with the procedures outlined in Standard Methods:

1. To obtain truly representative temperature measurement, it is necessary either to take the temperature reading at the point of sampling or immediately following sample collection. A large sample volume should be used to avoid a temperature change during the measurement.

2. The thermometer should be left in the sample while it is used.

3. The accuracy of the thermometer used should be occasionally verified against a precision thermometer certified by the National Bureau of Standards (NBS).

5.4.10 Dissolved Oxygen (DO)*

Dissolved oxygen is that oxygen dissolved in liquid and is usually expressed as milligrams per liter (mg/l). The solubility of oxygen in fresh waters ranges from 14.6 mg/l at 0'C to 7 mg/l at 35'C. The solubility of oxygen is at a minimum when temperatures are high. Table V-3 summarizes the solubility of oxygen in water exposed to water-saturated air.

The significance of the DO test in process control is in its measurement of the dissolved oxygen available for and essential to aerobic decomposition of the organic matter; otherwise, anaerobic decomposition may occur with the possible development of nuisance conditions. In the aerobic sludge digestion process, the DO test is used to monitor the aeration process as a basis for control of the air supply rates, in order to maintain a desired DO residual (1.0 to 3.0 mg/l), while avoiding over-aeration and power wastage. The DO test is also used in the determination of BOD. Fish and most aquatic life require dissolved oxygen to sustain their existence, and, therefore, the DO test is an important measurement in plant effluents and receiving water quality.

When performing the DO test, the following procedures should be followed in conjunction with the procedures outlined in Standard Methods:

1. Use extreme caution in handling the chemical reagents to avoid injury or damaged clothing.

2. Perform DO test immediately following collection of sample.

TABLE V- 3

SOLUBILITY OF OXYGEN IN WATER EXPOSED TO WATER-SATURATED AIR

Temp. °C	Chloride Concentration in Water, mg/l					Difference per 100 mg chloride
	0	5,000	10,000	15,000	20,000	
	Dissolved Oxygen, mg/l					
0	14.6	13.8	13.0	12.1	11.3	0.017
1	14.2	13.4	12.6	11.9	11.0	0.016
2	13.8	13.1	12.3	11.5	10.8	0.015
3	13.5	12.7	12.0	11.2	10.5	0.015
4	13.1	12.4	11.7	11.0	10.3	0.014
5	12.8	12.1	11.4	10.7	10.0	0.014
6	12.5	11.8	11.1	10.5	9.8	0.013
7	12.2	11.5	10.9	10.2	9.6	0.013
8	11.9	11.2	10.6	10.0	9.4	0.012
9	11.6	11.0	10.4	9.8	9.2	0.012
10	11.3	10.7	10.1	9.6	9.0	0.011
11	11.1	10.5	9.9	9.4	8.8	0.011
12	10.8	10.3	9.7	9.2	8.6	0.011
13	10.6	10.1	9.5	9.0	8.5	0.010
14	10.4	9.9	9.3	8.8	8.3	0.010
15	10.2	9.7	9.1	8.6	8.1	0.010
16	10.0	9.5	9.0	8.5	8.0	0.009
17	9.7	9.3	8.8	8.3	7.8	0.009
18	9.5	9.1	8.6	8.2	7.7	0.009
19	9.4	8.9	8.5	8.0	7.6	0.009
20	9.2	8.7	8.3	7.9	7.4	0.008
21	9.0	8.6	8.1	7.7	7.	0.008
22	8.8	8.4	8.0	7.6	7.1	0.008
23	8.7	8.3	7.9	7.4	7.0	0.008
24	8.5	8.1	7.7	7.3	6.9	0.008
25	8.4	8.0	7.6	7.2	6.7	0.008
26	8.2	7.8	7.4	7.0	6.6	0.008
27	8.1	7.7	7.3	6.9	6.5	0.008
28	7.9	7.5	7.1	6.8	6.4	0.008
29	7.8	7.4	7.0	6.6	6.3	0.008
30	7.5	7.3	6.9	6.5	6.1	0.008

3. The following substances will interfere in the azide modification of the iodometric DO analysis: iron salts, organic matter, excessive suspended matter, sulfide, sulfer dioxide, residual chlorine, chromium, and cyanide.

5.4.11 Residual Chlorine*

Tests for chlorine residual in wastewater chlorination are critical in preventing the undesirable effects of over or under chlorination. Satisfactory disinfection of secondary wastewater effluent can be obtained when the chlorine residual after 15 to 30 minutes of contact time is between 0.2 to 1.0 mg/l. A residual of 0.5 mg/l after 30 minute contact appears to be the reasonable average for achieving the desired disinfection.

5.4.12 Sample Laboratory Worksheet

Exhibits V-1, V-2, and V-3, and V-5 are the sample worksheets for determination of suspended solids, BOD, and COD, NH3-N and Fecal Coliform.

5.5 SAMPLING AND TESTING SCHEDULE

Exhibit V-6 and Table V-4 show the suggested sampling and testing schedule for the Courthouse Bay wastewater treatment plant. Exhibit V-6 shows the location of sampling points for performing the necessary tests required by the NPDES Permit and for process control. Table V-4 lists the tests, type of samples, location and their frequency of measurements as required by the Permit and for various unit operations/processes control.

5.6 REFERENCES

1. Effluent - Monitoring Procedures Basic Laboratory Skills, U.S. EPA, October, 1977.

2. Process Control Manual For Aerobic Biological Wastewater Treatment Facilities, EPA 430/9-77-006, March 1977, p. IV-7 to IV-32.

3. Standard Methods For Examination of Water and Wastewater, 14th Edition, 1976, APHA, AWWA, WPCF.

4. Simplified Laboratory Procedures For Wastewater Examination, WPCF Publication No. 18.

5. Methods For Chemical Analysis of Water and Waste, EPA.

6. Operation of Wastewater Treatment Plants - A Field Study Training Program, Sacramento State College, Department of Civil Engineers, 1970, Chapter 14.

7. Manual of Instruction For Sewage Treatment Plant Operators, New York State Department of Health.

8. Chemistry For Sanitary Engineers, Sawyer, McGraw-Hill.

9. Operation of Wastewater Treatment Plants, WPCF Manual of Practice No. 11.

10. Manual of Wastewater Operations, The Texas Water Utilities Association, 1971.

11. Operation and Maintenance of Sewage Treatment Plants, William Cameron and Frank Cross, Jr., 1976.

12. Federal Guidelines State and Local Pre-Treatment Programs, EPA, January 1977.

SUSPENDED SOLIDS WORKSHEET

Analysis By: ______________________ Date: ____________ Time: ________

TSS

Sample Identification	______		______	
Crucible/Filter No.	______	______	______	______
a. Wt. of crucible/filter and dry solids, gm	______	______	______	______
b. Wt. of crucible/filter, gm	______	______	______	______
c. Wt. of dry solids (a-b), gm	______	______	______	______
d. Volume of sample, ml	______	______	______	______
e. Suspended Solids, mg/l*	______	______	______	______
Average	______		______	

VSS

Sample Identification	______		______	
Crucible/Filter No.	______	______	______	______
a. Wt. of crucible/filter and dry solids, gm	______	______	______	______
b. Wt. of crucible/filter and ash, gm	______	______	______	______
c. Wt. of volatile solids (a-b), gm	______	______	______	______
d. Volume of sample, ml	______	______	______	______
e. Volatile Suspended Solids, mg/l*	______	______	______	______
Average	______		______	

*Suspended or Volatile Solids $= \frac{(a - b) \times 1{,}000{,}000}{d} = e$

EXHIBIT V-1

BOD WORKSHEET

Analysis By: ______________________ Date: __________ Time: ______

Bottle No.	Sample		Dilution Factor	Dissolved Oxygen, mg/l			BOD mg/l	Comment
	Identification	Volume ml.		Initial (1)	Final (F)	Diff. (I-F)		

$$BOD_5\text{, mg/l} = (\text{Initial DO} - \text{Final DO}) \times \frac{\text{Bottle Capacity, ml}}{\text{ml of Sample Used}}$$

or DO Depletion after 5 days x Dilution Factor

EXHIBIT V-2

COD WORKSHEET

Analysis By: ______________________ Date: __________ Time: __________

Sample Identification	Flask No.	Sample Volume ml.	FAS Volume ml.	FAS For Blank ml.	FAS Normality	COD mg/l	Comments

$$\text{COD, mg/l} = \frac{(\text{FAS Bland Vol., ml} - \text{FAS Sample Vol., ml}) \times \text{FAS Normality} \times 8000}{\text{Sample Volume, ml.}}$$

EXHIBIT V-3

AMMONIA NITROGEN (NH_3-N) WORKSHEET

Analysis By: ______________________ Date: __________ Time: ________

Sample Identification	Sample Volume ml.	mV	NH_3-N mg/l	Comments

EXHIBIT V-4

FECAL COLIFORM WORKSHEET

Analysis By: ______________________________

Date/Time Filtered: ______________________________

Date/Time Counted: ______________________________

Incubation Temperature: ______________________________

Media: Name ____________________ Manufacturer ______________

Lot No. ____________________ Date Prepared ______________

Sample Identification	Filter/P. Dish Number	Sample Volume ml.	Colony Count	Colonies per 100 ml.

$$\text{Colonies/100 ml} = \frac{\text{F. Coliform Colonies counted} \times 100}{\text{ml Sample filtered}}$$

EXHIBIT V-5

TABLE V-4

SAMPLING AND TESTING SCHEDULE

A. SAMPLING LOCATIONS (Shown on EXHIBIT V-6)

Key No.	Description
1	Inlet Structure
2	Primary Clarifier Effluent
3	Trickling Filter Recirculation Flow
4	Plant Effluent
5	Upstream
6	Downstream
7	Primary Sludge Waste Pump
8	Inlet Structure for Secondary Sludge
9	Aerobic Digester Sludge
10	Dewatered Sludge - Sand Beds
11	Aerobic Digester Decant
12	Sand Bed Underdrainage

B. TEST ABBREVIATIONS

Q_{EFF}	Effluent Flow
Q_{TFR}	Trickling Filter Recirculation Flow
Q_{WPS}	Waste Primary Sludge
Q_{WSS}	Waste Secondary Sludge
Q_{ADS}	Aerobic Digester Supernatant Flow
Q_{BDR}	Bed Underdrainage Return Flow
Temp	Temperature
DO	Dissolved Oxygen
BOD_5	Biochemical Oxygen Demand, 5 day

TABLE V-4

SAMPLING AND TEST SCHEDULE

B. TEST ABBREVIATIONS (Continued)

COD	Chemical Oxygen Demand
TSS	Total Suspended Solids
TS	Total Solids
TVS	Total Volatile Solids
Sett. S.	Settleable Solids
NH_3-N	Ammonia Nitrogen
TN	Total Nitrogen
F-Coli	Fecal Coliform
TP	Total Phosphorus
pH	pH (Hydrogen Ion Concentration)

C. NPDES PERMIT TESTS

Test	Frequency	Location	Type of Sample
Flow	Continuous	1 or 4	-
pH	Twice/Month	4	Grab
Temp ^{o}C	Weekly	4, 5, 6	Grab
BOD_5	Twice/Monthly	4	Composite
Total Nitrogen	Twice/Monthly	4	Composite
F-Coli	Twice/Monthly	4, 5, 6	Grab
Total Phosphorus	Twice/Year	4	Composite
Residual Chlorine	Daily	4	Grab

TABLE V-4

SAMPLING AND TEST SCHEDULE
(Continued)

D. PLANT PERFORMANCE TEST

Test	Frequency	Location	Type of Sample
Flow	1/Day	4	Continuous
Temp.	1/Day	1, 4	Grab
pH	1/Day	1, 4	Grab
BOD_5	Twice/Week	1, 4	Composite
TSS	Twice/Week	1, 4	Composite
NH_3-N	Twice/Month	1, 4	Composite
Total Nitrogen	Twice/Month	1, 4	Composite
Total Phosphorus	Twice/Year	1, 4	Composite
F. Coliform	Once/week	4	Composite

E. PROCESS CONTROL TESTS

Unit Operation/Process	Test	Frequency	Location	Type of Sample
1. Grit Removal	TS	Once/Month	Grit Product	Grab
	TVS	Once/Month	Grit Product	Grab
2. Primary Clarification	TSS	Twice/Week	1, 2	Composite
	Sett. S.	Daily	1, 2	Grab
3. Trickling Filter	Q_{TFR}	Continuous	Flow Meter	Continuous
	BOD_5	Twice/Month	2, 4	Composite
	TSS	Twice/Month	2, 4	Composite
4. Disinfection	Res. Cl_2	Daily	4	Grab
	F. Coli	Once/Week	4	Composite
5. Sludge Digestion	Flow	Daily	7	When operating
	pH	Twice/Week	9	Grab
	TS	Once/Week	9	Grab
	TVS	Once/Week	9	Grab
	BOD_5	When decanting	11	Grab
	TSS	When decanting	11	Grab

TABLE V-4

SAMPLING AND TEST SCHEDULE
(Continued)

Unit Operation/Process	Test	Frequency	Location	Type of Sample
6. Sludge Drying Beds	TS	Once/Week		Grab
	BOD_5	After Sludge landing	12	Grab
	TSS	After Sludge landing	12	Grab

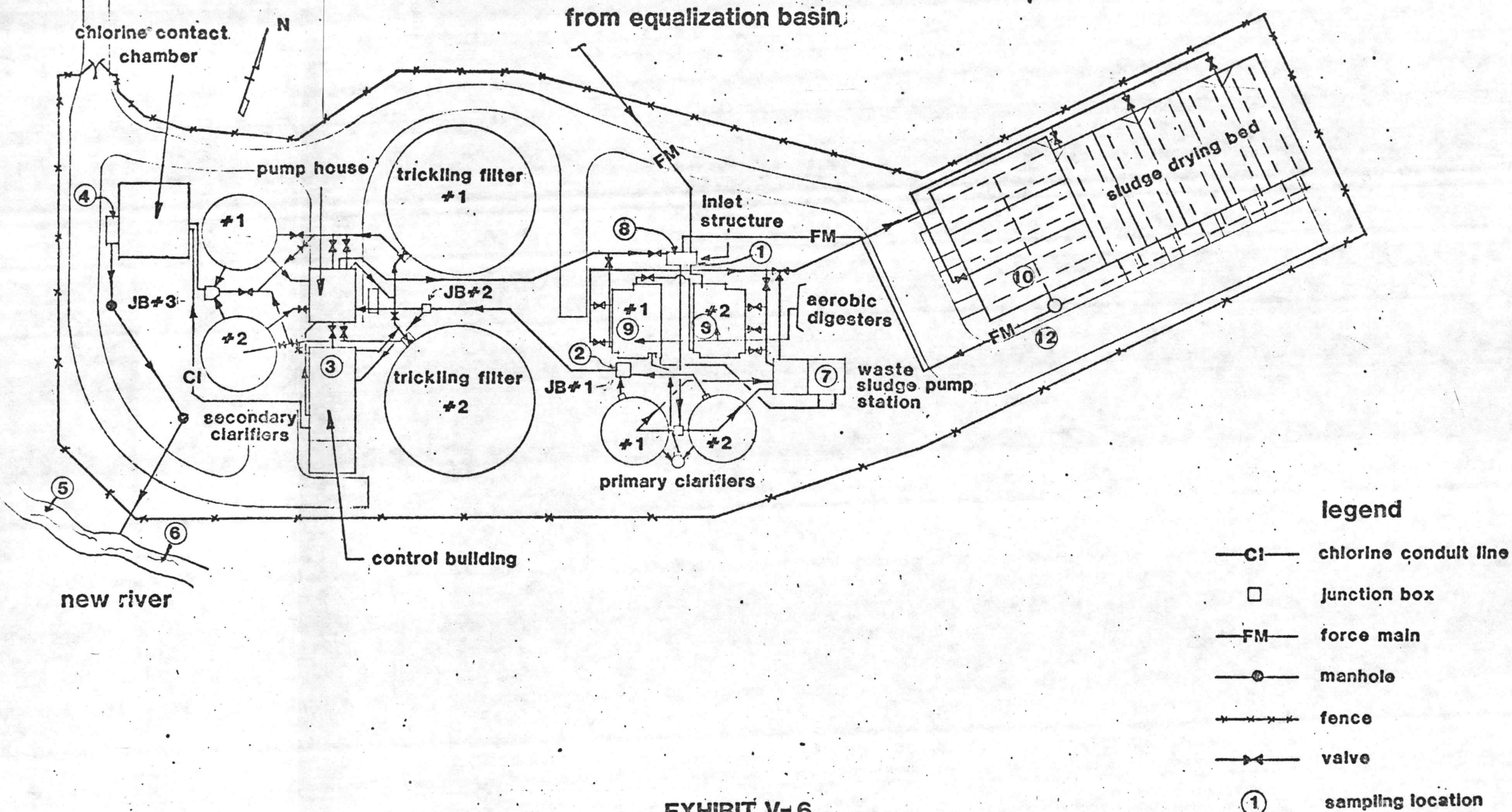

EXHIBIT V-6

SAMPLING POINT LOCATIONS

TAB PLACEMENT HERE

DESCRIPTION:

Records

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9/08

RECORDS

RECORDS

6.0 RECORDS

6.1 GENERAL

Maintenance of regular records of wastewater treatment plant operations serve many useful purposes which are summarized as follows:

1. Records serve as a guide for operator in regulating, adjusting, and modifying plant facilities and treatment processes for efficient plant operation.

2. Records often are the only sound basis on which administrative officials may negotiate to accept additional waste loadings, plan corrective measures, or justify budgeting changes.

3. In the event of lawsuit, the records and reports, together with the operator's testimony, provide the administration and legal counsel with factual information on which sound defense and adjustment may be established.

4. Operational reports help the officials of the plant administration and the State regulatory agency to evaluate the extent to which the objectives of wastewater treatment have been met.

Recognizing the usefulness of the records and reports for the efficient plant operation, this section describes the types of records and reports that should be maintained at the Courthouse Bay wastewater treatment plant. Typical examples are provided for preparation of records, forms and reports, and references are made to other sections of this manual where additional information on records can be found. It is recommended that the operator should use the given forms in establishing the procedures for maintaining the records at the plant.

6.2 PHYSICAL PLANT RECORDS

Plysical plant records should be available for reference at the plant and should include:

1. Plant operation and maintenance manual.

2. Facilities plan which includes the basis of design such as: service area, population served, and design parameters and capacities of all treatment units.

3. As-built plans and specifications.

4. Shop drawings, including operation and maintenance instructions, prepared by equipment manufacturers.

5. Piping and wiring diagrams.

6. Facility hydraulic profile.

7. Inventory of industrial waste contributors.

8. An equipment record that includes equipment name, manufacturer, identification number, rated capacity, and dates of purchase and installation.

6.3 PLANT OPERATION RECORDS

6.3.1 Daily Records

Daily operating log should be maintained as a primary record of all routine activities, process control data, and unusual or emergency conditions occurring during the plant operation. It is suggested that this log be maintained in a bound notebook to prevent the destruction or alteration of these important records. Exhibits VI-1a and VI-1b are sample daily operating log forms which can be used to record all daily activities of the plant operation.

Worksheets should be made to supplement the daily operating log. These worksheets should include the following information: (1) plant influent and effluent flow, mgd, (2) screening removed, cu.ft., (3) grit removed, cu.ft., (4) sludge handling data, (4) dissolved oxygen in the aerobic digester (5) residual chlorine, (6) laboratory test results, and (7) visual observations of influent, effluent, screen, grit chamber, equalization basin, primary clarifiers, trickling filter system chlorination, aerobic sludge digester and sludge drying beds. The Plant

Superintendent should prepare worksheets as they become necessary.

6.3.2 Laboratory Records

The test data such as weighing results, burette readings, etc., the final results of the laboratory tests, and the data on laboratory equipment calibration should be recorded on proper forms. This can be accomplished by keeping permanent laboratory notebooks, laboratory worksheets on which calculations can be made, worksheets for equipment calibration. Sample worksheets for some of the laboratory tests (BOD, TSS, etc.) are given in Section 5 on Laboratory Testing.

6.3.3 Monthly and Annual Reports

Relating to the implementation of Article 21, Chapter 143, North Carolina General Statutes, the Environmental Management Commission requires the filing of monthly reports on treatment plant operation. Section 2 of this manual includes a discussion of these reports, including the reporting procedures for the Courthouse Bay plant. A separate file for the monthly reports should be maintained at the plant.

In addition to the monthly reports required by the regulatory agency, monthly and annual operating reports should also be prepared. Monthly operating reports should contain a summary of all data collected daily, weekly or bi-weekly. By using weekly moving averages of the data collected, calculations of operating parameter such as hydraulic and organic loading to the trickling filters, volatile solids loading to the aerobic digester and solid loading to the sludge drying bed, that are helpful in process control may be made to reflect the consistency or changing conditions of plant operation. Exhibits VI-2 to VI-6 represent the sample forms, illustrating the information and basic types of data.

Using these forms, the Plant Superintendent should prepare the monthly operating reports as they fit the plant operating conditions.

The annual operating report generally consists of two parts which are: (1) operating data and (2) management data. Table VI-1 is a sample annual report. Using this as a guide and the development and activities that occurred during the previous year, the Plant Superintendent should prepare an annual operating report for his/her treatment plant.

6.3.4 Maintenance Records

A preventive maintenance card file record system should be established for each piece of equipment. The cards should be filed according to the date of maintenance that is scheduled for each particular piece of equipment so that the operator will know each day which maintenance work is to be performed on all equipment. After the maintenance work has been completed, the person who performed the work should initial and date the card in the space provided beside each work. If any unusual maintenance work was performed to remedy any trouble, the operator should make a note to this effect to simplify the work of the next person who may have to correct the same type of trouble. Operators should also enter on the card all emergency service calls, parts required, and the cost of maintenance work. This information can be used as a guide in determining the necessity for adjusting the parts requirements list and for replacing any equipment that is wearing out or becoming obsolete. Sample forms for equipment maintenance are shown on Exhibits VII-2 and VII-3 in Section 7 on Maintenance.

DAILY OPERATING LOG

COURTHOUSE BAY WASTEWATER TREATMENT PLANT

Operator: ______________________ Date: ________ Shift: ________

	Initial	Final	Total
Plant Influent, Sidestreams & Sludge Flows, 1,000 Gals.			
1. Plant Effluent			
2. Primary Sludge Pumping to Aerobic Digester			
3. Secondary Sludge Pumping to Aerobic Digester			
4. Trickling Filter Recycle			
5. Recycled Sludge (To Primary Clarifier)			
6. Digester Supernatant			
7. Sludge Bed Underdrainage			
Chemical Used, lbs/day			
1. Chlorine			
2. Polymer			
Electrical Consumption, KWH			

Screenings: ____________ cu. ft., Grit Removed ______ cu. ft.

Weather: Clear ______, Partly Cloudy _____, Cloudy _____, Rain _____

Remarks: ____

____

____

EXHIBIT V1 - 1a

DAILY OPERATING LOG SUMMARY

COURTHOUSE BAY WASTEWATER TREATMENT PLANT

Operator:______________________________ Date:__________

Influent Flow, gpd ____________,

Primary Sludge Pumped, gpd ____________,

Secondary Sludge Pumped, gpd ____________,

Sludge Recycled ____________,

Trickling Filter Recycle Flow, pgd ____________,

Digester Supernatant, gpd ____________,

Digested Sludge Pumped, gpd ____________,

Sludge Bed Underdrainage, gpd ____________,

pH: Influent______; Effluent________; Percent Removal__________

BOD5, mg/l: Influent______; Effluent________; Percent Removal__________

TSS, mg/l: Influent______; Effluent________; Percent Removal__________

COD, mg/l: Influent______; Effluent________; Percent Removal__________

Percent Solids, mg/l: Primary Sludge________; Secondary Sludge________

Percent Solids, mg/l: Digested Sludge________; Dewatered Sludge________

Fecal Coliform, #/100 ml: Effluent______; Upstream______; Downstream______

Dissolved Oxygen, mg/l: Aerobic Digester________; Effluent__________

Setteable Matter, mg/l: Influent________; Effluent__________

Temperature, C: Influent __ Effluent ____ Upstream ____ Downstream ____

Residual Chlorine, mg/l: Effluent________

Remark:____

EXHIBIT VI - 1 b

MONTHLY REPORT FORM
FOR MISCELLANEOUS PLANT DATA

Operator: ____________________ Month ____________ Year ________

Date	Weather			Plant Flow mgd	Grit Removed cu.ft/mil.gal	Screening Removed cu.ft/mil.gal	Chemical Used, lbs.				Power Used Kwh
	Precip. Inch	Temp. $^{\circ}C$	Type*				Chlorine	Alum	Lime	Polymer	
1											
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6											
7											
8											
9											
10											
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29											
30											
31											

* C-Clear; CL-Cloudy; R-Rain; S-Snow

EXHIBIT VI- 2

MONTHLY REPORT FORM
PRIMARY TREATMENT DATA

Operator: ______________________ Month ______________ Year ______________

Date	BOD-5 DAY			SUSPENDED SOLIDS			SUSP. VOLATILE SOLIDS			Remarks
	Inf. mg/l	Eff. mg/l	Removal %	Infl. mg/l	Eff. mg/l	Removal %	Inf. mg/l	Eff. mg/l	Removal %	
1										
2										
3										
4										
5										
6										
7										
8										
9										
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26										
27										
28										
29										
30										
31										
Average										

EXHIBIT VI- 3

MONTHLY REPORT FORM
TRICKLING FILTER DATA

Operator: ______________________________ Month ______________ Year ______

Date	FLOW			BOD-5 DAY				SUSPENDED SOLIDS			Remarks
	Plant Flow mgd	Recycle Flow mgd	Hydraulic Loading mgad	Primary Effluent mg/l	Organic Loading lb BOD/ 1000 cu.ft/day	Secondary Clarifier Effluent mg/l	Percent Removal	Primary Effluent mg/l	Secondary Clarifier Effluent mg/l	Percent Removal	
1											
2											
3											
4											
5											
6											
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Average											

EXHIBIT VI-4

MONTHLY REPORT FORM
FOR AEROBIC SLUDGE DIGESTION

Operator: ______________________________ Month ____________________ Year ________

Date	Waste Sludge						Digesting Sludge					Digested Sludge			Supernatant		
	Vol. gals	pH	TS %	VS %	COD mg/l	Loading lb VSS/ 1000 cu.ft.	pH	TS %	VS %	D.O. mg/l	COD mg/l	pH	TS %	VS %	Vol. gals	TSS mg/l	BOD_5 mg/l
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
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31																	
Average																	

EXHIBIT VI- 5

MONTHLY REPORT FORM
FOR SLUDGE DRYING BEDS

Operator: ______________________ Month ______________ Year ________

	Sludge Beds					Polymer Feed		Dried Sludge				Bed Underdrainage			
Date	Bed No.	Vol. gals.	TS %	Dry Solids lb	Loading Depth inch	mg/l	lb	Operation hrs	TS %	Volume lbs	Volume cu.ft.	Vol. gals	pH	TSS mg/l	BOD_5 mg/l
1															
2															
3															
4															
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30															
31															
Average															

EXHIBIT VI- 6

TABLE VI-1
ANNUAL REPORT

OPERATING DATA

Number of Sewer Customers:

Population Equivalent -

Flow, mgd:

Screening Removed, cu. ft/mil. gal. of flow ____________

Grit Removed, cu. ft/mil. gal. of flow ____________

pH: Influent ________, Effluent ________

BOD5 , mg/l: Influent ________, Effluent ________, % Reduction ______

TSS, mg/l: Influent ________, Effluent ________, % Reduction ______

Chlorine: Total used ____________ lbs; Residual ________ mg/l

Electrical Power: Total used __________ KWH

Aerobic Digerster: Percent Solids - Feed Sludge = ________%
Digested Sludge = ________%

Temperature - Feed Sludge = ________%
Digester Content = ________%

Volatile Solids - Feed Sludge = ________%
Digested Sludge = ________%
Percent Reduction = ________%

Supernatant - Volume, gals = ________
pH = ________
TSS, mg/l = ________
BOD , mg/l = ________

Sludge Drying Bed: Sludge Loading, lbs/sq. ft/year = ____________

TABLE VI-1
(Continued)

Loading Depth, inches		= ______
Percent Solids in Dewatered Sludge		= ______
Average Drying Time, week		= ______
Bed Underdrainage:	Vol. gals	= ______
	pH	= ______
	TSS, mg/l	= ______
	BOD5, mg/l	= ______

MANAGEMENT DATA

Operating Expense, $/year
- Administrative Personnel
- Operating Personnel
- Maintenance Personnel
- Chemist
- Clerical Staff
- Chemicals - Laboratory
  - Chlorine
- Material
- Travel

Miscellaneous

6.3.5 Industrial Waste Records

A record of the list of operations producing industrial type discharges to wastewater collection system should be maintained at the plant. The record should include the name of the operation, its SIC classification number if applicable, volume of wastewater discharge, and monitoring data on the pollutants subjected to prohibitive and categorical standards.

6.3.6 Operating Cost Records

The major categories of operating costs are labor, utilities, chemicals, and supplies. Labor should be broken down in administration, operation, and maintenance. Utilities include electricity, fuel oil, gas, telephone, and water. Chemicals should be limited to those used in the treatment processes. Supplies include laboratory equipment, chemicals, glassware and other expendable items, parts for mechanical equipment and miscellaneous items needed for building and ground maintenance at the plant.

Adequate budget must be provided for each Fiscal year for efficient operation and maintenance of the wastewater treatment plant. After consulting with the Utility Director, the Wastewater Superintendent must determine his/her responsibility for budget preparation. Generally, the Wastewater Superintendent will be responsible for providing the Utility Director with cost information and additional or unexpected fiscal requirements for the coming fiscal year. Table VI-2 summarizes an estimated operating budget cost for the fiscal year 1984-1985.

TABLE VI-2

ESTIMATED OPERATING BUDGET (1985-1986)
COURTHOUSE BAY WASTEWATER TREATMENT PLANT

Salaries and Benefits
Utilities
Chemicals and Other Supplies
Maintenance and Miscellaneous
TOTAL ANNUAL EXPENSE

6.4 RELATING RECORDS TO PLANT OPERATION

Records serve as a guide for the operator in regulating, adjusting, and modifying plant facilities and treatment processes for efficient plant operation. Plant flow and the results of the laboratory analyses reflect the operating condition of a treatment plant. They indicate the rate at which the wastewater enters the plant, waste characteristics, organic and solids loading to treatment units, unit efficiencies, and probable effluent quality. Variance in the plant flow or laboratory results from the normal conditions are often an indicator of an impending problem in plant operation. For example, a uniform increase in flow and organic load at the plant may indicate that the plant may be approaching its design capacity and may warrant planning for future expansion. Similarly, sudden variations in results from the normal range may indicate accidental discharges or damage to the wastewater collection system.

An efficient way to facilitate review of the daily records is to prepare trend charts as illustrated in Exhibit VI-7 showing value(s) plotted against days or time. Plotting data on graphs is very helpful to illustrate trends in the operation of a wastewater treatment facility. Regular plotting of data may reveal unexpected trends which could provide insight to prevent an operational upset of a unit process. The important concepts relevant to plotting trend charts are summarized below:

1. Plotting daily data will not provide good process control interpretations. A 5-day moving average method is suggested for normal operations. In cases where data is not taken daily, the collected data can still be used to generate moving averages. Each day a new set of data is included and one data set is deleted from the group of five to be averaged.

2. All data used for process control should be plotted on a daily, weekly, and monthly basis. Daily plot showing large variations indicate that either shock loadings or error in operation and/or calculation have occurred. Weekly and monthly plot will show long-term changes and indicate whether the control exerted by the process control technique is suited to operating conditions.

3. In order to get the maximum amount of information out of the data, the operator must familiarize himself with the technique of graphically displaying data. Trend observation is probably the most important tool by which the operator can prevent catastrophic upset of the biological process.

6.5 REFERENCES

1. WPCF, Operation of Wastewater Treatment Plants - Manual of Practice No. 11, 1976.

2. EPA, Consideration for Preparation of Operation and Maintenance Manuals, 1974.

3. EPA, Process Control Manual for Aerobic Biological Wastewater Treatment Facilities, March 1977.

4. The Texas Water Utilities Association, Manual of Wastewater Operations, 1971.

5. California State University, Sacramento, Operation of Wastewater Treatment Plants, Vols. I, II and III, A Field Study Training Program, 1980.

6. New York State Department of Environmental Conservation, Manual of Instruction for Wastewater Treatment Plant Operators, Vols. I and II, 1978.

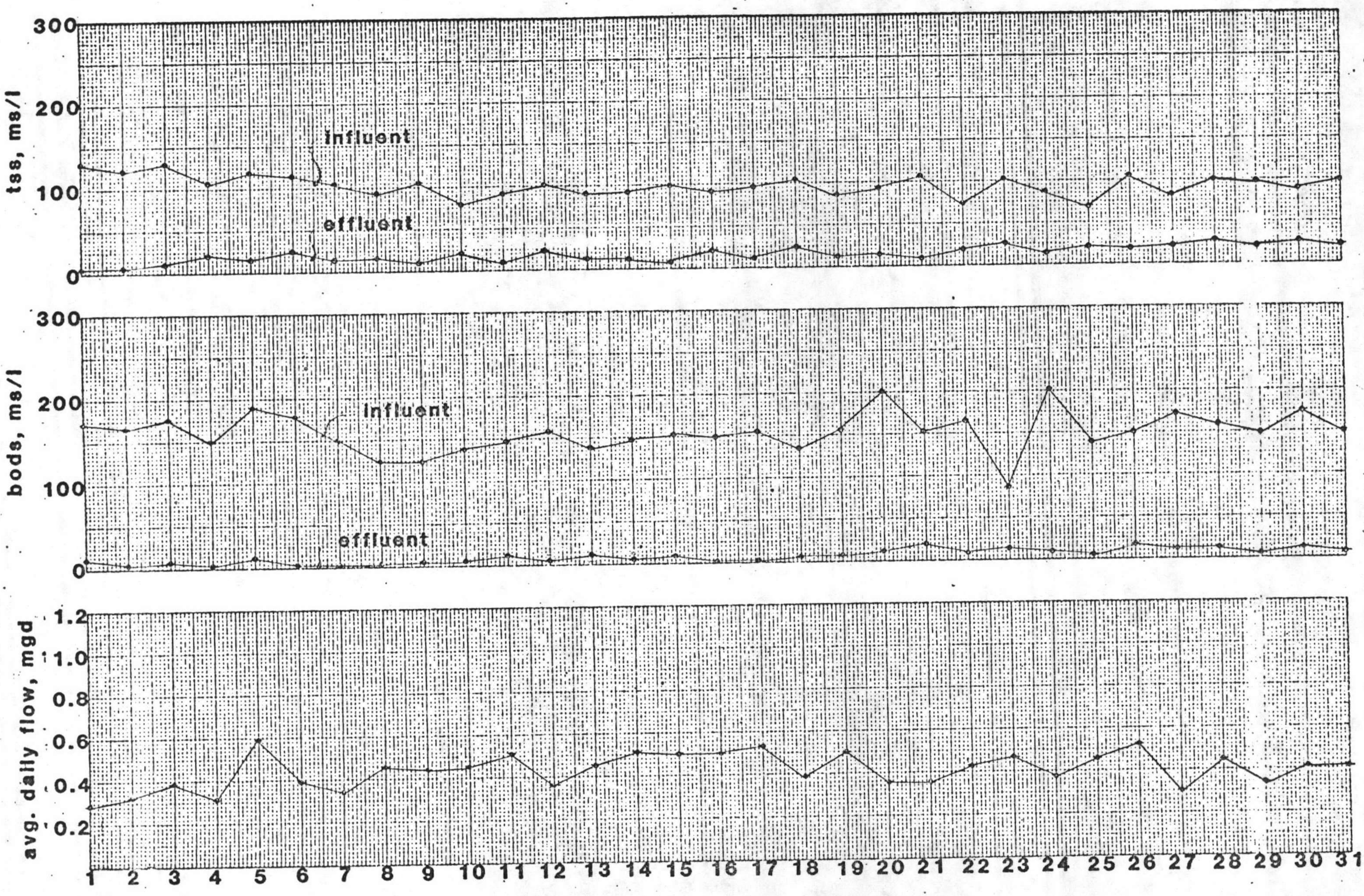

EXHIBIT VI-7
PLANT PERFORMANCE

TAB PLACEMENT HERE

DESCRIPTION:

maintenance

☑ Tab page did not contain hand written information

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*Scanned as next image

Confidential Records Management, Inc.
New Bern, NC
1-888-622-4425
9/08

MAINTENANCE

MAINTENANCE

7.0 MAINTENANCE

7.1 GENERAL

The primary goal of a maintenance management system is to achieve the highest level of wastewater treatment system performance. This goal can be achieved by:

1. Providing a means for knowledgeable management of maintenance system.
2. Ensuring the systematic, timely, safe, standardized and complete accomplishment of equipment care and inspection.
3. Incrasing wastewater treatment system reliability by preventing equipment breakdown and prolonging life of the system components.
4. Minimizing maintenance manpower requirements.
5. Providing management with information required for cost control, work load assessment and work assignment according to priority and urgency.
6. Providing a system of spare parts and standby equipment inventory control.

The basic features of any sound maintenance management system should include the following:

1. Equipment Record System
2. Maintenance Planning and Scheduling
3. Stockroom Inventory Control
4. Maintenance Personnel and Organization
5. Cost and Budget

In order to assist in developing a sound maintenance management system for the Courthouse Bay Wastewater Treatment Plan, the above features are discussed in the following sections.

7.2 EQUIPMENT RECORD SYSTEM

7.2.1 General

The equipment record system serves as a data base for day to day operation of a maintenance management system. The basic equipment records consist of equipment index or numbering, equipment reference data file, maintenance procedures, and equipment service records. In addition to the above equipment records, as-built drawings of the treatment plant, construction specifications, shop drawings, and manufacturer's instruction manuals should also be maintained on file for easy access.

The equipment record system also serves as a valuable source for developing budget cost and obtaining information to evaluate maintenance problems.

7.2.2 Equipment Index or Numbering

The equipment index is a list of all equipment included in the maintenance program. Each piece of equipment is given a unique identification (ID) number, using a functional numbering system. The equipment index provides a starting point for developing maintenance management records and it serves as a checklist to make sure that records for each piece of equipment are developed. The index can also help to locate the information for a particular piece of equipment.

A four-digit numbering system is developed for identification of each piece of equipment at the Courthouse Bay Wastewater Treatment Plant. Each digit of this number has a specific meaning as explained below:

ABCD - The first digit "A" identifies a major system in the plant. For example:

1000 Preliminary Treatment
2000 Equalization Basin
3000 Raw Sewage Pumps
4000 Primary Clarifier

5000 Trickling Filter System
6000 Chlorination
7000 Aerobic Sludge Digestion
8000 Sludge Drying Beds

ABCD - The second digit "B" identifies a subsystem with specific function within a major system. For example:

1100 Grit Removal
1200 Comminutor/By-pass Screen

ABCD - The third digit "C" identifies a specific type of equipment within a substation. For example:

1110 Grit Removal Equipment

ABCD - The fourth digit "D" identifies a specific piece of equipment within a type category. for example:

1111 Grit Collection Equipment
1112 Grit dewatering Equipment

Exhibit VII-1 shows a plant schematic divided up according up the major systems in the plant. A detailed list of equipment index is given in Appendix.

7.2.3 <u>Equipment Reference Data File</u>

The equipment reference data file contains the important information such a general data, equipment-specific data and spare parts for each piece of equipment listed in the equipment index. It serves as a central storage place for all the data needed to refer to each piece of equipment when requesting information or spare parts for equipment.

The equipment reference data file should be set up by the Plant Superintendent or Maintenance Supervisor to include a data sheet for each piece of equipment containing the information recorded on the equipment data sheets given in Section 4. Most of the information needed for equipment data sheet can be found in equipment name plates, manufacturer`s catalogs, drawing and operation and maintenance manuals.

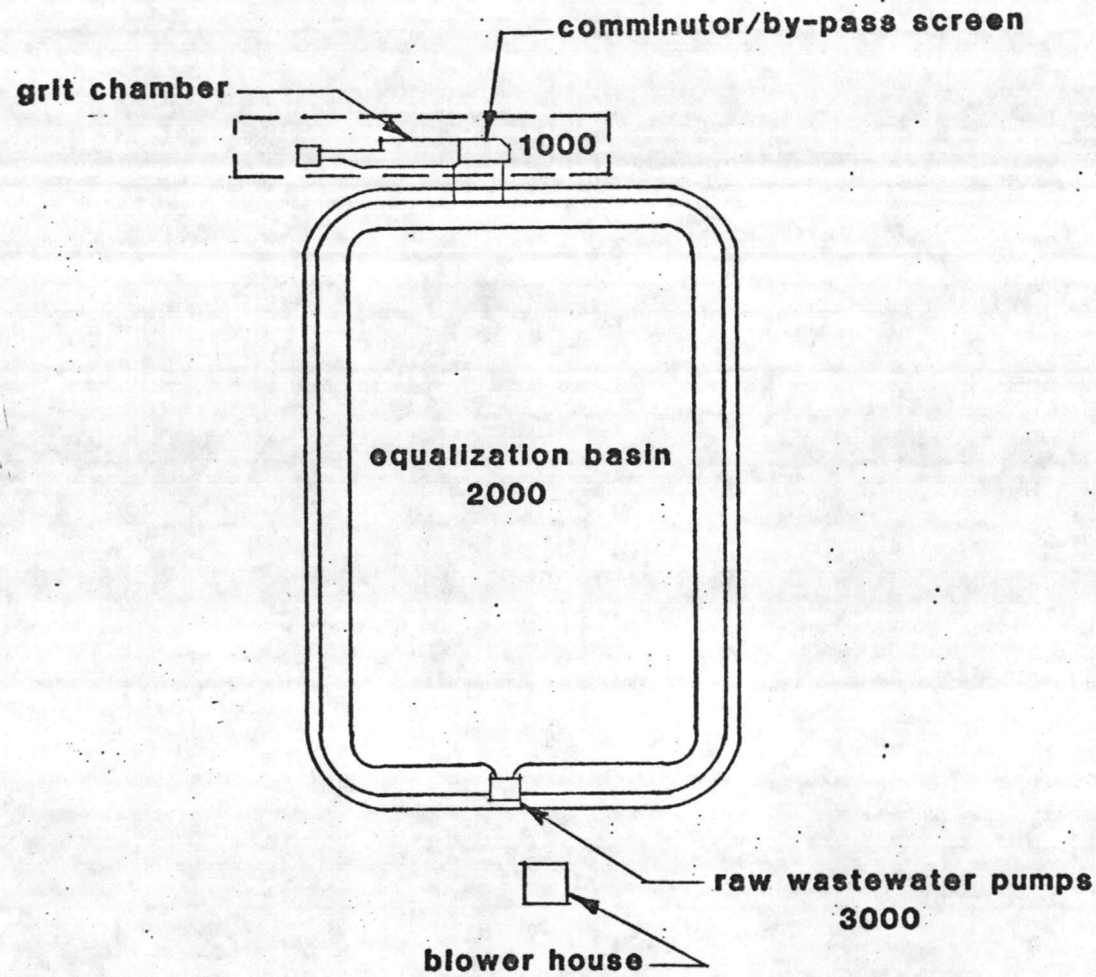


EXHIBIT VII-1

MECHANICAL UNIT NUMBERING SYSTEM

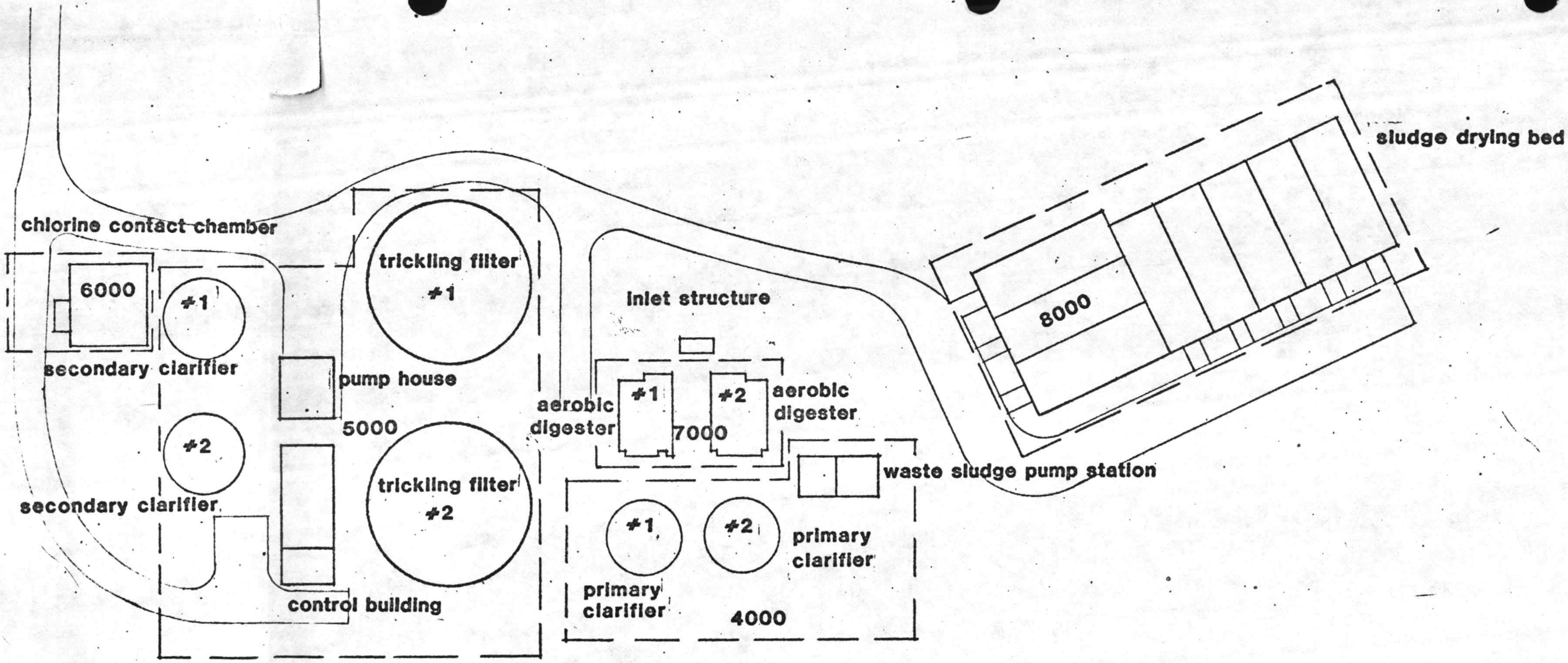


EXHIBIT VII-1

MECHANICAL UNIT NUMBERING SYSTEM

7.2.4 Maintenance Procedures

A file consisting of maintenance procedures for each preventive maintenance task for each piece of equipment should be set up by using the preventive maintenance schedules, given in section 4, and equipment service record as a guide. The maintenance procedure sheet contains the following information: (1) Maintenance Procedure Sheet Number, (2) The name of the equipment to be worked on, its serial number and location, (3) A descriptive title of the preventive maintenance task, (4) Labor requirement in terms of number of persons, their skill level and average time needed by each person, (5) Specific safety precautions to observe, (6) A list of tools, parts, materials and test equipment needed for the work, and (7) Step-by-step instructions for the work. A sample of the maintenance procedures sheet is shown on Exhibit VII-2.

7.2.5 Equipment Service Record

The equipment service record provides a history of all preventive and corrective maintenance major repairs and overhaul performed and the cost for each piece of equipment. Daily and weekly preventive maintenance works are generally not included in the service records because they are done on a regular basis. Using the data from equipment reference data file, maintenance procedure sheets for preventive maintenance, work orders for preventive and corrective maintenance and maintenance personnel doing the work, the Plant Superintendent or Maintenance Supervisor should prepare equipment service records for each piece of equipment at the plant. A sample of the equipment service record form is shown on Exhibit VII-3.

7.3 MAINTENANCE PLANNING AND SCHEDULING

The planning and scheduling of maintenance work is an essential ingredient in any good maintenance management system. If planning and

scheduling is done properly, the maintenance force will be used in the most efficient manner and the preventive maintenance program will be effective. Tools for planning and scheduling include schedule boards, maintenance work orders, and maintenance labor standards. The key to successful planning and scheduling is a realistic estimate of a facility`s corrective and preventive maintenance needs.

7.3.1 Schedule Chart Board

The Plant Superintendent should prepare schedule chart with priorities of subjects, personnel, and time. The schedule chart should be divided into daily, weekly, monthly, quarterly, semi-annually, and yearly sections so that the entire range of maintenance functions can be observed. The chart board provides a graphic indication of progress and manpower usage. The chart board will also provide a graphic indication of tasks that are running behind. A chart board can be obtained from most office supply companies.

7.3.2 Work Order System

A work order system should be used to initiate all preventive and corrective maintenance tasks. The work order system identifies the work to be done, its priority, and information on any special aspects of the job. A log of the work orders should be kept as a record which provides an information on when the work order was initiated and completed. All the work orders should be numbered to provide a means of maintaining accountability. Exhibits VII-4 and VII-5 are examples of preventive and corrective maintenance work order forms which can be used to devleop necessary work forms for the Rose Hill Wastewater Treatment Plant.

MAINTENANCE PROCEDURE SHEET	Page of	MPS No.
EQUIPMENT NAME	SERIAL NUMBER	AVERAGE LABOR S-1 ____@____ min. S-2 ____@____ min. S-3 ____@____ min.
LOCATION		
MAINTENANCE DESCRIPTION		
SAFETY PRECAUTIONS		
TOOLS, PARTS, MATERIAL, TEST EQUIPMENT		
PROCEDURE		

EXHIBIT VII-2

EQUIPMENT SERVICE RECORD

Equipment Name: ______________________________

Serial Number ____________ Location ______________ Equipment ID No. ____________

Date	MPS or WO	Description of Work	Cost							Down Time
			Labor			Materials		Other		
			Skill Level	Hours	Cost	Description	Cost	Description	Cost	

EXHIBIT VII-3

PREVENTIVE MAINTENANCE WORK ORDER

PMWO No.: Date Initiated:	
Equipment/Location	Initiated By:
	Equipment No.:
Description of Maintenance Procedure:	MPS No.:

Electric Motor Data: HP ____ RMP ____ AMPS ____ VOLTS ____ FRAME NO. ____

Pump Data: Type ____ Installation ____

Driver or Reducer Data: Type ____

LABOR AND EQUIPMENT TIME					MATERIAL USED				
NAME	REG.	OT	RATE	TOTAL	ITEM	SIZE	QUAN.	UNIT PRICE	TOTAL
			TOTAL					TOTAL	

Leg 1: Volts ____ Amps ____ Meg Ohms ____

Leg 2: Volts ____ Amps ____ Meg Ohms ____

Leg 3: Volts ____ Amps ____ Meg Ohms ____

TIME TO COMPLETE PM PROCEDURE: ____ Minutes

Remarks:

Completed by: ____ Date: ____

Approved by: ____ Date: ____

EXHIBIT VII-4

CORRECTIVE MAINTENANCE WORK ORDER

Equipment/Location:	CMWO No.:
	Date Initiated:
	Initiated by:
	Equipment No.:
Indication of Trouble:	
Description of Work Requested:	
Approved by: ______ Date: ______	Priority: ______

LABOR AND EQUIPMENT TIME					MATERIAL USED				
NAME	HOURS REG.	HOURS OT	RATE	TOTAL	ITEM	SIZE	QUAN.	UNIT PRICE	TOTAL
			TOTAL					TOTAL	

REMARKS

What was wrong? ______

How was it fixed? ______

______

DOWNTIME: (Including time before maintenance work started) ______ Hours

Work completed by: ______ Date ______

Work accepted by: ______ Date ______

EXHIBIT VII-5

7.3.3 Preventive Maintenance

Preventive maintenance is the work done to prevent breakdown, reduce wear, improve efficiency, and extend the life of equipment and structures. The greatest realiability and dependability of equipment are experienced only when a well-planned and organized preventive maintenance program is carried out. The important aspects of a good preventive maintenance program are discussed below:

A. Elements of Preventive Maintenance

Effective maintenance of equipment includes the following elements:

Knowledge: Every operator should have knowledge and understanding of the function, operation, and ajustment of the equipment for which he is responsible. Much of this basic information may be obtained from the equipment manufacturer`s instruction manuals which are given in Appendix IX. Every operator should study carefully this instruction manual for each type of equipment that he operates, underlining any points that are particularly important and making pertinent notations in the margins of the manual. Each operator should be able to check the installation and operation of the equipment to see that the work has been done in accordance with the instructions in the manual. In making any necessary repairs he should be able to reinstall any parts that may have to be replaced so that the equipment will operate correctly.

Tools: For the effective operation of any maintenance program, it is necessary to keep on hand an adequate supply of different types of tools that are required to service the specific equipment in the plant. Operators should review the operations that are listed on the

record cards and list the tools that are needed for these operations to determine the kinds and number of tools that will be required. Table VII-1 summarizes a suggested tool lists for the plant.

Spare Parts: Preventive maintenance schedules make it necessary to have in stock at all times an adequate supply of spare parts to be used to maintain equipment in proper operating condition. The kind and number of spare parts that should be stored depend upon the importance of the equipment in plant operation and the ease with which the equipment might be repaired by means of spare parts replacement. Each piece of equipment in the plant should be examined and a spare-parts inventory should be compiled. Particular attention should be given to such small items as shear pins, nuts, bolts, diaphrams, and brushes. The use of interchangeable spare parts will reduce the number of different items that will have to be stocked. The spare parts inventory should be checked semi-annually and revised, if necessary. A recommended spare parts list is provided on each equipment data sheet in Section 4. These parts should be kept on hand for normal scheduled maintenance or repair of equipment.

Safety Equipment: Appropriate safety equipment should be acquired and made reaily available for the use by, and protection of, operators at all times. Such equipment include safety harness, ropes, ladders, self-contained breathing apparatus, protective clothing, safety lamps, and toxic gas and oxygen-deficiency detectors. Safety equipment must be used by all persons who are engaged in any hazardous maintenace operations. Toxic gas and oxygen-deficiency detectors should be used to

determine the presence and extent of toxic gases and the degree of oxygen deficiency before personnel are allowed to enter pump stations and enclosed areas that may be considered unsafe.

B. Preventive Maintenance Supplies and Materials

The Plant Superintendent should prepare annually a complete list of the kinds and quantities of supplies and materials that will be needed to perform all necessary preventive maintenance operations in order to avoid operating delays and to prevent forced shutdown of the plant. The following supplies are generally required and should be included on a list: fuses, gaskets, pipe fittings, pipe repair bell clamp and sleeves, packing, lubricants, touch-up paints, solvents (kerosene and the like), detergents (trisodium phosphate and the like), bolts, nuts, screws, valve discs for renewable seat valves, etc.

C. Preventive Maintenance Schedule

Preventive maintenace shcedules should be established for the maintenace of all equipment. The schedule should include both procedures to be followed and time intervals for servicing the equipment. The preventive maintence schedules given in Section 4 for each major piece of equipment at the plant will assist the Plant Superintendent in planning and scheduling the maintenance work. For detail maintenance procedures it is suggested that the Plant Superintendent should follow the insructions given in the manufacturer`s operation and maintenance manuals.

D. Records

A preventive maintenance card file record similar to the one described in Section 7.2.4 should be established for each piece of equipment. The cards should be filed according to the date of the

maintenance that is scheduled for each particular piece of equipment so that the operator will know each day what maintenance work is to be performed on all equipment. After the maintenance work has been completed, the person who performed the work should initial and date the card in the space provided beside each operation to show what work was performed and the date it was completed. If any unusual maintenance work was performed to remedy any trouble, the operator should make a notation to this effect to simplify the work of the next person who may have to correct the same type of trouble. Operator should also enter on the card all emergency service calls, all parts required, and the cost of this maintenance. This information can be used as a guide in determining the necessity of adjusting the parts requirements list and for replacing any equipment that is wearing out or becoming obsolete.

E. Lubrication

Because of the variety of type equipment and the various conditions under which the equipment is operated, proper lubrication practices become extremely important. Improper lubrication of equipment causes damage to wearing surfaces, excessive power consumption, increased maintenance costs and outages or disuse of equipment because of repairs. The Plant Superintendent should refer to the manufacturer's instruction manuals given in Appendix VIII for lubrication of all equipment including information on when to lubricate and the type of lubricant to use. The lubricants, with acceptable subsitutes, that are required for maintenance of the equipment are listed in the maintenance section of Section 4.0 (Operation and Control). For each maintenance procedure the proper

lubricant or an acceptable substitute must be used. The lubrication frequency for each equipment is given in the tables of preventive maintenance schedules (Section 4.0).

7.3.4 Corrective Maintenance

Planning and scheduling of maintenance work must also make provisions to handle corrective maintenance tasks. Corrective maintenance is the work required for repairs or non-routine maintenance functions.

Corrective maintenance tasks should not be initiated without a work order unless the problem is an emergency and immediate action is required. The work order will provide a record of repairs, cost data, and a history of the equipment requiring repairs.

When performing corrective maintenance tasks, manufacturer's recommendations for disassembling and assembling their items of equipment should be followed.

7.4 INVENTORY SYSTEM

The Plant Superintendent is also responsible for maintaining inventory of spare parts, maintenance tools and equipment, safety equipment and housekeeping supplies and materials. For the Plant Superintendent to maintain these inventories, two forms are useful, one a record of amount of each item on hand (Stockroom Inventory Form shown on Exhibit VII-6) and another form for controlling purchases (Purchase Order Form shown on Exhibit VII-7). The Stockroom Inventory Form indicates the actual amount of each item on hand, while the Purchase Order form indicates the amount of each item on order that will be added on the Stockroom Inventory Form upon receiving.

TABLE VII-1

SUGGESTED LIST OF EQUIPMENT, MATERIALS & SUPPLIES

1. Grease Gun for plant equipment
2. Chain hoist, one-ton capacity
3. Electric drop light, explosion proof with 100 foot extension cord
4. Electric torch light
5. Barricades
6. Gas detector
7. First aid equipment
8. Warning signals
9. Squeegees, floor and window
10. Torch
11. Two wheel hand truck
12. Insect sprayer
13. Lawn mower, gas powered
14. Hose - Garden type
    Nozzel (shut-off-type)
15. Grease, for lubrication
16. Pipe joint compound
17. Soldering Kit
18. Portable diaphram mud pump
19. Pipe and machinist vise
20. Tank compressor
21. Boots, rubber
22. Brooms
23. Brushes, misc.
24. Gloves
25. Ladders, step, extension (20 ft.)
26. Lanterns
27. Mop and handle
28. Rope, ½-inch, 3/4-inch and Sash cord
29. Waste cans
30. Hedge clippers
31. Rakes
32. Caulking compound
33. Chain, assorted sizes and lengths
34. Cleaning powders
35. Cleaning solvents
36. Fuses
37. Light bulbs
38. Sand paper, assorted grades
39. Soap
40. Magnetic board for preventive maintenance

STOCKROOM INVENTORY

Item Description: ______________________________ Item No. __________

SHIP TO ______________________________________ Bin No. __________

Quantity Maximum ____________________ Minimum ____________________

Reorder ____________________

INVENTORY INFORMATION

Quantity Used or Stocked	Date	Signed	Quantity on Hand	USAGE OR SUPPLY INFORMATION Usage - Work Order No. Supply - Purchase Order No.

EXHIBIT VII- 6

PURCHASE ORDER

TO ______________________________

____

____

SHIP TO ______________________________

____

____

PURCHASE ORDER NO. __________

WORK ORDER NO. __________

DATE INITIATED __________

DATE REQUIRED __________

SHIP VIA __________

F.O.B. __________

TERMS __________

____

____

IMPORTANT

Our Purchase Order Number must appear on Invoices, Packages, and Correspondence.

QUANTITY	STOCK NUMBER/DESCRIPTION	PRICE	PER	TOTAL

APPROVED BY ______________________________ DATE __________

SHEET ______ OF ______

EXHIBIT VII-7

7.5 MAINTENANCE PERSONNEL AND ORGANIZATION

According to the staffing estimates, one Plant Superintendent and one operator/maintenance person are required for operation and maintenance of the Courthouse Bay wastewater Treatment Plant. Major maintenance and repairs at the plant will be performed by the maintenance personnel of the Base Sewer Department.

7.6 COST AND BUDGETS

The costs information from the equipment record system, work orders, storeroom inventory cards and maintenance man-hours should be used to develop the maintenance budget. In order to determine the normal operating expense for an item of equipment, a Maintenance Cost Trend Form should be developed. This form should provid for recording preventive maintenance and repair labor hours, equipment operating hours, labor cost per operating hour, total labor and material cost per operating hour, and a graph for plotting the total cost index. Exhibit VII-8 shows a sample of Maintenance Cost Trend form.

7.7 EQUIPMENT WARRANTIES

All equipment at the plant is warranted by the construction contractor for one year after the date of acceptance by the Owner. The warranties are provided by Wilson Construction Company in accordance with the plant construction specifications. Some equipment suppliers provide extended warranty coverage on specific equipment components. If such warranties exist, the terms and provisions of these agreements are

generally included in sales and shipping documents which accompany the equipment item. The Plant Superintendent should maintain a file of all such warranties for easy access should an equipment failure occur within a warranty period.

7.8 REFERENCES

1. Environmental Protection Agency, Consideration For Preparation of Operation and Maintenance Manual, EPA 430/9-74-001, 1974

2. EPA, Maintenance Management Systems For Municipal Wastewater Facilities, EPA 430/9-74-004, 1974

3. EPA, A Planned Maintenance Management Systems For Municipal Wastewater Treatment Plants, EPA 600/2-73-004, 1973

4. The Texas Water Utilities Association, Manual of Wastewater Operations, 1971

5. California State University, Sacramento, Operation of Wastewater Treatment Plants, Volumes I, II & III, A Field Study Training Program, 1980

6. Water Pollution control Federation, Operation and Wastewater Treatment Plants - MOP No. 11, 1976

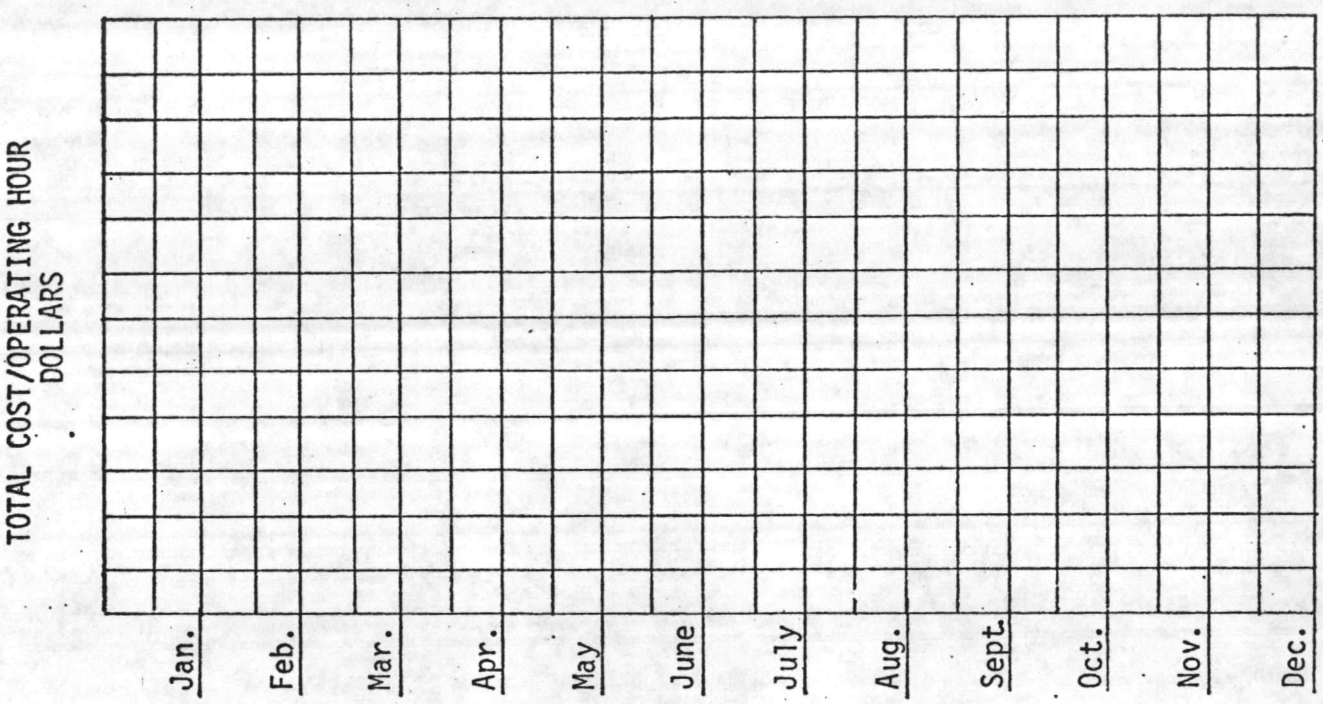
7. New York State Department of Environmental Conservation, Manual of Instruction For Wastewater Treatment Plant Operators, Vols. 1 and 2, 1978

8. Department of the Navy, Bureau of Yards and Docks, Training Course in Water and Sewage Plant Operations, June 1965

9. U.S. EPA, Maintenance Management in Wastewater Facilities - Instructor Training Course, September 1982

EQUIPMENT NAME ______________________ Location ____________

I.D. NO. ______________________



MAINT. COST/HOUR $______ DATE	OPN. HOURS	REPAIR LABOR HOURS	PM LABOR HOURS	TOTAL LABOR HOURS	MAT'L COST	LABOR COST PER OPN. HOUR	MAT'L COST PER OPN. HOUR	TOTAL COST PER OPN. HOUR
Jan.								
Feb.								
Mar.								
Apr.								
May								
June								
July								
Aug.								
Sept.								
Oct.								
Nov.								
Dec.								

REMARKS ______________________________________

EXHIBIT VII-8

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Emergency

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9/08

EMERGENCY

EMERGENCY

8. EMERGENCY OPERATIONS PLAN

8.1 GENERAL

In essence, an emergency operations plan is a system or procedure that will allow the management and its personnel to react more effectively in the case of an emergency situation. The primary objectives of the emergency operations response plan are:

1. To eliminate or minimize adverse effects from emergency situations affecting the treatment system.
2. To develop procedures for properly responding to emergencies.
3. To provide instruction for treatment plant personnel to ensure they understand their responsibilities during emergency situations.
4. To provide inventories of available emergency equipment and outline existing mutual aid agreements and contracts with outside organizations for specialized assistance.

8.2 CAUSES AND EFFECTS OF EMERGENCIES

Emergencies at a wastewater treatment plant can be caused by several reasons which are discussed in the following subsections.

8.2.1 Power Failure

Electrical power plays a vital role in the successful operation of the Courthouse Bay wastewater treatment plant. Most of the electrical and mechanical equipment contained in the treatment processes at the plant are operated by electrical power. Accordingly, the power failure will cease the process equipment function and will subsequently result in the plant upset if the power outage remains for a long time. In order to reduce the vulnerability of continued plant operation by a power failure, the plant is equipped with an emergency generator unit. If the normal power service is interrupted, the generator will start automatically to supply power to the treatment plant. In case of an emergency situation during the power failure, the operator should take the following steps:

1. Make sure that the emergency generator is turned on.

2. Determine if the power failure is due to the result of the power company activities or failure of some plant electrical equipment due to circuit overload or problems in the control system.

3. If the power failure is due to the activities of the power company, find out the expected power outage time from the power company.

4. If the failure is caused by plant electrical system, then try to determine whether it is due to an overload of circuit or due to a problem in a control panel. If the circuit was overloaded, the circuit breaker should be reset to supply normal power again. If the problem with the wiring is in a control panel, the electrician should be called to inspect and make corrections.

5. Report to Plant Superintendent about the nature of the problem and the corrective action being taken. File the report in the emergency record file.

6. After power has been restored, check all equipment for proper operation.

7. In order to reduce system vulnerability, advise the electrician to inspect the wiring of the control systems and all electrical connections to make sure that they are safe. Make corrections, if necessary.

8.2.2 Flood

The Courthouse Bay wastewater treatment plant is designed and constructed to protect from 100-year flood elevation. Accordingly, flooding is very unlikely at the plant. In the event of abnormal flooding that may occur at the plant, the operator should take the following steps:

1. Maintain communication with appropriate State and Federal agencies on forecasted water levels for the receiving stream.

2. If the operator determines that the rising water level in the receiving stream would flood the plant site, then he should notify the Plant Superintendent and should take the following action to protect the electrical and mechanical equipment at the plant from flooding:

   a. Refer the procedures followed in any previous floods and create a plan of action around the measures that worked then.

b. Dam the perimeter around the equipment and building with sand bags.

c. After the flood recedes, inspect the facilities for damage. Clean up the damage and flood debris using hose showels, and other heavy equipment, if necessary. Put the facilities into normal operation.

d. In order to reduce the system vulnerability by future floods, construct a permanent embankment where flood waters first gain access to the plant site.

Flooding in areas remote from the plant can also affect the plant operation indirectly. Surface runoff resulting in excessive inflow into the wastewater collection system can create a hydraulic overload at the pumping stations and the plant. Such condition will attribute to the poor performance of the plant. Accordingly, under such condition, means should be provided for bypassing of treatment units that are susceptible to upset by flood inflow waters. Severe flooding can also result in power failure due to damage to transmission lines. However, the pumping stations and the plant are provided with auxiliary power generators which keep the pumps and the plant operational during the power failure.

8.2.3 Fire

Fire at the treatment plant can be set-up by either lightening, personnel negligence or intentional and electrical short-circuiting. The effects of a fire on the plant activity may include personnel absence, power loss, equipment failure, blocked access, and communication loss.

In case of fire at the plant, the operator should immediately notify the fire and security department of the Base. If it is determined that the damage to the plant equipment and structure is significant and proper treatment of wastewater cannot be maintained, then the North Carolina Division of Environmental Management should be informed of the situation. Steps should be taken to provide interim treatment to produce best possible

effluent quality until the repairs have returned the plant to its normal operating condition.

8.2.4 Hurricane/Windstorms

The effects of a hurricane on the plant operation would be similar to those for a flood, because the intense rainfall and runoff associated with a hurricane normally cause localized flooding. High winds and gusts are normally associated with hurricane. These factors can cause power and communication failures, temporary supply delay, and personnel absence.

8.2.5 Civil Disorder and Strike

Several faucets of a widespread civil disorder such as destruction of a wastewater pumping station and treatment plant, bombing of a power sub-station, or dumping of toxic material into a manhole could interrupt the normal operation of a wastewater treatment plant and subsequently lead to violation of the NPDES Permit conditions.

Strikes also can affect plant operation in several ways such as delays in supply delivery and personnel absence. The most serious kind of strike is one involving the plant personnel. If the plant personnel were to engage in a strike, the plant could become unattended which would result in poor plant functioning and violation of the NPDES Permit discharge limitations. In such cases, the base authority must make all efforts to ensure that plant remains operational and comply with the discharge limitations.

Strikes by suppliers of chemicals and other expendable materials can also affect plant operation. However, these are short-term consequences which can be minimized by maintaining sufficient reserves of critical supplies. Strikes by the delivery companies can cause similar consequences

and can also be mitigated by maintaining sufficient reserves of critical supplies.

8.2.6 Faulty Maintenance

The unexpected breakdown due to faulty maintenance can greatly affect the operation of a wastewater treatment plant. Good maintenance practice should avoid such problem at the plant. Detailed discussion on maintenance practice for the plant is given in Section 7.0 of this manual.

8.2.7 Negligent Operation

The operations required for the treatment plant to function in a satisfactory manner require that certain procedures be followed. To improperly follow the established procedures at the plant constituents negligent operation. In many instances, negligent operation may not be as readily noticeable as faulty maintenance, but the emergency condition resulting from it could possibly be more severe because negligent operation could affect more units of operation before being discovered. The Plant Superintendent should develop sound operating procedures and see that they are followed to ensure the satisfactory operation of all units of the wastewater treatment plant.

8.2.8 Accidents

A final hazard to efficient plant operation is posed by accidents. Accidents at the treatment facility can result in manpower loss and poor plant operation due to equipment damage or chemicals spills. Implementation of the safety program discussed in Section 9.2 should help in preventing accidents at the plant.

8.3 PROTECTION MEASURES

8.3.1 Vulnerability Analysis

A vulnerability analysis of the system is an estimation of the degree to which the system is adversely affected in relation to the

function it must perform by an emergency condition. When performing the vulnerability analysis, the Plant Superintendent should consider the following steps:

1. List components of the treatment system.
2. Select emergency condition to be investigated.
3. Estimate effects of emergency condition on each component of system; use vulnerability worksheet.
4. Estimate treatment system`s ability to perform its intended function during the emergency.
5. Identify key system components responsible for the failure when a system fails to perform.

When identifying those components which are partially or totally incapacitated by the emergency condition, attention should be given to those system components which are interrelated with other components so as to make the entire system inoperative. These components are the most vulnerable. Tables VIII-1 and VIII-2 illustrate a typical Vulnerability Analysis for the emergency conditions created by power outage and flood. The emergency conditions created by hurricane or fire, if any, would be more or less similar to the condition created by power outage and flood.

8.3.2 Methods to Reduce Vulnerability

The following methods can be used to reduce the system`s vulnerability:

1. Keep vital documents in a safe place, preferably lockable, and secure from water damage, fire, and vandalism.
2. Prepare for natural or civil emergencies by listening to weather forecasts, new reports, and local information sources.
3. Ensure that standby generators are operative and have adequate fuel reserve at all times.
4. Establish procedures for responding to flood and hurricane warnings, so as to secure plant equipment, records, and supplies.

5. Ensure proper maintenance and lubrication practices are followed according to schedule.

6. Ensure proper operation of equipment to avoid process upsets.

7. Enact and enforce the safety program and instruction in safety.

8. Provide training to regular and auxiliary personnel in emergency operations and procedures.

9. Conduct emergency operations exercised periodically.

8.3.3 Emergency Equipment Inventory

The Plant Superintendent should prepare an emergency inventory worksheet which should list the equipment, materials, and chemicals that are available at the treatment plant to cope with emergency condition. Exhibit VIII-1 is a sample wastewater treatment system emergency worksheet. The following is a suggested list of emergency equipment and supplies that should be kept at the plant:

1. Detection equipment (for gases and oxygen deficiencies).
2. Masks (self-contained air packs for oxygen deficiencies).
3. Safety harnesses, lines, and hoists.
4. Proper protective clothing, footwear, and head gear.
5. Ventilating equipment.
6. Non-sparking tools.
7. Communications equipment.
8. Portable air blower.
9. Explosion-proof lantern and other safe illumination.
10. Warning signs and barriers.
11. Emergency first aid kits.
12. Proper fire extinguishers.
13. Eye wash and shower stations in laboratory areas.

14. Safety goggles for work in laboratories and other dangerous areas.

8.3.4 Standby and/or Duplicate Facilities

Standby facilities refer to equipment installed for use when the primary equipment fails; it is a substitute piece of equipment. The standby emergency generator provided at the treatment plant is an example of standby source of electrical power should the primary power source fail. The other standby equipment at the plant includes a raw wastewater pump, filter lift and recycle pumps, a sludge waste pump, blowers for equalization basin and aerobic digestion, and chlorinator.

8.3.5 Preventive Maintenance

All equipment regardless of design, construction, and use requires periodic maintenance during its lifetime. To perform such maintenance in an orderly manner and in accordance with a preplanned scheme for the purpose of obtaining the useful design life from a piece of equipment is called preventive maintenance. The details on preventive maintenance are given in Section 7.0 of the manual.

8.3.6 Records

The program for the protection of essential records, maps, and inventories is an important part of any emergency operating plan. It is suggested that the Plant Superintendent should maintain the following records at the plant:

1. Emergency facility and auxiliary personnel - names, addresses, telephone numbers, disaster responsibilities, skills, availability of transportation, etc.

2. Amounts, types, and location of emergency stockpiled equipment, materials, supplies, and chemicals.

3. Vehicle and equipment for hauling emergency supplies.

4. Treatment equipment such as auxiliary chlorinators available.

8.3.7 Industrial Waste Inventory and Monitoring System

The Plant Superintendent should inventory all industrial waste contributing to the wastewater collection and treatment system.

The existing industrial waste as well as future industrial waste under planning and/or construction, should be located on the wastewater collection system map and a list of the potential hazardous spill materials at each source should be maintained. Record the names and phone numbers of the key personnel at each source. If necessary, an industrial waste monitoring equipment should be installed at critical locations in the collection system. If the industrial waste monitoring equipment is installed, then the Plant Superintendent should establish a routine inspection schedule to ensure that the equipment is functioning properly. Exhibit VIII-2 is a sample industrial waste inventory form.

8.3.8 Emergency Operations Organization

The Plant Superintendent is responsible for implementing the emergency operations plan at the plant. The following is a list of his/her responsibilities during an emergency condition:

1. Upon receipt of emergency condition message, activate appropriate portions of emergency operations plan based on initial alert information.

2. Bring together key personnel to assess severity and outline response actions.

3. Notify the N.C. Division of Environmental Management of emergency situation, if applicable, and/or request assistance as required.

4. Mobilize emergency operating staff as directed by nature of emergency response actions as required until normal operation is restored.

5. Critique emergency operations plan and upgrade the plan as required. Areas to be reviewed include: response time, adequacy of emergency procedures, equipment, communications, and personnel training; process flexibility; and performance of auxiliary personnel and mutual aid agreements.

TABLE VIII-1

VULNERABILITY ANALYSIS WORKSHEET

Treatment System: Courthouse Bay Wastewater Treatment Plant

Type of Emergency: Power Outage

Description of Emergency: Area wide power failure with no outside power available to the treatment plant for an extended period of time.

System Component	Effect of Emergency Type and Extent	Prevention Recommendations
1. Collection Lines	Backup of flow due to pump stoppage. Possible flooding and spills of raw wastewater.	1. Provide bypasses to divert flow around pumping stations by using portable pumps. 2. Chlorinate raw wastewater that is being discharged to nearby drainage ditches or stream. 3. Provide standby generator at the pumping stations.
2. Pumping Stations	Shutdown of pumps causing backup of flow in collection lines if is not bypassed.	1. Provide standby diesel generator. 2. Provide for power from two different substations.
3. Pretreatment	Grit removal and comminution operations halted causing excessive amounts of grit and solids being introduced to the aeration tank and clarifier with eventual upset of activated sludge system operation.	1. Provide standby emergency generator. 2. Provide bypass channels with manually operated solids removal equipment.
4. Equalization Basin	Solids settling in the equalization basin will occur on account of the ceasing of aeration system operation.	1. Provide standby generator.

TABLE VIII-1
(Continued)

System Component	Effect of Emergency Type of Extent	Prevention Recommendations
5. Primary Clarification	Sludge removal operation is ceased causing excessive solids carry-over to the trickling filter system.	1. Provide standby generator. 2. Use gasoline driven portable pump for removing sludge.
6. Trickling Filter	Trickling filter will be inoperable due to shutdown of filter raw wastewater, filter lift and recycle pumps.	1. Same as Pumping Station. 2. Bypass the secondary filters.
7. Secondary Clarifier	Stoppage of scraper mechanisms allowing eventual carry-over of solids and violation of solids limits of the discharge permit.	1. Same as Pumping Station.
8. Sludge Handling	Shutdown of Aeration Blowers resulting temporary slow down of aerobic sludge digestion process. May create septic conditions in the digester if power outage remains for long time.	1. Provide standby diesel generator. 2. Provide for power from two separate substations.
9. Power Supply	Temporarily interrupted due to transmission line down.	1. Same as Pumping Station.
	When power is restored, the initial surge generated by the demand of all electrical systems trying to start simultaneously could cause main circuit breakers to trip, resulting in a second local power outage.	1. Open circuit breakers for each individual equipment item that is not operating on standby power. When main power is restored, turn each unit individually so load can build up slowly.

TABLE VIII-1
(Continued)

System Component	Effect of Emergency Type of Extent	Prevention Recommendations
10. Communication	Telephone should not be affected unless the telephone company operates on local power and their emergency power source fails.	1. Provide Walkie-talkie, CB, or other back-up communication equipment which is self-contained.
11. Personnel	Work will be hampered if failure occurs at night due to lack of light.	1. Provide emergency battery lighting, flashlights, and alternate circuitry for normal lighting to be operated on emergency generated power.

Date: ______________________ Analyst: ______________________

TABLE VIII-2

VULNERABILITY ANALYSIS WORKSHEET

Treatment System: Courthouse Bay Wastewater Treatment Plant

Type of Emergency: Flood (100 year or abnormal)

Description of Emergency: The flood will cause considerable damage to low lying areas. Bridges will be closed, utility poles may be downed, and electrical power interrupted.

System Component	Effect of Emergency Type and Extent	Prevention Recommendations
1. Collection Lines	Backup of flow due to pump stoppage by power failure. Possible flooding and spills of raw wastewater.	1. Provide bypasses to divert flow around pumping station.
2. Pumping Stations	Shutdown of pumps by power failure causing backup of flow in collection lines if flow is not bypassed.	1. Provide standby diesel generator. 1. Provide for power from two different substations.
3. Pretreatment	Power failure.	1. Provide standby diesel generator. 2. Provide for power from two separate substations.
4. Primary Clarification	Shutdown of sludge removal mechanism and pumps due to power failure.	1. Same as Pretreatment 1. and 2.
5. Trickling Filters	Power Failure - Cease operation of filter lift and recycle pumps.	1. Same as Pretreatment 1. and 2.
6. Secondary Clarifier	Power failure.	1. Provide for power from two separate substations. 2. Provide standby diesel generator.

TABLE VIII-2
(Continued)

System Component	Effect of Emergency Type and Extent	Prevention Recommendations
7. Sludge Handling	Power failure.	1. Provide for power from two separate substations. 2. Provide standby diesel generator.
8. Power Supply	Temporarily interrupted due to transmission lines down.	1. Provide for power from two separate substations.
9. Communication	Telephone lines downed.	1. Provide for radio communications at plant and in vehicle. 2. Use portable two-way radios within plant.
10. Personnel	Access road blocked due to washing of road.	1. Select alternate route in plant. 2. Provide supplies for persons stranded. 3. Provide auxiliary personnel. 4. Coordinate with City's Street Department for road repair.

Date: ____________________ Analyst: ____________________

WASTEWATER TREATMENT SYSTEM

EMERGENCY INVENTORY

SYSTEM: ______________________________

PREPARED BY: ______________________________ DATE: ____________
(Signature)

DUPLICATE EQUIPMENT IN STOCK

DESCRIPTION	MAKE	SIZE	TYPE	VOLTAGE	HP	CAPACITY	NO.

PARTS & COMPONENTS IN STOCK

DESCRIPTION	SIZE	NO.	APPLICATION IN SYSTEM

EXHIBIT VIII- 1a

SAMPLE INVENTORY WORKSHEET

EMERGENCY EQUIPMENT REPAIR TOOLS

DESCRIPTION	NO.	APPLICATION IN SYSTEM

PIPE	SIZE					
	TYPE					
	LENGTH					

AVERAGE CHEMICAL STOCK	TYPE				
	FORM				
	QUANTITY				

COMMUNICATIONS EQUIPMENT

DESCRIPTION	LOCATION

MAPS AND FACILITY LAYOUT DETAILS

OFFICIAL AUTHORIZING INVENTORY

EXHIBIT VIII- 1b

SAMPLE INVENTORY WORKSHEET

INDUSTRIAL WASTE INVENTORY FORM

Name and Location of the Industry	Industrial Waste Description	Key Personnel and Phone No.

EXHIBIT VIII-2

Exhibit VIII-3 is a sample emergency condition flow diagram for the Courthouse Bay wastewater treatment plant. Table VIII-3 lists the emergency phone numbers which might be handy in implementing emergency operations at the plant.

8.3.9 Mutual Aid Agreements

Mutual aid agreements are desired to get help during emergencies. Some examples of groups with whom mutual aid agreements should be developed are as follows:

1. Fire and police departments.
2. Electric, gas, and telephone utilities.
3. Construction companies.
4. Industrial firms.
5. Local equipment and chemical supplies companies.
6. Health departments.
7. Rescue squads.

Exhibit VIII-4 is a sample mutual aid agreement form which should be used as a guide to develop such agreements.

8.4 REFERENCES

1. U.S. EPA, Emergency Planning for Municipal Wastewater Treatments, Facilities, EPA-430/9-74-013, 1974.

2. U.S. EPA, Considerations For Preparation of Operation and Maintenance Manuals, EPA-430/9-74-001.

3. California State University, Operation of Wastewater Treatment Plants, Volumes I, II & III, A Field Study Training Program, 1980.

4. William Cameron and Frank Cross, Operation and Maintenance of Sewage Treatment Plants, 1976.

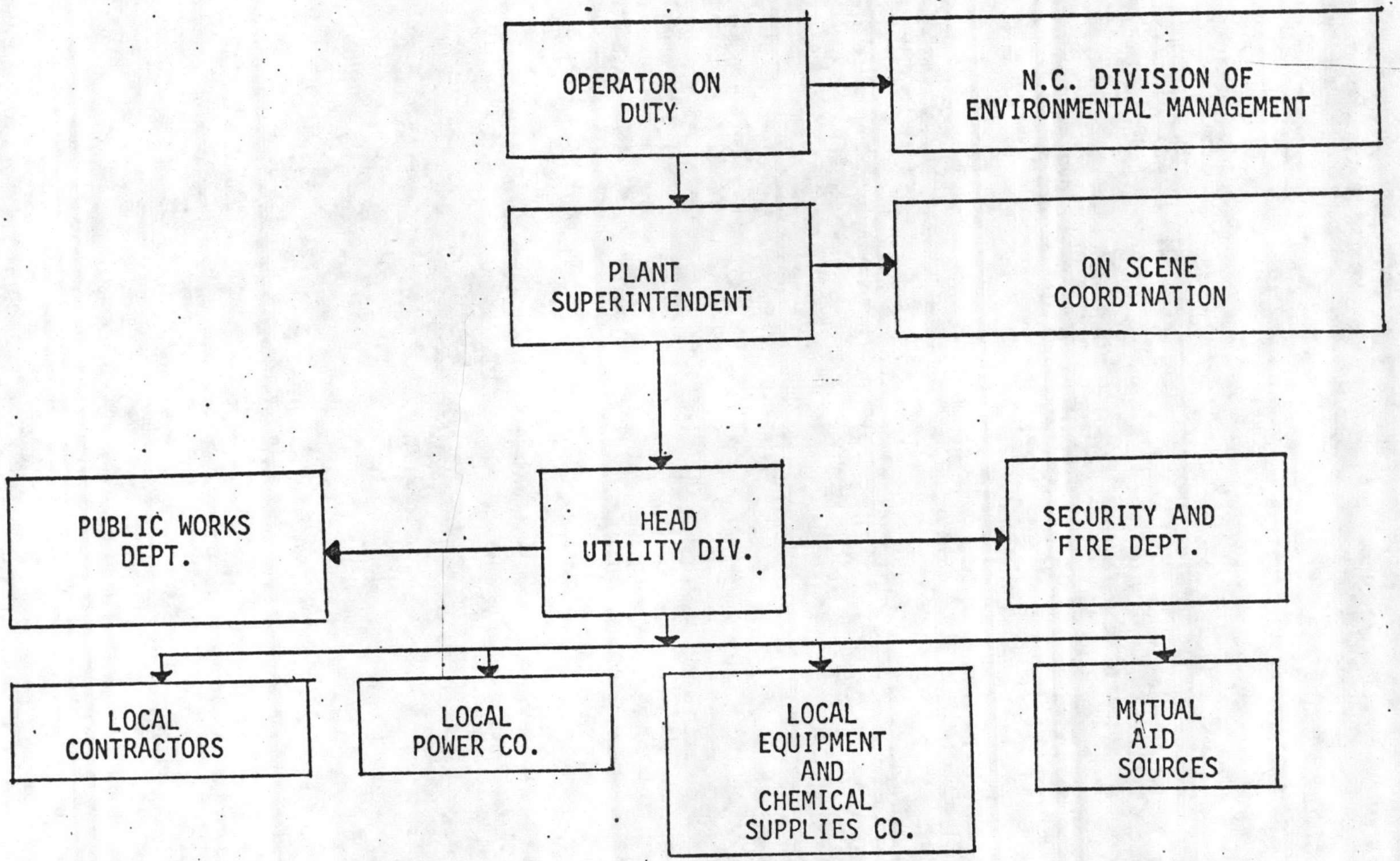

EXHIBIT VIII-3

EMERGENCY CONDITION FLOW DIAGRAM

TABLE VIII-3

EMERGENCY PHONE LIST

		Phone Numbers
Center Hospital		5969
Ambulance		4551
Fire		3333
PMO		2555
EOD		0118
Staff Duty Officers:	MCB	2528
	DIV	2127
	FSSG	2826
	MCAS	6111
Base Security		
Wastewater Superintendents		5988
Utilities		3001
Telephone		1114
N. C. Division of Environmental Management		
Regional Supervisor		256-4161
Central Office		733-5083

MUTUAL-AID AGREEMENT*

EMERGENCY SITUATIONS COULD ARISE IN A WASTEWATER TREATMENT SYSTEM THAT WOULD REQUIRE ASSISTANCE FROM OTHER DEPARTMENTS TO RESTORE NORMAL OPERATION.

IF AN EMERGENCY SITUATION ARISES IN ______________________ OR
(Department)

______________________, THE OFFICIALS IN BOTH DEPARTMENTS AGREE
(Department)

TO SUPPORT EACH OTHER DURING THE EMERGENCY.

EACH DEPARTMENT HAS A CONTINGENCY PLAN FOR RESPONSE TO EMERGENCIES

AFFECTING ITS WASTEWATER TREATMENT SYSTEM. THE ______________________
(Department)

AGREES TO SUPPORT ______________________ IN THE FOLLOWING AREAS:
(Department)

(Firefighting, Rescue Crews, Communications, Portable Chlorination,

Operational/Maintenance, Personnel, etc.)

TO THE EXTENT POSSIBLE UPON REQUEST INITIATED BY:

______________________ Name	______________________ Name
______________________ Title	______________________ Title
______________________ Department	______________________ Department

PERSONNEL RESPONDING TO THE REQUESTS FOR ASSISTANCE UNDER THIS AGREEMENT WILL REMAIN UNDER THE CONTROL OF THE DEPARTMENT PROVIDING THEM.

______________________ Signed	______________________ Signed
______________________ Name	______________________ Name
______________________ Title	______________________ Title
______________________ Department	______________________ Department

*Similar to format suggested by Planning Section, Virginia Office of Civil Defense.

EXHIBIT VIII-4

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New Bern, NC
1-888-622-4425
9/08

SAFETY

SAFETY

9. SAFETY

9.1 GENERAL

Safety in wastewater treatment plants is of major importance. Unsafe practices result in injuries with consequent human suffering, man-hour losses, equipment breakdown, increased equipment replacement, and higher labor cost.

9.2 SAFETY PROGRAM

A safety program is a management method to assign responsibility for accident prevention and ensure performance of that responsibility.

9.2.1 Management Attitude

Success of a safety program depends on direct and continued interest demonstrated by management. Posting of the safety policy, safety rallies, regular attendance at safety meetings, safety announcements, safety record reviews, and group conferences are a few examples of demonstrated interest.

9.2.2 Supervisory Responsibilities

Responsibility for development and implementation of the safety programs lies with the Plant Superintendent. In order to implement the safety program effectively, the Plant Superintendent is responsible for the following:

1. To see that each employee is completely familiar and understands the established safety rules and procedures of the treatment plant.

2. To see that correct and safe methods are used in operating and maintaining equipment.

3. To see that proper safeguards and proper equipment and procedures are used by the operators.

4. Instruct the operator in the safe method and procedures and assign only qualified and trained employees to do specific jobs.

9.2.3 Training

A safety training program is needed for all new employees. Once hired, the employee must be trained in appropriate safety procedures associated with the plant operation. He or she should become familiar with normal operations, hazardous areas, accident and illness prevention techniques, and emergency procedures before performing or taking responsibility for any operation.

Training in accidents and their prevention should include the following basic safety elements:

1. Wastewater facility hazards:

   a. Physical injuries
   b. Infections and infectious disease
   c. Oxygen deficiency
   d. Toxic or suffocating gases or vapors
   e. Radiological hazards
   f. Explosive gas mixtures
   g. Fire
   h. Electrical shock
   i. Noise - Refer to Table IX-1 for hazards encountered at wastewater treatment plant.

2. Personal hygiene

3. Personal protective equipment

4. Housekeeping

5. Materials handling and storage

6. Safe use of hand and power tools

7. Fire prevention and control

8. First aid

9. Accident reporting (Exibit IX-1), and

10. Accident investigation (Exhibit 1X-2)

ACCIDENT REPORT FORM

NO. ________

Date of Report: ____________________ Date of Injury: ____________________

Person Reporting: ____________________ Name of Injured: ____________________

Position of Injured: ____________________ Age: ______ Sex: ______

DESCRIPTION OF ACCIDENT

Time: ________ a.m. / p.m. Place: ____________________

____

Describe injury: ____________________

____

Describe how it happened: ____________________

____

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____

____

____

What was the cause: ____________________

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____

How was injury treated (what medical care): ____________________

____

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EXHIBIT IX- 1

ACCIDENT ANALYSIS FORM

No. ________

Accident Report Form No. ________

Description of accident: ______________________________

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Cause of accident: ______________________________

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Committee or supervisor suggestions for prevention: ______________________________

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EXHIBIT IX- 2

TABLE IX- 1

HAZARDS ENCOUNTERED AT WASTEWATER TREATMENT PLANT

Unit Operation or Process	Type of Hazard							
	Infections/ Infectious Diseases	Electrical Shock	Noise	Oxygen Deficiency	Radiological Hazard	Fire	Explosive Gas Mixtures	Physical Injuries
1. Inlet Structures								
a. Bar Screen	x	-	-	-	-	x	x	x
b. Comminutor	-	x	x	-	-	x	x	x
2. Clarification Fac.	x	x	-	-	-	-	-	x
3. Aeration Facilities	x	x	x	-	-	-	-	x
4. Disinfection Fac.	-	x	-	x	-	x	x	x
5. Laboratory	x	x	x	-	x	x	x	x
6. Control Structures	-	x	x	x	-	x	x	x
7. Office Building	-	-	-	-	-	x	-	x
8. Sludge Disposal								
a. Digesters	x	x	-	x	-	x	x	x
b. Dewatering Equip.	x	x	x	-	-	-	-	x
c. Sludge Drying Beds	x	-	-	-	-	-	-	x
9. Outside Facilities								
a. Manholes	x	x	-	x	-	x	x	x
b. Pump Stations	x	x	-	x	-	x	x	x
c. Lagoons	x	-	-	-	-	-	-	-

9.2.4 Safety Committee

The Commander, of Public Works, Camp Lejeune Marine Base, has formed a safety committee consisting of the following members:

9.3 SAFE PRACTICES

9.3.1 Safety Rules and Procedures

It is the responsibility of the Plant Superintendent to formulate safety rules and procedures to assist and protect the employee in his work. These rules must be stated clearly and be realistic.

Each employee should be provided with a copy of safety rules. It is the responsibility of each employee to study and observe the rules, especially those applying to his specific duties. Supervisory personnel should be responsible for the enforcement with immediate appropriate action taken if a violation occurs.

9.3.2 Employee Responsibilities

To help ensure the safety of the employee and the wastewater treatment facilities, employees are responsible for observing all safety rules and procedures. General safety practices that should be brought to the attention of each employee for compliance are:

1. All written and oral safety rules should be observed and particular job associated hazards recognized.
2. A job should not be started until proper instructions have been received and are understood.
3. Any hazardous conditions, unsafe equipment, or unsafe working practice should be reported to the supervisor immediately.
4. All injuries or accidents should be reported to the supervisor.

5. All water in the plant other than drinking water fountains or water coolers should be considered contaminated and unsafe to drink.

6. Running in the plant, except in case of emergency, is forbidden.

7. Moving equipment should not be operated unless instruction in its use has been given.

8. Safety devices and safety guards must be in place before operating any equipment.

9. Hand tools and special tools should be kept clean and in good condition.

10. The correct tool should be used for the particular job in the proper manner.

11. Proper protective equipment should be used for particular job conditions.

12. Wearing loose clothing should be avoided because it may be caught in moving equipment.

13. Good housekeeping should be practiced at all times.

14. The rules of personal hygiene should be observed to avoid infection.

15. Smoking in hazardous and prohibited areas is forbidden.

16. Reporting under the influence of alcohol or drugs, or bringing them on the treatment plant premises, is forbidden.

17. No job should be considered finished until the safety of the next person to use the equipment or facility has been maximized.

9.3.3 Personal Hygiene

Wastewater and sludge are potential hazards to treatment plant personnel. The hazards include the waterborne diseases such as typhoid fever, paratyphoid fever, dysentery, infectious jaundice, hepatitis, and the danger from tetanus. The best defense against infection is the practice of good personal hygiene. The following safety precautions should be observed whenever working with wastewater or sludge:

1. Hands and fingers should be kept from the nose, mouth, eyes, and ears.

2. Gloves always should be worn when hands are chapped or burned or when the skin is broken for any cause.

3. Rubber gloves should be worn when cleaning pumps; handling wastewater screenings, sludge, or grit; or for other work in which an employee comes into direct contact with untreated wastewater or sludge.

4. Before eating and smoking, and after work, the hands should be washed thoroughly with soap and hot water.

5. Fingernails should be kept short, and foreign material should be removed from the nails with a stiff soapy brush.

6. All cuts and scratches must be reported and be given first aid treatment.

7. A shower should be taken after each work day.

9.3.4 Safety Equipment

The following is a list of the minimum safety equipment which should be available at the treatment plant. Any other pieces of equipment which the operator deems necessary should be added to the list.

1. Portable fresh air blower and large diameter flexible hose for ventilation of manholes, sewers, wet or dry wells, or enclosed areas.

2. Carbon dioxide or dry chemical type fire extinguishers accessible to all hazardous locations.

3. First aid kit. A first aid kit should also be provided for the wastewater pumping station.

4. Self-contained air packs located near the entrance to the chlorine room.

5. "No Smoking" signs located in all hazardous locations at both the treatment plant and pumping station.

6. Safety, explosion-proof lighting equipment for use when working in hazardous locations.

7. Protective clothing, safety goggles, face shields, hard hats, gloves, rubber boots, and safety shoes.

8. Rubber mats in front of all electric panels at both the treatment plant and pumping station.

9. Barricades, traffic cones, warning signs, and flashers.

10. Safety shower for laboratory.

11. Eye wash for corrosive or irritating chemicals in eyes.

12. Hydrogen sulfide detector.

13. Fume hood for laboratory.

14. Oxygen deficiency/explosive gas detector.

9.3.5 <u>Good Housekeeping</u>

Accidents and fire can be prevented by practicing good housekeeping. The following is a list of good housekeeping guidelines which may help in eliminating causes for accidents or fire:

1. A routine program and schedule for housekeeping should be established.

2. Passageways, store rooms, service rooms, and working space should be kept clean and orderly and in a sanitary condition.

3. The floor of every work room should be maintained in a clean and, as far as possible, a dry condition.

4. Trash and loose debris and rubbish should be picked up from floors, passageways, and platforms.

5. To facilitate cleaning, every floor, working space, and passageway should be kept free of protruding nails, splinters, holes, and loose boards.

6. Walkways should be kept free of grease, sludge, and oil.

7. Splash guards and drip pans should be used whenever possible to keep oil and grease from machinery and pumps off the floor.

8. Walkways and roadways should be kept free of ice. If this is not possible, they should be salted and sanded.

9. Solvent-soaked and combustible wastes should be disposed of in airtight metal receptacles and removed daily from the plant.

10. General housekeeping should be scheduled on a periodic basis.

9.3.6 Oxygen Deficiency

Oxygen deficiency is one of the several hazardous conditions encountered at wastewater treatment facility. Normal air contains about 21 percent, by volume, oxygen and 79 percent nitrogen. Any atmosphere containing less oxygen is called an oxygen-deficient atmosphere. When the oxygen level drops to 12 percent or less, it may be fatal.

Oxygen deficiency can be attributed to one or more of the following factors: (1) poor ventilation, (2) depletion of oxygen as a result of the bio-chemical decomposition of organic matter, and (3) displacement of air by some other gas. Oxygen deficiency in wastewater treatment plants occurs primarily in manholes, in tightly covered pits or tanks regardless of depth, and in poorly ventilated rooms or basements where sludge spillage has occurred. It also may occur in partially emptied digesters, structures containing sludge gas piping, or appurtenances that may be leaking.

Safe practice requires an awareness of the potential problem, detecting the existence of oxygen deficiency, and proper ventilation to restore a normal atmospheric condition. Correction of oxygen deficiency includes ample ventilation and removal of noxious gases if present. In rooms or structures, ventilation may be secured by opening doors or windows or through the operation of fans. In tanks, pits, and manholes, ventilation may be secured with compressed air or portable air blowers. The discharge pipe or hose should extend to near the bottom of the structure.

9.3.7 Noxious Gas and Vapors

A noxious gas or vapor is one directly or indirectly injurious or destructive to the health or life of human beings. It may present a hazard by causing burns, exposions, asphyxiation, or poisoning.

Table IX-2 summarizes the characteristics of common gases found in sewers, wastewater pumping stations, and treatment plants. The treatment plant operators should be thoroughly familiar with characteristics, sources, and means of testing for the common gases associated with treatment facilities. These gases may occur in wet and dry well pumping stations, sludge recirculation and waste pumping stations, sewers, manholes, maintenance garages, chlorine facilities, and all other areas where wastewater, screenings, grit, and sludge solids are present. Safe practice requries that, before entering any manhole or vault, tests should be conducted for the presence of dangerous gas with approved gas detectors. When there is evidence of flammable or combustible gases, the manhole or vault should be purged before it is entered by forcing fresh air into the enclosure with a blower and flexible hose.

In chlorine cylinder storage room, it is safe practice to have one or two self-contained air packs readily available outside the storage room. For serious leaks, a hose mask or compressed air demand-type mask should be available and used.

9.3.8 Electrical Safety

The maintenance of the equipment, operated by electrical power, requires exposure to electrical hazards that may result in shock or death unless safe practices are strictly followed. The following is a list of general safe practices that should be considered as a guide to establish the electrical safety rules and procedures at a wastewater treatment plant:

1. Allow only qualified and authorized personnel to work on electrical equipment and wiring or to perform electrical maintenance.

2. Provide and use lock-out switches and tags at all remote locations or where the starter is remotely located from the equipment.

3. Electrical equipment and lines always should be considered as energized unless they are positively proven to be de-energized and properly grounded. If it is not grounded, it is not dead.

4. The use of metal ladders or metal tape measures around electrical equipment should be prohibited.

5. Two men should work as a team on energized equipment.

6. Use approved rubber gloves on voltages above 300 V.

7. An electrical control panel should never be opened unless the job requires it.

8. Before work is performed on a line that operates at 440 V or above, it should be de-energized, locked out, and grounded in an approved manner.

9. No part of the body should be used to test a circuit.

10. Personnel should avoid grounding themselves in water or on pipes, drains, or metal objects when working on electrical equipment or wiring.

11. No electrical safety device should be made inoperative or by-passed.

12. All tools should have insulated handles.

13. Metal-cased flashlights should never be used.

14. Rubber mats should be used at control centers and electrical panels.

15. All electrical motors, switches, and control boxes should be kept clean at all times.

9.3.9 Laboratory Safety

Laboratory safety is important as an intergral part of the safety program at wastewater treatment plant. Each employee working in the laboratory at the plant should be thoroughly familiar with the potential hazard associated with the handling of wastewater samples, chemicals, and equipment. Table IX-3 summarizes the common laboratory hazards associated with the handling of wastewater samples and chemicals. The following is a

general list of safety practices recommended in wastewater treatment plant laboratories:

1. Broken glassware should be discarded and disposed of properly.

2. When using the volatile solvents, acids, or bases, the work should be done under a ventilated hood.

3. Ammonia and nitric, acetic and perchloric acids react violently with some organic materials. When using these chemicals, care should be taken in regard to possible fire or explosion.

4. Chemicals should not be handled with the bare hands.

5. An emergency eye wash and shower should be located in the laboratory.

6. Suction bulbs should be used on all pipettes.

7. Rubber aprons should be worn when working with corrosive chemicals.

8. A face shield or chemical type goggles should be used when dangerous chemicals are handled.

9. All chemicals should be labelled clearly.

10. Proper ventilation should be available to remove fumes.

11. Appropriate fire extinguishers should be available in the laboratory.

12. Tongs and proper gloves should be used to remove samples from hot plates, oven, and furnace.

13. Electrical equipment should be properly grounded.

14. Personnel should thoroughly wash their hands with soap and hot water before eating or smoking.

9.3.10 Mechanical Safety

Majority of the equipment requiring maintenance in wastewater treatment plant is electrically driven but mechanical in its operation. The movement of machines, belts, and shafts can be hazardous, especially for persons with loose clothing. Carelessness can result in serious body injuries. The following is a list of general safety practices that should

be considered as a guide to establish the mechanical safety rules and procedures at the plant:

1. Post the rated capacities of lifting equipments with a statement that under no circumstances the capacities be exceeded.

2. All crane-hoist hooks should be equipped with safety latches.

3. Crane-hoist operator should accept signals from only one designated signal man to preclude any possibility of confusion.

4. Loads/equipment requiring repair should be lifted only a few inches at first to check for balance before completing the full lift.

5. No plant personnel should work under a suspended load, near a cable, chain, or rope under tension.

6. Operator should never leave the lifting device while the load is suspended; the load should be lowered to the ground and all power turned off before the operator leaves. Only trained and certified operator should be permitted to operate lifting equipment.

7. Fans, belts, and coupling should be provided with guards or screens to prevent accidental contact with these moving parts.

8. Only employees who are properly trained, qualified, and designated as welders should be permitted to operate welding equipment.

9. Use right tool for the job. Keep tools off ladders or overhead locations.

10. Use power actuated tools with precaution.

9.3.11 Plant Safety

A. Wet and Dry Wells

The wastewater collection and treatment system contains several pump stations which incorporate wet and dry wells. These wells present several hazards such as danger of falling in, presence of toxic and combustible gases, and presence of flammable liquids. The following is a list of general safe practices for wet and dry wells:

1. Adequate guard rails and safety chains conforming to OSHA standards should be provided around wells and floor openings.

2. When entering wet and dry wells, check for explosive gases, oxygen deficiency, and hydrogen sulfide concentration. Never enter one by yourself. Use a safety harness and have sufficient personnel available to lift you out.

3. Use extreme care in climbing up and down access ladders to pit or well areas. The application of a non-slip type coating on ladder rungs is helpful.

4. Keep good housekeeping. Debris, mud, ice, oil, and grease should be cleaned up and tools and materials properly stored to avoid slipping or tripping.

5. Never attempt to carry tools or equipment up or down ladders into pits or wells. Always use bucket and hand-line or sling for this purpose.

6. Only explosion-proof lights and equipment should be used in these areas.

B. Pumping Stations

Pumping stations have inherrent hazards that arise primarily from the moving equipment and from housekeeping. The following is a list of general safe practices for the pump stations in the Courthouse Bay wastewater treatment system:

1. Always provide adequate ventilation to remove gases and supply oxygen. If the room is below ground level and provided with only forced air ventilation, be certain the fan is on before entering the area.

2. The tops of all stairwells or ladders should be protected by a removable chain. Keep this chain in place when the stairwell or ladder is not being used.

3. Never remove guards from pumps, motors, or other equipment without first locking out or turning off equipment at main breaker and properly tagging. Always replace all guards before starting units.

4. Guards should be installed around all rotating shaft couplings, belt drives, or other moving parts normally accessible.

5. Maintain good housekeeping in pump room. Remove all oil and grease, and clean up spills immediately.

6. Only explosive-proof lights and equipment should be used in these areas.

C. Grit Chamber

The following safe practices should be considered for the grit chamber at the plant:

1. Maintain good housekeeping in and around grit chamber. Keep walking surfaces free of grit, grease, oil, slimes, or other material that will make a slippery surface.

2. Temporary on-site storage of grit may require application of lime for odor prevention. Protective equipment such as goggles and gloves should be used whether lime is applied in powered form or in solution.

D. Comminutor/By-Pass Screen

The following safe practices should be considered for the comminutor/by-pass screen at the plant:

1. Never work on the mechanical or electrical parts of the unit without first locking out the unit at either a push button lockout or the main circuit breaker of the control panel. Be certain the breaker is properly tagged.

2. Maintain good housekeeping in the area of screening operation. Keep all walking areas free of slimes, oils, greases, or other materials.

E. Equalization Basin, Trickling Filter System Clarification Tanks, and Aerobic Sludge Digester

The following safe practices should be considered for the aeration and clarification tanks:

1. Maintain good housekeeping. Maintain a good non-skid surface on walkways. Brush and clean effluent weirs and effluent troughs.

2. Be cautious when working on the bottom of a clarifier. When hosing down, always hose a clean path to walk upon. Avoid walking on the remaining sludge whenever possible.

3. Always turn off and lock out or turn off and tag clarifier or blower breakers before working on drive unit. If necessary, adjustments may be made on scrapers

while the unit is in operation; but keep in mind that, although these are moving quite slowly, there is a tremendous power behind their movement. Stay clear of any situation where your body or the tools you are using may get caught under one of the scrapers.

4. Guards should be installed over or around all gears, chains, sprockets, belts, or other moving parts. Keep these in place whenever the unit is in operation.

F. <u>Chlorination</u>

The following safe practices should be considered for the chlorination system at the plant:

1. Always turn chlorine exhaust fan on, whether for routine check, service or repair job.

2. Wear a self-contained air pack whenever presence of chlorine in air is suspected.

3. Do not start up or operate a chlorinator unless air pack is in the area.

4. Train all personnel in use of gas-protective equipment.

5. Wear air pack whenever trying to locate leaks and to repair and adjust equipment.

6. Make sure air-breathing apparatus is fully charged.

7. In event of leakage, vacate room immedately and do not re-enter unless air-breathing units have been donned.

8. When leak occurs in chlorinator room, open doors to outside.

9. Never spray water on a chlorine leak.

10. Always wear plastic-coated gloves when changing cylinders.

11. Two employees should always change cylinders or break apart feed system piping.

12. Use a ramp when lifting cylinders onto scales.

13. Always use a new lead or fiber washer when connecting cylinder piping to chlorinator or when breaking and recoupling connections.

14. Clean yokes, adapters, and clamps with wire brush.

15. Inspect for rounded or worn edges or yoke adapter at contact point with adapter clamp.

16. Make sure piping from cylinder to header or to chlorinator has an inverted loop no smaller than 10 inches in diameter.

17. Replace flexible-metal chlorine gas piping immediately if it is bent or twisted during cylinder changing.

18. Co or-code and label chlorination plant piping.

19. Never use petroleum-based fluids when working with chlorine.

20. Make an eye wash and a shower accessible to each chlorination station.

21. Never store combustible material near chlorine containers or apply direct heat to them at any time.

22. Keep upwind of chlorine leaks.

23. Never try to neutralize chlorine with chemicals.

9.4 HAZARDOUS OPERATIONS

9.4.1 Sub-Surface Working

Sub-surface work includes repair and maintenance of sewers, manholes, closed tanks, and dry and wet wells at pumping stations. The major hazards include oxygen deficiency, explosive and toxic gases, falling, cave-ins, and exposure to wastewater or sludge. The following is a general list of safe practices recommended in these operations:

1. Warning devices, barriers, barricades, or guard rails should be placed to protect the public and operators before manhole covers or pit gratings are removed.

2. Trucks and other equipment should be placed to present the least interruption or hazard to traffice.

3. Manhole covers always should be removed and replaced with appropriate hooks or hoists.

4. Smoking should not be permitted in any underground structure or enclosure.

5. Before entering any sub-surface work area, tests should be made for oxygen deficiency and the presence of dangerous gas with approved gas detectors.

6. If the atmosphere is normal, a worker with a safety harness attached to a life line may enter the sub-surface work area.

7. While work is in progress in a manhole, two men should be stationed at the surface of the opening to handle the life line, if necessary.

8. In an emergency, if it becomes necessary for an employee to enter when gas or oxygen deficiency is present, a hose mask should be worn.

9. Each employee should wear proper protective clothing such as hard hat, rubber gloves, and rubber boots.

9.4.2 Material Lifting

Accidents or back injuries are often caused by improper handling of heavy or bulky items. The following is a list of general guidelines to avoid accidents from material lifting:

1. The size, shape, and weight of the object to be lifted must be considered. A person should not lift more than he can handle comfortably.

2. The feet should be placed far enough apart for good balance and stability. The footing should be solid.

3. The worker should get as close to the load as possible. The legs should be bent about 90 degrees at the knees.

4. The back should be kept as straight as possible.

5. The object should be gripped firmly.

6. The hands should be free of oil, grease, or water that might prevent getting a firm grip.

7. Grease, oil, or dirt should be wiped off before handling bulky or heavy items.

8. The fingers should be kept away from any points that may cause the fingers to be pinched or crushed, especially when setting the object down.

9. Mechanical and power lift equipment should be used for heavy or bulky objects whenever possible.

9.4.3 Ladder Operations

Besides the fall hazards within a wastewater treatment plant, ladders present a major accident hazard. The following is a list of general guidelines for safe practices when ladder is used:

1. All ladders should be equipped with approved safety shoes.
2. The distance from the foot of a straight ladder to the support it rests against should equal one-fourth the length of the ladder.
3. Short ladders should never be placed against an unsafe support.
4. Whenever possible, a straight ladder should be tied at the top to a firm support.
5. A step ladder should be held by at least one employee when the worker is performing 10 feet or more above the floor.
6. Step ladders` legs should be spread fully when the ladder is in use.

9.5 REFERENCES

1. Water Pollution Control Federation, Operation of Wastewater Treatment Plants, MOP-11, 1976, p. 479-496.
2. Cameron, William and Gross, Frank, Jr., Operation and Maintenance of Sewage Treatment Plants, 1976, p. 181-185.
3. The Texas Water Utilities Associtiion, Manual of Wastewater Operations, 1971, p. 689-706.
4. U.S. Bureau of Mines, Washington, D.C., First Aid Manual.
5. Water Pollution Control Federation, Wastewater Treatment Plant Design, MOP No. 8, WPCF, 1977.
6. U.S. EPA, Safety in Operation and Maintenance of Wastewater Treatment Works, Tech. Bull., 1968.
7. U.S. EPA, Safety in Design of Wastewater Treatment Works, Tech. Bull., 1968.
8. Water Pollution Control Federation, Safety in Wastewater Works, MOP No. 1, 1975.

TABLE IX-2

CHARACTERISTICS OF COMMON GASES FOUND IN SEWERS, WASTEWATER PUMPING STATIONS & TREATMENT PLANTS*

Gas	Chemical Formula	Common Properties	Specific Gravity or Vapor Density (Air = 1.00)	Physiological Effects	Maximum Safe Go-minute Exposure (% by Vol. of air)	Maximum Safe 8-hour Exposure (% by Vol. of air)	Explosive Range (% of Vol. in air) Lower Limit	Explosive Range (% of Vol. in air) Upper Limit	Likely Location of Highest Concentration	Most Common Source
1.Hydrogen	H	Colorless, odorless, tasteless, flammable.	0.07	Acts mechanically to deprive tissues of oxygen.	-	-	4.0	74.0	At top	Manufactured gas, sludge digestion tank gas, electrolysis of water.
2.Hydrogen	H_2S	Rotten egg odor in small concentrations. Exposure for 2 to 15 min. at 0.01% impairs sense of smell. Color not evident at high concentrations. Colorless. Flammable.	1.19	Impairs sense of smell rapidly as concentration increases. Death in few minutes at 0.2%. Exposure to 0.07 to 0.1% rapidly causes acute poisoning. Paralyzes respiratory center.	0.02-0.03	0.001	4.3	46.0	Near bottom but may be above bottom if air is heated and highly humid.	Cool gas, petroleum, sewer gas. Sludge gas.

TABLE IX-2
(Continued)

Gas	Chemical Formula	Common Properties	Specific Gravity or Vapor Density (Air = 1.00)	Physiological Effects	Maximum Safe Go-minute Exposure (% by Vol. of air)	Maximum Safe 8-hour Exposure (% by Vol. of air)	Explosive Range (% of Vol. in air) Lower Limit	Upper Limit	Likely Location of Highest Concentration	Most Common Source
3. Methane	CH_4	Colorless, odorless, tasteless, flammable.	0.55	Acts mechanically to deprive tissues of oxygen. Does not support life.	-	-	5.0	15.0	At top, top, increasing to depth.	Natural gas, sludge gas.
4. Oxygen (in air)	O_2	Colorless, odorless, tasteless.	1.11	Normal air contains 20.5%. Man can tolerate down to 12%. Minimum safe 8-hour exposure 14 to 16%. Below 10% dangerous to life. Below 5 to 7% probably fatal.	-	-	-	-	Variable at different levels.	Oxygen depletion from poor ventilation and absorption or chemical consumption of oxygen.
5. Sludge gas		May be practically odorless, colorless. Flammable.	Variable	Will not support life.	No data. Would vary widely with composition.	-	5.3	19.3	Near top of structure.	Digestion of sludge.

TABLE IX- 2
(CONTINUED)

Gas	Chemical Formula	Common Properties	Specific Gravity or Vapor Density (Air = 1.00)	Physiological Effects	Maximum Safe Go-minute Exposure (% by Vol. of air)	Maximum Safe 8-hour Exposure (% by Vol. of air)	Explosive Range (% of Vol. in air)		Likely Location of Highest Concentration	Most Common Source
							Lower Limit	Upper Limit		
6. Ammonia	NH_4	Colorless, sharp pungent.	0.59	Irritates eyes and respiratory tract. Toxic at 0.01%.	-	0.00005	15	-	At top.	Sewer gas.
7. Carbon Dioxide	CO_2	Colorless, odorless. When Breathed in large quantities, may cause acid taste. Non-flammable. Not generally present in dangerous amounts unless an oxygen deficiency exists.	1.53	Cannot be endured at 1.0% for more than a few minutes even if subject is at rest and oxygen content normal. Acts on respiratory nerves.	4.0-5.0	0.5	-	-	At bottom when heated, may stratify at points above bottom.	Products of combution, sewer gas, sludge.

TABLE IX- 2

(Continued)

Gas	Chemical Formula	Common Properties	Specific Gravity or Vapor Density (Air = 1.00)	Physiological Effects	Maximum Safe Go-minute Exposure (% by Vol. of air)	Maximum Safe 8-hour Exposure (% by Vol. of air)	Explosive Range (% of Vol. in air)		Likely Location of Highest Concentration	Most Common Source
							Lower Limit	Upper Limit		
8. Carbon Monoxide	CO	Colorless, odorless, tasteless, flammable.	0.97	Combines with hemoglobin of blood. Unconsciousness in 30 minutes at 0.2 to 0.25%. Fatal in 4 hours at 0.1%.	0.04	0.005	12.5	74.0	Near top, especially if present with illuminating gas.	Manufactured gas. Flue gas product of combustion. Fires of almost any
9. Chlorine	CL_2	Yellow green color. Choking odor detectable in very low concentr-tions. Non-flammable.	2.49	Irritates respiratory tract. Kills most animals in very short time at 0.1%.	0.0004	0.0001	-	-	At bottom.	Chlorine cylinder and feed line leaks.

TABLE IX-2

(Continued)

Gas	Chemical Formula	Common Properties	Specific Gravity or Vapor Density (Air = 1.00)	Physiological Effects	Maximum Safe Go-minute Exposure (% by Vol. of air)	Maximum Safe 8-hour Exposure (% by Vol. of air)	Explosive Range (% of Vol. in air)		Likely Location of Highest Concentration	Most Common Source
							Lower Limit	Upper Limit		
10. Gasoline		Colorless. Odor noticeable at 0.03%. Flammable.	3.0-4.0	Anesthetic effects when inhaled. Rapidly fatal at 2.4%. Dangerous for short exposures at 1.1 to 2.2%.	0.4-0.7	Varies	1.2	6.0	At bottom.	Garage, storage tanks.

*Source: Operation of Wastewater Treatment Plants - WPCF Manual of Practice No. 11,1976.

TABLE IX-3

LABORATORY HAZARDS*

Materials/Conditions	Potential Hazard	Preventive/Corrective Measures
1. Infectious Materials		
a. Wastewater and sludge samples	Wastewater and sludge contains millions of bacteria, some of which are infectious and dangerous, and cause diseases such as tetanus, typhoid, dysentery, polimelytis, and hepatitis.	Personnel handling these materials should thoroughly wash their hands with soap and water, particularly before handling food. Do not pipette wastewater or polluted samples by mouth. Use a rubber bulb. It is recommended that each employee should get innoculations by their local County Health Department.
2. Corrosive Chemicals		
a. Acids: sulfuric, hydrochloric, nitric, glacial acetic, and chromic acid cleaning solutions.	Acids are extremely corrosive to human tissue, clothing, metals stone, and concrete.	Use glassware of polyethylene containers for handling. Pour and pipette carefully to prevent spilling and dropping. In case of accidental spills, immediately dilute with large portion of water and neutralize the acid with sodium carbonate or bicarbonate until foaming and bubbling stops. If spills occur on bench tops, dilute, neutralize and squeeze into sink.

TABLE IX- 3

LABORATORY HAZARDS*
(Continued)

Materials/Conditions	Potential Hazard	Preventive/Corrective Measures
		If spills occur on person, immediately wash off with water. If spills occur on face, immediately flood with large quantities of cold water.
b. Bases: sodium hydroxide, potassium hydroxide, ammonium, hydroxide.	Bases are extremely corrosive to skin, clothing, and leather.	Use glassware and polyethylene containers for handling.
	Ammonium hydroxide is extremely irritating to the eyes and respiratory system.	Pour ammonium hydroxide under a laboratory hood with fan in operation.
		In case of accidential spills, wash with large quantities of water and use saturated boric acid solution to neutralize.
c. Miscellaneous		
1) Chlorine gas solution	Inhalation and irritation to respiratory system.	Avoid inhalation; handle in hood; secure cover to prevent escape of vapor.
2) Ferric salts, ferric chloride	Very corrosive to metal and skin.	Avoid body contact and wash off immediately.
3) Strong oxidants	May damage skin.	Avoid body contact and wash off immediately.

TABLE IX- 3

LABORATORY HAZARDS*
(Continued)

Materials/Conditions	Potential Hazard	Preventive/Corrective Measures
3. Toxic Materials		
a. Solids: cyanides, chromium, cadmium, and other heavy metals.	Toxic	Avoid injesting.
b. Liquids: carbon tetrachloride, ammonium hydroxide, nitric acid, bromine, chlorine water, aniline dyes, formaldehyde, chloroform, and carbon disulfide.	Health hazard. Carbon tetrachloride is absorbed into skin on contact; its vapors will damage the lungs; and it will build up in a body to a dangerous level.	Use in vented hood.
c. Gases	Fire and health hazards. For detail, refer to Table IX-2.	Use in vented hood.

<u>IMPORTANT</u>: Most laboratory chemicals have toxicity warnings and antidotes on their labels. Learn about the materials you use. Do not breath, eat, or drink them; and if they come in contact with your body, quickly apply large quantities of water to wash the substance away.

Materials/Conditions	Potential Hazard	Preventive/Corrective Measures
4. Broken glassware	Injuries	Should be discarded.

*Source: Operation of Wastewater Treatment Plants - A Field Study Training Program, U.S. E.P.A., 1970.

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UTILITIES

UTILITIES

10. UTILITIES

10.1 GENERAL

The utilities serving a wastewater treatment plant play an important role in the proper operation of the plant. Frequent or prolonged interruptions of service can have significant effects, even on systems that have some form of standby or alternate service. The purpose of this section is to familiarize the plant personnel with the utilities available for operation of the plant and to provide any information regarding contacts for utilities that can be made under the emergency operating conditions. The Courthouse Bay Wastewater Treatment Plant is provided with three utilities which are: (1) electrical, (2) telephone, and (3) water. The detailed information on these utilities is given in the following sections.

10.2 ELECTRICAL

The Carolina Power & Light Company provides electrical service to the plant through overhead transmission lines at the treatment plant site. The service line voltage is 277/480 v, 30, 4-wire for serving receptacles and miscellaneous electrical equipment at the plant.

Power company records show that the maximum duration of service interruption to a customer in the Camp Lejeune Base area is approximately one hour. This indicates that reliability of the power source is excellent.

To obtain emergency maintenance or assistance in the event of electrical service interruption, contact Carolina Power & Light Company by calling

10.3 TELEPHONE

The Carolina Telephone and Telegraph Company provides the telephone communication service at the Courthouse Bay Wastewater Treatment Plant. For general information and repair service, the telephone company can be contacted by dialing 1114.

During emergency situations when all lines are busy, call the telephone operator by dialing "0" and explain that the situation is an emergency. Such explanation should be sufficient to allow the operator to break in and connect to the party of interest. It is recommended that a "walkie-talkie" or CB Radio should be provided as a back-up communication system.

10.4 Water

Potable water at the Courthouse Bay Wastewater Treatment Plant is provided by the Base water system. The operating pressure of the water supply system is 40-60 psi, approximately. Emergency maintenance in the water system can be obtained by contacting the Utilities Department by calling 5988.

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ELECTRICAL

ELECTRICAL

11. ELECTRICAL

11.1 POWER SOURCE

The Carolina Power and Light Company provides electrical power to the Courthouse Bay Wastewater Treatment Plant through overhead transmission lines which terminate at the plant site. The service line voltage is 277/480V, 3Ø, 4 wire, 60 Hz.

11.2 POWER DISTRIBUTION

Power distribution system for the plant is shown on Sheets E-1 through E-8 of construction drawing set for the plant. For ease of reference these sheets are included in the envelope given at the back of this section. The electrical system at the plant consists of 277/480 volts, 3-phase, 4 wire, 60 Hz which supply power to the major equipment at the plant and 208/120 volts, 3-phase, 4 wire, 60 Hz, which supply power to receptacles, lighting and miscellaneous equipment. All conductors, feeder or branch circuitry in the distribution system are color coded by phases as follows:

208 Volt System	480 Volt System
Phase A - Black	Phase A - Brown
Phase B - Red	Phase B - Orange
Phase C- Blue	Phase C - Yellow
Neutral - White	Neutral - White
Ground - Green	Ground - Green

11.3 CONTROL AND MONITORING

The major in-plant controls are the starters for the equipment associated with each unit operation/process. Control wiring diagram and schedule for the plant are shown on Sheet No. E-7 of the construction

drawing set which is included in the envelope given at the back of this section. The in-plant monitoring system is composed of flow metering and sampling. The effluent sampler and chlorinators are paced with the effluent flow metering system, respectively.

11.4 ALTERNATE POWER SOURCE

The plant is provided with a standby diesel generator as an alternate power source. In the event of a power failure, the plant will continue to operate on standby power provided by the emergency generator. The generator rated capacity is 125 kw at 0.8 power factor. For details on generator refer to the manufacturer's instruction manual given in Appendix VIII.

11.5 ELECTRICAL SAFETY

For electrical safety refer to Section 9.3.8 of this manual.

OPERATION & MAINTENANCE MANUAL

FOR

COURTHOUSE BAY WASTEWATER TREATMENT PLANT

MARINE CORPS BASE

CAMP LEJEUNE, NORTH CAROLINA

volume 2

ATLANTIC DIVISION NAVAL FACILITIES ENGINEERING COMMAND NORFOLK, VA

prepared by

L. E. WOOTEN and COMPANY

CONSULTING ENGINEERS

RALEIGH, NORTH CAROLINA

JUNE 1985

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APPENDIX - I

APPENDIX - 1

APPENDIX - I

Glossary of Common Wastewater and Environmental Technology

GLOSSARY

Absorption The taking up of one substance into the body of another.

Activated Sludge Sludge floc produced in raw or settled wastewater by the growth of organisms (including zoogleal bacteria) in the presence of dissolved oxygen. The term "activated" comes from the fact that the sludge is teaming with active, or living, microorganisms.

Activated Sludge Loading The pounds of biochemcial oxygen demand (BOD) in the applied liquid per unit volume of aeration capacity or per pound of activated sludge per day.

Activated Sludge Process A biological wastewater treatment process in which a mixture of wastewater and activated sludge is agitated and aerated. The activated sludge is subsequently separated from the treated wastewater (mixed liquor) by sedimentation and wasted or returned to the process as needed.

Adsorption The adherence of a gas, liquid, or dissolved material on the surface or interface zone of another substance.

Aeration The bringing about of intimate contact between air and a liquid by one or more of the following methods: (a) spraying the liquid in the air, (b) bubbling air through the liquid, and (c) agitating the liquid to promote surface absorption of air.

Aeration Period The theoretical time, usually expressed in hours, during which mixed liquor is subjected to aeration in an aeration tank while undergoing activated sludge treatment. It is equal to the volume of the tank divided by the volumetric rate of flow of the wastewater and return sludge.

Aerobic (1) A condition in which "free" or dissolved oxygen (O_2) is present. (2) Requiring, or not destroyed by, the presence of free oxygen.

Alkalinity Buffering, or acid neutralizing, capacity of water due primarily to its carbonate, bicarbonate, and hydroxide content.

Ambient Temperature Temperature of the surroundings.

Anaerobic (1) A condition in which "free" or dissolved oxygen (O_2) is *not* present. (2) Requiring, or not destroyed by, the absence of free oxygen.

Assimilation The process by which food is converted to cell protoplasm.

Autotrophic Having the ability to utilize CO_2 as sole source of carbon.

Available Oxygen The quantity of dissolved oxygen available for oxidation of organic matter in a water body.

Bacteria Singe celled microorganisms of primary importance in most biological wastewater treatment processes.

Batch Reactor Reactor in which flow is neither entering nor leaving on a continuous basis.

Biochemical Oxygen Demand (BOD) A standard test indicating the quantity of oxygen utilized by wastewater under controlled conditions of temperature and time.

Bioassay Estimating the toxicity of an effluent by testing its effects on living organisms.

Biodegradation The destruction or mineralization of organic materials by microorganisms.

Biolocculation A condition whereby organic materials tend to be transferred from the dispersed form in wastewater to settleable material by mechanical entrapment and assimilation.

Biological Examinations A microscopic survey of the types of microorganisms present in a sample.

Biological Filter A bed of sand, gravel, broken stone, or other medium through which wastewater flows or trickles that depends on biological action for its effectiveness.

Biological Filtration The process of passing a liquid through a biological filter, thus permitting contact with zoogleal films attached to the media that adsorb and absorb fine suspended, collodial, and dissolved solids and release end products of biochemical oxidation.

Biological Wastewater Treatment Forms of wastewater treatment in which bacterial or biochemcial action is intensified to stablize the unstable organic matter present and remove non-settling solids. Intermittent sand filters, contact beds, trickling filters, and activated sludge processes are examples.

Biological Reactor The site(s) in a wastewater treatment plant where the principal biochemical reactions take place.

Biomass Active or dead microorganisms present in a particular area of a biological treatment plant.

BOD See Biochemical Oxygen Demand.

BOD_5 Five-day biochemcial oxygen demand; the oxygen demand exerted after five days of a BOD test. (See Biochemcial Oxygen Demand)

BOD Load The BOD content, usually expressed in pounds per unit of time, of wastewater passing into a waste treatment system.

Bulking Sludge An activated sludge that settles poorly because of low-density floc.

Carbonaceous Oxidation Biochemical process by which heterotrophic microorganisms derive energy from organic wastes, rendering more stable organics or inorganics as end-products.

Catalyst A substance that speeds up a chemical reaction without being altered itself.

Chemical Oxygen Demand (COD) A measure of the oxygen-consuming capacity of inorganic and organic matter present in wastewater. It is expressed as the equivalent amount of oxygen required as determined using a chemical oxidant in a standard test. It does not differentiate between stable and unstable organic material and thus does not necessarily correlate with biochemical oxygen demand (BOD).

Chlorination The application of chlorine or chlorine compounds to water or wastewater, usually for disinfection, but frequently to obtain other biological or chemical results.

Chlorine Contact Chamber A detention basin provided primarily to secure the diffusion of chlorine through the liquid.

Chlorine Demand The difference between the amount of chlorine added to water or wastewater and the amount of residual chlorine remaining at the end of a specified contact period.

Ciliate A type of protozoan characterized by short, filamentous cilia used for motility and/or capturing food.

Coagulation The clustering of suspended solids into larger particles or flocs caused by the addition of a chemical (coagulant) or by biological processes.

COD See Chemical Oxygen Demand.

Coliform-Group Bacteria A group of bacteria found in the intestines of man which are used as indicators of fecal pollution and the presence of pathogenic bacteria in water and wastewater.

Colloids Finely divided, non-settleable solids which may be removed by coagulation or biochemcial action.

Complete Mix Idealized continuous flow reactor in which fluid particles are immediately dispersed throughout the reactor.

Complete Treatment In an imprecise and general sense, the processing of domestic and some industrial wastewaters by means of primary and secondary treatment. It may include other specialized types of treatment and disinfection. A high percentage removal of suspended, colloidal, and dissolved organic matter is implied.

Composite Samples Samples collected at regular intervals, sometimes in proportion to the existing flow, and then combined to form a sample representative of flow over a period of time.

Concentration (1) The amount of a given substance dissolved or suspended in a unit volume of solution. (2) The process of increasing the solids per unit volume in a liquid.

Contact Aerator A biological unit consisting of stone, cement-asbestos, or other surfaces supported in an aeration tank, in which air is diffused up and around the surfaces and settled wastewater flows through the tank.

Contact Stabilization Process A modification of the activated sludge process in which wastewater is aerated with a high concentration of activated sludge for a short period, usually less than 60 minutes, to obtain BOD removal. The solids are subsequently separated by sedimentation and transferred to a stabilization tank where aeration is continued, starving the activated sludge before returning it to the aeration basin.

Conventional Activated Sludge Process Activated sludge process utilizing plug-flow through the aeration basin with primary effluent and activated sludge fed at the head end and uniform aeration throughout.

Cytoplasm Contents of a biological cell excluding the nucleus.

Degradation The conversion of a substance to simpler compounds.

Density Mass per unit volume of any substance.

Design Parameters Various criteria used to determine size, shape, quantity, and/or methods in the design of units and processes in a treatment plant.

Detention Time The time required to fill a tank at a given flow or the theoretical time required for a given flow of wastewater to pass through a tank (volume divided by flow rate).

Dewater To extract a portion of the water present in a sludge or slurry.

Diffused Air Aeration The process by which air is compressed and discharged below the mixed liquor surface through some type of air diffusion device.

Diffuser A device (porous plate, tube, bag) used to break the air stream from a blower system into fine bubbles in a liquid.

Disinfection The process by which pathogenic (disease-causing) microorganisms are killed. Chlorination is the most frequently used method in wastewater treatment.

Dissolved Oxygen (DO) Molecular or "free" oxygen (O_2) dissolved in water or wastewater.

Dissolved Solids Very small, non-settling particles defined by the method of measurement (see Standard Methods).

Distributor A mechanical device used for spreading wastewater over the surface of a trickling filter. A rotary distributor is usually used.

Ditch Oxidation A modification of the activated sludge process or the aerated pond, in which the mixture under treatment is circulated in an endless ditch and aeration and circulation are produced by a mechanical device.

Diurnal Flow Flow that shows marked and regular variations through the course of a day.

Domestic Wastewater Wastewater derived principally from dwellings, business buildings, institutions and other non-industrial sources.

DO See Dissolved Oxygen.

Dosing Ratio The maximum rate of wastewater application to a filter divided by the average rate.

Dry Suspended Solids The weight of the suspended matter in wastewater or other liquid after drying for 1 hr. at 103° C.

Ecology The branch of biology dealing with the relationships between organisms and their environment.

Effluent Wastewater or other liquid flowing from a basin, treatment process, or treatment plant.

Enzymes Substances produced by living organisms that speed up chemical changes.

Endogenous Respiration Utilization internal cellular material as food under aerobic conditions when an adequate external food supply is unavailable.

Excess Activated Sludge The quantity of activated sludge above that needed for process operation.

Extended Aeration A modification of the activated sludge process utilizing very long aeration periods.

F/M Ratio Food to microorganism ratio; the amount of food (organic matter as BOD or COD) available per unit mass of microorganisms.

Facultative (1) A condition in which "free" or dissolved oxygen (O_2) is present only in some places. (2) Able to function both in the presence or absence of free oxygen.

Filamentous Bacteria Bacteria that grow in a thread or filamentous form.

Filter Flooding The filling of a trickling filter to an elevation above the top of the medium by closing all outlets, in order to control nuisance of filter flies.

Floc Groups or "clumps" of bacteria that have come together and formed a small gelatinous mass. Found in aeration tanks and secondary clarifiers.

Flocculation An action resulting in the gathering of fine particles to form larger particles.

Grab Sample A single sample of wastewater taken all at one time from one place.

Head A term used in expressing the pressure or energy of fluids in terms of the height of a verticle column of water.

Head Loss Energy lost, expressed in head, from flowing fluids due to friction and turbulence.

Heterotrophic A term describing organisms which use organics as the source of cell carbon.

High-Rate Filter A trickling filter operated at a high average daily dosing rate, usually between 100 and 1000 gpd/sq. ft.

Hydraulic Detention Time The theoretical time required to displace the contents of a tank or unit at a given discharge rate (volume of tank divided by discharge rate).

Hydraulic Loading The volume of wastewater applied to a unit in a given time.

Industrial Wastewater Wastewater in which wastes from industrial processes predominate.

Influent Wastewater or other liquid flowing *into* a reservoir, basin, treatment process, or treatment plants.

Intermittent Filter A trickling filter which is dosed intermittently rather than continuously.

Kessener Brush A cylindrical metal brush used to maintain circulation and provide oxygen in the activated sludge process.

Kinetic Data Recorded measurements used to determine rates of microorganism growth and substrate removal.

Kraus Process A modification of the activated sludge process in which liquid from anaerobic digesters is added to the aeration basins as a source of additional nutrients.

Log Growth Phase The period of time when the mass of microorganisms is doubling at regular intervas.

Low-Rate Filter A trickling filter designed to be operated with a hydraulic load of 25 to 100 gpd/sq. ft. of filter surface. Also called standard-rate filter.

Mean Cell Residence Time Average period that a cell is held in the activated sludge process; also known as solids retention time.

MechanicalAeration A class of processes by which the surface of an aeration tank is mechanically agitated to cause spray or wave resulting in aeration of the liquid.

Metabolism The life-process in which food is utilized.

Micronutrients Inorganic nutrients required in only trace amounts.

Microorganism Very small organisms that can be seen only through a microscope. Some microorganisms use the wastes in wastewater for food and thus remove or alter much of the undesirable matter.

Mixed Liqour The mixture of activated sludge and wastewater in an aeration tank.

Mixed Liquor Suspended Solids (MLSS) Defined by testing method (see Standard Methods). May be roughly defined as non-filterable solid particles in mixed liquor.

Mixed Liquor Volatile Suspended Solids (MLVSS) Defined by testing method (see Standards Methods). May be roughly defined as that part of the mixed liquor suspended solids that is combustible.

Motile Capable of movement.

Nematode Unsegmented worm.

New Growth Rate The rate of increase in the mass of live microorganisms calculated by subtracting the death rate from the synthesis rate.

Nitrification The biochemcial conversion of unoxidized nitrogen (amonia and organic nitrogen) to oxidized nitrogen (usually nitrate).

Nutrients Elements which are needed to support living cells such as carbon, hydrogen, oxygen, nitrogen, and phosphorus.

Organic Matter High Energy carbon compounds, usually from plant or animal sources, but sometimes synthetic.

Oxidation A chemical reaction, usually involving the addition of oxygen and the release of energy.

Oxygen Uptake Rate The rate at which oxygen is transferred to wastewater under aeration.

Oxygen Utilization The oxygen consumed to support aerobic biological treatment processes.

Parshall Flume A device which measures the critical depth to determine flow.

Peak Load The maximum rate of flow to a wastewater treatment plant.

pH An expression of the intensity of the alkaline or acidic strength of a water.

Photosynthesis The use of sunlight to obtain the energy necessary to synthesize new cell material.

Pin Floc Very fine floc particles with poor settling characteristics.

Plain Sedimentation Sedimentation without the aid of chemicals.

Plug Flow Reactor Idealized continuous flow reactor in which fluid particles are discharged in the same order in which they entered.

Ponding The formation of pools or ponds of wastewater as a result of surface clogging in trickling filters.

Preaeration A preparatory treatment of wastewater consisting of aeration to remove gases, add oxygen, promote flotation of grease, and aid coagulation.

Pretreatment The use of racks, screens, communitors, and grit removal devices to remove metal, rocks, sand, eggshells, and similar materials which may hinder the operation of a treatment plant.

Primary Treatment The first phase of wastewater treatment, consisting of separating the readily settleable or floatable solids by sedimentation and skimming.

Protoplasm The material of a living cell.

Protozoa Animal-like microorganisms.

Psychoda The generic name of filter flies.

Raw Wastewater Wastewater before it receives any treatment.

Reactor Any vessel in which a chemical, biochemical, or physical reaction takes place.

Recirculation The return of a portion of the wastewater which has already passed through a trickling filter for a second passage.

Respiration The process by which a cell takes up oxygen and gives off the carbon dioxide formed in energy-producing reactions.

Rising Sludge A problem in secondary settling tanks generally attributed to denitrification in the sludge blanket.

Rotary Distributor A movable distributor made up of horizontal arms that extend to the edge of the circular filter bed, revolve about a central post, and distribute liquid over the bed through holes or jets in the arms.

Rotifer A small, multi-celled animal that gets its name from the rotating action of rows of cilia near its mouth.

Roughing Filter A trickling filter of relatively coarse material operated at high rate to afford preliminary treatment.

Scum Collector A mechanical device for skimming and removing scum from the surface of a settling tank.

Secondary Treatment Phase of wastewater treatment in which dissolved or suspended material is converted into a form more readily separated from the wastewater.

Sedimentation The process of settling suspended solids by gravity.

Septic A condition produced by growth of anaerobic organisms.

Settleable Matter See Settleable Solids.

Settleable Solids That matter in wastewater which will not stay in suspension during a preselected settling period, either settling to the bottom or floating to the top.

Settled Wastewater Wastewater from which most of the settleable solids have been removed by sedimentation.

Sewage Spent water of a community.

Shock Load The arrival at a plant of a waste which is toxic to organisms in sufficient quantity or strength to cause operating problems. Organic or hydraulic overloads can also cause a shock load.

Side Water Depth (SWD) The depth of water measured along a vertical exterior wall.

Sloughing The dropping or washing off of slime from trickling filter media.

Sludge The solids separated from liquids during processing.

Sludge Age A measure of the length of time a particle of suspended solids has been undergoing aeration.

Sludge Blanket A layer of sludge suspended within an enclosed body of wastewater, such as a settling tank.

Sludge Bulking Poor settling due to low density floc in the activated sludge process.

Sludge Digestion A process by which organic matter in sludge is converted into a more stable form by anaerobic or aerobic organisms.

Sludge Density Index The reciprocal of the sludge volume index (SVI) multiplied by 100 (i.e. $1/SVI \times 100$).

Sludge Volume Index The ratio of the volume in milliliters of sludge settled from a 1,000-ml sample in 30 min to the concentration of mixed liquor in milligrams per liter multiplied by 1000.

Solids Retention Time (SRT) The average residence time of suspended solids in a biological waste treatment system, equal to the total weight of suspended solids in the system divided by the total weight of suspended solids leaving the system per unit time.

Solids Loading The weight or mass of solids applied to a treatment process per unit time.

Soluble Capable of dissolving readily.

Stabilization Conversion to a form that resists change.

Stage A process which is followed or preceded by a similar process.

Standard-Rate Filter See Low-Rate Filter.

Step Aeration Same as step feed.

Step Feed Adding wastewater at points along the length of an aeration basin rather than just at the head end.

Supernatant Liquid removed from settled sludge.

Substrate The substance being used by microorganisms in suspension.

Suspended Matter See Suspended Solids.

Suspended Solids (SS) Defined by testing method (see Standard Methods), but may be roughly defined as all non-dissolved solids that take a certain minimum time to settle in still water.

Synthesis The creation of new material from elementary building blocks.

Tapered Aeration An aeration method whereby the quantity of air added varies along the aeration basin with a maximum at the head end and a minimum at the outlet end.

Toxicity The ability of a waste to poison organisms.

Trickling Filter A biological treatment process in which the wastewater trickles through a bed of slime-covered media and is treated by the action of the microorganisms in the slime layer.

Trickling Filter Media The solid material in a trickling filter which provides a surface for a biological film of microorganisms. Crushed stone is the most commonly used media, but plastics are gaining popularity.

Turbidity Cloudiness of wastewater due to suspended solids.

Virus The smallest form capable of producing diseases in man or other higher organisms.

Volatile Matter See Volatile Solids.

Volatile Solids Defined by testing method (see Standard Method), but may be roughly defined as combustible solids.

Wastewater The used water and solids that flow to a treatment plant.

Zooglea A jelly-like coating developed by bacteria.

Zooleal Matrix The floc or slime formed by zoogleal bacteria.

(Definitions principally from *Glossary of Water and Wastewater Engineering*, APHA, ASCE, AWWA, and WPCF (1969); "Operation of Wastewater Treatment Plants," EPA (1970); *Wastewater Engineering*, Metcalf & Eddy (1972); *Biology of Microorganisms*, Brock (1974).)

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APPENDIX - II

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APPENDIX - II

NPDES Permit

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30308

4E-WE

FEB 26 1980

RECEIVED
MAR 02 1983
E. E. Wooten & Co.

Commanding General
United States Marine Corps
Marine Corps Base
Camp Lejeune, North Carolina 28542

Attn: Lt. Colonel T. R. Baisley
Base Maintenance Officer

Re: Issuance of NPDES Permit No. NC0003239

Dear Sir:

Enclosed is the National Pollutant Discharge Elimination System (NPDES) permit for the facility referenced above. This permit constitutes my determination under Title 40, Code of Federal Regulations, Section 125.35, as amended (39 FR 27080, July 24, 1974).

Any previously issued permit for this facility is hereby revoked upon the effective date of this permit. In accordance with 40 CFR 125.35, this permit will become issued and effective on the effective date specified in the permit, provided that no request for an adjudicatory hearing and/or legal decision is subsequently filed with the Agency. In the event that such a request is filed, the contested provisions of the permit will be stayed and will not become effective until the administrative review process is completed. All uncontested provisions of the permit will be considered issued and effective on the effective date set out in the permit and must be complied with by the facility.

If you wish to request an adjudicatory hearing and/or legal decision, you must submit such request (an original and two copies) to the Regional Hearing Clerk within ten (10) days from the receipt of this letter. The request will be timely if mailed by Certified Mail within the ten (10) day time period. For the request to be valid, it must conform to the requirements of 40 CFR 125.36(b). Such requirements are specified in the attachment hereto.

Information on procedures and legal matters pertaining to an adjudicatory hearing request may be obtained by contacting the EPA Legal Branch at 404/881-3506.

Sincerely yours,

Sanford W. Harvey, Jr.
Director
Enforcement Division

Enclosures

cc: See attached

cc: Dr. Neil S. Grigg
Director, Division of Environmental Management
NC Dept. of Natural Resources and Community Development

Commander
Naval Facilities Engineering Command
Norfolk, Virginia

Permit No. NC0003239

AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, as amended, (33 U.S.C. 1251 et.seq;the "Act"),

U. S. Marine Corps Base
Camp Lejeune, North Carolina

is authorized to discharge from facilities located at

Camp Lejeune, Onslow County, North Carolina, Marine Corps Air Station,
New River, Onslow County, North Carolina

to receiving waters named

New River	Stone Creek	Edwards Creek
Courthouse Bay	Brinson Creek	Gillets Creek
Scales Creek	Beaver Dam Creek	Intercoastal Waterway
North East Creek	Wilson Bay	

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective on MAR 26 1980

This permit and the authorization to discharge shall expire at midnight,

MAR 26 1985

Signed FEB 26 1980

Sanford W. Harvey, Jr.
Director
Enforcement Division

A. (1) EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (FINAL)

1. During this period beginning Modification Effective Date and lasting through Permit Expiration, the permittee is authorized to discharge from outfall serial number 001 - Camp Gieger STP.

Such discharges shall be limited and monitored by the permittee as specified below:

PARAMETER	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS		
	kg/day(lbs/day)		Other Units (Specify)				
	Monthly Average	Weekly Average	Monthly Average	Weekly Average	Measurement Frequency	Sample Type	Sampling Point
Flow, M^3/day (MGD)	6056(1.600)				Daily	N/A	Influent or Effluent
Biochemical Oxygen Demand (5 day)	181.8(400.6)	272.8(600.8)	30mg/1	45mg/1	2/week	Composite	Influent & Effluent
Suspended Solids	181.8(400.6)	272.8(600.8)	30mg/1	45mg/1	2/week	Composite	Influent & Effluent
Fecal Coliform Bacteria, Geometric Mean			200/100 ml	400/100 ml	2/week	Grab	Effluent
Chlorine Residual(1)					Daily	Grab	Effluent

The effluent limits and any additional requirements specified in the attached state certification supersede any less stringent limits listed above. During any time period which more stringent state certification effluent limits are stayed or inoperable, the effluent limits listed above shall be in effect and fully enforceable.

2. In addition to the specified limits, the monthly average effluent BOD_5 and suspended solids concentration shall not exceed 15 percent of the respective monthly average influent concentrations.

3. The pH of the effluent shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored by grab sample 2/week.

4. There shall be no discharge of floating solids or visible foam in other than trace amounts.

5. The effluent shall not cause a visible sheen on the receiving water.

(1) Minimum concentration that assures continuous compliance with above Fecal Coliform Requirements.

A. (1) EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (FINAL)

1. During this period beginning Modification Effective Date and lasting through Permit Expiration, the permittee is authorized to discharge from outfall serial number 002 - Tarawa Terrance STP.

Such discharges shall be limited and monitored by the permittee as specified below:

PARAMETER	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS		
	kg/day(lbs/day)		Other Units (Specify)				
	Monthly Average	Weekly Average	Monthly Average	Weekly Average	Measurement Frequency	Sample Type	Sampling Point
Flow, M^3/day (MGD)	4731(1.25)				Daily	N/A	Influent or Effluent
Biochemical Oxygen Demand (5 day)	142.1(312.9)	213.1(469.4)	30mg/1	45mg/1	2/week	Composite	Influent & Effluent
Suspended Solids	142.1(312.9)	213.1(469.4)	30mg/1	45mg/1	2/week	Composite	Influent & Effluent
Fecal Coliform Bacteria, Geometric Mean			200/100 ml	400/100 ml	2/week	Grab	Effluent
Chlorine Residual (1)					Daily	Grab	Effluent

The effluent limits and any additional requirements specified in the attached state certification supersede any less stringent limits listed above. During any time period which more stringent state certification effluent limits are stayed or inoperable, the effluent limits listed above shall be in effect and fully enforceable.

2. In addition to the specified limits, the monthly average effluent BOD_5 and suspended solids concentration shall not exceed 15 percent of the respective monthly average influent concentrations.

3. The pH of the effluent shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored by grab sample 2/week.

4. There shall be no discharge of floating solids or visible foam in other than trace amounts.

5. The effluent shall not cause a visible sheen on the receiving water.

(1) Minimum concentration that assures continuous compliance with above Fecal Coliform Requirements.

A. (1) EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (FINAL)

1. During this period beginning Modification Effective Date and lasting through Permit Expiration, the permittee is authorized to discharge from outfall serial number 003 - Montfort Point STP.

Such discharges shall be limited and monitored by the permittee as specified below:

PARAMETER	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS		
	kg/day(lbs/day)		Other Units (Specify)				
	Monthly Average	Weekly Average	Monthly Average	Weekly Average	Measurement Frequency	Sample Type	Sampling Point
Flow, M^3/day (MGD)	3785(1.00)				Daily	N/A	Influent or Effluent
Biochemical Oxygen Demand (5 day)	113.6(250.3)	170.5(375.5)	30mg/l	45mg/l	2/week	Composite	Influent & Effluent
Suspended Solids	113.6(250.3)	170.5(375.5)	30mg/l	45mg/l	2/week	Composite	Influent & Effluent
Fecal Coliform Bacteria, Geometric Mean			200/100 ml	400/100 ml	2/week	Grab	Effluent
Chlorine Residual(1)					Daily	Grab	Effluent

The effluent limits and any additional requirements specified in the attached state certification supersede any less stringent limits listed above. During any time period which more stringent state certification effluent limits are stayed or inoperable, the effluent limits listed above shall be in effect and fully enforceable.

2. In addition to the specified limits, the monthly average effluent BOD_5 and suspended solids concentration shall not exceed 15 percent of the respective monthly average influent concentrations.

3. The pH of the effluent shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored by grab sample 2/week.

4. There shall be no discharge of floating solids or visible foam in other than trace amounts.

5. The effluent shall not cause a visible sheen on the receiving water.

(1) Minimum concentration that assures continuous compliance with above Fecal Coliform Requirements.

A. (1) EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (FINAL)

1. During the period beginning Modification Effective Date and lasting through Permit Expiration, the permittee is authorized to discharge from outfall serial number 004 Had Not Point STP

Such discharges shall be limited and monitored by the permittee as specified below:

PARAMETER	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS		
	kg/day(lbs/day)		Other Units (Specify)				
	Monthly Average	Weekly Average	Monthly Average	Weekly Average	Measurement Frequency	Sample Type	Sampling Point
Flow, M^3/day (MGD)	30,280(8.00)				Daily	N/A	Influent or Effluent
Biochemical Oxygen Demand (5 day)	909.3(2002.8)	1362.9(3004.2)	30mg/l	45mg/l	5/week	Composite	Influent & Effluent
Suspended Solids	909.3(2002.8)	1362.9(3004.2)	30 mg/l	45mg/l	5/week	Composite	Influent & Effluent
Fecal Coliform Bacteria, Geometric Mean			200/100 ml	400/100 ml	3/week	Grab	Effluent
Chlorine Residual(1)					Daily	Grab	Effluent

The effluent limits and any additional requirements specified in the attached state certification supersede any less stringent limits listed above. During any time period which more stringent state certification effluent limits are stayed or inoperable, the effluent limits listed above shall be in effect and fully enforceable.

2. In addition to the specified limits, the monthly average effluent BOD_5 and suspended solids concentration shall not exceed 15 percent of the respective monthly average influent concentrations.

3. The pH of the effluent shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored by grab sample 3/week.

4. There shall be no discharge of floating solids or visible foam in other than trace amounts.

5. The effluent shall not cause a visible sheen on the receiving water.

(1) Minimum concentration that assures continuous compliance with above stated Fecal Coliform Requirements.

A. (1) EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (FINAL)

1. During this period beginning modification effective date and lasting through permit expiration, the permittee is authorized to discharge from outfall serial number 005 Rifle Range STP

Such discharges shall be limited and monitored by the permittee as specified below:

PARAMETER	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS		
	kg/day(lbs/day)		Other Units (Specify)				
	Monthly Average	Weekly Average	Monthly Average	Weekly Average	Measurement Frequency	Sample Type	Sampling Point
Flow, M^3/day (MGD)	1987(0.525)				Daily	N/A	Influent or Effluent
Biochemical Oxygen Demand (5 day)	59.7(131.4)	89.5(197.1)	30mg/l	45mg/l	1/week	Composite	Influent & Effluent
Suspended Solids	59.7(131.4)	89.5(197.1)	30mg/l	45mg/l	1/week	Composite	Influent & Effluent
Fecal Coliform Bacteria, Geometric Mean			200/100 ml	400/100 ml	1/week	Grab	Effluent
Chlorine Residual(1)					Daily	Grab	Effluent

The effluent limits and any additional requirements specified in the attached state certification supersede any less stringent limits listed above. During any time period which more stringent state certification effluent limits are stayed or inoperable, the effluent limits listed above shall be in effect and fully enforceable.

2. In addition to the specified limits, the monthly average effluent BOD_5 and suspended solids concentration shall not exceed 15 percent of the respective monthly average influent concentrations.

3. The pH of the effluent shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored By grab sample 1.week.

4. There shall be no discharge of floating solids or visible foam in other than trace amounts.

5. The effluent shall not cause a visible sheen on the receiving water.

(1) Minimum concentration that assures continuous compliance with above stated Fecal Coliform Requirements.

A. (1) EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (FINAL)

1. During this period beginning Modification Effective Date and lasting through Permit Expiration, the permittee is authorized to discharge from outfall serial number 006 - Courthouse Bay STP.

Such discharges shall be limited and monitored by the permittee as specified below:

PARAMETER	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS		
	kg/day(lbs/day) Monthly Average	kg/day(lbs/day) Weekly Average	Other Units (Specify) Monthly Average	Other Units (Specify) Weekly Average	Measurement Frequency	Sample Type	Sampling Point
Flow, M^3/day (MGD)	1987(0.525)				Daily	N/A	Influent or Effluent
Biochemical Oxygen Demand (5 day)	59.7(131.4)	89.5(1971.1)	30mg/l	45mg/l	1/week	Composite	Influent & Effluent
Suspended Solids	59.7(131.4)	89.5(1971.1)	30mg/l	45mg/l	1/week	Composite	Influent & Effluent
Fecal Coliform Bacteria, Geometric Mean			200/100 ml	400/100 ml	1/week	Grab	Effluent
Chlorine Residual(1)					Daily	Grab	Effluent

The effluent limits and any additional requirements specified in the attached state certification supersede any less stringent limits listed above. During any time period which more stringent state certification effluent limits are stayed or inoperable, the effluent limits listed above shall be in effect and fully enforceable.

2. In addition to the specified limits, the monthly average effluent BOD_5 and suspended solids concentration shall not exceed 15 percent of the respective monthly average influent concentrations.

3. The pH of the effluent shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored by grab sample 1/week.

4. There shall be no discharge of floating solids or visible foam in other than trace amounts.

5. The effluent shall not cause a visible sheen on the receiving water.

(1) Minimum concentration that assures continuous compliance with above Fecal Coliform Requirements.

A. (1) EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS (FINAL)

1. During the period beginning Modification Effective Date and lasting through Permit Expiration, the permittee is authorized to discharge from outfall(s) serial number(s) 007 - Onslow Beach STP.

Such discharges shall be limited and monitored by the permittee as specified below:

PARAMETER	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS		
	kg/day(lbs/day) Monthly Average	kg/day(lbs/day) Weekly Average	Other Units (Specify) Monthly Average	Other Units (Specify) Weekly Average	Measurement Frequency	Sample Type	Sampling Point
Flow, M^3/day (MGD)	757(0.200)				Daily	N/A	Influent or Effluent
Biochemical Oxygen Demand (5 day)	22.7(50.1)	34.1(75.1)	30mg/l	45mg/l	1/week	Composite	Influent & Effluent
Suspended Solids	22.7(50.1)	34.1(75.1)	30mg/l	45mg/l	1/week	Composite	Influent & Effluent
Fecal Coliform Bacteria, Geometric Mean			200/100 ml	400/100 ml	1/week	Grab	Effluent
Chlorine Residual(1)					Daily	Grab	Effluent

The effluent limits and any additional requirements specified in the attached state certification supersede any less stringent limits listed above. During any time period which more stringent state certification effluent limi are stayed or inoperable, the effluent limits listed above shall be in effect and fully enforceable.

2. In addition to the specified limits, the monthly average effluent BOD_5 and suspended solids concentration shall not exceed 15 percent of the respective monthly average influent concentrations.

3. The pH of the effluent shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored by grab sample 1/week.

4. There shall be no discharge of floating solids or visible foam in other than trace amounts.

5. The effluent shall not cause a visible sheen on the receiving water.

(1) Minimum concentration that assures continuous compliance with above stated Fecal Coliform Requirements.

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning effective date and lasting through expiration the permittee is authorized to discharge from outfall(s) serial number(s) (1)

Such discharges shall be limited and monitored by the permittee as specified below: (2)

Effluent Characteristic	Discharge Limitations				Monitoring Requirements	
	kg/day (lbs/day)		Other Units (Specify)			
	Daily Avg	Daily Max	Daily Avg	Daily Max	Measurement Frequency	Sample Type
Flow—m^3/Day (MGD)	—	—	—	—		
Suspended Solids			30 mg/1	50 mg/1	1/week	Equal Volume Composite

(1) 008 - WTP, Hadnot Point
009 - WTP, Montford Point
010 - WTP, Tarawa Terrance
011 - WTP, Courthouse Bay
012 - WTP, Rifle Range
013 - WTP, Holcomb Boulevard
014 - WPT, Onslow Beach
015 - WTP, New River

The effluent limits and any additional requirements specified in the attached state certification supersede any less stringent limits listed above. During any time period which more stringent state certification effluent limits are stayed or inoperable, the effluent limits listed above shall be in effect and fully enforceable.

The pH shall not be less than 6.0 standard units nor greater than 10.0 standard units and shall be monitored 1/week by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s):

(2) See attached Federal Facility Compliance Agreement.

B. SCHEDULE OF COMPLIANCE (Applicable on Discharge Serial Nos. 001, 002, 003, 004, 005, 006, and 007)

1. The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:

   a. Permittee shall comply with the effluent limitations by the effective date of the permit.

   b. This permit shall be modified, or alternatively, revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved under sections 301(b)(2) (C), and (D), 304(b)(2), and 307(a)(2) of the Clean Water Act, if the effluent standard or limitation so issued or approved:

      (1) Contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or
      (2) Controls any pollutant not limited in the permit.

   The permit as modified or reissued under this paragraph shall also contain any other requirements of the Act then applicable.

2. No later than 14 calendar days following a date identified in the above schedule of compliance, the permittee shall submit either a report of progress or, in the case of specific actions being required by identified dates, a written notice of compliance or noncompliance. In the latter case, the notice shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.

C. MONITORING AND REPORTING

1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

2. Reporting

Monitoring results obtained during the previous 3 months shall be summarized for each month and reported on a Discharge Monitoring Report Form (EPA No. 3320-1 or T-40) postmarked no later than the 28th day of the month following the completed reporting period. The first report is due on * Duplicate signed copies of these, and all other reports required herein, shall be submitted to the Regional Administrator and the State at the following addresses:

Water Enforcement Branch
Environmental Protection Agency
Region IV
345 COURTLAND STREET N.E.
ATLANTA GA 30308

North Carolina Department of
Natural and Economic Resources
P. O. Box 27687
Raleigh, North Carolina 27611

3. Definitions

a. The monthly average, other than for fecal coliform bacteria, is the arithmetic mean of all the composite samples collected in a one-month period. The monthly average for fecal coliform bacteria is the geometric mean of samples collected in a one-month period.

b. The weekly average, other than for fecal coliform bacteria, is the arithmetic mean of all the composit samples collected during a one-week period. The weekly average for fecal colifrom bacteria is the geometric mean of samples collected in a one-week period.

c. Flow, M^3/day (MGD): The flow limit expressed in this permit is the 24 hour average flow, averaged monthly. It is determined as the arithmetic mean of the total daily flows recorded during the calendar month.

d. Arithmetic Mean: The arithmetic mean of any set of values is the summation of the individual values divided by the number of individual values.

* at the end of the first full quarter following the effective date of the permit.

e. Geometric Mean: The geometric mean of any set of values is the N^{th} root of the product of the individual values where N is equal to the number of individual values. The geometric mean is equivalent to the antilog of the arithmetic mean of the logarithms of the individual values. For purposes of calculating the geometric mean, values of zero (0) shall be considered to be one (1).

f. Composite Sample: A "composite sample" is any of the following:

(1) Not less than four influent or effluent portions collected at regular intervals over a period of 8 hours and composited in proportion to flow.

(2) Not less than four equal volume influent or effluent portions collected over a period of 8 hours at intervals proportional to the flow.

(3) An influent or effluent portion collected continuously over a period of 24 hours at a rate proportional to the flow.

g. Grab Sample: A "grab sample" is a single influent or effluent portion which is not a composite sample. The sample(s) shall be collected at the period(s) most representative of the total discharge.

4. Test Procedures

Test procedures for the analysis of pollutants shall conform to regulations published pursuant to Section 304(g) of the Federal Water Pollution Control Act, As Amended. (Federal Register, October 16, 1973; Title 40, Chapter I, Sub-chapter D, Part 136 "Guidelines Establishing Test Procedures for the Analysis of Pollutants".)

5. Recording of Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

a. The exact place, date, and time of sampling;

b. The dates the analyses were performed;

c. The person(s) who performed the analyses.

d. The analytical techniques or methods used; and

e. The results of all required analyses

6. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Discharge Monitoring Report Form (EPA No. 3320-1 or T-40). Such increased frequency shall also be indicated.

7. Records Retention

All records and information resulting from the monitoring activities required by this permit including all records of analyses performed and calibration and maintenance of instrumentation and recordings from continuous monitoring instrumentation shall be retained for a minimum of three (3) years, or longer if requested by the Regional Administrator or the State water pollution control agency.

A. MANAGEMENT REQUIREMENTS

1. Change in Discharge

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit. Any anticipated facility expansions, production increases, or process modifications which will result in new, different, or increased discharges of pollutants must be reported by submission of a new NPDES application or, if such changes will not violate the effluent limitations specified in this permit, by notice to the permit issuing authority of such changes. Following such notice, the permit may be modified to specify and limit any pollutants not previously limited.

2. Non compliance Notification

If, for any reason, the permittee does not comply with or will be unable to comply with any effluent limitation specified in this permit, the permittee shall provide the Regional Administrator and the State with the following information, in writing, within five (5) days of becoming aware of such condition:

a. A description of the discharge and cause of noncompliance; and

b. The period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the noncomplying discharge.

3. Facilities Operation

The permittee shall at all times maintain in good working order and operate as efficiently as possible all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit.

4. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to navigable waters resulting from noncompliance with any effluent limitations specified in this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

5. Bypassing

Any diversion from or bypass of facilities necessary to maintain compliance with the terms and conditions of this permit is prohibited, except (i) where

unavoidable to prevent loss of life or severe property damage, or (ii) where excessive storm drainage or runoff would damage any facilities necessary for compliance with the effluent limitations and prohibitions of this permit. All permittees who have such sewer bypasses or overflows of this discharge shall submit, not later than six months from the date of issue of this permit, detailed data or engineering estimates which identify:

a. The location of each sewer system bypass or overflow;

b. The frequency, duration and quantity of flow from each sewer system bypass or overflow.

This requirement is waived where infiltration/inflow analyses are scheduled to be performed as part of an Environmental Protection Agency facilities planning project.

6. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

7. Power Failures

The permittee is responsible for maintaining adequate safeguards to prevent the discharge of untreated or inadequately treated wastes during electrical power failures either by means of alternate power sources, standby generators or retention of inadequately treated effluent. Should the treatment works not include the above capabilities at time of permit issuance, the permittee must furnish within six months to the permitting authority, for approval, an implementation schedule for their installing, or documentation demonstrating that such measures are not necessary to prevent discharge of untreated or inadequately treated wastes. Such documentation shall include frequency and duration of power failures and an estimate of retention capacity of untreated effluent.

8. Onshore or Offshore Construction

This permit does not authorize or approve the construction of any onshore or offshore physical structures or facilities or the undertaking of any work in any navigable waters.

B. RESPONSIBILITIES

1. Right of Entry

The permittee shall allow the head of the State water pollution control agency, the Regional Administrator, and/or their authorized representatives, upon the presentations of credentials:

a. The enter upon the permittee's premises where an effluent source is located or in which any records are required to be kept under the terms and conditions of this permit; and

b. At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect any monitoring equipment or monitoring method required in this permit; and to sample any discharge of pollutants.

2. Transfer of Ownership or Control

In the event of any change in control or ownership or facilities from which the authorized discharges emanate, the permittee shall notify the succeeding owner or controller of the existence of this permit by letter, a copy of which shall be forwarded to the Regional Administrator and the State water pollution control agency.

3. Availability of Reports

Except for data determined to be confidential under Section 308 of the Act, all reports prepared in accordance with the terms shall be available for public inspection at the offices of the State water pollution control agency and the Regional Administrator. As required by the Act, effluent data shall not be considered confidential. Knowingly making any false statement on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the Act.

4. Permit Modification

After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to; the following:

a. Violation of any terms or conditions of this permit;

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge.

5. Toxic Pollutants

Notwithstanding Part II, B-4 above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Act for a toxic pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, this permit shall be revised or modified in accordance with the toxic effluent standard or prohibition and the permittee so notified.

6. Civil and Criminal Liability

Except as provided in permit conditions on "Bypassing" (Part II, A-5) and "Power Failures" (Part II, A-7), nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

7. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act.

8. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Act.

9. Property Rights

The issuance of this permt does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations.

10. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

11. Expiration of Permit

Permittee is not authorized to discharge after the expiration date. In order to receive authorization to discharge beyond the expiration date, the permittee shall submit such information, forms, and fees as are required by the agency authorized to issue permits no later than 180 days prior to the expiration date.

12. Industrial Pretreatment Standards

Permittee shall require any industrial dischargers into the permitted system to meet Federal Pretreatment Standards (40 CFR, Part 128) promulgated in response to Section 307(b) of the Act. The permittee shall provide yearly reports to the permitting agency regarding the pretreatment requirements which have been imposed on each major contributing industry and the results achieved therefrom. Other information may be needed regarding new industrial discharges and this will be requested from the permittee after the permitting agency has received notice of the new industrial discharge.

A major contributing industry is one that: (1) has a flow of 50,000 gallons or more per average work day; (b) has a flow greater than five percent of the flow carried by the municipal system receiving the waste; (c) has in its waste a toxic pollutant in toxic amounts as defined in standards issued under Section 307(a) of the Act; (d) has significant impact either singly or in combination with other contributing industries, on the treatment works or the quality of its effluent.

Any change in the definition of a major contributing industry as a result of promulgations in response to Section 307 of the Act shall become a part of this permit.

13. Control of User Discharges to the System:

(a) Under no circumstances shall the permittee allow introduction of the following wastes into the waste treatment system:

Wastes which create a fire or explosion hazard in the treatment works.

Wastes which will cause corrosive structural damage to treatment works.

Solids or viscous substances in amounts which cause obstructions to the flow in sewers or interference with the proper operation of the treatment works.

Wastewaters at a flow rate and/or pollutant discharge rate which is excessive over relatively short time periods so as to cause a loss of treatment efficiency.

(b) The permittee shall notify the permitting agency of any of the following changes in user discharge to the system no later than 180 days prior to change of discharge:

(1) New introductions into such works of pollutants from any source which would be a new source as defined in Section 306 of the Act if such source were discharging pollutants.

(2) New introductions of pollutants into such works from a source which would be subject to Section 301 of the Act if it were discharging such pollutants.

(3) A substantial change in volume or character of pollutants being introduced into such works by a source already discharging pollutants into such works at the time the permit is issued.

This notice will include information on the quantity and quality of the wastewater introduced by the new source into the publicly owned treatment works, and on any anticipated impact on the effluent discharged from such works.

III. OTHER REQUIREMENTS

A. Discharge Sources

1. Potable and Industrial Water Treatment Facilities: Facilities for removal of objectionable constituents such as suspended solids, taste, odor, hardness or dissolved solids so that the product may be utilized for domestic supply (drinking water) or industrial purposes. Discharges include sludges, filter backwash, brines and ion exchange regeneration wastes.

2. Cooling Systems: Facilities for the removal of waste heat by transfer to water, all or a portion of which is then discharged. Discharges include blowdown, once through cooling water and wastes from cleaning of the system.

3. Boilers: Facilities for the transfer of heat produced by combustion to water which is then used in liquid form or converted to steam. Discharges include blowdown, bleed off and waste from cleaning of the system.

4. Vehicle and Equipment Cleaning Facilities: Facilities for cleaning of aircraft, motor vehicles and other equipment by washing, brushing, abrasion, steam cleaning, paint stripping, chemical degreasing, or other methods.

5. Painting and Corrosion Control Facilities: Facilities for the application of primer, paint, undercoating, or other protective coatings or corrosion control compounds with the exception of metal finishing operations involving plating, galvanizing or annodizing.

6. Petroleum Storage and Handling Areas: Areas utilized for the storage or transfer of fuel, lubricants, solvents or other petroleum products.

7. Vehicle and Equipment Maintenance Facilities: Facilities utilized for maintenance and repair of vehicles, engineer equipment and other equipment.

8. Battery Rework Facilities: Facilities utilized for the maintenance, repair or charging of storage batteries.

9. Photographic Laboratories: Facilities utilized for processing of photographic materials.

10. Firefighter Training Areas: Areas or facilities utilized for training of fire protection personnel utilizing fire and extinguishing materials.

11. Storm Sewers: Systems consisting primarily of closed conduits (i. e., pipes as opposed to open conduits or ditches) which are designed for the collection and transport of surface runoff resulting from precipitation but which may also receive waste discharges from one or more sources.

B. Additional Permitted Discharges

1. Applicability

The discharge limitations and monitoring requirements below are applicable to all discharges from sources defined in Part III A with the exception of:

a. Discharges from such sources which are identified as serially numbered discharges in an NPDES permit.

b. Discharges from such sources which are directed to a treatment facility the discharge from which is authorized by an NPDES permit.

Discharges from such sources which when combined with other discharges or surface runoff form a discharge which is identified as a serially numbered discharge in an NPDES permit but which is not the discharge or effluent from a treatment facility, are subject to the requirements specified below.

2. General Conditions

Discharge from sources identified in Part III A are authorized provided that:

a. Such discharge is in conformance with the limitations and monitoring requirements specified below:

3. Discharge Limitations and Monitoring Requirements

During the period beginning effective date, and lasting through expiration, discharges from the sources identified in Part III A shall be limited and monitored(1) by the permittee in accordance with the conditions below:

(1) See attached Federal Facility Compliance Agreement

a. General Requirements

Unless otherwise specified the following requirements are applicable to all discharges.

(1) There shall be no discharge of floating solids or visible foam in other than trace amounts.

(2) The pH shall not be less than 6.0 nor greater than 9.0 and shall be monitored at the frequency specified for flow.

b. Discharge Limitations and Monitoring Requirements

(1) Potable and industrial water treatment facilities including filters, softeners and demineralizers.

Characteristic	Limitation		Monitoring	
	Daily Average	Daily Maximum	Frequency	Type
Flow	--	--	Daily	N/A
Suspended Solids	30 mg/l	50 mg/l	1/Week (1)	Equal Volume Composite

Note
(1) May be reduced to 1/month for discharges less than 50,000 gpd (daily maximum).

(2) Cooling water, cooling tower blowdown and cleaning wastes originating at space cooling facilities.

Characteristic	Limitations		Monitoring	
	Daily Average	Daily Maximum	Frequency	Type
Flow			Quarterly	NA
Chromium (Total		1.0 mg/l	Quarterly[2]	Grab
Zinc	0.5	1.0 mg/l	Quarterly[2]	Grab
Copper	0.5	1.0 mg/l	Quarterly[2]	Grab
Temperature ^oC	35	38	Quarterly	Grab
Temperature ^oF	95	100	Quarterly	Grab
Chlorine Residual		0.2 mg/l	During Addition	Grab

NOTE:

(1) The above requirements are not applicable where:
  (a) Facilities discharge less than 10,000 GPD and are specifically utilized for space cooling.
  (b) Water conditioning chemicals utilized contain no chromium.
  (c) Discharges do not result in violation of applicable water quality standards.

(2) Monitoring of this parameter is not required for discharges to which treatment or conditioning chemicals are not added or where added materials do not contain the material limited.

(3) Boiler blowdown originating at space heating facilities.

Characteristic	Limitations		Monitoring	
	Daily Average	Daily Maximum	Frequency	Type
Flow			Quarterly	NA
Temperature °C	35	38	Quarterly	Grab
Temperature °F	95	100	Quarterly	Grab

The pH shall not be less than 6.0 nor greater than 10.0 standard units and shall be monitored quarterly.

NOTE:

(1) The above requirements are not applicable where:
  (a) Facilities discharge less than 10,000 GPD and are specifically utilized for space heating.
  (b) Discharges do not result in violation of applicable water quality standards.

(4) Vehicle and Equipment Cleaning Facilities

Characteristic	Limitation		Monitoring	
	Daily Average	Daily Maximum	Frequency	Type
Flow	--	--	Daily	N/A
pH	--	--	1/Month	Grab
Oil and Grease	10 mg/l	15 mg/l	1/Month	Grab
Suspended Solids	25 mg/l	40 mg/l	1/Month	Grab
Phenol	1.0 mg/l	2.0 mg/l	1/Month(1)	Grab
Biochemical Oxygen Demand (5 Day)	30 mg/l	45 mg/l	1/Month(2)	Grab
Fecal Coliform Bacteria (no. per 100 ml)	200	--	1/Month(2)	Grab

Notes

(1) Required only at facilities at which paint stripping is performed.
(2) Required only at facilities at which sanitation equipment is cleaned.

(5) Painting and Corrosion Control Facilities

Characteristic	Limitation		Monitoring	
	Daily Average	Daily Maximum	Frequency	Type
Flow	--	--	Daily	N/A
pH	--	--	1/Month	Grab
Oil and Grease	10 mg/1	15 mg/1	1/Month	Grab
Suspended Solids	25 mg/1	40 mg/1	1/Month	Grab
Phenol	1.0 mg/1	2.0 mg/1	1/Quarter	Grab

(6) Vehicle and Equipment Maintenance Areas

Discharges, including surface runoff resulting from precipitation, shall not contain more than 15 mg/1 of oil and grease as a daily maximum and shall be monitored quarterly.

(7) Petroleum, Oil and Lubricant (POL) Storage and Handling Areas

Discharges, including surface runoff resulting from precipitation, shall not contain more than 15 mg/1 of oil and grease as a daily maximum. Discharges from areas with a storage capacity of 40,000 gallons or more shall be monitored quarterly.

(8) Battery Maintenance

There shall be no discharge of pollutants from battery maintenance facilities.

(9) Photographic Laboratories

There shall be no discharge of pollutants from photographic laboratories.

(10) Firefighter Training Areas

Characteristic	Limitation		Monitoring	
	Daily Average	Daily Maximum	Frequency	Type
Flow	--	--	Upon Occurrence	N/A
pH	--	--	1/Quarter	Grab
Biochemical Oxygen Demand (5 Day)	--	45 mg/1	1/Quarter	Grab
Oil and Grease	--	15 mg/1	1/Quarter	Grab
Suspended Solids	--	50 mg/1	1/Quarter	Grab

(11) Swimming Pools

Characteristic	Limitation Daily Average	Limitation Daily Maximum	Monitoring Frequency	Monitoring Type
Flow	--	--	Upon Occurrence	N/A
pH	--	--	1/Month	Grab
Suspended Solids	--	40 mg/l	1/Month	Grab
Chlorine Residual (1)	--	0.2 mg/l	1/Month	Grab

Notes
(1) Does not apply when potable water is used for filter backwash.

(12) Storm Sewers

Note
The discharge limitations specified below are applicable to all discharges from storm sewer systems which receive waste discharges from any sources; they are not applicable to discharges consisting entirely of uncontaminated surface runoff.

Characteristic	Limitation Daily Average	Limitation Daily Maximum	Monitoring Frequency	Monitoring Type
Flow	--	--	Note 1	
pH	--	--	1/Quarter	Grab
Oil and Grease	--	15 mg/l	1/Quarter	Grab
Suspended Solids	--	50 mg/l (2)	Quarterly	Grab
Temperature ^{o}C (^{o}F)	--	38 (100)	1/Quarter	Grab

Notes

(1) Flow shall be measured or estimated once per quarter.
(2) Suspended solids limitations are not applicable during periods of increased discharge resulting from precipitation.

c. Effluent Limitations specified above shall be modified, or alternatively, revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved under sections 301(b)(2) (C), and (D), 304(b)(2), and 307(a)(2) of the Clean Water Act, if the effluent standard or limitation so issued or approved.

(1) Contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or
(2) Controls any pollutant not limited in the permit.

The permit as modified or reissued under this paragraph shall also contain any other requirements of the Act then applicable.

The effluent limits and any additional requirements specified in the attached state certification supersede any less stringent limits listed above. During any time period which more stringent state certification effluent limits are stayed or inoperable, the effluent limits listed above shall be in effect and fully enforceable.

North Carolina Department of Natural Resources & Community Development

James B. Hunt, Jr., Governor

Howard N. Lee, Secretary

DIVISION OF ENVIRONMENTAL MANAGEMENT

RECEIVED FEB 1 1980 EPA-REGION IV ATLANTA, GA

January 30, 1980

Mr. George L. Harlow, Chief
Water Enforcement Branch
Enforcement Division
U. S. Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30308

Subject: 401 Water Quality Certification
Proposed NPDES Permit
#NC0003239
Camp Lejeune
Onslow County

Dear Mr. Harlow:

Pursuant to Section 401 of the Federal Clean Water Act (33 U. S. C. 1251, 1341; hereafter the "Act"), the State of North Carolina issues this Certification to subject application for a National Pollutant Discharge Elimination System (NPDES) permit to discharge into navigable waters.

Having evaluated the applicant's application and having reviewed the conditions to be imposed in the NPDES permit, the State of North Carolina certifies that if the applicant complies with the conditions developed for the NPDES permit, the applicant's discharge will comply with the applicable provision of Section 301 of the Act and appropriate requirements of Chapter 143 of the North Carolina General Statutes. Furthermore, in so far as it can determine, the State of North Carolina certifies that there are no limitations under Section 302 nor standards under Section 306 or 307 which are applicable to the applicant's discharge.

This Certification shall be subject to the permittee complying with attached conditions which are to be included in the NPDES permit.

Yours very truly,

C. C. Tinsley

for Neil S. Grigg
Director

Attachments
WQC 1378
cc: Wilmington Regional Office
Permits and Engineering

EFFLUENT

NPDES PERMIT NO: ______________ DISCHARGE NO: __________ MONTH: ______________ YEAR: ____

FACILITY NAME: ____ CLASS: ___ COUNTY: ________________

OPERATOR IN RESPONSIBLE CHARGE (ORC): ____ GRADE: ____

CERTIFIED LABORATORY: ____

CHECK BLOCK IF ORC HAS CHANGED ☐

PERSON(s) COLLECTING SAMPLES: ________________________

Mail original and one copy to:
ATT: Central Files
Division of Environmental Management
N C Department of NRCD
P O Box 27687
Raleigh, North Carolina 27611

I CERTIFY THAT THIS REPORT IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

X ____
Signature of operator in responsible charge

DATE	TIME 2400 CLOCK	COMPOSITE TIME	FLOW EFF ☐ INF ☐ DAILY RATE	TEMPERATURE CELSIUS	pH	SETTLEABLE MATTER	RESIDUAL CHLORINE	BOD5 20°C	COD	AMMONIA NITROGEN	TOTAL RESIDUE	TOTAL SUSPENDED RESIDUE	FECAL COLIFORM Geometric Mean	DISSOLVED OXYGEN	ENTER PARAMETER CODE ABOVE NAME AND UNITS BELOW			
			50050	00010	00400	00545	50060	00310	00340	00610	00500	00530	31616	00300				
		HRS	MGD	C°	UNIT	ML/L	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L	/100 ML	MG/L				
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Min.																		
Comp.(C)/Grab(G)																		
Monthly Limit																		

DEM Form MR-1 (11/84)

Facility Status: (Please check one of the following)

All monthly averages and / or other limitation do meet permit monitoring requirements ☐ (Compliant)

All monthly averages and / or other limitation do not meet permit monitoring requirements ☐ (Noncompliant)

If the facility is noncompliant, please comment on corrective actions being taken in respect to equipment, operation, maintenance, etc. and a time table for improvements to be made.
(Attach additional sheets if necessary)

____

____

____

____

____

____

I certify that this Report is accurate
and complete to the best of my knowledge:

____
Signature of Permittee

PARAMETER CODES

00010	Temperature	00556	Oil and Grease	00950	Dissolved Fluoride	01077	Silver	39516	PCBS
00065	Stream Stage	00600	Total Nitrogen	01002	Total Arsenic	01087	Total Vanadium	39941	Roundup
00076	Turbidity	00610	Ammonia Nitrogen	01027	Cadmium	01092	Zinc	50047	Max. flow during 24-hr. period
00300	Dissolved Oxygen	00625	Total Kjeldahl Nitrogen	01032	Hexavalent Chromium	01105	Total Aluminum	50048	Min. flow during 24-hr. period
00310	BOD_5	00665	Total Phosphorous	01034	Chromium	01147	Total Selenium	50050	Flow
00340	COD	00720	Cyanide	01037	Total Cobalt	31504	Total Coliform	50060	Total Residual Chlorine
00400	pH	00745	Total Sulfide	01042	Copper	31614	Fecal Coliform, MPN, Tube	71880	Formaldehyde
00500	Total Solids	00927	Total Magnesium	01045	Total Iron	31616	Fecal Coliform	71900	Mercury
00530	TSS	00929	Total Sodium	01051	Lead	32730	Total Phenolics	81318	Ferrocyanides
00545	Settleable Solids	00940	Total Chloride	01067	Nickel	38260	MBAS	85652	Time

The monthly average for fecal coliform is to be reported as a geometric MEAN.

If using alternate units for reporting data, please designate.

Influent

NPDES NO: ____________ DISCHARGE NO: ____________ MONTH: ____________ YEAR: ____________

FACILITY NAME: ______________________________ COUNTY: ____________

			00400	00010	00545	00310	00610	00500	00530	00340							
											ENTER PARAMETER CODE ABOVE & NAME AND UNITS BELOW						
Date	Time	Composite Time	PH	Temperature (Celsius)	Settleable Matter	BOD$_5$ 20 °C	Ammonia Nitrogen	Total Residue	Total Suspended Residue	COD							
		HRS	STD UNITS	°C	MI/L	MG/L	MG/L	MG/L	MG/L	MG/L							
1																	
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MONTHLY MAXIMUM																	
MONTHLY MINIMUM																	
SAMPLE TYPE C or G																	

NPDES NO: ______________ DISCHARGE NO: ______________ MONTH: ______________ YEAR: ______________

FACILITY NAME: ______________________________ COUNTY: ______________

STREAM: ______________________________ STREAM: ______________________________

LOCATION: ______________________________ LOCATION: ______________________________

Upstream

Date	Time 2400 Clock	Temperature (Celsius)	Dissolved Oxygen	PH	BOD_5 20°C	COD	Fecal Coliform *Geometric Mean	Enter Parameter Code above Name and Units Below			
		00010	00300	00400	00310	00340	31616				
	HRS	°C	MG/L	STD UNITS	MG/L	MG/L	100 ml				
1											
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3											
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31											
Average											
Monthly Maximum											
Monthly Minimum											

Downstream

Date	Time 2400 Clock	Temperature (Celsius)	Dissolved Oxygen	PH	BOD_5 20°C	COD	Fecal Coliform *Geometric Mean	Enter Parameter Code above Name and Units Below			
		00010	00300	00400	00310	00340	31616				
	HRS	°C	MG/L	STD UNITS	MG/L	MG/L	100 ml				
1											
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Average											
Monthly Maximum											
Monthly Minimum											

DEM Form MR-3 (11/84)

federal register

WEDNESDAY, DECEMBER 1, 1976

4

OPERATOR TRAINING & CERTIFICATION

PART II:

ENVIRONMENTAL PROTECTION AGENCY

WATER PROGRAMS

Guidelines Establishing Test Procedures for the Analysis of Pollutants

Amendments

NOTE:

See page 52786 for corrections.

Title 40—Protection of Environment

CHAPTER I—ENVIRONMENTAL PROTECTION AGENCY

SUBCHAPTER D—WATER PROGRAMS

[FRL 630-4]

PART 136—GUIDELINES ESTABLISHING TEST PROCEDURES FOR THE ANALYSIS OF POLLUTANTS

Amendment of Regulations

On June 9, 1975, proposed amendments to the Guidelines Establishing Test Procedures for the Analysis of Pollutants (40 CFR 136) were published in the FEDERAL REGISTER (40 FR 24535) as required by section 304(g) of the Federal Water Pollution Control Act Amendments of 1972 (86 Stat. 816, et seq., Pub. L. 92-500, 1972) hereinafter referred to as the Act.

Section 304(g) of the Act requires that the Administrator shall promulgate guidelines establishing test procedures for the analysis of pollutants that shall include factors which must be provided in: (1) any certification pursuant to section 401 of the Act, or (2) any permit application pursuant to section 402 of the Act. Such test procedures are to be used by permit applicants to demonstrate that effluent discharges meet applicable pollutant discharge limitations and by the States and other enforcement activities in routine or random monitoring of effluents to verify compliance with pollution control measures.

Interested persons were requested to submit written comments, suggestions, or objections to the proposed amendments by September 7, 1975. One hundred and ...ty-five letters were received from ...menters. The following categories of ...ganizations were represented by the commenters: Federal agencies accounted for twenty-four responses; State agencies accounted for twenty-six responses; local agencies accounted for seventeen responses; regulated major dischargers accounted for forty-seven responses; trade and professional organizations accounted for eight responses, analytical instrument manufacturers and vendors accounted for seven responses; and analytical service laboratories accounted for six responses.

All comments were carefully evaluated by a technical review committee. Based upon the review of comments, the following principal changes to the proposed amendments were made:

(A) *Definitions.* Section 136.2 has been amended to update references: Twenty commenters, representing the entire spectrum of responding groups pointed out that the references cited in §§ 136.2 (f), 136.2(g), and 136.2(h) were out-of-date; §§ 136.2(f), 136.2(g), and 136.2(h), respectively, have been amended to show the following editions of the standard references: "14th Edition of Standard Methods for the Examination of Water and Waste Water;" "1974 EPA Manual of Methods for the Analysis of Water and Waste;" and "Part 31, 1975 Annual Book of ASTM Standards."

(B) *Identification of Test Procedures.* ...th the content and format of § 136.3, Table I, List of Approved Test Procedures" have been revised in response to twenty-one comments received from State and local governments, major regulated dischargers, professional and trade associations, and analytical laboratories.

Table I has been revised by:

(1) The addition of a fourth column of references which includes procedures of the United States Geological Survey which are equivalent to previously approved methods.

(2) The addition of a fifth column of miscellaneous references to procedures which are equivalent to previously approved methods.

(3) Listing generically related parameters alphabetically within four subcategories: bacteria, metals, radiological and residue, and by listing these subcategory headings in alphabetic sequence relative to the remaining parameters.

(4) Deleting the parameter "Algicides" and by entering the single relevant algicide, "Pentachlorophenol" by its chemical name.

(C) *Clarification of Test Parameters.* The conditions for analysis of several parameters have been more specifically defined as a result of comments received by the Agency:

(1) In response to five commenters representing State or local governments, major dischargers, or analytical instrument manufacturers, the end-point for the alkalinity determination is specifically designated as pH 4.5.

(2) Manual digestion and distillation are still required as necessary preliminary steps for the Kjeldahl nitrogen procedure. Analysis after such distillation may be by Nessler color comparison, titration, electrode, or automated phenolate procedures.

(3) In response to eight commenters representative of Federal and State governments, major dischargers, and analytical instrument manufacturers, manual distillation at pH 9.5 is now specified for ammonia measurement.

(D) *New Parameters and Analytical Procedures.* Forty-four new parameters have been added to Table I. In addition to the designation of analytical procedures for these new parameters, the following modifications have been made in analytical procedures designated in response to comments.

(1) The ortho-tolidine procedure was not approved for the measurement of residual chlorine because of its poor accuracy and precision. Its approval had been requested by seven commenters representing major dischargers, State, or local governments, and analytical instrument manufacturers. Instead, the N,N-diethyl-p-phenylenediamine (DPD) method is approved as an interim procedure pending more intensive laboratory testing. It has many of the advantages of the ortho-tolidine procedure such as low cost, ease of operation, and also is of acceptable precision and accuracy.

(2) The Environmental Protection Agency concurred with the American Dye Manufacturers' request to approve its procedure for measurement of color, and copies of the procedure are now available at the Environmental Monitoring and Support Laboratory, Cincinnati (EMSL-CI).

(3) In response to three requests from Federal, State governments, and dischargers, "hardness," may be measured as the sum of calcium and magnesium analyzed by atomic absorption and expressed as their carbonates.

(4) The proposal to limit measurement of fecal coliform bacteria in the presence of chlorine to only the "Most Probable Number" (MPN) procedure has been withdrawn in response to requests from forty-five commenters including State pollution control agencies, permit holders, analysts, treatment plant operators, and a manufacturer of analytical supplies. The membrane filter (MF) procedure will continue to be an approved technique for the routine measurement of fecal coliform in the presence of chlorine. However, the MPN procedure must be used to resolve controversial situations. The technique selected by the analyst must be reported with the data.

(5) A total of fifteen objections, representing the entire spectrum of commenters, addressed the drying temperatures used for measurement of residues. The use of different temperatures in drying of total residue, dissolved residue and suspended residue was cited as not allowing direct intercomparability between these measurements. Because the intent of designating the three separate residue parameters is to measure separate waste characteristics (low drying temperatures to measure volatile substances, high drying temperatures to measure anhydrous inorganic substances), the difference in drying temperatures for these residue parameters must be preserved.

(E) *Deletion of Measurement Techniques.* Some measurement techniques that had been proposed have been deleted in response to objections raised during the public comment period.

(1) The proposed infrared spectrophotometric analysis for oil and grease has been withdrawn. Eleven commenters representing Federal or State agencies and major dischargers claimed that this parameter is defined by the measurement procedure. Any alteration in the procedure would change the definition of the parameter. The Environmental Protection Agency agreed.

(2) The proposed separate parameter for sulfide at concentrations below 1 mg/l, has been withdrawn. Methylene blue spectrophotometry is now included in Table I as an approved procedure for sulfide analysis. The titrimetric iodine procedure for sulfide analysis may only be used for analysis of sulfide at concentrations in excess of one milligram per liter.

(F) *Sample Preservation and Holding Times.* Criteria for sample preservation and sample holding times were requested by several commenters. The reference for sample preservation and holding time criteria applicable to the Table I parameters is given in footnote (1) of Table I.

(G) *Alternate Test Procedures.* Comments pertaining to § 136.4, Application for Alternate Test Procedures, included objections to various obstacles within

these procedures for expeditious approval of alternate test procedures. Four analytical instrument manufacturers commented that by limiting of application for review and/or approval of alternate test procedures to NPDES permit holders, § 136.4 became an impediment to the commercial development of new or improved measurement devices based on new measurement principles. Applications for such review and/or approval will now be accepted from any person. The intent of the alternate test procedure is to allow the use of measurement systems which are known to be equivalent to the approved test procedures in waste water discharges.

Applications for approval of alternate test procedures applicable to specific discharges will continue to be made only by NPDES permit holders, and approval of such applications will be made on a case-by-case basis by the Regional Administrator in whose Region the discharge is made.

Applications for approval of alternate test procedures which are intended for nationwide use can now be submitted by any person directly to the Director of the Environmental Monitoring and Support Laboratory in Cincinnati. Such applications should include a complete methods write-up, any literature references, comparability data between the proposed alternate test procedure and those already approved by the Administrator. The application should include precision and accuracy data of the proposed alternate test procedure and data confirming the general applicability of the test procedure to the industrial categories of waste water for which it is intended. The Director of the Environmental Monitoring and Support Laboratory, after review of submitted information, will recommend approval or rejection of the application to the Administrator, or he will return the application to the applicant for more information. Approval or rejection of applications for test procedures intended for nationwide use will be made by the Administrator, after considering the recommendation made by the Director of the Environmental Monitoring and Support Laboratory, Cincinnati. Since the Agency considers these procedures for approval of alternate test procedures for nationwide use to be interim procedures, we will welcome suggestions for criteria for approval of alternate test procedures for nationwide use. Interested persons should submit their written comments in triplicate on or before June 1, 1977 to: Dr. Robert B. Medz, Environmental Protection Technologist, Monitoring Quality Assurance Standardization, Office of Monitoring and Technical Support (RD-680), Environmental Protection Agency, Washington, D.C. 20460.

(H) *Freedom of Information.* A copy of all public comments, an analysis by parameter of those comments, and documents providing further information on the rationale for the changes made in the final regulation are available for inspection and copying at the Environmental Protection Agency Public Information Reference Unit, Room 2922, Waterside Mall, 401 M Street, SW., Washington, D.C. 20460, during normal business hours. The EPA information regulation 40 CFR 2 provides that a reasonable fee may be charged for copying such documents.

Effective date: These amendments become effective on April 1, 1977.

Dated: November 19, 1976.

JOHN QUARLES,
Acting Administrator,
Environmental Protection Agency.

Chapter I, Subchapter D, of Title 40, Code of Federal Regulations is amended as follows:

1. In § 136.2, paragraphs (f), (g), and (h) are amended to read as follows:

§ 136.2 Definitions.

* * * * *

(f) "Standard Methods" means *Standard Methods for the Examination of Water and Waste Water*, 14th Edition, 1976. This publication is available from the American Public Health Association, 1015 18th Street, N.W., Washington, D.C. 20036.

(g) "ASTM" means *Annual Book of Standards, Part 31, Water, 1975.* This publication is available from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

(h) "EPA Methods" means *Methods for Chemical Analysis of Water and Waste, 1974.* Methods Development and Quality Assurance Research Laboratory, National Environmental Research Center, Cincinnati, Ohio 45268; U.S. Environmental Protection Agency, Office of Technology Transfer, Industrial Environmental Research Laboratory, Cincinnati, Ohio 45268. This publication is available from the Office of Technology Transfer.

2. In § 136.3, the second sentence of paragraph (b) is amended, and a new paragraph (c) is added to read as follows:

§ 136.3 Identification of test procedures.

* * * * *

(b) * * * Under such circumstances, additional test procedures for analysis of pollutants may be specified by the Regional Administrator or the Director upon the recommendation of the Director of the Environmental Monitoring and Support Laboratory, Cincinnati.

(c) Under certain circumstances, the Administrator may approve, upon recommendation by the Director, Environmental Monitoring and Support Laboratory, Cincinnati, additional alternate test procedures for nationwide use.

3. Table I of § 136.3 is revised by listing the parameters alphabetically; by adding 44 new parameters; by adding a fourth column under references listing equivalent United States Geological Survey methods; by adding a fifth column under references listing miscellaneous equivalent methods; by deleting footnotes 1 through 7 and adding 24 new footnotes, to read as follows:

* * * * *

TABLE I.—*List of approved test procedures*[1]

Parameter and units	Method	References (page nos.): 1974 EPA methods	14th ed. standard methods	Pt. 31 1975 ASTM	USGS methods[2]	Other approved methods
1. Acidity, as $CaCO_3$, milligrams per liter.	Electrometric end point (pH of 8.2) or phenolphthalein end point.	1	273(4d)	116	40	[4](607)
2. Alkalinity, as $CaCO_3$, milligrams per liter.	Electrometric titration (only to pH 4.5) manual or automated, or equivalent automated methods.	3	278	111	41	[4](607)
		5				
3. Ammonia (as N), milligrams per liter.	Manual distillation[4] (at pH 9.5) followed by nesslerization, titration, electrode. Automated phenolate.		410			
		159	412	237	116	[4](614)
		165				
		168	616			
BACTERIA						
4. Coliform (fecal)[5], number per 100 ml.	MPN;[6] membrane filter.		922			
			937		[5](45)	
5. Coliform (fecal)[5] in presence of chlorine, number per 100 ml.	do.[6]		922			
			928, 937			
6. Coliform (total),[5] number per 100 ml.	do.[6]		916			
			928		[5](35)	
7. Coliform (total)[5] in presence of chlorine, number per 100 ml.	MPN;[6] membrane filter with enrichment.		916			
			933			
8. Fecal streptococci,[5] number per 100 ml.	MPN;[6] membrane filter; plate count.		943			
			944		[5](50)	
			947			
9. Benzidine, milligrams per liter.	Oxidation—colorimetric[7]					
10. Biochemical oxygen demand, 5-d (BOD_5), milligrams per liter.	Winkler (Azide modification) or electrode method.		543		[5](50)	
						[10](17)
11. Bromide, milligrams per liter.	Titrimetric, iodine-iodate.	14		323	58	
12. Chemical oxygen demand (COD), milligrams per liter.	Dichromate reflux	20	550	472	124	[4](610)
						[10](17)
13. Chloride, milligrams per liter.	Silver nitrate; mercuric nitrate; or automated colorimetric-ferricyanide.		320	267		
		29	304	265		[4](615)
		31	613		[11](46)	

See footnotes at end of table.

Parameter and units	Method	1974 EPA methods	14th ed. standard methods	References (page nos.) Pt. 31, 1975 ASTM	USGS methods[1]	Other approved methods
14. Chlorinated organic compounds (except pesticides), milligrams per liter.	Gas chromatography[11]					
15. Chlorine—total residual, milligrams per liter.	Iodometric titration, amperometric or starch-iodine end-point; DPD colorimetric or Titrimetric methods (these last 2 are interim methods pending laboratory testing).	35	318 322 332 329	278		
16. Color, platinum cobalt units or dominant wave length, hue, luminance, purity.	Colorimetric; spectrophotometric; or ADMI procedure.[11]	36 39	64 66		82	
17. Cyanide, total,[16] milligrams per liter.	Distillation followed by silver nitrate titration or pyridine pyrazolone (or barbituric acid) colorimetric.	40	361	503	85	[1](22)
18. Cyanide amenable to chlorination, milligrams per liter.	...do	49	376	503		
19. Dissolved oxygen, milligrams per liter.	Winkler (Azide modification) or electrode method.	51 56	443 450	358	126	[1](609)
20. Fluoride, milligrams per liter.	Distillation[4] followed by ion electrode; SPADNS; or automated complexone.	65 59 61	389 391 393 614	307 305	93	
21. Hardness—Total, as $CaCO_3$, milligrams per liter.	EDTA titration; automated colorimetric; or atomic absorption (sum of Ca and Mg as their respective carbonates).	68 70	202	161	94	[1](617)
22. Hydrogen ion (pH), pH units.	Electrometric measurement.	239	460	178	129	[1](606)
23. Kjeldahl nitrogen (as N), milligrams per liter.	Digestion and distillation followed by nesslerization, titration, or electrode; automated digestion automated phenolate.	175 165 182	437		122	[1](612)
METALS						
24. Aluminum—Total, milligrams per liter.	Digestion[11] followed by atomic absorption[11] or by colorimetric (Eriochrome Cyanine R).	92	152 171		[11](19)	
25. Aluminum—Dissolved, milligrams per liter.	0.45 micron filtration[11] followed by referenced methods for total aluminum.					
26. Antimony—Total, milligrams per liter.	Digestion[11] followed by atomic absorption.[11]	94				
27. Antimony—Dissolved, milligrams per liter.	0.45 micron filtration[11] followed by referenced method for total antimony.					
28. Arsenic—Total, milligrams per liter.	Digestion followed by silver diethyldithiocarbamate; or atomic absorption.[11][14]	9 95	285 153 159		[14](23) [14](37)	
29. Arsenic—Dissolved, milligrams per liter.	0.45 micron filtration[11] followed by referenced method for total arsenic.					
30. Barium—Total, milligrams per liter.	Digestion[11] followed by atomic absorption.[11]	97	152		52	
31. Barium—Dissolved, milligrams per liter.	0.45 micron filtration[11] followed by referenced method for total barium.					
32. Beryllium—Total, milligrams per liter.	Digestion[11] followed by atomic absorption[11] or by colorimetric (Aluminon).	99	152 177		83	
33. Beryllium—Dissolved, milligrams per liter.	0.45 micron filtration[11] followed by referenced method for total beryllium.					
34. Boron—Total, milligrams per liter.	Colorimetric (Curcumin)	13	287			
35. Boron—Dissolved, milligrams per liter.	0.45 micron filtration[11] followed by referenced method for total boron.					
36. Cadmium—Total, milligrams per liter.	Digestion[11] followed by atomic absorption[11] or by colorimetric (Dithizone).	101	148 182	345	62	[1](619) [18](37)
37. Cadmium—Dissolved, milligrams per liter.	0.45 micron filtration[11] followed by referenced method for total cadmium.					
38. Calcium—Total, milligrams per liter.	Digestion[11] followed by atomic absorption; or EDTA titration.	103	148 189	345	66	
39. Calcium—Dissolved, milligrams per liter.	0.45 micron filtration[11] followed by referenced method for total calcium.					
40. Chromium VI, milligrams per liter.	Extraction and atomic absorption; colorimetric (Diphenylcarbazide).	89, 105	192		76 75	
41. Chromium VI—Dissolved, milligrams per liter.	0.45 micron filtration[11] followed by referenced method for chromium VI.					
42. Chromium—Total, milligrams per liter.	Digestion[11] followed by atomic absorption[11] or by colorimetric (Diphenylcarbazide).	105	148 192	345 338	78 77	[1](609)
43. Chromium—Dissolved, milligrams per liter.	0.45 micron filtration[11] followed by referenced method for total chromium.					

See footnotes at end of table.

Parameter and units	Method	1974 EPA methods	14th ed. standard methods	References (page nos.) Pt. 31 1975 ASTM	USGS methods [1]	Other approved methods
44. Cobalt—Total, milligrams per liter.	Digestion [13] followed by atomic absorption.[15]	107	148	345	80	[18] (37)
45. Cobalt—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total cobalt.					
46. Copper—Total, milligrams per liter.	Digestion [13] followed by atomic absorption [15] or by colorimetric (Neocuproine).	108	148 196	345 293	83	[8] (619) [18] (37)
47. Copper—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total copper.					
48. Gold—Total, milligrams per liter.	Digestion [13] followed by atomic absorption.[15]					
49. Iridium—Total, milligrams per liter.	Digestion [13] followed by atomic absorption.[15]					
50. Iron—Total, milligrams per liter.	Digestion [13] followed by atomic absorption [15] or by colorimetric (Phenanthroline).	110	148 208	345 326	102	[8] (619)
51. Iron—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total iron.					
52. Lead—Total, milligrams per liter.	Digestion [13] followed by atomic absorption [15] or by colorimetric (Dithizone).	112	148 215	345	105	[8] (619)
53. Lead—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total lead.					
54. Magnesium—Total, milligrams per liter.	Digestion [13] followed by atomic absorption; or gravimetric.	114	148 221	345	109	[8] (619)
55. Magnesium—Dissolved milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total magnesium.					
56. Manganese—Total milligrams per liter.	Digestion [13] followed by atomic absorption [15] or by colorimetric (Persulfate or periodate).	116	148 225, 227	345	111	[8] (619)
57. Manganese—Dissolved milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total manganese.					
58. Mercury—Total, milligrams per liter.	Flameless atomic absorption.	118	156	338	[11] (51)	
59. Mercury—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total mercury.					
60. Molybdenum—Total, milligrams per liter.	Digestion [13] followed by atomic absorption.[15]	139		350		
61. Molybdenum—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total molybdenum.					
62. Nickel—Total, milligrams per liter.	Digestion [13] followed by atomic absorption [15] or by colorimetric (Heptoxime).	141	148	345	115	
63. Nickel—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total nickel.					
64. Osmium—Total, milligrams per liter.	Digestion [13] followed by atomic absorption.[15]					
65. Palladium—Total, milligrams per liter.	Digestion [13] followed by atomic absorption.[15]					
66. Platinum—Total, milligrams per liter.	Digestion [13] followed by atomic absorption.[15]					
67. Potassium—Total, milligrams per liter.	Digestion [13] followed by atomic absorption, colorimetric (Cobaltinitrite), or by flame photometric.	143	235 244	408	134	[8] (630)
68. Potassium—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total potassium.					
69. Rhodium—Total, milligrams per liter.	Digestion [13] followed by atomic absorption.[15]					
70. Ruthenium—Total, milligrams per liter.	Digestion [13] followed by atomic absorption.[15]					
71. Selenium—Total, milligrams per liter.	Digestion [13] followed by atomic absorption.[15]	145	159			
72. Selenium—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total selenium.					
73. Silica—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by colorimetric (Molybdosilicate).	274	487	898	139	
74. Silver—Total,[20] milligrams per liter.	Digestion [13] followed by atomic absorption [15] or by colorimetric (Dithizone).	146	148 243		142	[8] (619) [18] (37)
75. Silver—Dissolved,[20] milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total silver.					
76. Sodium—Total, milligrams per liter.	Digestion [13] followed by atomic absorption or by flame photometric.	147	250	408	143	[8] (621)
77. Sodium—Dissolved, milligrams per liter.	0.45 micron filtration [17] followed by referenced method for total sodium.					

See footnotes at end of table.

Parameter and units	Method	1974 EPA methods	14th ed. standard methods	References (page nos.) Pt. 31 1975 ASTM	USGS methods[1]	Other approved methods
78. Thallium—Total, milligrams per liter.	Digestion[14] followed by atomic absorption.[14]	149				
79. Thallium—Dissolved, milligrams per liter.	0.45 micron filtration[17] followed by referenced method for total thallium.					
80. Tin—Total, milligrams per liter.	Digestion[14] followed by atomic absorption.[14]	150			[11] (65)	
81. Tin—Dissolved, milligrams per liter.	0.45 micron filtration[17] followed by referenced method for total tin.					
82. Titanium—Total, milligrams per liter.	Digestion[14] followed by atomic absorption.[14]	151				
83. Titanium—Dissolved, milligrams per liter.	0.45 micron filtration[17] followed by referenced method for total titanium.					
84. Vanadium—Total, milligrams per liter.	Digestion[14] followed by atomic absorption[14] or by colorimetric (Gallic acid).	153	152 200	441	[11] (67)	
85. Vanadium—Dissolved, milligrams per liter.	0.45 micron filtration[17] followed by referenced method for total vanadium.					
86. Zinc—Total, milligrams per liter.	Digestion[14] followed by atomic absorption[14] or by colorimetric (Dithizone).	155	148 265	345	159	[1](619) [10](37)
87. Zinc—Dissolved, milligrams per liter.	0.45 micron filtration[17] followed by referenced method for total zinc.					
88. Nitrate (as N), milligrams per liter.	Cadmium reduction; brucine sulfate; automated cadmium or hydrazine reduction.[21]	201 197 207	423 427 620	358	119	[1](614), [10](26)
89. Nitrite (as N), milligrams per liter.	Manual or automated colorimetric (Diazotization).	215	434		121	
90. Oil and grease, milligrams per liter.	Liquid-liquid extraction with trichloro-trifluoroethane-gravimetric.	229	515			
91. Organic carbon; total (TOC), milligrams per liter.	Combustion—Infrared method.[22]	236	532	467	[10] (4)	
92. Organic nitrogen (as N), milligrams per liter.	Kjeldahl nitrogen minus ammonia nitrogen.	175, 159	437		122	[1] (612, 614)
93. Orthophosphate (as P), milligrams per liter.	Manual or automated ascorbic acid reduction.	249 256	481 624	286	131	[1] (621)
94. Pentachlorophenol, milligrams per liter.	Gas chromatography[11].					
95. Pesticides, milligrams per liter.	do.[12]		555	529	[10] (24)	
96. Phenols, milligrams per liter.	Colorimetric (4AAP)	241	582	345		
97. Phosphorus (elemental), milligrams per liter.	Gas chromatography[18]					
98. Phosphorus; total (as P), milligrams per liter.	Persulfate digestion followed by manual or automated ascorbic acid reduction.	249 256	476, 481 624	384	133	[1] (621)
RADIOLOGICAL						
99. Alpha—Total, pCi per liter.	Proportional or scintillation counter.		648	591	[11] (75+78)	
100. Alpha—Counting error, pCi per liter.	do.		648	594	[11] (79)	
101. Beta—Total, pCi per liter	Proportional counter		648	601	[11] (75+78)	
102. Beta—Counting error, pCi per liter.	do.		648	606	[11] (79)	
103. (a) Radium—Total, pCi per liter.	do.		661	661		
(b) ^{226}Ra, pCi per liter	Scintillation counter		667		[11] (81)	
RESIDUE						
104. Total, milligrams per liter	Gravimetric, 103 to 105° C.	270	91			
105. Total dissolved (filterable), milligrams per liter.	Glass fiber filtration, 180° C.	266	92			
106. Total suspended (nonfilterable), milligrams per liter.	Glass fiber filtration, 103 to 105° C.	268	94			
107. Settleable, milliliters per liter or milligrams per liter.	Volumetric or gravimetric		95			
108. Total volatile, milligrams per liter.	Gravimetric, 550° C.	272	95			
109. Specific conductance, micromhos per centimeter at 25° C.	Wheatstone bridge conductimetry.	275	71	120	148	[1] (606)
110. Sulfate (as SO_4), milligrams per liter.	Gravimetric; turbidimetric; or automated colorimetric (barium chloranilate).	277 279	493 496	424 425		[1] (624) [1] (623)
111. Sulfide (as S), milligrams per liter.	Titrimetric—iodine for levels greater than 1 mg per liter; Methylene blue photometric.	294	505 503		154	
112. Sulfite (as SO_3), milligrams per liter.	Titrimetric, iodine-iodate	285	508	435		
113. Surfactants, milligrams per liter.	Colorimetric (Methylene blue).	157	600	494	[10] (11)	
114. Temperature, degrees C.	Calibrated glass or electrometric thermometer.	286	125		[10] (31)	
115. Turbidity, NTU	Nephelometric	296	132	223	156	

[1] Recommendations for sampling and preservation of samples according to parameter measured may be found in "Methods for Chemical Analysis of Water and Wastes, 1974" U.S. Environmental Protection Agency, table 2, pp. viii-xii.

[2] All page references for USGS methods, unless otherwise noted, are to Brown, E., Skougstad, M. W., and Fishman, M. J., "Methods for Collection and Analysis of Water Samples for Dissolved Minerals and Gases," U.S. Geological Survey Techniques of Water-Resources Inv., book 5, ch. A1, (1970).
[3] EPA comparable method may be found on indicated page of "Official Methods of Analysis of the Association of Official Analytical Chemists" methods manual, 12th ed. (1975).
[4] Manual distillation is not required if comparability data on representative effluent samples are on company file to show that this preliminary distillation step is not necessary; however, manual distillation will be required to resolve any controversies.
[5] The method used must be specified.
[6] The 5 tube MPN is used.
[7] Slack, K. V. and others, "Methods for Collection and Analysis of Aquatic Biological and Microbiological Samples: U.S. Geological Survey Techniques of Water-Resources Inv. book 5, ch. A4 (1973)."
[8] Since the membrane filter technique usually yields low and variable recovery from chlorinated wastewaters, the MPN method will be required to resolve any controversies.
[9] Adequately tested methods for benzidine are not available. Until approved methods are available, the following interim method can be used for the estimation of benzidine: (1) "Method for Benzidine and Its Salts in Wastewaters," available from Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268.
[10] American National Standard on Photographic Processing Effluents, Apr. 2, 1975. Available from ANSI, 1430 Broadway, New York, N.Y. 10018.
[11] Fishman, M. J. and Brown, Eugene, "Selected Methods of the U.S. Geological Survey for Analysis of Wastewaters," (1976) open-file report 76-177.
[12] Procedures for pentachlorophenol, chlorinated organic compounds and pesticides can be obtained from the Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268.
[13] Color method (ADMI procedure) available from Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268.
[14] For samples suspected of having thiocyanate interference, magnesium chloride is used as the digestion catalyst. In the approved test procedure for cyanides, the recommended catalysts are replaced with 20 ml of a solution of 510 g/l magnesium chloride ($MgCl_2 \cdot 6H_2O$). This substitution will eliminate thiocyanate interference for both total cyanide and cyanide amenable to chlorination measurements.
[15] For the determination of total metals the sample is not filtered before processing. Because vigorous digestion procedures may result in a loss of certain metals through precipitation, a less vigorous treatment is recommended as given on p. 83 (4.1.4) of "Methods for Chemical Analysis of Water and Wastes" (1974). In those instances where a more vigorous digestion is desired the procedure on p. 82 (4.1.3) should be followed. For the measurement of the noble metal series (gold, iridium, osmium, palladium, platinum, rhodium and ruthenium), an aqua regia digestion is to be substituted as follows: Transfer a representative aliquot of the well-mixed sample to a Griffin beaker and add 3 ml of concentrated redistilled HNO_3. Place the beaker on a steam bath and evaporate to dryness. Cool the beaker and cautiously add a 5 ml portion of aqua regia. (Aqua regia is prepared immediately before use by carefully adding 3 volumes of concentrated HCl to one volume of concentrated HNO_3.) Cover the beaker with a watch glass and return to the steam bath. Continue heating the covered beaker for 50 min. Remove cover and evaporate to dryness. Cool and take up the residue in a small quantity of 1:1 HCl. Wash down the beaker walls and watch glass with distilled water and filter the sample to remove silicates and other insoluble material that could clog the atomizer. Adjust the volume to some predetermined value based on the expected metal concentration. The sample is now ready for analysis.
[16] As the various furnace devices (flameless AA) are essentially atomic absorption techniques, they are considered to be approved test methods. Methods of standard addition are to be followed as noted in p. 78 of "Methods for Chemical Analysis of Water and Wastes," 1974.
[17] Dissolved metals are defined as those constituents which will pass through a 0.45 μm membrane filter. A prefiltration is permissible to free the sample from larger suspended solids. Filter the sample as soon as practical after collection using the first 50 to 100 ml to rinse the filter flask. (Glass or plastic filtering apparatus are recommended to avoid possible contamination.) Discard the portion used to rinse the flask and collect the required volume of filtrate. Acidify the filtrate with 1:1 redistilled HNO_3 to a pH of 2. Normally, 3 ml of (1:1) acid per liter should be sufficient to preserve the samples.
[18] See "Atomic Absorption Newsletter," vol. 13, 75 (1974). Available from Perkin-Elmer Corp., Main Ave., Norwalk, Conn. 06852.
[19] Method available from Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268.
[20] Recommended methods for the analysis of silver in industrial wastewaters at concentrations of 1 mg/l and above are inadequate where silver exists as an inorganic halide. Silver halides such as the bromide and chloride are relatively insoluble in reagents such as nitric acid but are readily soluble in an aqueous buffer of sodium thiosulfate and sodium hydroxide to a pH of 12. Therefore, for levels of silver above 1 mg/l 20 ml of sample should be diluted to 100 ml by adding 40 ml each of 2M $Na_2S_2O_3$ and 2M NaOH. Standards should be prepared in the same manner. For levels of silver below 1 mg/l the recommended method is satisfactory.
[21] An automated hydrazine reduction method is available from the Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, Cincinnati, Ohio 45268.
[22] A number of such systems manufactured by various companies are considered to be comparable in their performance. In addition, another technique, based on combustion-methane detection is also acceptable.
[23] Goerlitz, D., Brown, E., "Methods for Analysis of Organic Substances in Water": U.S. Geological Survey Techniques of Water Resources Inv., book 5, ch. A3 (1972).
[24] R. F. Addison and R. G. Ackman, "Direct Determination of Elemental Phosphorus by Gas-Liquid Chromatography," "Journal of Chromatography," vol. 47, No. 3, pp. 421-426, 1970.
[25] The method found on p. 75 measures only the dissolved portion while the method on p. 78 measures only suspended. Therefore, the 2 results must be added together to obtain "total."
[26] Stevens, H. H., Ficke, J. F., and Smoot, G. F., "Water Temperature—Influential Factors, Field Measurement and Data Presentation: U.S. Geological Survey Techniques of Water Resources Inv., book 1 (1975)."

4. In § 136.4, the second sentence of paragraph (c) is amended by deleting the word "subchapter" immediately following the phrase "procedure under this" and immediately preceding the word "shall" and replaced with the phrase "paragraph (c):" and § 136.4 is amended by adding a new paragraph (d) to read as follows:

§ 136.4 Application for alternate test procedures.

* * * * *

(c) * * * Any application for an alternate test procedure under this paragraph (c) shall: * * *

(d) An application for approval of an alternate test procedure for nationwide use may be made by letter in triplicate to the Director, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268. Any application for an alternate test procedure under this paragraph (d) shall:

(1) Provide the name and address of the responsible person or firm making the application.

(2) Identify the pollutant(s) or parameter(s) for which nationwide approval of an alternate testing procedure is being requested.

(3) Provide a detailed description of the proposed alternate procedure, together with references to published or other studies confirming the general applicability of the alternate test procedure to the pollutant(s) or parameter(s) in waste water discharges from representative and specified industrial or other categories.

(4) Provide comparability data for the performance of the proposed alternate test procedure compared to the performance of the approved test procedures.

§ 136.5 [Amended]

5. In § 136.5, paragraph (a) is amended by inserting the phrase "proposed by the responsible person or firm making the discharge" immediately after the words "test procedure" and before the period that ends the paragraph.

6. In § 136.5, paragraph (b) is amended by inserting in the first sentence the phrase "proposed by the responsible person or firm making the discharge" immediately after the words "such application" and immediately before the comma. The second sentence of paragraph (b) is amended by deleting the phrase "Methods Development and Quality Assurance Research Laboratory" immediately after the phrase "State Permit Program and to the Director of the" at the end of the sentence, and inserting in its place the phrase "Environmental Monitoring and Support Laboratory, Cincinnati."

7. In § 136.5, paragraph (c) is amended by inserting the phrase "proposed by the responsible person or firm making the discharge" immediately after the phrase "application for an alternate test procedure" and immediately before the comma; and by deleting the phrase "Methods Development and Quality Assurance Laboratory" immediately after the phrase "application to the Director of the" and immediately before the phrase "for review and recommendation" and inserting in its place the phrase "Environmental Monitoring and Support Laboratory, Cincinnati."

8. In § 136.5, the first sentence of paragraph (d) is amended by inserting the phrase, "proposed by the responsible person or firm making the discharge," immediately after the phrase, "application for an alternate test procedure," and immediately before the comma.

The second sentence of paragraph (d) is amended by deleting the phrase, "Methods Development and Quality Assurance Research Laboratory," immediately after the phrase, "to the Regional Administrator by the Director of the," and immediately preceding the period ending the sentence and inserting in its place the phrase, "Environmental Monitoring and Support Laboratory, Cincinnati."

The third sentence of paragraph (d) is amended by deleting the phrase, "Methods Development and Quality Assurance Research Laboratory," immediately after the phrase, "forwarded to the Director," and immediately before the second comma and by inserting in its place the phrase, "Environmental Monitoring and Support Laboratory, Cincinnati."

9. Section 136.5 is amended by the addition of a new paragraph (e) to read as follows:

§ 136.5 Approval of alternate test procedures.

* * * * *

(e) Within ninety days of the receipt by the Director of the Environmental Monitoring and Support Laboratory, Cincinnati of an application for an alternate test procedure for nationwide use, the Director of the Environmental Monitoring and Support Laboratory, Cincinnati shall notify the applicant of his recommendation to the Administrator to approve or reject the application, or shall specify additional information which is required to determine whether to approve the proposed test procedure. After such notification, an alternate method determined by the Administrator to satisfy the applicable requirements of this part shall be approved for nationwide use to satisfy the requirements of this subchapter; alternate test procedures determined by the Administrator not to meet the applicable requirements of this part shall be rejected. Notice of these determinations shall be submitted for publication in the FEDERAL REGISTER not later than 15 days after such notification and determination is made.

[FR Doc 76-35032 Filed 11-30-76;8:45 am]

Title 40 - Protection of Environment

Chapter 1-Environmental Protection Agency

Subchapter D--Water Programs

Part 136--Guidelines Establishing Test Procedures for the Analysis of Pollutants

Amendment of Regulations: Corrections

In FR Doc. 76-35032 appearing at pages 52780 to 52786 in the Federal Register of Wednesday, December 1, 1976, the following changes should be made:

§ 136.3 (Amended)

1. On Page 52783, for parameter number 62, Nickel-Total, add "232" to the page references in the column under the 14th edition of Standard Methods opposite the colorimetric method designation.

2. On page 52784, for parameter number 89, change the parameter designation from "Nitrate" to "Nitrite".

3. On page 52784, for parameter number 96, Phenols, delete the present method designation, "Colorimetric, (4AAP)," and replace it with the method designation, "Distillation followed by colorimetric, (4AAP)"; delete the page reference in the column under the 14th edition of Standard Methods, "582", and replace it with page number "574".

Dated: January 10, 1977.

Wilson K. Talley
Assistant Administrator for Research and Development.

(FR Doc.77-1453 Filed 1-17-77;8:45 am)

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Appendix - III

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APPENDIX - III

APPENDIX - III

APPENDIX - III

1. Rules and Regulations for
   Surface Water Monitoring; Reporting

2. Water Quality Standards

STATE OF NORTH CAROLINA

DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT

DIVISION OF ENVIRONMENTAL MANAGEMENT

ADMINISTRATIVE CODE SECTION:

15 NCAC 2B .0500 - SURFACE WATER MONITORING: REPORTING

EFFECTIVE DECEMBER 1, 1984

ENVIRONMENTAL MANAGEMENT COMMISSION

RALEIGH, NORTH CAROLINA

SECTION .0500 - SURFACE WATER MONITORING: REPORTING

.0501 PURPOSE

The purpose of this Section is to set forth the requirements of the Environmental Management Commission for monitoring and reporting the quantity and quality of wastewater discharges to, and their effects upon, the water resources of the state.

History Note: Statutory Authority G.S. 143-215.64; 143-215.68;
Eff. February 1, 1976;
Amended Eff. December 1, 1984.

.0502 SCOPE

This Section shall apply to all persons subject to the provisions of G.S. 143-215.1.

History Note: Statutory Authority G.S. 143-215.64; 143-215.68;
Eff. February 1, 1976.

.0503 DEFINITIONS

Unless the context otherwise requires, the terms used herein shall be as defined in G.S. 143-213 and as follows:

(1) "Actual flow" means the total volume of wastewater discharged from a point source in any calendar month divided by the number of days during the month in which discharge occurred.

(2) "Bioassay monitoring" means tests employed to determine the effluent concentration, expressed as a percent volume, that is lethal to 50 percent of the organisms within a prescribed period of time. Such tests may include either static and/or flow-through methodologies for acute evaluations and may also include chronic tests if warranted.

(3) "Biological monitoring" shall mean the determination of the effects on aquatic life, including accumulation of pollutants in tissue, in receiving waters due to the discharge of pollutants by techniques and procedures, including sampling of organisms representative of appropriate levels of the food chain appropriate to the volume and the physical, chemical, and biological characteristics of a wastewater effluent.

(4) "Classified water pollution control facility" means a treatment works classified by the Wastewater Treatment Plant Operators Certification Commission pursuant to Chapter 90A of the North Carolina General Statutes as class I, class II, class III, or class IV facility, or

such other classification system as the certification commission may hereafter adopt.

(5) "Commercial laboratory" means any laboratory which analyzes water samples for a fee.

(6) "Composite sample" means, as a minimum, either a combination of four or more grab samples or a single sample collected continuously during the complete period of daily discharge. The volume of each grab sample or the rate of collection of the continuously collected sample shall be in direct proportion to the rate of flow during the time of collection. Where the rate of flow does not vary significantly, grab samples may be of equal size taken at equal intervals of time.
Note: See .0505 (c)(3)(B) for details.

(7) "Daily" means every day on which a wastewater discharge occurs except Saturdays, Sundays and legal holidays.

(8) "Design flow" means the average daily volume of wastewater which a water pollution control facility was designed, approved and constructed to treat.

(9) "Design treatment capability" means the capability of a water pollution control facility to adequately treat a specified wastewater flow, and a designated quantity of organic wastes and suspended and dissolved solid wastes.

(10) "Director" means the Director of the Division of Environmental Management, Department of Natural Resources and Community Development.

(11) "Division" means the Division of Environmental Management, Department of Natural Resources and Community Development.

(12) "Domestic sewage" means water-carried human wastes together with all other water-carried wastes normally present in wastewater from residences used exclusively for human habitation.

(13) "Downstream" means a location in the receiving waters below (downstream of) a point of waste discharge after a reasonable opportunity for dilution and mixture as specified in the commission's "Rules, Regulations, Classifications and Water Quality Standards Applicable to the Surface Waters of North Carolina."

(14) "Effluent" means wastewater discharged from a water pollution control facility or other point source whether treated or untreated.

(15) "Grab sample" means an individual sample collected instantaneously.

(16) "Industrial establishment" means any industrial, business, commercial or governmental enterprise which produces water carried wastes.

(17) "Influent" means the wastewater entering a water pollution control facility.

(18) "Monitoring" means a program of sample collection and analysis sufficient to determine the volume of influent and effluent flow of a water pollution control facility or other point source; the nature of waste contained therein; and the effects on receiving waters of waste discharged thereto; or, in the case of septic tank-nitrification line type wastewater disposal systems, visual observation.

(19) "Point source" means any discernible, confined, and discrete conveyance, including, but specifically not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, or concentrated animal feeding operation from which waste is or may be discharged to the waters of the state.

(20) "Quarterly" means occurring four times during a 12-month period at intervals of three consecutive months.

(21) "Sample" means a small portion of the wastewater influent, wastewater effluent or of receiving waters.

(22) "Standard industrial classification" (SIC) means those numerical designations set forth in "The Standard Industrial Classification Manual, 1972" (Superintendent of Documents, U.S. Government Printing Office) classifying industries according to the type of activity (relating to major products manufactured or principle services furnished) in which they are engaged. For the purposes of this Section, each industry or unit of government shall be classified by SIC numbers applicable to each activity carried on by such establishment or unit which results in a discharge of wastewater. In addition, any industrial establishment or unit of government which collects or discharges domestic sewage is hereby assigned SIC number 9999. "The Standard Industrial Classification Manual, 1972," may be available in public libraries and a copy is available for reference at the field and central offices of the Department of Natural Resources and Community Development.

(23) "Storet number" means a number appearing in the "Water Quality Control Information System Handbook" (U.S. Environmental Protection Agency) which designates a test or measurement according to the analytical procedure used or a method of measurement and units of measurement. Storet is an acronym for the water quality data storage and retrieval computer system of the Environmental Protection Agency.

(24) "Toxic waste" means those wastes, or combinations of wastes, including disease-causing agents, which, after

discharge, and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction), or physical deformities, in such organisms or their offspring. Toxic substances include, by way of illustration and not limitation: lead, cadmium, chromium, mercury, vanadium, arsenic, molybdenum, antimony, nickel, barium, beryllium, copper, selenium, zinc, ortho-nitro-chlorobenzene (ONCB), polychlorinated byphenyls (PCB's) and dichlordiphenyl-trichloroethant (DDT); and any other materials that have or may hereafter be determined to have toxic properties.

(25) "Unit of government" means nay incorporated city, town or village, county, sanitary district, metropolitan sewerage district, water or sewer authority, special purpose district, other municipality, or any agency, board, commission, department or political subdivision or public corporation of the state, now or hereafter created or established, empowered to provide wastewater collection systems or wastewater treatment works.

(26) "Upstream" means a location in the receiving waters near but above (upstream of) a point a wastewater discharge and unaffected by the discharge.

(27) "Water pollution control facilities" or "facility" means "treatment works" as defined in G.S. 143-213.

History Note: Statutory Authority G.S. 143-213; 143-215.68;
Eff. February 1, 1976;
Amended December 1, 1984.

.0504 CLASSIFICATION OF WASTE SOURCES

(a) All persons subject to the requirements of these regulations shall determine the standard industrial classification (SIC) number for each type of activity (required to be reported under Rule .0506 of this Section) in which they are engaged by reference to the Standard Industrial Classification Manual, 1972. Copies of the manual may be available in public libraries and a copy is available for reference at the regional and central offices of the Division of Environmental Management.

(b) Environmental Management Commission hereby assigns SIC number 9999 to every industrial establishment or unit of government which collects or discharges domestic sewage, whether

from on-premises bathrooms, restrooms, kitchens, dining rooms, water pollution control facilities, or from any other source.

(c) The owner or person in responsible charge of every water pollution control facility which receives a wastewater influent from more than one source shall determine and report to the Department of Natural Resources and Community Development the name and standard industrial classification number(s) for each applicable activity(ies) of every industrial establishment contributing wastes containing toxic materials, in toxic quantities, and also every industrial establishment contributing an average daily wastewater influent of one percent or more of the design flow of the facility or in excess of 100,000 gallons per day, whichever is less, and shall report such other information as is required by Regulation .0505 of this Section; provided; however, that it is not required that the name and SIC number of any source contributing domestic sewage influent only be reported hereunder.

(d) The average daily influent volume contributed by any one source may be computed by dividing the total estimated volume of wastewater discharged by the source during the reporting year by the total number of days that the source operated during the reporting year.

History Note: Statutory Authority G.S. 143-215.64; 143-215.68;
Eff. February 1, 1976;
Amended Eff. December 1, 1984; November 1, 1978.

.0505 MONITORING REQUIREMENTS

(a) General. Every person subject to this Section shall be required to establish, operate and maintain a monitoring program consistent with their NPDES Permit.

(b) Wastewater and Stream Flow Measurement.

(1) A device or method, approved by the director for determining the rate of flow of all discharges of wastewater whether treated or untreated shall be provided at those point sources of which monthly reports of monitoring tests and measurements are required unless specifically excepted by the director as not significant. All water pollution control facilities shall install, operate, and maintain continuous flow measuring with recording or totalizing devices, or shall employ flow measuring or flow control methods approved by the director and shall submit monthly reports of such data as required in Rule .0506 of this Section.

(2) A reading of the U.S. Geological Survey stream flow staff gauge or reference point shall be made at the

time of stream sampling in those instances where determined to be needed by the director.

(c) Sampling

(1) Frequency and Location. Except as otherwise provided herein, all industrial establishments and units of government shall take influent, effluent and stream samples at such locations and with such frequency as shall be necessary to conduct the tests and analyses required by Rule .0508 of this Section.

(2) Establishment of Sampling Points

(A) Sampling points as required in Rule .0508 of this Section shall be established for collecting influent and effluent samples for each facility.

(B) Sampling points shall be established in the receiving waters at one upstream location and at least one but not more than three downstream locations adequate in the opinion of the director to measure impact of the discharge on receiving waters; provided that if the receiving waters are subject to tidal influence, the director may require two upstream sampling points.

(C) Personnel of the division shall be contacted to assist in locating the sampling points.

(3) Collection of Samples

(A) Samples collected in receiving waters shall be grab samples.

(B) Samples of the influent and effluent of the water pollution control facility or other point source shall be composite samples, except as provided in Rule .0505 (c)(3)(C) of this Section, or for facilities with design flows of 30,000 gallons per day or less when determined unnecessary by the director. If the composite sample is obtained from grab samples, the following requirements apply. The intervals between influent grab samples shall be no greater than hourly. Intervals between effluent grab samples shall be no greater than hourly except where the detention time of the wastewater in the facility is greater than 24 hours, in which case, the interval between grab samples shall be no greater in number of hours than the detention time in number of days; provided, however, in no case may the time between effluent grab samples be greater than six hours nor the number of grab samples less than four during any discharge period of 24 hours or less.

(C) The following influent and effluent tests shall be made on grab samples which shall be collected during the period of maximum flow, and shall not be made on composite samples:
(i) dissolved oxygen,
(ii) temperature,
(iii) settleable matter,
(iv) turbidity,
(v) pH,
(vi) residual chlorine,
(vii) coliform bacteria (fecal or total)
(viii) cyanide,
(ix) oil and grease.

(4) If the director approves identical sampling points on receiving waters for two or more facilities, the facilities may collaborate in operating stream sampling points.

(5) Stream sampling may be discontinued at such times as flow conditions in the receiving waters or extreme weather conditions will result in a substantial risk of injury or death to persons collecting samples. In such cases, on each day that sampling is discontinued, written justification for the discontinuance shall be attached to the monitoring report for the month in which the event occurred. This provision shall be strictly construed and may not be utilized to avoid the requirements of this Section when performance of these requirements is feasible. When there is a discontinuance pursuant to this provision, stream sampling shall be resumed at the first opportunity after the risk has ceased.

(d) Biological and/or Bioassay Monitoring. Biological and/or Bioassay monitoring may be required when, in the opinion of the director, such monitoring is necessary to establish whether the designated best use of larger rivers, bodies or impoundments of water, as determined by the Environmental Management Commission, is being or will be impaired or when toxic effluents are known to exist at a facility.

(e) Tests and Analyses.

(1) If a water pollution control facility receives waste influent from two or more sources, every test required by Rule .0508 of this Section for the standard industrial classification applicable to the sources shall be performed one time, and it shall not be necessary to repeat such tests for each source; however, the tests shall be performed at the intervals specified by Rule .0508 of this Section for the

applicable industrial classification requiring the most frequent test interval.

(2) If analyses of samples of any effluent or any receiving water (collected by the state or a public agency) indicate a violation of effluent limitations or water quality standards or that a violation or water quality standards may result under any projected conditions including minimum stream flow and temperature extremes, the director may require the person responsible for the violation or potential violation to monitor the pollutant or parameter at such points and with such frequency as he determines appropriate. If the source of the pollutant is unknown, the director may require all persons that he determines may be discharging each pollutant to monitor for it.

(3) If the wastewaters discharged by any water pollution control facility violate any effluent limitations or water quality standards or contribute to the violation of water quality standards established by the Environmental Management Commission the facility shall perform and report such additional tests and measurements at such frequencies and for such periods of time as the director may direct.

(4) Approved Methods of Analysis. The methods used in collection, preservation and analysis of samples shall conform to the guidelines of the Environmental Protection Agency codified as 40 CFR Part 136, which are adopted by reference as amended through June 1, 1984. Other analytical procedures shall conform to those found in either the Fourteenth Edition of "Standard Methods for the Examination of Water and Wastewater", 1975, (published jointly by the American Public Health Association, the American Water Works Association, and the Water Pollution Control Federation), or "Methods for Chemical Analysis of Waters and Wastes", 1974, (prepared by the U.S. Environmental Protection Agency and available from the Superintendent of Documents, U.S. Government Printing Office) which are adopted by reference.

(5) Approval of Laboratories. Analytical determinations made pursuant to the monitoring and reporting requirements of this Section shall be made in adequately equipped laboratories staffed by person(s) competent to perform tests. Only monitoring programs which provide for the making of analytical determinations by qualified employees of the owner or

by a laboratory certified by the division will be considered adequate.

History Note: Statutory Authority G.S. 143-215.64; 143-215.66; 143-215.68;
Eff. February 1, 1976;
Amended Eff. December 1, 1984; November 1, 1978.

.0506 REPORTING REQUIREMENTS

(a) General

(1) Every person subject to this Section shall file certified monitoring reports setting forth the results of tests and measurements conducted pursuant to NPDES permit monitoring requirements.

(A) Monthly monitoring reports shall be filed no later than 30 days after the end of the reporting period for which the report is made.

(B) Reports filed pursuant to the requirements of Subdivision (a)(1) of this Rule shall be of forms furnished or approved by the director and shall be submittedin duplicate to the division at its main office in Raleigh.

(C) A copy of all reports submitted to the director pursuant to this Section shall be retained by the owner of each water pollution control facility for a period of at least three years from the date of submission.

A maximum of three copies of Annual Report Forms and 36 copies of necessary Monthly Report Forms will be furnished per year by the division for each point source subject to the provisions of this Section.

(2) Every person subject to this Section shall report by telephone or telegraph to either the central office or appropriate regional office of the division (telephone numbers will be furnished by the department) normally within a period of 24 hours or on the next working day (however, if the occurrence is one which may endanger the public health, or fish or wildlife, such person shall report as soon as possible) following the occurrence or first knowledge of the occurrence of any of the following:

(A) Any failure of a pumping station or treatment facility resulting in a by-pass directly to receiving waters without treatment of all or any portion of the influent to such station or facility.

(B) Any occurrence at the water pollution control facility which results in the discharge of significant amounts of wastes which are abnormal in quantity or characteristic, such as the dumping of the contents of a sludge digester, the known passage of a slug of hazardous substance through the facility or any other unusual circumstances.

(C) Any process unit failure, due to known or unknown reasons, that render the facility incapable of adequate wastewater treatment, such as mechanical or electrical failures of pumps, aerators, compressors, etc.

(3) Persons reporting such occurrences by telephone or telegraph shall also file a written report in letter form setting out the information required in Subdivision (a)(4) of this Regulation and pertinent information pertaining to the occurrence within 15 days following first knowledge of the occurrence.

(4) All reports required to be filed by this Section shall contain the following information in addition to such other information as is required for the particular report:

(A) name of governmental unit or industrial establishment,

(B) designation of facility and location,

(C) the class assigned to the water pollution control facility,

(D) the number assigned by the Department of Natural Resources and Community Development to the permit or other approval document issued by the Environmental Management Commission under which the discharge is made.

(5) Any person desiring confidentiality for any influent information submitted shall specify the influent information for which confidentiality is sought and shall justify such request to the Department of Natural Resources and Community Development, and if approved shall by an appropriate stamp, indicate the location of such information on each report filed thereafter.

(b) Monthly Monitoring Reports

(1) Every person operating a monitoring system required by this Section shall file a monitoring report once each month which includes the data for the samples collected during the month.

(2) Monthly monitoring reports shall be submitted by the chief administrative official of a unit of government, by the owner or chief executive officer of an

industrial establishment or their duly appointed designee. The monthly report shall be certified by the operator in responsible charge of a classified treatment facility or by the manager of an industrial establishment which has a point source of waste discharge and which does not have a classified water pollution control facility.

(3) In addition to the information required on all reports [see Subparagraph (a)(4) of this Rule] the following information shall be submitted in monthly monitoring reports:
   (A) name of person or group collecting sample or making observation;
   (B) name of person or group that analyzed sample;
   (C) name of operator in responsible charge of the facility and the grade certificate held;
   (D) sampling point for each sample;
   (E) date and time (on 2400 hour clock basis) at which each grab sample was collected;
   (F) composite samples:
      (i) date on which collection of composite samples is commenced,
      (ii) time of starting and ending of composite sample period on 2400 hour clock basis;
   (G) wastewater flow in million gallons per day (MGD);
   (H) Results of analyses (reported to the designated number of figures with a properly placed decimal point as indicated on each report sheet) together with the proper storet number (to be furnished by the division) for the analytical procedure used;
   (I) The results of all tests on the characteristics of the effluent, including but not limited to NPDES Permit Monitoring Requirements, shall be reported on monthly report forms;
   (J) The monthly average of analysis for each parameter and the maximum and minimum values for the month shall be reported.

(c) Additional Reporting Requirements

(1) When a facility is operated on an independent contract basis, the operator in responsible charge shall notify the owner of the facility in writing of any existing or anticipated conditions at the facility which may interfere with its proper operation and which need corrective action by the owner. The notice shall include recommendations for corrective action.

(2) Two copies of the notice to the owner shall be sent to the division as an attachment to the next monthly monitoring report.

(d) Reporting Addresses and Phone Numbers

(1) The following list includes the addresses and phone numbers for the division director and staff to which appropriate notifications shall be made.

(A) Raleigh Central Office
Director's Office
Division of Environmental Management
P.O. Box 27687
Raleigh, North Carolina 27611
919/733-7015
Water Quality Section Chief
Division of Environmental Management
P.O. Box 27687
Raleigh, North Carolina 27611
919/733-5083

(B) Asheville Regional Office
Regional Supervisor
Division of Environmental Management
P.O. Box 370
Asheville, North Carolina 28801
704/253-3341

(C) Fayetteville Regional Office
Regional Supervisor
Division of Environmental Management
Wachovia Building
Suite 714
Fayetteville, North Carolina 28301
919/486-1541

(D) Mooresville Regional Office
Regional Supervisor
Division of Environmental Management
P.O. Box 950
Mooresville, North Carolina 28115
704/663-1699

(E) Raleigh Regional Office
Regional Supervisor
Division of Environmental Management
3800 Barrett Drive
P.O. Box 27687
Raleigh, North Carolina 27611
919/733-2314

(F) Washington Regional Office
Regional Supervisor
Division of Environmental Management

1502 North Market Street
Washington, North Carolina 27889
919/946-6481

(G) Wilmington Regional Office
Regional Supervisor
Division of Environmental Management
7225 Wrightsville Avenue
Wilmington, North Carolina 28401
919/256-4161

(H) Winston-Salem Regional Office
Regional Supervisor
Division of Environmental Management
8003 North Point Boulevard
Winston-Salem, North Carolina 27106
919/761-2351

History Note: Statutory Authority G.S. 143-215.1(b); 143-215.64; 143-215.65; 143-215.68;
Eff. February 1, 1976;
Amended Eff. December 1, 1984; November 1, 1978.

.0507 IMPLEMENTATION

History Note: Statutory Authority G.S. 143-215.68; 143-215.64 to 143-215.66;
Eff. February 1, 1976;
Amended Eff. November 1, 1978;
Repealed Eff. December 1, 1984.

.0508 TESTS AND MEASUREMENTS APPLICABLE TO SICs

(a) Determination of Type and Frequency of Tests and Measurements

(1) Introduction. The tables set forth in this Rule are designed to indicate, for any particular water pollution control facility or point source, the standard tests and measurements which are to be performed, the frequency with which the tests and measurements are to be made, and the location and mininimum number of sampling points that are required.

(2) Determination of Facility Class and SIC Numbers. Before these tables may be used, the standard industrial classification(s) of the activities discharging to the water pollution control facility must be determined from The Standard Industrial Classification Manual (Superintendent of Document, U.S. Government Printing Office), 1972 or subsequent editions. The classification of the facility as

determined by the Wastewater Treatment Plant Operators Certification Commission, must also be known.

(b) Modification of Test(s) or Measurement(s) Requirements

(1) If it is demonstrated to the satisfaction of the director that any of the tests and measurements, sampling points, or frequency of sampling requirements, as required in this Rule for a particular SIC group, are not applicable to the discharge of a particular water pollution control facility, or if it can be shown that the objectives of this Section can be achieved by other acceptable means, then such requirements may be waived or modified to the extent that the division, determines to be appropriate.

(2) In addition to the tests and measurements as listed in this Rule applicable to each of the SIC groups, persons subject to this Section may be required to perform such additional tests and measurements at such sampling points and with such frequency as are determined by the director to be necessary to adequately monitor constituents of the waste discharge and their effect upon the receiving waters.

(c) Unclassified Activities

(1) Any person owning or operating a water pollution control facility who determines that a major SIC group(s) is not listed in this Rule for an activity subject to this Section shall so notify the division.

(2) The director shall prescribe the number and location of sampling points and the frequency with which tests and measurements must be made for such pollutant or pollutant effects as it shall deem necessary to properly monitor the quality of waste discharges resulting from any activity subject to this Section which is not included in the major SIC groups set forth in this Rule and to properly monitor effects of the discharges upon the waters of this state.

(d) Index of Major Standard Industrial Groups

SIC Number	Major Products or Services
0200-0299	Agricultural Production -- Livestock
1400-1499	Mining
2000-2099	Food and Beverage Processing
2100-2199	Tobacco Processing
2200-2299	Textile Processing
2400-2499	Lumber and Wood Products Except Furniture
2500-2599	Manufacturing of Furniture and Fixtures
2600-2699	Paper and Allied Products

2800-2899	Chemical and Allied Products
2900-2999	Petroleum Refining and Related Industries
3100-3199	Leather and Leather Products
3400-3499	Fabricated Metal Products Except Ordnance, Machinery and Transportation Equipment
3500-3599	Machinery Except Electrical
3600-3699	Electrical Machinery, Equipment and Supplies
4600-4699	Pipe Line Transportation
4900-4999	Electric, Gas and Sanitary Services
7200-7299	Personal Services
7300-7399	Miscellaneous Business Service
7500-8599	Automobile Repairing Services and Garages
9999	Domestic Sewage

Abbreviations for sampling locations to be used with SIC monitoring requirements:

"I" means influent
"E" means effluent
"U" means upstream
"D" means downstream

AGRICULTURAL PRODUCTIONS - LIVESTOCK
MINIMUM REQUIREMENTS FOR SIC 0200-0299
EFFLUENT LIMITED

REQUIRED TEST	LOCATION	FREQUENCY CLASS I & II	CLASS III & IV
1. pH	E	Weekly	Daily
2. Temperature, °C	E	Weekly	Daily
3. BOD, 5-day, 20°C	E	2/month	Daily
4. Total Suspended Residue	E	2/month	Daily
5. Ammonia Nitrogen	E	Monthly	Weekly
6. Total Nitrogen	E	*	*
7. Total Phosphorus	E	*	*
WATER QUALITY LIMITED			
1. Dissolved Oxygen	E	Weekly	Daily
2. Dissolved Oxygen	U,D	Weekly	3/week +
3. pH	E	Weekly	Daily
4. Temperature, °C	E	Weekly	Daily
5. Temperature, °C	U,D	Weekly	3/week +
6. BOD, 5-day, 20°C	E	2/month	Daily
7. Total Suspended Residue	E	2/month	Daily
8. Ammonia Nitrogen	E	2/month	Daily
9. Total Nitrogen	E	*	*
10. Total Phosphorus	E	*	*

MINING
MINIMUM REQUIREMENTS FOR SIC 1400-1499

EFFLUENT LIMITED

REQUIRED TEST		LOCATION	FREQUENCY CLASS I & II	CLASS III & IV
1.	Turbidity	E	Weekly	Daily
2.	Settleable Matter	E	Weekly	Daily
3.	Total Suspended Residue	E	2/month	Daily
4.	pH	E	Weekly	Daily

WATER QUALITY LIMITED

1.	Turbidity	E	Weekly	Daily
2.	Turbidity	U,D	Weekly	3/week +
3.	Settleable Matter	E	Weekly	Daily
4.	Total Suspended Residue	E	2/month	Daily
5.	pH	E	Weekly	Daily

FOOD AND BEVERAGE PROCESSING

MINIMUM REQUIREMENTS FOR SIC 2000-2099

EFFLUENT LIMITED

REQUIRED TEST		LOCATION	FREQUENCY CLASS I & II	CLASS III & IV
1.	pH	E	Weekly	Daily
2.	Temperature, ^oC	E	Weekly	Daily
3.	BOD, 5-day, 20^oC	E	2/month	Daily
4.	Total Suspended Residue	E	2/month	Daily
5.	Ammonia Nitrogen	E	Monthly	Weekly
6.	Total Nitrogen	E	*	*
7.	Total Phosphorus	E	*	*

WATER QUALITY LIMITED

1.	Dissolved Oxygen	E	Weekly	Daily
2.	Dissolved Oxygen	U,D	Weekly	3/week +
3.	pH	E	Weekly	Daily
4.	Temperature, ^oC	E	Weekly	Daily
5.	Temperature, ^oC	U,D	Weekly	3/week +
6.	BOD, 5-day, 20^oC	E	2/month	Daily
7.	Total Suspended Residue	E	2/month	Daily
8.	Ammonia Nitrogen	E	2/month	Daily
9.	Total Nitrogen	E	*	*
10.	Total Phosphorus	E	*	*

TOBACCO PROCESSING

MINIMUM REQUIREMENTS FOR SIC 2100-2199

EFFLUENT LIMITED

REQUIRED TEST		LOCATION	FREQUENCY CLASS I & II	CLASS III & IV
1.	pH	E	Weekly	Daily
2.	Temperature, ^oC	E	Weekly	Daily
3.	BOD, 5-day, 20^oC	E	2/month	Daily
4.	Total Suspended Residue	E	2/month	Daily
5.	Ammonia Nitrogen	E	Monthly	Weekly

6.	Total Nitrogen	E	*	*
7.	Total Phosphorus	E	*	*

WATER QUALITY LIMITED

1.	Dissolved Oxygen	E	Weekly	Daily
2.	Dissolved Oxygen	U,D	Weekly	3/week +
3.	pH	E	Weekly	Daily
4.	Temperature, °C	E	Weekly	Daily
5.	Temperature, °C	U,D	Weekly	3/week +
6.	BOD, 5-day, 20°C	E	2/month	Daily
7.	Total Suspended Residue	E	2/month	Daily
8.	Ammonia Nitrogen	E	2/month	Daily
9.	Total Nitrogen	E	*	*
10.	Total Phosphorus	E	*	*

<u>TEXTILE PROCESSING</u>

MINIMUM REQUIREMENTS FOR SIC 2200-2299

EFFLUENT LIMITED

	REQUIRED TEST	LOCATION	FREQUENCY CLASS I & II	CLASS III & IV
1.	pH	E	Weekly	Daily
2.	Temperature, °C	E	Weekly	Daily
3.	BOD, 5-day, 20°C	E	2/month	Daily
4.	COD	E	Monthly	Weekly
5.	Total Suspended Residue	E	2/month	Daily
6.	Total Nitrogen	E	*	*
7.	Total Phosphorus	E	*	*

WATER QUALITY LIMITED

1.	Dissolved Oxygen	E	Weekly	Daily
2.	Dissolved Oxygen	U,D	Weekly	3/week +
3.	pH	E	Weekly	Daily
4.	Temperature, °C	E	Weekly	Daily
5.	Temperature, °C	U,D	Weekly	3/week +
6.	BOD, 5-day, 20°C	E	2/month	Daily
7.	COD	E	2/month	Weekly
8.	Total Suspended Residue	E	2/month	Daily
9.	Total Nitrogen	E	*	*
10.	Total Phosphorus	E	*	*

<u>LUMBER AND WOOD PRODUCTS (EXCEPT FURNITURE)</u>

MINIMUM REQUIREMENTS FOR SIC 2400-2499

EFFLUENT LIMITED

	REQUIRED TEST	LOCATION	FREQUENCY CLASS I & II	CLASS III & IV
1.	pH	E	Weekly	Daily
2.	Temperature, °C	E	Weekly	Daily
3.	BOD, 5-day, 20°C	E	2/month	Daily
4.	COD	E	Monthly	Weekly
5.	Total Phenolics	E	2/month	Daily
6.	Total Suspended Residue	E	2/month	Daily

7.	Total Nitrogen	E	*	*
8.	Total Phosphorus	E	*	*

WATER QUALITY LIMITED

1.	Dissolved Oxygen	E	Weekly	Daily
2.	Dissolved Oxygen	U,D	Weekly	3/week +
3.	pH	E	Weekly	Daily
4.	Temperature, °C	E	Weekly	Daily
5.	Temperature, °C	U,D	Weekly	3/week +
6.	BOD, 5-day, 20°C	E	2/month	Daily
7.	COD	E	2/month	Daily
8.	Total Phenolics	E	2/month	Daily
9.	Total Suspended Residue	E	2/month	Daily
10.	Total Nitrogen	E	*	*
11.	Total Phosphorus	E	*	*

MANUFACTURING OF FURNITURE AND FIXTURES
MINIMUM REQUIREMENTS FOR SIX 2500-2599
EFFLUENT LIMITED

REQUIRED TEST		LOCATION	FREQUENCY CLASS I & II	CLASS III & IV
1.	pH	E	Weekly	Daily
2.	Temperature, °C	E	Weekly	Daily
3.	BOD, 5-day, 20°C	E	2/month	Daily
4.	COD	E	Monthly	Weekly
5.	Total Phenolics	E	2/month	Daily
6.	Formaldehyde	E	2/month	Daily
7.	Total Suspended Residue	E	2/month	Daily
8.	Total Nitrogen	E	*	*
9.	Total Phosphorus	E	*	*

WATER QUALITY LIMITED

1.	Dissolved Oxygen	E	Weekly	Daily
2.	Dissolved Oxygen	U,D	Weekly	3/week +
3.	pH	E	Weekly	Daily
4.	Temperature, °C	E	Weekly	Daily
5.	Temperature, °C	U,D	Weekly	3/week +
6.	BOD, 5-day, 20°C	E	2/month	Daily
7.	COD	E	2/month	Daily
8.	Total Phenolics	E	2/month	Daily
9.	Formaldehyde	E	2/month	Daily
10.	Total Suspended Residue	E	2/month	Daily
11.	Total Nitrogen	E	*	*
12.	Total Phosphorus	E	*	*

PAPER AND ALLIED PRODUCTS
MINIMUM REQUIREMENTS FOR SIC 2600-2699
EFFLUENT LIMITED

REQUIRED TEST		LOCATION	FREQUENCY CLASS I & II	CLASS III & IV
1.	pH	E	Weekly	Daily

2.	Temperature, °C	E	Weekly	Daily
3.	BOD, 5-day, 20°C	E	2/month	Daily
4.	Total Suspended Residue	E	2/month	Daily
5.	Total Nitrogen	E	*	*
6.	Total Phosphorus	E	*	*

WATER QUALITY LIMITED

1.	Dissolved Oxygen	E	Weekly	Daily
2.	Dissolved Oxygen	U,D	Weekly	3/week +
3.	pH	E	Weekly	Daily
4.	Temperature, °C	E	Weekly	Daily
5.	Temperature, °C	U,D	Weekly	3/week +
6.	BOD, 5-day, 20°C	E	2/month	Daily
7.	Total Suspended Residue	E	2/month	Daily
8.	Total Nitrogen	E	*	*
9.	Total Phosphorus	E	*	*

CHEMICAL AND ALLIED PRODUCTS

MINIMUM REQUIREMENTS FOR SIC 2800-2899

EFFLUENT LIMITED

REQUIRED TEST		LOCATION	FREQUENCY	
			CLASS I & II	CLASS III & IV
1.	pH	E	Weekly	Daily
2.	Temperature, °C	E	Weekly	Daily
3.	BOD, 5-day, 20°C	E	2/month	Daily
4.	Total Suspended Residue	E	2/month	Daily
5.	Total Nitrogen	E	*	*
6.	Total Phosphorus	E	*	*

WATER QUALITY LIMITED

1.	Dissolved Oxygen	E	Weekly	Daily
2.	Dissolved Oxygen	U,D	Weekly	3/week +
3.	pH	E	Weekly	Daily
4.	Temperature, °C	E	Weekly	Daily
5.	Temperature, °C	U,D	Weekly	3/week +
6.	BOD, 5-day, 20°C	E	2/month	Daily
7.	Total Suspended Residue	E	2/month	Daily
8.	Total Nitrogen	E	*	*
9.	Total Phosphorus	E	*	*

PETROLEUM REFINING AND RELATED INDUSTRIES

MINIMUM REQUIREMENTS FOR SIC 2900-2999

EFFLUENT LIMITED

REQUIRED TEST		LOCATION	FREQUENCY	
			CLASS I & II	CLASS III & IV
1.	pH	E	Weekly	Daily
2.	Temperature, °C	E	Weekly	Daily
3.	BOD, 5-day, 20°C	E	2/month	Daily
4.	Total Suspended Residue	E	2/month	Daily
5.	Total Phenolics	E	2/month	Daily
6.	Oil and Grease	E	2/month	Daily

7.	Total Nitrogen	E	*	*
8.	Total Phosphorus	E	*	*

WATER QUALITY LIMITED

1.	Dissolved Oxygen	E	Weekly	Daily
2.	Dissolved Oxygen	U,D	Weekly	3/week +
3.	pH	E	Weekly	Daily
4.	Temperature, °C	E	Weekly	Daily
5.	Temperature, °C	U,D	Weekly	3/week +
6.	BOD, 5-day, 20°C	E	2/month	Daily
7.	Total Suspended Residue	E	2/month	Daily
8.	Total Phenolics	E	2/month	Daily
9.	Oil and Grease	E	2/month	Daily
10.	Total Nitrogen	E	*	*
11.	Total Phosphorous	E	*	*

LEATHER AND LEATHER PRODUCTS
MINIMUM REQUIREMENTS FOR SIC 3100-3199
EFFLUENT LIMITED

REQUIRED TEST		LOCATION	FREQUENCY	
			CLASS I & II	CLASS III & IV
1.	pH	E	Weekly	Daily
2.	Temperature, °C	E	Weekly	Daily
3.	BOD, 5-day, 20°C	E	2/month	Daily
4.	Total Suspended Residue	E	2/month	Daily
5.	COD	E	Monthly	Weekly
6.	Ammonia Nitrogen	E	Monthly	Weekly
7.	Oil and Grease	E	2/month	Daily
8.	Turbidity	E	Weekly	Daily
9.	Total Nitrogen	E	*	*
10.	Total Phosphorous	E	*	*

WATER QUALITY LIMITED

1.	Dissolved Oxygen	E	Weekly	Daily
2.	Dissolved Oxygen	U,D	Weekly	3/week +
3.	pH	E	Weekly	Daily
4.	Temperature, °C	E	Weekly	Daily
5.	Temperature, °C	U,D	Weekly	3/week +
6.	BOD, 5-day, 20°C	E	2/month	Daily
7.	Total Suspended Residue	E	2/month	Daily
8.	COD	E	2/month	Daily
9.	Ammonia Nitrogen	E	2/month	Daily
10.	Oil and Grease	E	2/month	Daily
11.	Turbidity	E	Weekly	Daily
12.	Total Nitrogen	E	*	*
13.	Total Phosphorous	E	*	*

FABRICATED METAL PRODUCTS EXCEPT ORDINANCE:
MACHINERY AND TRANSPORTATION EQUIPMENT
MINIMUM REQUIREMENTS FOR SIC 3400-3499
EFFLUENT LIMITED

REQUIRED TEST	LOCATION	FREQUENCY CLASS I & II	CLASS III & IV
1. pH	E	Weekly	Daily
2. Temperature, °C	E	Weekly	Daily
3. Oil and Grease	E	2/month	Daily
4. Total Nitrogen	E	*	*
5. Total Phosphorous	E	*	*
WATER QUALITY LIMITED			
1. Dissolved Oxygen	E	Weekly	Daily
2. Dissolved Oxygen	U,D	Weekly	3/week +
3. pH	E	Weekly	Daily
4. Temperature, °C	E	Weekly	Daily
5. Temperature, °C	U,D	Weekly	3/week +
6. Oil and Grease	E	2/month	Daily
7. Total Nitrogen	E	*	*
8. Total Phosphorous	E	*	*

MACHINERY EXCEPT ELECTRICAL
MINIMUM REQUIREMENTS FOR SIC 3500-3599
EFFLUENT LIMITED

REQUIRED TEST	LOCATION	FREQUENCY CLASS I & II	CLASS III & IV
1. pH	E	Weekly	Daily
2. Temperature, °C	E	Weekly	Daily
3. Oil and Grease	E	2/month	Daily
4. Total Nitrogen	E	*	*
5. Total Phosphorous	E	*	*
WATER QUALITY LIMITED			
1. Dissolved Oxygen	E	Weekly	Daily
2. Dissolved Oxygen	U,D	Weekly	3/week +
3. pH	E	Weekly	Daily
4. Temperature, °C	E	Weekly	Daily
5. Temperature, °C	U,D	Weekly	3/week +
6. Oil and Grease	E	2/month	Daily
7. Total Nitrogen	E	*	*
8. Total Phosphorous	E	*	*

ELECTRICAL MACHINERY, EQUIPMENT AND SUPPLIES
MINIMUM REQUIREMENTS FOR SIC 3600-3699
EFFLUENT LIMITED

REQUIRED TEST	LOCATION	FREQUENCY CLASS I & II	CLASS III & IV
1. pH	E	Weekly	Daily
2. Temperature, °C	E	Weekly	Daily
3. Oil and Grease	E	2/month	Daily
4. Total Nitrogen	E	*	*
5. Total Phosphorous	E	*	*
WATER QUALITY LIMITED			
1. Dissolved Oxygen	E	Weekly	Daily

2.	Dissolved Oxygen	U,D	Weekly	3/week
3.	pH	E	Weekly	Daily
4.	Temperature, °C	E	Weekly	Daily
5.	Temperature, °C	U,D	Weekly	3/week +
6.	Oil and Grease	E	2/month	Daily
7.	Total Nitrogen	E	*	*
8.	Total Phosphorous	E	*	*

PIPELINE TRANSPORTATION
MINIMUM REQUIREMENTS FOR SIC 4600-4699
EFFLUENT LIMITED

REQUIRED TEST		LOCATION	FREQUENCY CLASS I & II	CLASS III & IV
1.	pH	E	Weekly	Daily
2.	Temperature, °C	E	Weekly	Daily
3.	Oil and Grease	E	2/month	Daily
4.	Total Nitrogen	E	*	*
5.	Total Phosphorous	E	*	*
	WATER QUALITY LIMITED			
1.	Dissolved Oxygen	E	Weekly	Daily
2.	Dissolved Oxygen	U,D	Weekly	3/week +
3.	pH	E	Weekly	Daily
4.	Temperature, °C	E	Weekly	Daily
5.	Temperature, °C	U,D	Weekly	3/week +
6.	Oil and Grease	E	2/month	Daily
7.	Total Nitrogen	E	*	*
8.	Total Phosphorous	E	*	*

ELECTRICAL, GAS, AND SANITARY SERVICES
MINIMUM REQUIREMENTS FOR SIC 4900-4999
EFFLUENT LIMITED

REQUIRED TEST		LOCATION	FREQUENCY CLASS I & II	CLASS III & IV
1.	pH	E	Daily	Daily
2.	Temperature, °C	E	Daily	Daily
3.	Total Nitrogen	E	*	*
4.	Total Phosphorous	E	*	*
	WATER QUALITY LIMITED			
1.	Dissolved Oxygen	E	Daily	Daily
2.	Dissolved Oxygen	U,D	Daily	1/week
3.	pH	E	Daily	Daily
4.	Temperature, °C	E	Daily	Daily
5.	Temperature, °C	U,D	Daily	3/week +
6.	Total Nitrogen	E	*	*
7.	Total Phosphorous	E	*	*

Note: The following additional monitoring for steam electric generating establishments discharging cooling water shall be required whether or not the discharge is from a classified facility.

REQUIRED TEST	LOCATION	FREQUENCY CLASS I & II	CLASS III & IV
1. Temperature, °C	E	Continuous	Continuous
2. Temperature, °C	U,C	3/week +	3/week +
3. Rate of Cooling Water Discharge	E	Continuous during Discharge	Continuous during Discharge

PERSONAL SERVICES
MINIMUM REQUIREMENTS FOR SIC 7200- 7299
EFFLUENT LIMITED

REQUIRED TEST	LOCATION	FREQUENCY CLASS I & II	CLASS III & IV
1. pH	E	Weekly	Daily
2. Temperature, °C	E	Weekly	Daily
3. BOD, 5-day, 20°C	E	2/month	Daily
4. Total Suspended Residue	E	2/month	Daily
5. Ammonia Nitrogen	E	Monthly	Weekly
6. Detergents (MBAS)	E	2/month	Weekly
7. Fecal Coliform (where applicable)	E	2/month	Daily
8. Total Nitrogen	E	*	*
9. Total Phosphorous	E	Monthly	Weekly

WATER QUALITY LIMITED

REQUIRED TEST	LOCATION	FREQUENCY CLASS I & II	CLASS III & IV
1. Dissolved Oxygen	E	Weekly	Daily
2. Dissolved Oxygen	U,D	Weekly	3/week +
3. pH	E	Weekly	Daily
4. Temperature, °C	E	Weekly	Daily
5. Temperature, °C	U,D	Weekly	3/week +
6. BOD, 5-day, 20°C	E	2/month	Daily
7. Total Suspended Residue	E	2/month	Daily
8. Ammonia Nitrogen	E	2/month	Daily
9. Detergents (MBAS)	E	2/month	Weekly
10. Fecal Coliform	E	2/month	Daily
11. Total Nitrogen	E	*	*
12. Total Phosphorous	E	2/month	Weekly

MISCELLANEOUS BUSINESS SERVICE
MINIMUM REQUIREMENTS FOR SIC 7300-7399
EFFLUENT LIMITED

REQUIRED TEST	LOCATION	FREQUENCY CLASS I & II	CLASS III & IV
1. pH	E	Weekly	Daily
2. Temperature, °C	E	Weekly	Daily
3. BOD, 5-day, 20°C	E	2/month	Daily
4. Total Suspended Residue	E	2/month	Daily
5. Total Nitrogen	E	*	*
6. Total Phosphorous	E	*	*

WATER QUALITY LIMITED

1.	Dissolved Oxygen	E	Weekly	Daily
2.	Dissolved Oxygen	U,D	Weekly	3/week +
3.	pH	E	Weekly	Daily
4.	Temperature, °C	E	Weekly	Daily
5.	Temperature, °C	U,D	Weekly	3/week +
6.	BOD, 5-day, 20°C	E	2/month	Daily
7.	Total Suspended Residue	E	2/month	Daily
8.	Total Nitrogen	E	*	*
9.	Total Phosphorous	E	*	*

AUTOMOBILE REPAIRING SERVICES AND GARAGES

MINIMUM REQUIREMENTS FOR SIC 7500-8599

EFFLUENT LIMITED

REQUIRED TEST		LOCATION	FREQUENCY CLASS I & II	CLASS III & IV
1.	pH	E	Weekly	Daily
2.	Temperature, °C	E	Weekly	Daily
3.	BOD, 5-day, 20°C	E	2/month	Daily
4.	Total Suspended Residue	E	2/month	Daily
5.	Detergents (MBAS)	E	2/month	Weekly
6.	Oil and Grease	E	Monthly	Weekly
7.	Turbidity	E	Weekly	Daily
8.	Total Nitrogen	E	*	*
9.	Total Phosphorous	E	*	*

WATER QUALITY LIMITED

1.	Dissolved Oxygen	E	Weekly	Daily
2.	Dissolved Oxygen	U,D	Weekly	3/week +
3.	pH	E	Weekly	Daily
4.	Temperature, °C	E	Weekly	Daily
5.	Temperature, °C	U,D	Weekly	3/week +
6.	BOD, 5-day, 20°C	E	2/month	Daily
7.	Total Suspended Residue	E	2/month	Daily
8.	Detergents	E	2/month	Daily
9.	Oil and Grease	E	2/month	Daily
10.	Turbidity	E	Weekly	Daily
11.	Total Nitrogen	E	*	*
12.	Total Phosphorous	E	*	*

DOMESTIC SEWAGE

MINIMUM REQUIREMENTS FOR SIC 9999

EFFLUENT LIMITED

REQUIRED TEST		LOCATION	FREQUENCY CLASS I & II	CLASS III & IV
1.	pH	E	2/month	Daily
2.	Temperature, °C	E	Weekly	Daily
3.	BOD, 5-day, 20°C	I,E	2/month	Daily
4.	Total Suspended Residue	E	2/month	Daily
5.	Amonia Nitrogen	E	Monthly	Weekly

6. Residual Chlorine (where applicable)	E	Daily	Daily
7. Fecal Coliform (where applicable)	E	2/month	Daily
8. Total Nitrogen	E	*	*
9. Total Phosphorous	E	*	*

WATER QUALITY LIMITED

1. Dissolved Oxygen	E	Weekly	Daily
2. Dissolved Oxygen	U,D	Weekly	3/week +
3. pH	E	2/month	Daily
4. Temperature, °C	E	Weekly	Daily
5. Temperature, °C	U,D	Weekly	3/week +
6. BOD, 5-day, 20°C	I,E	2/month	Daily
7. Total Suspended Residue	E	2/month	Daily
8. Ammonia Nitrogen	E	2/month	Daily
9. Residual Chlorine	E	Daily	Daily
10. Fecal Coliform	E	2/month	Daily
11. Fecal Coliform	U,D	2/month	3/week +
12. Total Nitrogen	E	*	*
13. Total Phosphorous	E	*	*

± Upstream and Downstream monitoring in water quality limited waters is to be sampled three times per week during June, July, August, and September, and once per week during the rest of the year.

* Total Nitrogen and Phosphorus Monitoring

(1) Monitoring Requirements

(A) All facilities equal to or greater than 50,000 gpd, shall monitor for total N and P.

(B) Facilities less than 50,000 gpd shall monitor for total N and P when discharging into nutrient sensitive waters as designated by the division.

(2) Monitoring frequency for total N and P is based on river subbasins in two separate areas of the state as follows:

(A) Western area includes the French Broad, Broad, Savannah, New, Watauga, Little Tennessee, and Hiwassee:

Facility Design Capacity Frequency:	Frequency
(i) 50,000 gpd or higher	Semi-annually
(ii) 1,000,000 gpd or higher	Quarterly.

(B) Piedmont and Eastern area includes the Catawba, Lumber, Yadkin, Cape Fear, Chowan, Neuse, Pasquotank, Roanoke, Tar-Pamlico, and White Oak:

Facility Design Capacity	Frequency
(i) 50,000 gpd or higher	Quarterly
(ii) 1,000,000 gpd or higher	Monthly.

(3) Definition for Total Nitrogen and Total Phosphorus:

(A) Total Nitrogen shall be the sum of total kjeldahl nitrogen, nitrate nitrogen, and nitrite nitrogen expressed as "N" in mg/ 1.

(B) Total Phosphorus shall include all orthophosphates and condensed phosphates, both dissolved and particulate, organic and inorganic, measured as "P" in mg/ 1.

History Note: Statutory Authority G.S. 143-215.65; 143-215.66; 143-215.68;
Eff. February 1, 1976;
Amended Eff. December 1, 1984; November 1, 1978.

.0509 PENALTIES
.0510 SEVERABILITY

History Note: Statutory Authority G.S. 143-215.68; 143-215.69;
Eff. February 1, 1976;
Repealed Eff. December 1, 1984.

STATE OF NORTH CAROLINA

DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT

DIVISION OF ENVIRONMENTAL MANAGEMENT

ADMINISTRATIVE CODE SECTION:

15 NCAC 2B .0100 - PROCEDURES FOR ASSIGNMENT OF WATER QUALITY STANDARDS

15 NCAC 2B .0200 - CLASSIFICATIONS AND WATER QUALITY STANDARDS APPLICABLE TO SURFACE WATERS OF NORTH CAROLINA

EFFECTIVE JANUARY 1, 1985

ENVIRONMENTAL MANAGEMENT COMMISSION

RALEIGH, NORTH CAROLINA

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SUBCHAPTER 2B - SURFACE WATER STANDARDS: MONITORING

SECTION .0100 - PROCEDURES FOR ASSIGNMENT OF WATER QUALITY STANDARDS

.0101 GENERAL

(a) The Environmental Management Commission, prior to classifying and assigning standards of water quality to any waters of the state, will proceed as follows:

(1) The commission will identify waters to be studied for the propose of classification and assignment of water quality standards on the basis of user requests and needs identified by the Division of Environmental Management.

(2) The commission will request the division to study the identified waters to obtain the data and information required for determining the proper classification of the waters or segments of water under consideration.

(3) The commission will request the division to make a preliminary recommendation on the appropriate classifications and water quality standards of the identified waters on the basis of the study findings.

(4) The commission, or its designee, will designate a hearing examiner or examiners to conduct a public hearing on the matter of classifying and assigning water quality standards to the waters under consideration and will specify the date, time, and place for holding each public hearing.

(5) The commission will give due notice of such hearing or hearings in accordance with the requirements of General Statute 143-214.1.

(6) The hearing examiner or examiners will, as soon as practicable after the completion of the hearing, submit a complete report of the proceedings of the hearing to the commission. The hearing examiner shall include in the report a transcript and summary of testimony presented at such public hearing, relevant exhibits, a summary of relevant information from the stream studies conducted by the technical staff of the commission, and final recommendations as to classification of the designated waters and the standards of water quality which should be applied to each classification recommended.

(7) The commission, after due consideration of the hearing records and the final recommendations of the hearing

examiner or examiners, will adopt its final action with respect to the assignment of classifications applicable to the waters under consideration. The commission will publish such action, together with the effective date for the application of the provisions of General Statute 143-215.1 and 143-215.2, as amended, as a part of the commission's official regulations.

(8) The final action of the commission with respect to the assignment of classification with its accompanying standards shall contain the commission's conclusions relative to the various factors given in General Statute 143-214.1(d), and shall specifically include the class or classes to which such specifically designated waters in the watershed or watersheds shall be assigned on the basis of best usage in the interest of the public.

(A) Freshwater Classifications.
(i) Class A-1; raw water supply requiring only disinfection and fish propagation;
(ii) Class A-II; raw water supply requiring conventional or other appropriate treatment and all Class C uses;
(iii) Class B; suitable for swimming and primary recreation and all Class C uses;
(iv) Class C; suitable for secondary recreation and fish propagation;

(B) Tidal Salt Water Classifications.
(i) Class SA; suitable for commercial shell-fishing and all other tidal salt water uses;
(ii) Class SB; suitable for swimming and primary recreation and all Class SC uses;
(iii) Class SC; suitable for secondary recreation and fish propagation;

(C) Supplemental Classifications.
(i) Trout waters; suitable for natural trout propagation and maintenance of stocked trout;
(ii) Swamp waters; waters which have low velocities and other natural characteristics which are different from adjacent streams;
(iii) Nutrient sensitive waters; waters requiring limitations on nutrient inputs.

(b) In determining the best usage of waters and assigning classifications of such waters, the commission shall consider the criteria specified in General Statute 143-214.1(d).

(c) When revising the classification of waters, the division shall collect water quality data within the watershed for those substances which require more stringent control than required by

the existing classification. However, such sampling may be limited to only those parameters which are suspected to be present in significant quantities.

(d) The rules contained in Section 2B .0100, 2B .0200 and 2B .0300 which pertain to the series of classifications and water quality standards shall be known as the "Classifications and Water Quality Standards Applicable to the Surface Waters of North Carolina."

History Note: Statutory Authority G.S. 143-214.1;
143-215.3(a)(1);
Eff. February 1, 1976;
Amended Eff. January 1, 1985; September 9, 1979.

.0102 USE OF CLASSIFICATIONS AND WATER QUALITY STANDARDS

History Note: Statutory Authority G.S. 143-214.1;
Eff. February 1, 1976;
Repealed Eff. January 1, 1985.

.0103 ANALYTICAL PROCEDURES

Tests or analytical procedures to determine conformity or non-conformity with standards will, insofar as practicable and applicable, conform to the guidelines by the Environmental Protection Agency codified as 40 CFR, Part 136, which are adopted by reference as amended through June 1, 1984. Other analytical procedures shall conform to those found in the fourteenth edition of "Standard Methods for the Examination of Water and Wastewater," 1975 (published jointly by the American Public Health Association, the American Water Works Association, and the Water Pollution Control Federation), or "Methods for Chemical Analysis of Water and Wastes," (prepared by the U.S. Environmental Protection Agency and available from the Superintendent of Documents, U.S. Government Printing Office) which are adopted by reference or such other methods as may be approved by the Environmental Management Commission.

History Note: Statutory Authority G.S. 143-214.1;
143-215.3(a)(1);
Eff. February 1, 1976;
Amended Eff. January 1, 1985; September 9, 1979.

.0104 DETERMINATION OF SAFETY OR SUITABILITY: CLASS A-I WATERS

In determining the safety or suitability of class A-I waters for use as a source of water supply for drinking, culinary or food-processing purposes after approved disinfection, the commission will be guided by the physical, chemical, and

bacteriological maximum contaminant levels specified by Environmental Protection Agency regulations adopted pursuant to the Public Health Service Act, 42 U.S.C. 201 et seq., as amended by the Safe Drinking Water Act, 42 U.S.C. 300(f) et seq. In addition the commission will be guided by the requirements for unfiltered water supplies and the maximum contaminant levels specified in the North Carolina Rules Governing Public Water Supplies, 10 NCAC 10D .1200 and .1600.

History Note: Statutory Authority G.S. 143-214.1;
143-215.3(a)(1);
Eff. February 1, 1976;
Amended Eff. January 1, 1985; September 9, 1979.

.0105 DETERMINATION OF SAFETY OR SUITABILITY: CLASS A-II WATERS

In determining the safety or suitability of Class A-II waters for use as a source of water supply for drinking, culinary or food-processing purposes after approved treatment, the commission will be guided by the physical, chemical and bacteriological maximum contaminant levels specified by Environmental Protection Agency regulations adopted pursuant to the Public Health Service Act, 42 U.S.C. 201 et seq., as amended by the Safe Drinking Water Act, 42 U.S.C. 300(f) et seq. In addition the commission will be guided by the requirements for filtered water supplies and the maximum contaminant levels specified in the North Carolina Rules Governing Public Water Supplies, 10 NCAC 10D .1300 and .1600. The commission will also take into consideration the relative proximity, quantity, composition, natural dilution and diminution of potential sources of pollution to determine that risks posed by all pollutants are adequately considered.

History Note: Statutory Authority G.S. 143-214.1;
143-215.3(a)(1);
Eff. February 1, 1976;
Amended Eff. January 1, 1985; September 9, 1979.

.0106 CONSIDERATIONS IN ASSIGNING B AND SB CLASSIFICATIONS

In assigning the B or SB classification to waters intended for primary recreation, the commission will take into consideration the relative proximity of sources of water pollution and will recognize the potential hazards involved in locating swimming areas close to sources of water pollution and will not assign this classification to waters in which such water pollution could result in a hazard to public health. Discharges to waters classified as B or SB shall meet the reliability requirements specified in 15 NCAC 2H .0124.

History Note: Statutory Authority G.S. 143-214.1;
143-215.3(a)(1);
Eff. February 1, 1976;
Amended Eff. January 1, 1985; September 9, 1979.

.0107 DEFINITION OF REGULATIONS: CLASSIFICATIONS: AND STANDARDS

History Note: Statutory Authority G.S. 143-214.1;
Eff. February 1, 1976;
Repealed Eff. January 1, 1985.

.0108 DETERMINATION OF SAFETY OR SUITABILITY: CLASS SA WATERS

In determining the safety of suitability of Class SA waters to be used for shellfishing for market purposes, the commission will be guided not only by the physical, chemical, and bacteriological maximum contaminant levels in the water but will also consider the proximity of waste discharges that could adversely affect the shellfish. Waters will not be classified SA without the written concurrence of the Division of Health Services, North Carolina Department of Human Resources.

History Note: Statutory Authority G.S. 143-214.1;
143-215.3(a)(1);
Eff. January 1, 1985.

SECTION .0200 - CLASSIFICATIONS AND WATER QUALITY STANDARDS APPLICABLE TO SURFACE WATERS OF NORTH CAROLINA

.0201 ANTIDEGRADATION STATEMENT

It is the policy of the Environmental Management Commission to maintain, protect, and enhance water quality within the State of North Carolina. Pursuant to this policy, the Environmental Management Commission will not approve any project or development which would result in the significant degradation of waters whose existing quality is better than the assigned water quality standards, unless such degradation is found by the commission to be justifiable to provide necessary economic and social development. In such cases, those pollution control measures necessary to maintain high water quality will be required where physically and economically feasible. Prior to approval of any project or development which will result in the significant degradation of water quality, the commission will solicit, through public notice or public hearing or both, comments from the public and intergovernmental agencies relative to the project or development and anticipated water quality degradation. In cases where the project or development requires a NPDES permit, the Environmental Management Commission shall publish in conjunction with the public notices required by 15 NCAC 2H .0109(a) (regarding application for a NPDES permit) and 15 NCAC 2H .0109(b) (regarding a public hearing on a NPDES permit application) a statement that such project or development is anticipated to result in significant degradation. Furthermore, the commission shall consider the present and anticipated usage of said high quality waters, including any uses not specified by the assigned classification (such as outstanding national resource waters or waters of exceptional water quality) and will not allow degradation of the high quality waters below the water quality necessary to maintain existing and anticipated uses. In implementing this policy, the commission will keep the United States Environmental Protection Agency informed and will provide it with such information as it will need in discharging its responsibility under the Clean Water Act, 33 U.S.C. 466 et seq.

History Note: Statutory Authority G.S. 143-214.1; 143-215.1; 143-215.3(a)(1);
Eff. February 1, 1976;
Amended Eff. January 1, 1985; September 9, 1979.

.0202 DEFINITIONS

The definition of any word or phrase used in these regulations shall be the same as given in Article 21, Chapter 143 of the General Statutes of North Carolina, as amended. The following words and phrases, which are not defined in this article, shall be construed to have the following meanings:

(1) Agricultural shall include the use of waters for stock watering, irrigation, and other farm purposes.

(2) Approved treatment, as applied to water supplies, means treatment accepted as satisfactory by the authorities responsible for exercising supervision over the sanitary quality of water supplies.

(3) Average (except bacterial) means arithmetical average and includes the analytical results of all samples taken during the specified period; all sampling shall be done as to obtain the most representative sample under prevailing conditions:

(a) Daily Average for dissolved oxygen, shall be of at least four samples;

(b) Weekly Average means the average of all daily composite samples obtained during the calendar week; if only one grab sample is taken each day, the weekly average is the average of all daily grab samples; at least one representative sample shall be taken each day in which there is a discharge;

(c) Monthly Average means the average of all daily composites (or grab samples if only one per day obtained during the calendar month).

The definitions in this Paragraph do not change the monitoring requirements for NPDES permits but rather are to be used by the division along with other methodologies in determining violations of water quality standards.

(4) Best usage of waters as specified for each class means those uses as determined by the Environmental Management Commission in accordance with the provisions of Article 21, Chapter 143, General Statutes of North Carolina.

(5) Bioaccumulative means substances which are taken up, concentrated, and retained by an organism from its environment.

(6) Discharge is the addition of any man-induced waste effluent either directly or indirectly to state surface waters.

(7) Division means the Division of Environmental Management or its successors.

(8) Effluent channel means a discernable confined and discrete conveyance which is used for transporting treated wastewater to a receiving stream or other body of water provided that such channels shall:

(a) be contained entirely on property owned (or otherwise controlled) by the discharger (to be demonstrated by the discharger);
(b) not contain natural waters except when such waters occur in direct response to rainfall events by overland runoff;
(c) be so constructed or modified to minimize the migration of fish into said channel;
(d) be identified and designated on a case-by-case basis prior to permit issuance.

(9) Estuarine waters means those tidal salt waters assigned S classifications.

(10) Fishing means the taking of fish by sport or commercial methods as well as the propagation of fish and such other aquatic life as is necessary to provide a suitable environment for fish.

(11) Freshwater means all waters that under natural conditions would have a chloride ion content of 500 mg/l or less.

(12) Lower piedmont and coastal plain waters shall mean those waters of the Catawba River Basin below Lookout Shoals Dam; the Yadkin River Basin below the junction of the Forsyth, Yadkin, and Davie County lines and all of the waters of Cape Fear; Lumber; Roanoke; Neuse; Tar-Pamlico; Chowan; Pasquotank; and White Oak River Basins, except tidal salt waters which are assigned S classifications.

(13) MF is an abbreviation for the membrane filter procedure for bacteriological analysis.

(14) Mixing zone shall mean a region of the receiving water in the vicinity of a discharge within which dispersion and dilution of constituents in the discharge occurs (i.e. where adequate mixing of the discharge and receiving water takes place), and within which water quality standards shall not apply, except that such zones shall be subject to conditions established in accordance with 15 NCAC 2B .0204(b).

(15) Mountain and upper piedmont waters shall mean all of the waters of the Hiwassee; Little Tennessee, including the Savannah River drainage area; French Broad; Broad; New; and Watauga River Basins and those portions of the Catawba River Basin above Lookout Shoals Dam and the Yadkin River Basin above the junction of the Forsyth, Yadkin, and Davie County lines.

(16) Nonpoint source pollution means pollution which enters waters mainly as a result of precipitation and subsequent runoff from lands which have been disturbed by man's activities and includes all sources of water pollution which are not designated as point sources by the state.

(17) Nutrient sensitive waters shall mean those waters which are so designated in the classification schedule in order to limit the discharge of nutrients (usually nitrogen and phosphorus). The are designated by "NSW" following the water classification.

(18) Offensive condition means any condition or conditions resulting from the presence of sewage, industrial wastes or other wastes within the waters of the state or along the shorelines thereof which shall either directly or indirectly cause foul or noxious odors, unsightly conditions, or breeding of abnormally large quantities of mosquitoes or other insect pests, or shall damage private or public water supplies or other structures, result in the development of gases which destroy or damage surrounding property, herbage or grasses, or which shall affect the health of any person residing or working in the area.

(19) Parts per million and parts per billion as used herein shall be construed to mean milligrams per liter (mg/l), and micrograms per liter (ug/l), respectively, as defined in the fourteenth edition of "Standard Methods for the Examination of Water and Wastewater," published by the American Public Health Association, American Water Works Association, and Water Pollution Control Federation which is adopted by reference.

(20) Present waste treatment technology shall mean for industrial wastewaters "Best Available Technology Economically Achievable," or "New Source Performance Standards" if applicable and more stringent, as published in the Federal Register. Where such limits have not been published or adopted, they shall be established in accordance with 15 NCAC 2B .0405(c). For municipal wastewater and other similar discharges greater than 15,000 gallons per day (gpd), present waste treatment technology shall be defined, for oxygen consuming wastes, as follows (however, additional treatment may be necessary to achieve water quality standards):

Effluent Characteristics	Monthly Average	Weekly Average
Ammonia Nitrogen	4.0 mg/l	8.0 mg/l
BOD(5)	10.0 mg/l	20.0 mg/l

For municipal wastewater and other similar discharges equal to or less than 15,000 gpd, present waste treatment technology shall be defined, for oxygen consuming wastes, as follows:

Effluent Characteristics	Monthly Average	Weekly Average
BOD(5)	30 mg/l	45 mg/l

(21) Primary recreation shall include swimming, skin diving, skiing, and similar uses involving human body contact with water where such activities take place in an organized or on a frequent basis.

(22) Secondary recreation shall include wading, boating, other uses not involving human body contact with water, and activities involving human body contact with water where such activities take place on an infrequent, unorganized, or incidental basis.

(23) Shellfish culture shall include the use of waters for the propagation, storage and gathering of oysters, clams, and other shellfish for market purposes.

(24) Source of water supply for drinking, culinary or food-processing purposes shall mean any source, either public or private, the waters from which are used for human consumption, or used in connection with the processing of milk, beverages, food, or other purpose which requires water meeting the maximum contaminant levels (mcls) in the North Carolina Rules Governing Public Water Supplies, 10 NCAC 10D .1600 as well as mcls promulgated by the Environmental Protection Agency pursuant to the Public Health Service Act, 42 U.S.C. 201 et seq., as amended by the Safe Drinking Act, 42 U.S.C. 300(f) et seq.

(25) Swamp waters shall mean those waters which are so designated by the Environmental Management Commission and which are topographically located so as to generally have very low velocities and certain other characteristics which are different from adjacent streams draining steeper topography. They are designated by "Sw" following the water classification.

(26) Tidal salt waters shall mean all tidal waters which are so designated by the Environmental Management Commission and which generally have a natural chloride ion content in excess of 500 parts per million.

(27) Toxic substance means any substance or combination of substances including disease-causing agents, which after discharge and upon exposure, ingestion, inhalation, or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction) or physical deformities in such organisms or their offspring.

(28) Trout waters are those waters which have been so designated by the Environmental Management Commission, with the advice of the Wildlife Resources Commission. Their natural condition will sustain and allow for trout propagation and maintenance of stocked trout on a year-round basis. They are designated by "Tr" following the water classification.

(29) Waste disposal shall include the use of waters for disposal of sewage, industrial waste or other waste after approved treatment.

(30) 96-hour LC50 shall mean that concentration of a toxic substance which is lethal (or immobilizing, if appropriate) to 50 percent of the organisms tested under the test conditions in a period of 96 hours. The 96-hour LC50 concentration for toxic materials shall be determined for appropriate sensitive species under aquatic conditions characteristic of the receiving waters or, if deemed necessary by the director by bioassays conducted by or in cooperation with the division.

History Note: Statutory Authority G.S. 143-214.1; 143-215.3(a)(1); Eff. February 1, 1976; Amended Eff. January 1, 1985; September 9, 1979; December 14, 1978; March 1, 1977.

.0203 PROTECTION OF WATERS DOWNSTREAM OF RECEIVING WATERS

In cases where treated sewage, industrial wastes or other wastes including those from nonpoint sources are directly or indirectly allowed to enter into waters which are assigned a different classification than the waters into which such receiving waters flow, the standards applicable to the waters which receive such wastes shall be supplemented by the following: "The quality of any waters receiving sewage, industrial waste or other waste shall be such that no impairment of the best usage of waters in any other class shall occur by reason of such waste."

History Note: Statutory Authority G.S. 143-214.1; 143-215.3(a)(1); Eff. February 1, 1976; Amended Eff. January 1, 1985; September 9, 1979.

.0204 LOCATION OF SAMPLING SITES AND MIXING ZONES

(a) Location of Sampling Sites. In making tests or analytical determinations of classified waters to determine conformity or nonconformity with the established standards, samples shall be collected outside the limits of prescribed mixing zones.

However, where appropriate, samples shall be collected within the mixing zone in order to ensure compliance with in-zone water quality requirements as outlined in (b) of this Rule.

(b) Mixing Zones. A mixing zone may be established in the area of a discharge in order to provide reasonable opportunity for the mixture of the wastewater with the receiving waters. The limits of such mixing zones will be defined by the division on a case-by-case basis after consideration of the magnitude and character of the waste discharge and the size and character of the receiving waters. Such zones shall not:

(1) prevent free passage of fish around or cause fish mortality within the mixing zone,
(2) result in offensive conditions,
(3) produce undesirable aquatic life or result in a dominance of nuisance species outside of the assigned mixing zone,
(4) endanger the public health or welfare.

In addition, a mixing zone shall not be assigned for fecal coliform organisms in waters classified "A-II," "B," "SB," or "SA." For the discharge of heated wastewater, compliance with federal rules and regulations pursuant to Section 316(a) of the Federal Water Pollution Control Act, as amended, shall constitute compliance with this Subsection (b).

History Note: Statutory Authority G.S. 143-214.1;
Eff. February 1, 1976;
Amended Eff. September 9, 1979.

.0205 NATURAL CHARACTERISTICS OUTSIDE STANDARDS LIMITS

Natural waters may on occasion have characteristics outside of the limits established by the standards. The adopted water quality standards relate to the condition of waters as affected by the discharge of sewage, industrial wastes or other wastes including those from nonpoint sources. The specified standards will not be considered violated when values outside the established limits are caused by natural conditions. Where wastes are discharged to such waters, the discharger shall not be considered a contributor to substandard conditions provided maximum treatment in compliance with permit requirements is maintained and, therefore, meeting the established limits is beyond the discharger's control.

History Note: Statutory Authority G.S. 143-214.1;
143-215.3(a)(1);
Eff. February 1, 1976;
Amended Eff. January 1, 1985.

.0206 FLOW DESIGN CRITERIA FOR EFFLUENT LIMITATIONS

(a) There are several flow design criteria for the protection of water quality standards as follows:

(1) The governing flow criterion for water quality standards except toxic substances, generally shall be the minimum average flow for a period of seven consecutive days that has an average recurrence of once in 10 years (7Q10).

(2) Other governing flow strategies such as varying discharges with the receiving waters ability to assimilate wastes may be designated for water quality standards except for toxic substances on a case-by-case basis if the discharger or permit applicant provide evidence which establishes to the satisfaction of the commission that the alternative governing flow strategies will give better protection for the water quality standards. Better protection for the water quality standards means that values outside the limits of the standards would be expected less frequently than provided by using the 7Q10 flow as listed in (a)(1) of this Rule.

(3) The governing flow for toxic substances standards shall be the minimum average flow for a period of 30 consecutive days that has an average recurrence of two years (30Q2), except that a less frequent governing flow for toxic substances may be designated when the director considers such action necessary for the protection of aquatic life and wildlife and/or human health and welfare.

(4) In cases where the stream flow is regulated, the governing flow for all water quality standards shall be the instantaneous minimum flow, or if deemed appropriate by the commission, an alternative flow on a case-by-case basis as given in (a)(2) of this Rule.

(b) These governing criteria are established specifically for setting effluent limitations and for the design of wastewater treatment facilities. In addition, the governing flow also establishes a value below which deviations from water quality standards can be anticipated.

History Note: Statutory Authority G.S. 143-214.1; 143-215.3(a)(1);
Eff. February 1, 1976;
Amended Eff. January 1, 1985; September 9, 1979; August 12, 1979.

.0207 MINIMUM ACCEPTABLE DEGREE OF TREATMENT

History Note: Statutory Authority G.S. 143-214.1;
Eff. February 1, 1976;
Repealed Eff. September 9, 1979.

.0208 STANDARDS FOR TOXIC SUBSTANCES AND TEMPERATURE

(a) Toxics Substances. The concentration of toxic substances in the receiving water, (either alone or in combination, when affirmatively demonstrated to be non-bioaccumulative) when not specified elsewhere in this Section, shall not exceed the concentration specified by the fraction of the 96-hour LC50 value which predicts a no effect chronic level (as determined by the use of established acute/chronic ratios). If an acceptable acute/chronic ratio is not available, then that toxic substance shall not exceed one-one hundredth (0.01) of the 96-hour LC50 or if it is affirmatively demonstrated that a toxic substance has a half-life of less than 96 hours or is not bioaccumulative, the maximum concentration shall not exceed one-twentieth (0.05) of the 96-hour LC50. If it is affirmatively demonstrated that the standard for a particular toxic substance as specified in Rule .0211 or .0212 of this Section is inappropriate for a specific stream segment, the commission may revise the applicable standard on a case-by-case basis in accordance with the provisions of Section 143-214.1 of the General Statutes of North Carolina.

(b) Chemical Substances Requiring Special Attention. The following is a partial list of chemicals that are either on the Environmental Protection Agency's priority pollutant list or are known to be present in industrial or domestic compounds that could find their way into the state's waters. They are suspected of being toxic, carcinogenic, teratogenic, mutagenic, or neurotoxic but sufficient data are not presently available to adopt statewide numerical concentrations limits for each one. In implementing the standard that toxic substances shall not make the waters injurious to public health or to aquatic life or wildlife, a careful evaluation may be necessary to determine any possible harmful effects upon the receiving waters of a proposed discharge that is likely to contain any of these substances. The evaluation may include bioassay studies, consultation with public health authorities, and other means of obtaining relevant information. Appropriate limitations shall be set based on the evaluations and/or criteria specified in Paragraph (a) of this Rule.

Inorganic Substance

Antimony (total)
Asbestos (fibrous)
Boron and compounds
Hydrofluoric acid & cmpds.
Lithium and compounds
Thallium (total)

Organic Substance

Acenaphthene
Acenapthlvene
Acetone
Acrolein
Acrylonitrile
Aniline
Anthracene
Benzene
    Dichlorobenzene
    Hexachlorobenzene
    Monochlorobenzene
    Nitrobenzene
    Pentachloronitrobenzene
    1,2,4-Trichlorobenzene
Benzidine & ben. dyes
Benzo (a) anthracene
Benzo (a) pyrene
Benzo (b) fluoranthene
Benzo (g,h,) perylene
Benzo (k) fluoranthene
a-BHC (alpha)
b-BHC (beta)
d-BHC (delta)
g-BHC (gamma)
Biphenyl
Bis (2-Chloroethyl) ether
Bis (2-Chloroethoxy) methane
Bis (2-Chloroisopropyl) ether
Bis (Chloromethyl) ether
Bis (2-ethylhexyl) phthalate
Bromodichloromethane
Bromoform
Bromomethane
4-Bromophenylphenyl ether
Butylbenzyl phthalate
Carbon disulfide

Organic Substance

Carbon tetrachloride
4-Chloro-3-methylphenol
Chlorobenzene
Chloroethane
2-Chloroethylvinyl ether
Chloroform
Chloromethane
2-Chloronapthalene
2-Chlorophenol
4-Chlorophenylphenyl ether
Chrysene
4 4'-DDD
4 4'-DDE
4 4'-DDT
Diazinone
dibenzo (a,h) anthracene
Dibromochloromethane
1,2-dichlorobenzene
1,3-dichlorobenzene
1,4-dichlorobenzene
3,3'-dichlorobenzidine
1,1-dichloroethane
1,2-dichloroethane
1,1-dichloroethene
trans-1,2 dichloroethene
1,2-dichloropropane
1,3-dichloropropene
diethyl phthalate
dimethylamine
4-dimethylaminoazabenzene
2,4-dimethylphenol
dimethyl phthalate
di-n-butyl phthalate
4,6-dinitro-2-methylphenol
2,4-dinitrophenol
2,4-dinitrotoluene
2,6-dinitrotoluene
1,4-Dioxane
1,2-diphenylhydrazine
epichlorhydrin
ethane-ethylene family
    1,2-Dichloroethane
    Ethylene dichloride
    Ethyleneimine

Ethylene Oxide
Ethylene thiourea
Hexachloroethane
Tetrachloroethane
Trichloroethane
Trichloroethene
Trichloroethylene
1,1,2-Trichloro-1,2,2-
Trifluoroethane
Ethylbenzene
Ethylene diamine
Ethylmethanesulfonate
Fluoranthene
Fluorene
Formaldehyde
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachloroethane
Hexamethylene diamine
Hydrazine & Dimethyl hyd.
Indene
Indeno (1,2,3-ed) pyrene
Isophorone
Maleic Anhydride
Methanol
Methylene Chloride
Methylenebis (2-Chloroaniline)
Methyl ethyl ketone
Naphthalene
1-Naphthylamine
N-hexane
Nitrobenzene
2-nitrophenol
4-nitrophenol
1-Nitropropane
N-nitrosodimethylamine
N-nitrosodipropylamine
N-nitrosodiphenylamine
N-nitroso-N-methylurea
N-nitroso-N-methylurethane
N-nitrosomethylvinylamine
N-nitrosomorpholine
Organotin Compounds
Phenanthrene
Phthalates
P-nitrosodiphenylamine
Polyoxyethyleneoxyterephthaloyl
Propylene Oxide
Pyrene
Pyrethrin
Semicarbazide
2,3,7,8-tetrachlorodibenzo-
p-dioxin
Tetraazotrichlorodecane
1,1,2,2-tetrachlorethane
Tetrachloroethene
Tetrachloroethylene
Thiourea
Toluene
Toluene-2, 4-Diisocyanate
1,2,4-tricholorobenzene
1,1,1-tricholoroethane
1,1,2-trichloroethane
Trichloroethene
2,4,6-trichlorophenol
Trichlorophenol
Vinyl acetate
Vinyl Chloride

(c) Temperature. Upon a case-by-case determination that thermal discharges to waters of the state which serve or may serve as a source and/or receptor of industrial cooling water provide for the maintenance of the designated best use throughout a reasonable portion of the water body, the otherwise applicable temperature standards as given in Rules .0211 and .0212 of this Section may not apply, in which case the commission shall establish a separate water quality standard for temperature for the affected portions of waters of the state. Such revisions shall be indicated in the schedules of classifications with the

revised standard and shall provide for the designated best use classification applicable to the stream segment in question.

History Note: Statutory Authority G.S. 143-214.1;
143-215.3(a)(1);
Eff. February 1, 1976;
Amended Eff. January 1, 1985; September 9, 1979.

.0209 VARIANCES FROM APPLICABLE STANDARDS
.0210 BEST USE CRITERIA

History Note: Statutory Authority G.S. 143-214.1;
Eff. February 1, 1976;
Amended Eff. September 9, 1979;
Repealed Eff. January 1, 1985.

.0211 FRESH SURFACE WATER CLASSIFICATIONS STANDARDS

(a) General. The water quality standards for all fresh surface waters are the basic standards applicable to Class C waters. Additional and more stringent standards applicable to other specific freshwater classifications are specified in (c) through (e) of this Rule.

(b) All fresh surface waters.

(1) Best Usage of Waters. Fishing, secondary recreation, agriculture and any other usage except for primary recreation or as a source of water supply for drinking, culinary or food processing purposes;

(2) Conditions Related to Best Usage. The waters will be suitable for fishing and fish and wildlife propagation, secondary recreation, and agriculture;

(3) Quality standards applicable to all fresh surface waters:

(A) Chlorophyll a (corrected): not greater than 40 ug/l for lakes, reservoirs, and other slow-moving waters not designated as trout waters, and not greater than 15 ug/l for lakes, reservoirs, and other slow-moving waters designated as trout waters (not applicable during the months of December through March; nor applicable to lakes and reservoirs less than 10 acres in surface area);

(B) Dissolved oxygen: not less than 6.0 mg/l for trout waters; for non-trout waters, not less than a daily average of 5.0 mg/l with a minimum instantaneous value of not less than 4.0 mg/l; swamp waters may have lower values if caused by natural conditions;

(C) Floating solids; settleable solids; sludge deposits: only such amounts attributable to sewage, industrial wastes or other wastes as will not make the water unsafe or unsuitable for fish and wildlife or impair the waters for any designated uses;

(D) Gases, total dissolved: not greater than 110 percent of saturation;

(E) Organisms of the coliform group: fecal coliforms not to exceed a geometric mean of 1000/100ml (MF count) based upon at least five consecutive samples examined during any 30 day period; nor exceed 2000/100ml in more than 20 percent of the samples examined during such period; standards are not applicable during or immediately following periods of rainfall; in certain stream segments where uncontrollable nonpoint source pollution prevents the attainment of the established fecal coliform standard, exceptions to the fecal coliform standard shall be established on a case-by-case basis in accordance with Section 143-214.1 of the General Statutes of North Carolina; such exceptions shall be indicated in the schedules of classifications and such waters shall not be considered satisfactory for secondary recreation usage; all coliform concentrations are to be analyzed using the membrane filter technique unless high turbidity or other adverse conditions necessitate the tube dilution method; in case of controversy over results, the MPN 5-tube dilution technique will be used as the reference method;

(F) Oils; deleterious substances; colored or other wastes: only such amounts as will not render the waters injurious to public health, secondary recreation or to aquatic life and wildlife or adversely affect the palatability of fish, aesthetic quality or impair the waters for any designated uses;

(G) ph: shall be normal for the waters in the area, which generally shall range between 6.0 and 9.0 except that swamp waters may have a low of 4.3;

(H) Phenolic compounds: only such levels as will not result in fish-flesh tainting or impairment of other best usage;

(I) Radioactive substances:

(i) Combined radium-226 and radium-228: the maximum average annual activity level (based

on at least four samples collected quarterly) for combined radium-226 and radium-228 shall not exceed five picocuries per liter;

(ii) Alpha Emitters: the average annual gross alpha particle activity (including radium-226, but excluding radon and uranium) shall not exceed 15 picocuries per liter;

(iii) Beta Emitters: the maximum average annual activity level (based on at least four samples, collected quarterly) for strontium-90 shall not exceed eight picocuries per liter; nor shall the average annual gross beta particle activity (excluding potassium-40 and other naturally occurring radio-nuclides) exceed 50 picocuries per liter; nor shall the maximum average annual activity level for tritium exceed 20,000 picocuries per liter;

(J) Temperature: not to exceed 2.8 degrees C (5.04 degrees F) above the natural water temperature, and in no case to exceed 29 degrees C (84.2 degrees F) for mountain and upper piedmont waters and 32 degrees C (89.6 degrees F) for lower piedmont and coastal plain waters. The temperature for trout waters shall not be increased by more than 0.5 degrees C (0.9 degrees F) due to the discharge of heated liquids, but in no case to exceed 20 degrees C (68 degrees F);

(K) Turbidity: the turbidity in the receiving water due to a discharge shall not exceed 50 Nephelometric turbidity units (NTU) in streams not designated as trout waters and 10 NTU in streams, lakes or reservoirs designated as trout waters; for lakes and reservoirs not designated as trout waters, the turbidity shall not exceed 25 NTU due to discharge; if turbidity exceeds these levels due to natural background conditions, the discharge level cannot cause any increase in turbidity in the receiving water;

(L) Toxic substances: only such amounts, whether alone or in combination with other substances or wastes as will not render the waters injurious to public health, secondary recreation, or to aquatic life and wildlife (either through chronic or acute exposure or through bioaccumulation), or impair the waters for any designated uses; any toxic substance or complex waste will be considered

acutely toxic at instream waste concentrations greater than one third of the 96-hour LC50 value; acceptable levels of chronic exposure may be determined by test procedures deemed appropriate by the director; in addition to the substances listed in this Paragraph, for which numerical standards have been adopted for the protection of aquatic life, Rule .0211(b)(4) includes action levels for toxic substances which may be toxic under certain environmental conditions and Rule .0208(b) contains a list of chemicals which are suspected of being toxic, carcinogenic, teratogenic, mutagenic, or neurotoxic; requirements for dischargers with any of these substances will be determined on a case-by-case basis and are further described in these Rules; toxic substances with numerical standards for all fresh surface waters:

(i) Arsenic: not greater than 50 ug/l;
(ii) Beryllium: not greater than 11 ug/l;
(iii) Cadmium: not greater than 0.4 ug/l for trout waters and not greater than 2.0 ug/l for non-trout waters;
(iv) Chlorine, total residual: not greater than 2.0 ug/l for trout waters;
(v) Chromium, total: not to exceed 50 ug/l;
(vi) Cobalt: not greater than 1.0 mg/l;
(vii) Cyanide: not greater than 5.0 ug/l;
(viii) Fluorides: not greater than 1.8 mg/l;
(ix) Lead: not greater than 25 ug/l or if more stringent, one one-hundredth (0.01) the 96-hour LC50;
(x) MBAS: not greater than 0.5 mg/l;
(xi) Mercury: not greater than 0.2 ug/l;
(xii) Nickel: not greater than 50 ug/l or if more stringent, one one-hundredth (0.01) of the 96-hour LC50;
(xiii) Pesticides, maximum concentrations:
  (I) Aldrin: 0.002 ug/l;
  (II) Chlordane: 0.004 ug/l;
  (III) DDT: 0.001 ug/l;
  (IV) Demeton: 0.1 ug/l;
  (V) Dieldrin: 0.002 ug/l;
  (VI) Endosulfan: 0.05 ug/l;
  (VII) Endrin: 0.002 ug/l;
  (VIII) Guthion: 0.01 ug/l;
  (IX) Heptachlor: 0.004 ug/l;

(X) Lindane: 0.01 ug/l;
(XI) Methoxychlor: 0.03 ug/l;
(XII) Mirex: 0.001 ug/l;
(XIII) Parathion: 0.04 ug/l;
(XIV) Toxaphene: 0.013 ug/l;
(xiv) Polychlorinated biphenyls: not greater than 0.001 ug/l;
(xv) Selenium: not greater than 10 ug/l or, if more stringent, one one-hundredth (0.01) of the 96-hour LC50 in streams and rivers; not greater than 5 ug/l in ponds, lakes and reservoirs;
(xvi) Trialkyltin compounds: 0.008 ug/l expressed as tributyltin;

(4) Action Levels for Toxic Substances: if the levels of any of the substances listed in this Paragraph (which are generally not bioaccumulative and have variable toxicity to aquatic life because of chemical form, solubility, stream characteristics and/or associated waste characteristics) are determined by the waste load allocation to be exceeded in a receiving water by a discharge under the specified low flow criterion for toxic substances (Rule .0206), the discharger will be required to monitor the chemical and/or biological effects of the discharge as part of the NPDES permit; efforts shall be made by all dischargers to reduce or eliminate these substances from their effluents; after receiving such monitoring data for a discharge, the substance will be limited to the level listed in this Paragraph or an appropriate toxicity limit will be set as determined using the requirements of Rule .0208(a);
(A) Copper: in excess of 15 ug/l;
(B) Iron: in excess of 1.0 mg/l;
(C) Silver: in excess of 10 ug/l;
(D) Zinc: in excess of 50 ug/l.

(c) Class A-1 Waters.
(1) Best Usage of Waters. Source of water supply for drinking, culinary, or food-processing purposes or any other usage requiring waters of lower quality;
(2) Conditions Related to the Best Usage. This class is intended primarily for waters having watersheds which are uninhabited and otherwise protected as required by the Division of Health Services and which require only approved disinfection, with additional treatment when necessary to remove naturally present impurities, in order to meet the maximum contaminant levels considered safe for drinking, culinary, and food-processing

purposes which are specified in the national drinking water regulations and in the North Carolina Rules Governing Public Water Supplies, 10 NCAC 10D .1600;

(3) Quality standards applicable to Class A-1 waters:

(A) Organisms of coliform group: total coliforms not to exceed 50/100 ml (MF count) as a monthly geometric mean value;

(B) Phenolic compounds: not greater than 1.0 ug/1 (phenols) to protect water supplies from taste and odor problems from chlorinated phenols;

(C) Sewage, industrial wastes, or other wastes: none;

(D) Solids, total dissolved: not greater than 500 mg/1;

(E) Total hardness: not greater than 100 mg/1 as calcium carbonate;

(F) Toxic and other deleterious substances: numerical limits for Class A-I waters:

(i) Barium: not greater than 1.0 mg/1;

(ii) Chloride: not greater than 250 mg/1;

(iii) Manganese: not greater than 50 ug/1;

(iv) Nickel: not greater than 25 ug/1 or if more stringent, one-one hundredth (0.01) the 96-hour LC50;

(v) Nitrate nitrogen: not greater than 10.0 mg/1;

(vi) Pesticides, maximum concentrations:

(I) 2,4-D: not greater than 100 ug/1;

(II) 2,4,5-TP (Silvex): not greater than 10 ug/1;

(vii) Sulfates: not greater than 250 mg/1.

(d) Class A-II Waters.

(1) Best Usage of Waters. Source of water supply for drinking, culinary, or food-processing purposes and any other best usage specified by the "C" classification;

(2) Conditions Related to Best Usage. The waters, if subjected to approved treatment equal to coagulation, sedimentation, filtration and disinfection with additional treatment if necessary to remove naturally present impurities, will meet the maximum contaminant levels considered safe for drinking, culinary, or food-processing purposes which are specified in the national drinking water regulations and in the North Carolina Rules Governing Public Water Supplies, 10 NCAC 10D .1600;

(3) Quality standards applicable to Class A-II Waters;

(A) Odor producing substances contained in sewage, industrial wastes, or other wastes: only such amounts, whether alone or in combination with

other substances or wastes, as will not cause taste and odor difficulties in water supplies which cannot be corrected by treatment as specified under Paragraph (a)(2) immediately preceding, impair the palatability of fish, or have a deleterious effect upon any best usage established for waters of this class;

(B) Phenolic compounds: not greater than 1.0 ug/1 (phenols) to protect water supplies from taste and odor problems from chlorinated phenols; specific phenolic compounds may be given a different limit if it is demonstrated not to cause taste and odor problems and not to be detrimental to other best usage;

(C) Sewage, industrial wastes, or other wastes: none which will have an adverse effect on human health or which are not effectively treated to the satisfaction of the commission and in accordance with the requirements of the Division of Health Services, North Carolina Department of Human Resources;

(D) Total hardness: not greater than 100 mg/1 as calcium carbonate;

(E) Total dissolved solids: not greater than 500 mg/1;

(F) Toxic and other deleterious substances: numerical limits for Class A-II waters:

(i) Barium: not greater than 1.0 mg/1;
(ii) Chloride: not greater than 250 mg/1;
(iii) Manganese: not greater than 200 ug/1;
(iv) Nickel: not greater than 25 ug/1 or if more stringent, one one-hundredth (0.01) the 96-hour LC50;
(v) Nitrate nitrogen: not greater than 10.0 mg/1;
(vi) Pesticides, maximum concentrations:
  (I) 2,4-D: 100 ug/1;
  (II) 2,4,5-TP: 10 ug/1;
(vii) Sulfates: not greater than 250.0 mg/1.

(d) Class B Waters.

(1) Best Usage of Waters. Primary recreation and any other best usage specified by the "C" classification;

(2) Conditions Related to Best Usage. The waters will meet accepted standards of water quality for outdoor bathing places and will be of sufficient size and depth for primary recreation purposes. Also, suitable for other uses requiring waters of lower quality;

(3) Quality standards applicable to Class B waters:

(A) Sewage, industrial wastes, or other wastes: none which are not effectively treated to the satisfaction of the commission; in determining the degree of treatment required for such waste when discharged into waters to be used for bathing, the commission will consider the quality and quantity of the sewage and wastes involved and the proximity of such discharges to waters in this class;

(B) Organisms of coliform group: (applicable only during the months of May through September; during other months the coliform organism standard for Class "C" waters shall apply) fecal coliforms not to exceed geometric mean of 200/100 ml (MF count) based on at least five consecutive samples examined during any 30-day period and not to exceed 400/100 ml in more than 20 percent of the samples examined during such period.

History Note: Statutory Authority G.S. 143-214.1; 143-215.3(a)(1); Eff. February 1, 1976; Amended Eff. January 1, 1985; September 9, 1979; December 14, 1978; March 1, 1977.

.0212 TIDAL SALT WATER CLASSIFICATIONS STANDARDS

(a) General. The water quality standards for all tidal salt waters are the basic standards applicable to Class SC waters. Additional and more stringent standards applicable to other specific tidal salt water classifications are specified in (c) and (d) of this Rule.

(b) All tidal salt waters.

(1) Best Usage of Waters. Fishing, secondary recreation, and any other usage except primary recreation or shellfishing for market purposes;

(2) Conditions Related to Best Usage. The waters will be suitable for fishing, fish and wildlife propagation, secondary recreation, and other uses requiring waters of lower quality;

(3) Quality standards applicable to all tidal salt waters:

(A) Chlorophyll a (corrected): not greater than 40 ug/l in sounds, estuaries, and other slow-moving waters (not applicable during the months of December through March);

(B) Dissolved oxygen: not less than 5.0 mg/l, except that swamp waters may have lower values if caused by natural conditions;

(C) Floating solids; settleable solids; sludge deposits: only such amounts attributable to sewage, industrial wastes or other wastes, as will not make the waters unsafe or unsuitable for fish and wildlife, or impair the waters for any designated uses;

(D) Gases, total dissolved: not greater than 110 percent of saturation;

(E) Organisms of coliform group: fecal coliforms not to exceed geometric mean of 1,000/100 ml (MF count) based upon at least five consecutive samples examined during any 30 day period; not exceed 2,000/100 ml in more than 20 percent of the samples examined during such period; standards are not applicable during or immediately following periods of rainfall; all coliform concentrations are to be analyzed using the MF technique unless high turbidity or other adverse conditions necessitate the tube dilution method; in case of controversy over results the MPN 5-tube dilution method will be used as the referee method;

(F) Oils; deleterious substances; colored or other wastes: only such amounts as will not render the waters injurious to public health, secondary recreation or to aquatic life and wildlife or adversely affect the palatability of fish, aesthetic quality or impair the waters for any designated uses;

(G) pH: shall be normal for the waters in the area, which generally shall range between 6.8 and 8.5 except that swamp waters may have a low of 4.3;

(H) Phenolic compounds: only such levels as will not result in fish-flesh tainting or impairment of other best usage;

(I) Radioactive substances:

(i) Combined radium-226 and radium-228: The maximum average annual activity level (based on at least four samples, collected quarterly) for combined radium-226, and radium-228 shall not exceed five picocuries per liter;

(ii) Alpha Emitters. The average annual gross alpha particle activity (including radium-226, but excluding radon and uranium) shall not exceed 15 picocuries per liter;

(iii) Beta Emitters. The maximum average annual activity level (based on at least four

samples, collected quarterly) for strontium-90 shall not exceed eight picocuries per liter; nor shall the average annual gross beta particle activity (excluding potassium-40 and other naturally occurring radionuclides) exceed 50 picocuries per liter; nor shall the maximum average annual activity level for tritium exceed 20,000 picocuries per liter;

(J) Temperature: shall not be increased above the natural water temperature by more than 0.8 degrees C (1.44 degrees F) during the months of June, July, and August nor more than 2.2 degrees C (3.96 degrees F) during other months and in no cases to exceed 32 degrees C (89.6 degrees F) due to the discharge of heated liquids;

(K) Turbidity: the turbidity in the receiving water due to a discharge shall not exceed 25 NTU; if turbidity exceeds this level due to natural background conditions, the discharge level cannot cause any increase in turbidity in the receiving water;

(L) Toxic substances: only such amounts, whether alone or in combination with other substances or wastes as will not render the waters injurious to aquatic life and wildlife, or impair the waters for any designated uses; in addition to the substances for which numerical standards have been adopted, which are listed in this Paragraph for protection of aquatic life, Rule .0212(b)(4) includes action levels for toxic substances which may be toxic under certain environmental conditions and Rule .0208(b) contains a list of chemicals which are suspected to be toxic, carcinogenic, teratogenic, mutagenic, or neurotoxic; requirements for discharges with any of these substances will be determined on a case-by-case basis and are further described in these Rules; toxic substances with numerical limits in all tidal saltwaters:

(i) Arsenic: not greater than 50 ug/1;
(ii) Cadmium: not greater than 5.0 ug/1;
(iii) Chromium, total: not greater than 20 ug/1;
(iv) Cyanide: not greater than 5.0 ug/1;
(v) Mercury: not greater than 0.10 ug/1;
(vi) Lead: not greater than 25 ug/1;

(vii) Nickel: not greater than 50 ug/l; or if more stringent, one one-hundredth (0.01) the 96-hour LC50;

(viii) Pesticides, maximum concentrations:

(I) Aldrin: 0.003 ug/l;

(II) Chlordane: 0.004 ug/l;

(III) DDT: 0.001 ug/l;

(IV) Demeton: 0.1 ug/l;

(V) Dieldrin: 0.002 ug/l;

(VI) Endosulfan: 0.009 ug/l;

(VII) Endrin: 0.002 ug/l;

(VIII) Guthion: 0.01 ug/l;

(IX) Heptachlor: 0.004 ug/l;

(X) Lindane: 0.004 ug/l;

(XI) Methoxychlor: 0.03 ug/l;

(XII) Mirex: 0.001 ug/l;

(XIII) Parathion: 0.04 ug/l;

(XIV) Toxaphene: 0.07 ug/l;

(ix) Polycholorinated biphenyls: not greater than 0.001 ug/l;

(x) Selenium: not greater than 10.0 ug/l or if more stringent, one one-hundredth (0.01) the 96-hour LC50;

(xi) Trialkyltin compounds: 0.002 ug/l expressed as tributyltin;

(4) Action Levels for Toxic Substances: if the levels of any of the substances listed in this Paragraph (which are generally not bioaccumulative and have variable toxicity to aquatic life because of chemical form, solubility, stream characteristics and/or associated waste characteristics) are determined by the waste load allocation to be exceeded in a receiving water by a discharge under the specified low flow criterion for toxic substances (Rule .0206), the discharger will be required to monitor the chemical and/or biological effects of the discharge as part of the NPDES permit; efforts shall be made by all dischargers to reduce or eliminate these substances from their effluents; after receiving such monitoring data for a discharge, the substance will be limited to the level listed in this Paragraph or an appropriate toxicity limit will be set as determined using the requirements of Rule .0208(a):

(A) Copper: in excess of 10 ug/l;

(B) Silver: in excess of 10 ug/l;

(C) Zinc: in excess of 50 ug/l.

(c) Class SA Waters.

(1) Best Usage of Waters. Shellfishing for market purposes and any other usage specified by the "SB" or "SC" classification;

(2) Conditions Related to Best Usage. Waters will meet the current sanitary and bacteriological standards as adopted by the Commission for Health Services and will be suitable for shellfish culture;

(3) Quality Standards applicable to Class SA Waters:

(A) Floating solids; settleable solids; sludge deposits: none attributable to sewage, industrial wastes or other wastes;

(B) Sewage: none;

(C) Industrial wastes, or other wastes: none which are not effectively treated to the satisfaction of the commission in accordance with the requirements of the Division of Health Services;

(D) Toxic substances: numerical limits for Class SA waters:

(i) Fluoride: not greater than 1.8 mg/1;

(ii) Manganese: not greater than 0.1 mg/1;

(E) Organisms of coliform group: fecal coliform group not to exceed a median MF of 14/100 ml and not more than 10 percent of the samples shall exceed an MF count of 43/100 ml in those areas most probably exposed to fecal contamination during the most unfavorable hydrographic and pollution conditions.

(d) Class SB Waters.

(1) Best Usage of Waters. Primary recreation and any other usage specified by the "SC" classification;

(2) Conditions Related to Best Usage. The waters will meet accepted sanitary standards of water quality for outdoor bathing places and will be of sufficient size and depth for primary recreation purposes;

(3) Quality Standards applicable to Class SB waters:

(A) Floating solids; settleable solids; sludge deposits: none attributable to sewage, industrial wastes or other wastes;

(B) Sewage; industrial wastes; or other wastes: none which are not effectively treated to the satisfaction of the commission; in determining the degree of treatment required for such waters discharged into waters which are to be used for bathing, the commission will take into consideration quantity and quality of the sewage and other wastes involved and the proximity of such discharges to the waters in this class;

(C) Organisms of coliform group: (applicable only during the months of May through September; during other months the coliform organism standard for Class "SC" waters shall apply) fecal coliforms not to exceed a geometric mean of 200/100 ml (MF count) based on at least five consecutive samples examined during any 30 day period and not to exceed 400/100 ml in more than 20 percent of the samples examined during such period; standards are not applicable during or immediately following periods of rainfall.

History Note: Statutory Authority G.S. 143-214.1; 143-215.3(a)(1);
Eff. February 1, 1976;
Amended Eff. January 1, 1985; September 1, 1984; September 9, 1979; March 1, 1977.

.0213 REVISIONS TO DISSOLVED OXYGEN STANDARDS

For class "C" and "SC" waters, the commission, on its own initiative or pursuant to a request under G.S. 150A-16 by affected dischargers, may grant revisions to the dissolved oxygen standard for certain stream segments, where the commission finds that:

(1) Natural background conditions in the stream segment preclude the attainment of a daily average dissolved oxygen concentration of 5.0 mg/l; or
(2) Irretrievable and uncontrollable man-induced conditions preclude the attainment of a daily average dissolved oxygen concentration of 5.0 mg/l; or
(3) Application of effluent limitations for existing sources in the stream segment more stringent than present waste treatment technology in order to attain and maintain a daily average dissolved oxygen concentration of 5.0 mg/l would result in substantial adverse economic and social impact.

Any such revisions shall be established in accordance with G.S. 143-214.1 and shall be indicated in the schedule of classifications. The revised dissolved oxygen standard shall be established at the highest level economically attainable but shall be no lower than the level attainable with the application of present waste treatment technology by dischargers to the stream segment. Dischargers to such waters shall provide treatment at least as stringent as present waste treatment technology.

History Note: Statutory Authority G.S. 143-214.1;

Eff. December 14, 1978.

.0214 NUTRIENT SENSITIVE WATERS

(a) In addition to existing classifications, the commission may classify any surface waters of the state as nutrient sensitive waters (NSW) upon a finding that such waters are experiencing or are subject to excessive growths of microscopic or macroscopic vegetation. Excessive growths are growths which the commission in its discretion finds to substantially impair the use of the water for its best usage as determined by the classification applied to such waters.

(b) NSW may include any or all waters within a particular river basin as the commission deems necessary to effectively control excessive growths of microscopic or macroscopic vegetation.

(c) For the purpose of this Rule, the term "nutrients" shall mean phosphorous and/or nitrogen. When considering the assignment of this classification, the commission may specify as a "nutrient" any other chemical parameter or combination of parameters which it determines to be essential for the growth of microscopic and macroscopic vegetation.

(d) Those waters additionally classified as nutrient sensitive shall be identified in the appropriate schedule of classifications as referenced in Section .0300 of this Subchapter.

(e) For the purpose of this Rule, the term "background levels" shall mean the concentration(s), taking into account seasonal variations, of the specific nutrient or nutrients upstream of a nutrient source.

(f) Quality standards applicable to NSW: no increase in nutrients over background levels unless it is shown to the satisfaction of the director that the increase:

(1) is the result of natural variations; or

(2) will not endanger human health, safety or welfare and that preventing the increase would cause a serious economic hardship without equal or greater benefit to the public.

History Note: Statutory Authority G.S. 143-214.1;
Eff. May 10, 1979.

.0215 EFFLUENT CHANNELS

The standards of water quality contained in this Section shall not apply to waters within effluent channels, except that said waters shall be maintained at a quality which will prevent the occurrence of offensive conditions, protect public health, and

allow maintenance of the standards applicable to all downstream waters.

History Note: Statutory Authority G.S. 143-214.1;
Eff. September 9, 1979.

WATER QUALITY STANDARDS FOR FRESHWATER CLASSIFICATIONS

Parameters	Standards For All Freshwaters	More Stringent Standards To Support Additional Uses		
		Class A-I	Class A-II	Class B
Arsenic (ug/l)	50			
Barium (mg/l)		1.0	1.0	
Beryllium (ug/l)	11.0			
Cadmium (ug/l)	2.0 (TR)			
Chloride (mg/l)		250	250	
Chlorine, total residual (ug/l)	(TR)			
Chlorophyll a, corrected (ug/l)	(N)			
Chromium, total (ug/l)	50			
Cobalt (mg/l)	1.0			
Coliform, total (MFTCC/100ml)		50(NC)		
Coliform, Fecal (MFFCC/100ml)	1000(NC)			200(NC)
Copper (ug/l)	15 (AL)			
Cyanide (ug/l)	5.0			
Dissolved gases	(N)			
Dissolved oxygen (mg/l)	5.0 (TR)(SW)(1)			
Fluoride (mg/l)	1.8			
Hardness, total (mg/l)		100	100	
Iron (mg/l)	1.0(AL)			
Lead (ug/l)	25(2)			
Manganese (ug/l)		50	200	
MBAS (ug/l)	500			
Mercury (ug/l)	0.20			
Nickel (ug/l)	50(2)	25	25	
Nitrate Nitrogen (mg/l)		10	10	
Pesticides (ug/l)				
Aldrin	0.002			
Chlordane	0.004			
DDT	0.001			
Demeton	0.1			
Dieldrin	0.002			
Endosulfan	0.05			
Endrin	0.002			
Guthion	0.01			
Heptachlor	0.004			
Lindane	0.01			
Methoxychlor	0.03			
Mirex	0.001			
Parathion	0.04			
Toxaphene	0.013			
2,4-D		100	100	
2,4,5-TP (Silvex)		10	10	
pH (Units)	6.0-9.0(SW)			
Phenolic Compounds (ug/l)	(N)	1.0(NC)	1.0(NC)	
Polychlorinated Biphenyls (ug/l)	0.001			
Radioactive Substances	(N)			
Selenium (ug/l)	10(3)			
Silver (ug/l)	10(AL)			
Solids, total dissolved (mg/l)		500	500	
Solids, suspended	(N)			
Sulfates (mg/l)		250	250	
Temperature	(N)			
Toxic substances	(N)			
Trialkyltin (ug/l)	0.008			
Turbidity	(N)			
Zinc (ug/l)	50(AL)			

Note:
- (N) See 2B .0211 (b) For narrative description of limits.
- (NC) See narrative description for specific classification.
- (AL) Values represent action levels as specified in .0211(b)(4).
- (SW) Designated swamp waters may have a pH as low as 4.3 and dissolved oxygen less than 5.0 mg/l if due to natural conditions.
- (TR) Designated trout waters have cadmium limit of 0.4 ug/l, a total residual chlorine limit of 2.0 ug/l and dissolved oxygen must be at least 6.0 mg/l.
- (1) An instantaneous reading may be as low as 4.0 ug/l but the daily average must be 5.0 mg/l or more.
- (2) or if more stringent, 0.01 of the 96-hr LC50.
- (3) Selenium limit for ponds, lakes, and reservoirs is 5 ug/l.

Water Quality Standards For Tidal Saltwater Classifications

Parameters	Standards For All Tidal Saltwaters	More Stringent Standards To Support Additional Uses: Class SB	Class SA
Arsenic (ug/l)	50		
Cadmium (ug/l)	5.0		
Chlorophyll a (ug/l)	40(N)		
Chromium, Total (ug/l)	20		
Coliform, Fecal (MFFCC/100ml)	1000 (NC)	200 (NC)	14 (NC)
Copper (ug/l)	10 (AL)		
Cyanide (ug/l)	5.0		
Dissolved Gases	(N)		
Dissolved Oxygen (mg/l)	5.0 (1)		
Fluoride (mg/l)			1.8
Lead (ug/l)	25		
Manganese (mg/l)			0.1
Mercury (ug/l)	0.10		
Nickel (ug/l)	50 (2)		
Phenolic Compounds	(N)		
Polychlorinated Biphenyls (ug/l)	0.001		
Pesticides (ug/l)			
Aldrin	0.003		
Chlordane	0.004		
DDT	0.001		
Demeton	0.1		
Dieldrin	0.002		
Endosulfan	0.009		
Endrin	0.002		
Guthion	0.01		
Heptachlor	0.004		
Lindane	0.004		
Methoxychlor	0.03		
Mirex	0.001		
Parathion	0.04		
Toxaphene	0.07		
pH (Units)	6.8-9.0 (1)		
Radioactive Substances	(N)		
Selenium (ug/l)	10 (2)		
Silver (ug/l)	10 (AL)		
Solids, Suspended	(N)		
Temperature	(N)		
Toxic Substances	(N)		
Trialkyltin (ug/l)	0.002		
Turbidity (NTU)	25 (N)		
Zinc (ug/l)	50 (AL)		

Note: (N) See 2B .0212 (b) For narrative description of limits.
(NC) See narrative description for specific classification.
(AL) Values represent action levels as specified in .0212(b)(4).
(1) Designated swamp waters may have a pH as low as 4.3 and dissolved oxygen less than 5.0 mg/l if due to natural conditions.
(2) Or if more stringent, 0.01 of the 96-hour LC50.

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APPENDIX - IV

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APPENDIX - IV

Rules and Regulations for Wastewater Discharges to Surface Waters

STATE OF NORTH CAROLINA

DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT

DIVISION OF ENVIRONMENTAL MANAGEMENT

ADMINISTRATIVE CODE SECTION:

15 NCAC 2H .0100 - WASTEWATER DISCHARGES TO SURFACE WATERS

EFFECTIVE DECEMBER 1, 1984

ENVIRONMENTAL MANAGEMENT COMMISSION

RALEIGH, NORTH CAROLINA

SUBCHAPTER 2H - PROCEDURES FOR PERMITS: APPROVALS

SECTION .0100 - WASTEWATER DISCHARGES TO THE SURFACE WATERS

.0101 PURPOSE

These Regulations implement G.S. 143-215.1 which requires permits for control of sources of water pollution by providing the requirements and procedures for application and issuance of state NPDES permits for a discharge from an outlet, point source, or disposal system discharging to the surface waters of the state, and, for the construction, entering a contract for construction, and operation of treatment works with such a discharge (see Section .0200 of this Subchapter regarding permits for disposal systems not discharging to the surface waters of the state). These Regulations also contain the requirements and procedures for issuance of state permits for pretreatment facilities.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-215.1;
Eff. February 1, 1976;
Amended Eff. December 1, 1984.

.0102 SCOPE

These Regulations apply to all persons discharging or proposing to discharge waste to the surface waters of the state; discharging or proposing to discharge waste requiring pretreatment to a treatment works of another; constructing or proposing to construct a treatment or pretreatment works with such a discharge; operate or propose to operate a treatment works with such a discharge; provided that those persons who have obtained a permit from a local pretreatment program authority, approved in accordance with Section .0900 of this Subchapter and authorized to issue such permits, do not require a separate state permit for pretreatment facilities.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-215.1; 143-215.3(a)(14);
Eff. February 1, 1976;
Amended Eff. December 1, 1984.

.0103 DEFINITION OF TERMS

For the purpose of these Regulations the following definitions shall apply:

(1) "Commission" means the Environmental Management Commission of the Department of Natural Resources and Community Development or its successor.
(2) "Committee" means the NPDES committee of the Environmental Management Commission.
(3) "EPA" means the United States Environmental Protection Agency.
(4) "NPDES" means the National Pollutant Discharge Elimination System.
(5) "Director" means the Director of the Division of Environmental Management, Department of Natural Resources and Community Development or his delegate.
(6) "Staff" means the staff of the Division of Environmental Management, Department of Natural Resources and Community Development.
(7) "New Source" shall apply to any industrial installation, from which there may be a discharge, the construction or modification of which is commenced on or after the date of publication of new source performance standards by the Environmental Protection Agency.
(8) "New Source Performance Standards" means those standards of performance applied to industrial discharges defined as new sources.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-213;
Eff. February 1, 1976;
Amended Eff. December 1, 1984; November 1, 1978; December 1, 1976.

.0104 REQUIRED PERMITS

(a) For purpose of this state's NPDES program, the discharge of waste or any pollutant shall be unlawful except as in compliance with N.C.G.S. 143-215.1 and these Regulations.

(b) No person shall do any of the following things or carry out any of the following activities until or unless such person shall have applied for and shall have received from the commission (or, if applicable, a local pretreatment authority) a permit therefor and shall have complied with such conditions, if any, as are prescribed by such permit:

(1) make any outlets into the waters of the state;
(2) construct or operate any sewer system, treatment works, or disposal system within the state;
(3) alter, extend, or change the construction or method of operation of any sewer system, treatment works, or disposal system within the state;

(4) increase the quantity of waste discharged through any outlet or processed in any treatment works, or disposal system to an extent which would result in any violation of the effluent standards or limitations established for any point source or which would adversely affect the condition of the receiving waters to the extent of violating any of the standards applicable to such water, or to any extent beyond such minimum limits as the commission may prescribe, by way of general exemption from the provisions of this Paragraph, by its official regulations;

(5) change the nature of the waste discharged through any disposal system in any way which would exceed the effluent standards or limitations established for any point source or which would adversely affect the condition of the receiving waters in relation to any of the standards applicable to such waters;

(6) cause or permit any waste, directly or indirectly to be discharged to or in any manner intermixed with the waters of the state in violation of the water quality standards applicable to the assigned classifications or in violation of any effluent standards or limitations established for any point source, unless allowed as a condition of any permit, special order or other appropriate instrument issued or entered into by the commission under the provisions of this article;

(7) cause or permit any wastes for which pretreatment is required by pretreatment standards to be discharged directly or indirectly, from a pretreatment facility to any disposal system or to alter, extend or change the construction or method of operation or increase the quantity or change the nature of the waste discharged from or processed in such facility;

(8) enter into a contract for the construction and installation of any outlet, sewer system, treatment works, pretreatment facility or disposal system or for the alteration or extension of any such facilities.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-215.1(a);
Eff. February 1, 1976;
Amended Eff. December 1, 1984.

.0105 APPLICATION: ENVIRONMENTAL ASSESSMENT FOR NEW SOURCES

(a) Except as provided in Subdivisions (c) and (d) of this Regulation, any person discharging or who proposes to discharge pollutants shall complete, sign, and submit, in triplicate, an

NPDES application accompanied by the processing fee described herein for each application in the form of a check or money order made payable to N.C. Department of Natural Resources and Community Development, Short Form A (municipal), B (agriculture), C (manufacturing and mining), or D (commercial) as appropriate in accordance with the instructions provided with such forms. All applications are incomplete until required processing fees are received and may be returned to the applicant. No processing fee will be charged for modification of unexpired permits when the modifications are initiated by the director to correct processing errors, to change permit conditions, or otherwise to implement new standards. The processing fee shall not apply to any farmer who submits an application which pertains to his farming operation. The processing fee is as follows:

Flow (gpd)	Fee
Less Than 999	$ 25.00
1,000 - 4,999	$ 50.00
5,000 - 49,999	$ 75.00
50,000 or more	$100.00.

(b) Applicants for projects requiring construction of control facilities shall, in addition to applications required in Subdivision (a) of this Rule, file, in triplicate, an engineering proposal setting forth the following information:

(1) a description of the origin and type of waste which is discharged,
(2) a description of the proposed treatment works including size and arrangement of major components,
(3) a projected evaluation of the effect of the discharge upon the receiving waters,
(4) a scale location plan,
(5) a plot plan of the site of the proposed treatment works.

(c) Applications for NPDES permit renewals may be accomplished by letter with the processing fee described herein in the form of a check or money order made payable to N.C. Department of Natural Resources and Community Development, provided the applicant contemplates no change in the wastewater volume or characteristics allowed by the permit about to expire. A renewal application which contemplates any change in the wastewater volume or characteristics allowed by the existing permit must be submitted in accordance with Paragraph (a) of this Rule at least 180 days prior to expiration of an NPDES permit. The notice and public participation procedures set in Regulations .0109 and .0111 of this Section shall be followed for each request for reissuance of an NPDES permit. All applications are incomplete

until required processing fees are received, and may be returned to the applicant. The processing fee shall not apply to any farmer who submits an application which pertains to his farming operation. The processing fee for NPDES Permit Renewal is as follows:

Flow (gpd)	Fee
Less Than 999	$ 25.00
1,000 - 4,999	$ 50.00
5,000 - 49,999	$ 75.00
50,000 or more	$100.00

(d) Complete NPDES applications which have been previously filed with Region IV, EPA, shall be considered an application for state NPDES permit, if they have not been denied and, the discharge described in the application has not substantially changed in nature, volume or frequency.

(e) Applications for permits for pretreatment facilities shall be made in triplicate upon forms approved by the director.

(f) Applicants for permits for new source discharges which propose to discharge industrial process wastewater in excess of 100,000 gallons per day or 10 MGD of cooling water to the surface waters shall file, in addition to the applications and supporting documents required in Subsections (a) and (b), an environmental assessment sufficient to describe the impact of the proposed action upon the waters of the area. As a minimum, the environmental assessment shall contain the following:

(1) Cover Sheet. The cover sheet shall indicate the nature of the proposed action, the name of the permit applicant, the date of the assessment and the signature of the responsible company official.

(2) The assessment shall identify, develop, and analyze the pertinent issues concerning the impact on the aquatic environment as follows:

(A) Background and description of the proposed new source: The assessment shall describe the proposed new source, its product or purpose, its location and its construction and operation time schedule in as broad a context as is reasonable. The relationship of the new source project to other projects and proposals directly affected by or stemming from the construction and operation of the new source should be discussed. Maps, photos, or artist sketches should be incorporated if available to help depict the environmental setting and, if not available, supporting documents should be referenced.

(B) Alternatives available for treatment or other control methods should be described, developed and objectively weighed against the proposed new source. The analysis should be sufficiently detailed to allow for comparative evaluation of impacts on the aquatic environment. The analysis of alternatives shall be compared to the existing aquatic environment.

(C) The assessment should discuss the primary and secondary environmental impacts both beneficial and adverse. The scope of the description should include both short term and long term impacts.

(D) Adverse impacts which cannot be avoided should the permit be issued should be described in detail and proposed remedial or protective measures which will be taken to minimize such impacts should be described. This shall be a description of the extent to which the proposed activity involves trade-offs between short term environmental gains at the expense of long term losses or vice-versa and the extent to which proposed actions may foreclose future options. The assessment must adequately address irreversible and irretrievable commitments of aquatic resources which will result if the new source permit is issued.

(3) Any assessment which is required by any other state agency or any federal agency shall be deemed to comply with requirements of this Subsection provided aquatic impacts are adequately addressed.

(4) No permit shall be subject to challenge by a third party on the grounds that information required under this Subsection is incomplete or insufficient.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-215.1(c);
Eff. February 1, 1976;
Amended Eff. December 1, 1984; January 1, 1984; December 1, 1976.

.0106 FILING APPLICATIONS

(a) Permit applications accompanied by the processing fee as described in Regulation .0105 of this Section shall be filed with the Director, Division of Environmental Management, P.O. Box 27687, Raleigh, North Carolina, 27611.

(b) All applications shall be filed at least 180 days in advance of the date on which an existing permit expires or in

sufficient time prior to the proposed commencement of a waste discharge to insure compliance wtih all legal procedures.

(c) NPDES applications filed with the director shall be signed as follows:

(1) in the case of corporations, by a principal executive officer of at least the level of vice-president, or his duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge described in the NPDES form originates;

(2) in the case of a partnership, by a general partner and in the case of a limited partnership, by a general partner;

(3) in the case of a sole proprietorship, by the proprietor;

(4) in the case of a municipal, state, or other public entity by either a principal executive officer, ranking elected official or other duly authorized employee.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-215.1(c);
Eff. February 1, 1976;
Amended Eff. January 1, 1984; November 1, 1978.

.0107 STAFF REVIEW AND EVALUATION

(a) The director is authorized to accept applications for the commission and shall refer all applications to the staff for review and evaluation. Additionally, the director shall refer applications for the disposal of waste into waters classified as sources of public water supply (classification "A-II") to the Division of Health Services, Department of Human Resources, for review and written approval in accordance with the provisions of G.S. 143-215.1(a).

(b) The director shall acknowledge receipt of a complete application, or if not complete, shall return the application to the applicant with a statement of what additional information is required.

(c) Tentative Determination and Draft Permit

(1) The staff shall conduct a treatment works, or in the case of new discharges, a site investigation including an on-site inspection and shall prepare its written evaluation and tentative determination to issue or deny the NPDES permit for the discharge.

(2) If the staff's tentative determination in Paragraph (1) of this Subdivision is to issue the NPDES permit, it shall make the following additional determinations in writing:

(A) proposed effluent limitations for those pollutants proposed to be limited;
(B) a proposed schedule of compliance, including interim dates and requirements, for meeting the proposed effluent limitations; and
(C) a brief description of any other proposed special conditions which will have significant impact upon the discharge described in the NPDES application.

(3) The staff shall organize the determinations made pursuant to Paragraphs (1) and (2) of this Subdivision into a draft NPDES permit.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-215.3(a)(4); 130-161; 143-215.1(a); 143-215.1(c);
Eff. February 1, 1976;
Amended Eff. December 1, 1984.

.0108 FACT SHEETS

(a) For all discharges which have a total volume of 500,000 or more gallons on any day, or as may be determined by the director, a fact sheet providing a brief synopsis of the application shall be prepared by the staff and made available upon request following issuance of the public notice. The contents of such fact sheets shall include at least the following information:

(1) a sketch or detailed description of the location of the discharge described in the NPDES application;
(2) a quantitative description of the discharge described in the NPDES application which includes at least the following:
(A) the rate or frequency of the proposed discharge; if the discharge is continuous, the average daily flow in gallons per day or million gallons per day;
(B) for thermal discharges subject to limitation under the act, the average summer and winter temperatures in degrees Fahrenheit; and
(C) the average daily discharge in pounds per day of any pollutants which are present in significant quantities or which are subject to limitations or prohibition;
(3) the tentative determinations required under Regulation .0107 of this Section;
(4) a brief citation, including a brief identification of the uses for which the receiving waters have been classified, of the water quality standards and effluent

standards and limitations applied to the proposed discharge; and

(5) a fuller description of the procedures for the formulation of final determinations than that given in the public notice including:

(A) the 30-day comment period required by Regulation .0110 of this Section,

(B) procedures for requesting a public hearing and the nature thereof, and

(C) any other procedures by which the public may participate in the formulation of the final determinations.

(b) Any person, upon request, will be furnished, without charge, one copy of any fact sheet. Any person may also request and receive all fact sheets as they are published by the department. Persons requesting all fact sheets shall be included in a special fact sheet mailing list. Requests for all fact sheets shall be renewed by July 1 of each year or the name of the person making the request shall be dropped from the fact sheet mailing list. Appropriate notice shall be given by the director prior to dropping persons from the fact sheet mailing list.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-215.1(c)(2)(i);
Eff. February 1, 1976.

.0109 PUBLIC NOTICE

(a) Notice of Application

(1) Public notice of each complete application shall be circulated in the geographical areas of the proposed discharge by the director at least 45 days prior to any proposed final action:

(A) by posting a copy of the notice at the courthouse in the county in which the pretreatment facility, outlet, point source or disposal system lies; and

(B) by publishing the notice one time in a newspaper having general circulation in said county; and

(C) by mailing to all persons or agencies listed in Subdivision (c) of this Regulation.

(2) The notice shall set forth at least the following:

(A) name, address, phone number of agency issuing the public notice;

(B) name and address of each applicant;

(C) brief description of each applicant's activities or operations which result in the discharge described in the NPDES application;

(D) name of waterway to which each discharge is made and a short description of the location of each discharge on the waterway indicating whether such discharge is a new or an existing discharge;
(E) a statement of the tentative determination to issue or deny an NPDES permit for the discharge described in the NPDES application;
(F) a brief description of the procedures for the formulation of final determinations, including a 30-day comment period and any other means by which interested persons may influence or comment upon the determinations; and
(G) address and phone number of state agency premises at which interested persons may obtain further information, request a copy of the draft permit, request a copy of the fact sheet and inspect and copy NPDES forms and related documents. Copies of the fact sheet shall be made available free upon request. Copies of the information on file, other than fact sheets, will be made available upon request and payment of the cost of reproduction.

(3) Public notice of applications for discharges from single family dwellings of 1,000 gallons per day or less shall not be required.

(b) Notice of Hearing

(1) Notice of public hearing on any permit application shall be circulated in the geographical areas of the proposed discharge by the director at least 30 days prior to the date of the hearing:
(A) by posting a copy of the notice at the courthouse in the county in which the pretreatment facility, outlet, point source, or disposal system lies;
(B) by publishing the notice one time in a newspaper having general circulation in said county;
(C) by mailing to all persons and government agencies which received a copy of the notice or the fact sheet for the NPDES application; and
(D) by mailing to any person or group upon request.

(2) The contents of public notice of any hearing shall include at least the following:
(A) name, address, and phone number of agency holding the public hearing;
(B) name and address of each applicant whose application will be considered at the hearing;
(C) name of waterway to which each discharge is made and a short description of the location of each discharge on the waterway;

(D) a brief reference to the public notice issued for each NPDES application including identification number and date of issuance;

(E) information regarding the time and location for the hearing;

(F) the purpose of the hearing;

(G) a concise statement of the issues raised by the persons requesting the hearing;

(H) address and phone number of premises at which interested persons may obtain further information, request a copy of each draft NPDES permit, request a copy of each fact sheet, and inspect and copy NPDES forms and related documents; and

(I) a brief description of the nature of the hearing, including the rules and procedures to be followed; The notice shall also state that additional information is on file with the Division of Environmental Management, Department of Natural Resources and Community Development at the Archdale Building at 512 North Salisbury Street, Raleigh, North Carolina, and may be inspected at any time during normal working hours. Copies of the information on file will be made available upon request and payment of cost of reproduction.

(c) Mailing Lists. Any person may request to receive copies of all notices required under this Rule and the director shall mail such notice to any such person. The director shall also give notice to the following:

(1) State water pollution control agency for the States of Virginia, South Carolina, Tennessee, and Georgia;

(2) Appropriate district engineer, U.S. Army Corps of Engineers;

(3) Lead agency responsible for preparation of plan pursuant to Section 208(b) of the Federal Water Pollution Control Act in approved 208 areas;

(4) State agency responsible for the preparation of plans pursuant to Section 303(e) of the Federal Water Pollution Control Act;

(5) North Carolina Department of Human Resources, Division of Health Services, and appropriate local health agency; and

(6) Any other federal, state or local agency upon request.

(d) The applicant shall pay to the Division of Environmental Management the cost of advertising the public notice or notices required by Subdivisions (a) and (b) of this Regulation. Permits shall be withheld until such costs have been paid.

History Note: Statutory Authority G.S. 143-215.1(a)(1); 143-215.1(c); 143-215.4(a); 143-215.4(c);
Eff. February 1, 1976;
Amended Eff. December 1, 1984; November 1, 1978.

.0110 RESPONSE TO PUBLIC NOTICE

(a) Any person who desires a public hearing on any permit application shall so request in writing to the director within 30 days following the publication date of the notice of application. The director shall consider all such requests for hearing and, if he determines there is a significant public interest, shall issue public notice of hearing.

(b) All comments received within 30 days following the publication date of the notice of application shall be made part of the application file and shall be considered by the director prior to taking final action on the application.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-215.1(c)(3); 143-215.3(a)(3); 143-215.3(a)(4);
Eff. February 1, 1976.

.0111 HEARINGS

(a) Public Hearings. The director shall provide an opportunity for the applicant, any affected state, any affected interstate agency, the regional administrator, or any interested agency, person, or group of persons to request or petition for a public hearing with respect to NPDES applications. Any such request or petition for public hearing shall be filed within 30 days of the date of notice and shall indicate the interest of the party filing such request and the reasons why a hearing is warranted. The director shall hold a hearing if there is a significant public interest (including the filing of requests of petitions for such hearing) in holding such a hearing. Instances of doubt shall be resolved in favor of holding the hearing. Any hearing brought pursuant to this Subsection shall be held in the geographical area of the proposed discharge or other appropriate area, in the discretion of the director, and may, as appropriate, consider related groups of permit applications.

(b) Adjudicatory Hearings. An applicant whose permit is denied, or is granted subject to conditions he deems unacceptable, shall have the right to an adjudicatory hearing before a hearing officer designated by the director upon making written demand, identifying the specific issues to be contended, to the director within 30 days following notice of final decision to deny or grant the permit. Unless such demand is made, the decision on the application shall be final and binding.

(c) Appeal Hearings. Any decision of a hearing officer made as a result of an adjudicatory hearing held under Subdivision (b) of this Regulation may be appealed by any party, to the committee upon filing a written demand within 10 days of receipt of notice of the decision. Hearings held under this Subdivision shall be conducted in accordance with N.C.G.S. 143-215.5.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-215.1(c)(1); 143-215.3(a)(3); 143-215.3(a)(4); 143-215.5; 143-215.1(e); Eff. February 1, 1976.

.0112 FINAL ACTION ON PERMIT APPLICATIONS

(a) The director shall take final action on all applications not later than 60 days following notice of application or, if a public hearing is held, within 90 days following the closing of the record of the hearing.

(b) The director is authorized to:

(1) issue a permit containing such conditions as are necessary to effectuate the purposes of G.S. 143-215.1;

(2) issue permit containing time schedules for achieving compliance with applicable effluent standards and limitations, water quality standards and other legally applicable requirements;

(3) modify or revoke any permit upon giving 60 days notice to the person affected pursuant to Regulation .0114(a) of this Section;

(4) suspend a permit pursuant to Regulation .0114(a) of this Section;

(5) deny a permit application:

(A) where necessary to effectuate the purposes of G.S. 143-215.1,

(B) for a discharge prohibited by G.S. 143-214.2(a),

(C) where the Secretary of the Army finds the discharge would substantially impair anchorage and navigation,

(D) for a discharge to which the regional administrator of EPA has objected as provided in Section 402(d) of the Federal Water Pollution Control Act Amendments of 1972 (PL-92-500),

(E) for any point discharge which conflicts with a plan approved pursuant to Section 208(b) of the 1972 FWPCA Amendments.

(c) The director shall submit to the commission at its regular meetings a report which contains the action taken with respect to any permit application since the last commission meeting.

(d) Permits shall be issued or renewed for a period of time deemed reasonable by the director but in no case shall the period exceed five years.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-215.1(c)(4); 143-215.1(b); 143-215.3(a)(3); 143-215.3(a)(4); 143-215.1(c)(5); 143-214.2(a); 143-215; 143-215.2(a);
Eff. February 1, 1976;
Amended Eff. December 1, 1984.

.0113 NOTIFICATION OF APPLICANTS

The director shall notify an applicant by certified or registered mail of the final decision on his permit application. Notifications of denial shall specify the reasons therefor and the proposed changes which in the opinion of the director will be required to obtain the permit.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-215.1(a); 143-215.3(a)(4);
Eff. February 1, 1976.

.0114 MODIFICATION: REVOCATION: AND SUSPENSION OF PERMITS

(a) Any permit issued pursuant to this Regulation is subject to revocation, suspension or modification in whole or part for good cause including but not limited to:

(1) violation of any terms or conditions of the permit;
(2) obtaining a permit by misrepresentation or failure to disclose fully all relevant facts;
(3) a change in any condition that requires either a temporary or permanent reduction or limitation of the permitted discharge; and
(4) refusal of the permittee to permit the director or his authorized representative upon presentation of credentials:
   (A) to enter upon permittee's premises in which an effluent source is located or in which any records are required to be kept under terms and conditions of the permit,
   (B) to have access to any copy and records required to be kept under terms and conditions of the permit,
   (C) to inspect any monitoring equipment or method required in the permit, or
   (D) to sample any discharge of pollutants.

(b) Modifications of permits shall be subject to the same procedural requirements as the issuance of permits except as follows:

(1) modifications of the monitoring program contained in the permit,
(2) changes in the ownership of the discharge when no other change in the permit is indicated,
(3) a single modification of any compliance schedule not in excess of four months,
(4) modification of compliance schedules (construction schedules) in permits for new sources where the new source will not begin to discharge until control facilities are operational.

(c) A request for a modification or revocation by the permittee shall constitute a waiver of the 60 day public notice required by G.S. 143-215.1(b) for modifications or revocations.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-215.1(b)(3);
Eff. February 1, 1976.

.0115 PUBLIC ACCESS

(a) All records, reports and information required to be submitted to the commission or the director; any public comment on these records, reports or information; and the draft and final permits shall be disclosed to the public unless the person submitting the information can show that such information, if made public, would disclose methods or processes entitled to protection as trade secrets.

(b) The director is authorized to determine information which is entitled to confidential treatment. In the event the director determines that such information (other than effluent data) is entitled to confidential treatment, he shall take steps to protect such information from disclosure. He shall submit the information considered to be confidential to the Regional Administrator, EPA, Region IV, for concurrence in his determination of confidentiality.

(c) The director shall:

(1) provide facilities for the inspection of information relating to NPDES permit applications and permits,
(2) insure that division employees handle request for such inspections promptly,
(3) insure that copying machines or devices are available for a reasonable fee.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-215.3(a)(2); 143-215.3(a)(4); 132-6;

143-215.65;
Eff. February 1, 1976.

.0116 EMERGENCY PROCEDURES

If the director determines any threatened or continuing violations exist which warrant immediate action, the director shall so notify the commission or the secretary who may exercise emergency powers pursuant to G.S. 143-215.3(a)(8), 143-215.13(d), 143-215.6(c), or 143-215.3(a)(12).

History Note: Statutory Authority G.S. 143-215.3(a)(8);
143-215.13(d); 143-215.6(c);
Eff. February 1, 1976;
Amended Eff. December 1, 1984; November 1, 1978.

.0117 INVESTIGATIONS: MONITORING: AND REPORTING

(a) Employees of the Department of Natural Resources and Community Development are authorized to conduct any investigations as provided in G.S. 143-215.3(a)(2), (7), and (9) for the purpose of determining compliance with water quality standards, effluent limitations, permit conditions and any duly adopted regulation of the commission.

(b) Any person subject to the provisions of G.S. 143-215.1 shall comply with the monitoring and reporting requirements of regulations in Section 15 NCAC 2B .0500. This Regulation contains the requirements for monitoring and reporting the quantity and quality of waste discharges to and their effects upon the water resources of the state. It also contains the required tests and measurements, the location of sampling points, and the frequency of the monitoring and reporting for the following major standard industrial groups:

SIC NUMBER	MAJOR PRODUCTS OR SERVICES
0200-0299	Agricultural Production -- Livestock
1400-1499	Mining
2000-2099	Food and Beverage Processing
2100-2199	Tobacco Processing
2200-2299	Textile Processing
2400-2499	Lumber & Wood Products Except Furniture
2500-2599	Manufacturing of Furniture & Fixtures
2600-2699	Paper & Allied Products
2800-2899	Chemical & Allied Products
2900-2999	Petroleum Refining & Related Industries
3100-3199	Leather & Leather Products
3400-3499	Fabricated Metal Products Except Ordinance, Machinery & Transportation Equipment

3500-3599	Machinery Except Electrical
3600-3699	Electrical Machinery, Equipment and Supplies
4600-4699	Pipeline Transportation
4900-4999	Electric, Gas, & Sanitary Services
7200-7299	Personal Services
7300-7399	Miscellaneous Business Service
7500-8599	Automobile Repairing Services & Garage
9999	Domestic Sewage

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-215.3(a)(4); 143-215.3(a)(2); 143-215.3(a)(7); 143-215.1(b)(1); 143-215.3(a)(9); 143-215.63;
Eff. February 1, 1976;
Amended Eff. December 1, 1984; November 1, 1978.

.0118 EFFLUENT LIMITATIONS AND STANDARDS

Any state NPDES permit or state permit for a pretreatment facility will contain effluent limitations and standards required by EMC Regulation Adopting Effluent Limitations and Guidelines for Wastewater Discharges to Surface Waters of North Carolina adopted on March 20, 1975, by the commission or as may be future amended by the commission. That regulation contains the effluent standards and limitations for ensuring compliance with Sections 301, 302, 306, and 307 of the Federal Water Pollution Control Act. For effluent limited stream segments, the regulation adopts by reference federal effluent limitations and guidelines as state effluent limitations and guidelines. For water quality limited streat segments, the regulations provide that effluent limitations be calculated by the staff and approved by the director, to comply with Section 301(b)(1)(C) of the federal act.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-213.23; 143-215; 143-214(c); 143-215.1(b)(1);
Eff. February 1, 1976.

.0119 DISCHARGES OF 50,000 GALLONS PER DAY OR LESS

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-215.3(a)(4);
Eff. February 1, 1976;
Repealed Eff. December 1, 1984.

.0120 LIMITATION ON DELEGATION

The director is authorized to delegate any or all of the functions contained in this Regulation except the following:

(1) denial of a permit application,
(2) suspension of a permit,
(3) revocation of a permit,
(4) modification of a permit which does not fall within the exceptions listed in Regulation .0114(b) of this Section, or
(5) determination of confidentiality.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-215.3(a)(4);
Eff. February 1, 1976.

.0121 SUSPENSION OF REQUIREMENT FOR STATE NPDES PERMITS

(a) The commission finds that an NPDES Permit issued by the U.S. Environmental Protection Agency will serve in lieu of a State Permit under 15 NCAC 2H .0104 and G.S. 143-215.1 so long as the Federal Permit is valid.

(b) Nothing in this Rule shall prevent the commission from enforcing laws and regulations which by their terms are applicable without a G.S. 143-215.1 permit.

History Note: Statutory Authority G.S. 143-215.3(a)(1); 143-215.1; 143B-282;
Eff. December 1, 1976;
Amended Eff. December 1, 1984.

.0122 CONCENTRATED ANIMAL FEEDING OPERATIONS

Part 122.23 of Title 40 of the Code of Federal Regulations, revised as April 1, 1983, entitled "Concentrated Animal Feeding Operations", is hereby adopted as part of the Regulations of this Section.

History Note: Statutory Authority G.S. 143-213(24); 143-215; 143-215.1; 143-215.3(a)(1);
Eff. December 1, 1976;
Amended Eff. December 1, 1984; June 7, 1981.

.0123 REQUIRING: EVALUATING FEEDLOT PERMIT APPLICATIONS

(a) Guidelines. Upon identifying any concentrated animal feeding operation or animal feeding operation that the staff has reason to believe should or could be regulated under this permit program, the staff shall conduct an on-site inspection of such operation, and shall make the following determinations as a result thereof:

(1) For a concentrated animal feeding operation as described in 40 CFR 122.23(b)(3), does a discharge of pollutants occur to the surface waters of the state by

any means, as a result of any other than a 25-year, 24-hour rainfall event?

(2) For a concentrated animal feeding operation as described in 40 CFR 122.23(b)(3):

(A) Does a pollutant discharge occur to the surface waters of the state through a man-made ditch, flushing system, or similar man-made device; or

(B) Does a pollutant discharge occur to the surface waters of the state which originate outside of and pass over, across, through, or otherwise come in contact with animals confined in the operation, as a result of any other than a 25-year, 24-hour rainfall event?

(3) Case-by-Case Determination

(A) For an animal feeding operation not otherwise falling within the definition provided in 40 CFR 122.23(b)(3):

(i) Does a pollutant discharge occur to the state's surface waters through a man-made ditch, flushing system, or similar man-made device; or

(ii) Does a pollutant discharge occur to the state's surface waters which originate outside of and pass over, across, through, or otherwise come into direct contact with animals confined in the operation as a result of any other than a 25-year, 24-hour rainfall event?

(B) If the staff determines that a discharge occurs under either (i) or (ii) of this Paragraph, then such an animal feeding operation may be designated by the Director, Division of Environmental Management, as a concentrated animal feeding operation. In making such designation, the director shall consider the following factors:

(i) The size of the animal feeding operations; the amount of waste therefrom reaching the state's surface waters;

(ii) The operation's location relative to the surface waters of the state;

(iii) The means of conveyance of animal wastes or process waste waters into the surface waters of the state;

(iv) The degree of slope, nature of vegetation, extent of rainfall, and other factors relative to the likelihood or frequency of

discharge of animal wastes and process waste waters into the state's surface waters;

(v) Other factors relative to the significance of the pollution problem sought to be regulated;

(vi) Does a discharge of pollutants occur which results in a violation of water quality standards, as a result of any other than a 25-year, 24-hour storm event?

(b) Notice to Apply for Permit. If the field determination verifies that a discharge from an animal feeding operation or concentrated animal feeding operation occurs under any of the conditions listed in Paragraph (a)(1) to (3) of this Rule, the director shall give written notice to the owner or operator of the concentrated animal feeding operation, that he must submit an application for a permit. The notice shall specify that if the owner or operator can permanently eliminate a discharge of pollutants to the surface waters of the state, by such minor changes as can be affected within 60 days of the receipt of notice to submit a permit application (such as, but not limited to, diversion of outside drainage from pen areas, modifications to lagoons, closing off drainage ditches) a permit application will not be required. If modifications necessary to eliminate permanently discharges of pollutants to surface waters of the state cannot or are not completed within 60 days of receipt of notice, a permit application must be submitted.

(c) Permit Applications. Permit applications as required by 40 CFR 122.23(a) will be available in county extension and regional engineers' environmental operations section offices. On determination that an application should be submitted, the applicant should forward supporting information required by Rules .0105 to .0109 of this Section. Applications with supporting documentation are to be mailed to the Director, Division of Environmental Management, P.O. Box 27687, Raleigh, North Carolina 27611. On receipt of the application, the regional engineer, accompanied by a representative of the U.S. or N.C. Departments of Agriculture, will conduct an inspection to determine whether a permit is required. If a permit is required, the application will be processed. If not, it will be returned without action. Those concentrated animal operations that can alleviate the requirement to have a permit through minor modifications to facilities will be given 60 days to make such modifications prior to processing the permit application. On completion of required modifications to facilities, the permit application will be returned with written confirmation that the concentrated animal operation is in compliance with these Regulations.

(d) Methodology for Establishing a Potential for a Discharge Other Than the 24-Hour, 25-Year Rainfall Event. The staff site

evaluation shall include soil characteristics of the feedlot and of the land area lying between the feedlot and the receiving stream; slope and other topographic characteristics of the feedlot and the area between the feedlot, and the receiving stream; and the total drainage area. Using the results of the site evaluation, the staff shall use either the "rational method for determination of runoff" or the "SCS method for determination of runoff" to establish whether a discharge occurs at rainfall events of less than the 24-hour, 25-year rainfall.

(e) Impact Evaluation. Utilizing the results of the site evaluation and the runoff evaluation required in Paragraph (d) of this Rule, the staff shall through mathematical modeling determine whether pollutants discharged as a result of rainfall runoff will cause a violation of water quality standards at flows in existence during the runoff period.

(f) Final Determination and Fact Sheet. Upon a final determination that a permit is required, the staff shall prepare a fact sheet which delineates the reasons which have been established for requiring the permit, the corrective actions if any necessary to control the discharge of pollutants, and an implementation schedule for completing such actions. If no corrective actions are required, the fact sheet shall specifically state that none are required and provide the justification for not requiring corrective actions. Upon completion of the fact sheet, the staff shall prepare an NPDES draft permit containing a description of needed corrective actions and a schedule for implementation and process the permit in accordance with Rule .0108 of this Section.

History Note: Statutory Authority G.S. 143-213(24); 143-215; 143-215.1; 143-215.3(a)(1), (4);
Eff. December 1, 1976;
Amended Eff. December 1, 1984; June 7, 1981.

.0124 RELIABILITY

All facilities discharging to waters assigned B or SB classification shall provide adequate disinfection, and adequate standby systems which, in the opinion of the director, will insure continued disinfection where the interruption of such treatment would render the waters unsafe for primary recreation usage. These requirements shall also apply to facilities discharging upstream of B or SB waters, if an interruption in disinfection would render the waters in the B or SB segment unsafe for primary recreation usage.

History Note: Statutory Authority G.S. 143-214.1; 143-215.1(b); 143-215.3(a)(1);

Eff. December 1, 1984.

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APPENDIX - V

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APPENDIX - V

Rules and Regulations for Certified Wastewater Treatment Plant Operators

NORTH CAROLINA ADMINISTRATIVE CODE

TITLE 15

DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT

CHAPTER 8

CURRENT THROUGH JULY 1, 1983

AS APPROVED BY THE ATTORNEY GENERAL

DEPARTMENT OF NATURAL RESOURCES AND COMMUNITY DEVELOPMENT

RALEIGH, NORTH CAROLINA

NORTH CAROLINA ADMINISTRATIVE CODE

TITLE 15
DEPARTMENT OF NATURAL RESOURCES & COMMUNITY DEVELOPMENT

CHAPTER 8
WASTEWATER TREATMENT PLANT OPERATORS

SUBCHAPTER 8A - AUTHORITY: ORGANIZATION:
STRUCTURE: DEFINITIONS
AND HEARING PROCEDURES

SUBCHAPTER 8B - CERTIFICATION OF OPERATORS

CHAPTER 8 - WASTEWATER TREATMENT PLANT OPERATORS CERTIFICATION COMMISSION T15.08

SUBCHAPTER 8A - AUTHORITY: ORGANIZATION: STRUCTURE: DEFINITIONS AND HEARING PROCEDURES

SECTION .0100 - DEFINITIONS AND ORGANIZATION

.0101 DEFINITIONS

The following definitions are used throughout this Chapter:

(1) Environmental Management Commission. The Environmental Management Commission as created by Paragraph 143-214 of Article 21 of Chapter 143 of the General Statutes of North Carolina;

(2) Division of Environmental Management. Division of environmental management as created by Paragraph 143-212 of Article 21 of Chapter 143 of the General Statutes of North Carolina;

(3) Certification Commission. The Wastewater Treatment Plant Operators Certification Commission as established by Article 7, Part 9 of Chapter 143B of the General Statutes of North Carolina;

(4) Wastewater Treatment Facilities. [G.S. 143-213(17) -- Treatment Plants] Any facility specifically designed and approved by proper authority for treatment of the discharge of waterborne wastes;

(5) Operator in Responsible Charge. The operator who has been designated by the owner of a wastewater treatment facility to be the operator in responsible charge of such facility after receipt of notification from the Wastewater Treatment Plant Operators Certification Commission of the plant classification; The operator in responsible charge must either possess or be working towards achieving permanent certification in a grade at least equivalent to the classification of the facility for which he is designated. The operator in responsible charge is the operator who is actually in charge of the daily operation and maintenance of the treatment facility and who resides within 30 minutes travel time of the facility and is readily available for consultation at the facility in case of an emergency, the malfunction or breakdown of equipment, or for other needs. However, operators in responsible charge at Class I and II facilities may be

employees of companies in the business of operating wastewater treatment facilities under contractual agreements, so long as that operator possesses permanent certification in a grade at least equivalent to the classification of the facility at which the operator has been designated, and meets other applicable requirements for the operator in responsible charge;

(6) Permanent Certification. Permanent certification may be achieved by taking and passing examination; reciprocity; and conversion from the voluntary certification program; To maintain active certificates annual fees must be paid;

(7) Limited Certification. Limited certification may be achieved by temporary certification; and conditional certification.

Note: Other definitions may be found in Subchapter 8B, Section .0200; and Subchapter 8C, Rule .0004 of this Chapter.

History Note: Statutory Authority G.S. 143B-300; 150A-2(4);
Eff. February 1, 1976;
Amended Eff. February 20, 1980; January 1, 1977.

.0102 CREATION

The Wastewater Treatment Plant Operators Certification Commission, Department of Natural Resources and Community Development, located at 512 N. Salisbury Street, Archdale Building, P.O. Box 27687, Raleigh, North Carolina 27611, was created and became effective July 1, 1969.

History Note: Statutory Authority G.S. 90A-36; 143B-300;
Eff. February 1, 1976;
Amended Eff. August 1, 1978.

.0103 MEMBERSHIP AND QUALIFICATIONS
.0104 APPOINTMENT OF MEMBERS
.0105 DISMISSAL OF MEMBERS
.0106 COMPENSATION FOR MEMBERS
.0107 A QUORUM
.0108 CLERICAL STAFF

History Note: Statutory Authority G.S. 90A-36; 143B-301; 143B-13; 93B-5;
Eff. February 1, 1976;
Amended Eff. August 1, 1978;
Repealed Eff. July 1, 1983.

.0109 COMMISSION MEETINGS

(a) Regular Meetings. Regularly scheduled meetings of the commission will be held bi-monthly.

(b) Special Meetings. Special called meetings of the commission may be scheduled by the chairman or any two members of the commission by giving no less than seven days notice to all members of the commission.

History Note: Statutory Authority G.S. 143B-301;
Eff. February 1, 1976.

.0110 DELEGATIONS

The commission delegates to its chairman the following authority:

(1) pursuant to Rule .0303 of Subchapter 8B of this Chapter, to receive and process requests of examinees to review examination papers; to designate the representatives who will review examination papers with examiners; and to establish the date, time and place for reviewing the examinations;
(2) pursuant to Rule .0102 of Subchapter 8B of this Chapter, to process applications for certification as wastewater treatment plant operators by examination and to notify the applicants of their eligibility to take the examination;
(3) pursuant to Rule .0001 of Subchapter 8C of this Chapter, to rate and classify all wastewater pretreatment and treatment facilities under the jurisdiction of the Environmental Management Commission, to rate and classify non-discharging wastewater facilities of a design capacity in excess of 3,000 gpd;
(4) pursuant to Rule .0404 of Subchapter 8B of this Chapter, to receive applications for and to issue temporary certificates.

History Note: Statutory Authority G.S. 90A-37;
90A-39; 90A-40;
Eff. February 20, 1980.

SECTION .0200 - GENERAL PURPOSE, DUTIES AND REQUIREMENTS, AND PROGRAMS

.0201 PURPOSE

History Note: Statutory Authority G.S. 90A-35; 90A-43;
Eff. February 1, 1976;
Repealed Eff. July 1, 1983.

.0202 DUTIES AND REQUIREMENTS

(a) Refunding of Fees. When refunding of fees becomes necessary, it will be the commission's responsibility to determine the fees or portion of fees to be refunded.

(b) Promotion of Training Operators and Other Powers. The certification commission is authorized to take all necessary and appropriate steps in order to effectively and fairly achieve the purposes of the statutes, including, but not limited to, the providing of training for operators and cooperation with educational institutions and private and public associations, persons, or corporations in the promotion of training for wastewater treatment personnel.

(c) Federal Grants-in-Aid. The certification commission is authorized and empowered to adopt such rules and regulations not inconsistent with the laws of the state as may be required by the federal government for grants-in-aid for programs concerned with the certification of wastewater treatment plant operators which may be made available to the state by the federal government. This is to be liberally construed in order that the state and its citizens may benefit from such grants-in-aid.

(d) Requirements for Certified Operators

(1) Every person, firm or corporation, municipal or private, owning or having control of a classified wastewater treatment facility shall have the obligation of assuring that the operator in responsible charge of such plant is duly certified by the Wastewater Treatment Plant Operators Certification Commission. No person shall perform the duties of an operator in responsible charge of a classified wastewater treatment facility without being duly certified.

(2) The owner must submit a letter to the commission designating the operator in responsible charge. The letter must be signed by the owner and the designated operator in responsible charge. This letter must be submitted when:

(A) A new wastewater treatment facility is 50 percent completed.

(B) Notified of classification or change of classification of an existing facility.
(C) A new operator in responsible charge is designated.

(3) Owners are required to inform the commission in writing of any change in employment of the operator in responsible charge, giving date operator in responsible charge left employment and owner's plans to retain another operator in responsible charge.

History Note: Statutory Authority G.S. 143B-300;
90A-37 through 90A-43;
Eff. February 1, 1976;
Amended Eff. July 1, 1983; February 20, 1980;
January 1, 1977.

.0203 PROGRAMS

The commission's programs are as follows:

(1) classifications of wastewater treatment plants,
(2) requirement for certified operators,
(3) wastewater treatment plant operator training,
(4) wastewater treatment plant operator certification,
(5) recognition of individuals or group achievements in the operation of wastewater treatment plants.

History Note: Statutory Authority G.S. 143B-300; 90A-35;
Eff. February 1, 1976;
Amended Eff. January 1, 1977.

SECTION .0300 - HEARING PROCEDURES

.0301 RULE MAKING PROCEDURES

The Wastewater Treatment Plant Operators Certification Commission adopts by reference 15 NCAC 1B .0100 for the purpose of its rule making procedures.

History Note: Statutory Authority G.S. 143B-300;
Eff. January 1, 1977.

.0302 CONTESTED CASE PROCEDURES

(a) The Wastewater Treatment Plant Operators Certification Commission adopts by reference 15 NCAC 1B .0200 for the purpose of adjudicating contested cases.

(b) Contested cases as defined in this Chapter do not include controversies over whether an examination was fair or whether the applicant passed the examination or whether or not a waiver subject to 8B .0206 of this Chapter should be granted.

History Note: Statutory Authority G.S. 143B-300; 150A-2(4);
Eff. January 1, 1977;
Amended Eff. February 15, 1978.

SUBCHAPTER 8B - CERTIFICATION OF OPERATORS

SECTION .0100 - APPLICATION FOR EXAMINATION AND CERTIFICATION, AND NOTIFICATION OF CHANGE IN ADDRESS

.0101 APPLICATION FORM

(a) An application which is designed for requesting certification as a wastewater treatment plant operator by way of examination; temporary certification; reciprocity certification; conditional certification; or conversion from voluntary certification must be properly and accurately completed and submitted with the appropriate fee to the office of the chairman of the certification commission.

(b) Incomplete applications and applications not accompanied by appropriate fee and attachments cannot be processed and will be returned to the applicant.

History Note: Statutory Authority G.S. 90A-39; 90A-42;
Eff. February 1, 1976.

.0102 APPLYING FOR EXAMINATION

(a) An application being filed for examination shall be filed with the commission 30 days prior to the date upon which the examination is scheduled to be administered and the appropriate fee must accompany the application.

(b) Upon receipt of the application by the commission, the application will be reviewed for eligibility to take examination. The applicant will be notified by letter of his eligibility and will be advised of the date, time and place of examination. A receipt for the examination fee will accompany the letter. In cases where the applicant is ineligible for examination, he will also be notified by letter and advised the reason of ineligibility. A refund check for the examination fee will be prepared and forwarded under separate cover. Upon learning of his ineligibility, the applicant may request a hearing before the certification commission relative to his ineligibility, if he so desires.

History Note: Statutory Authority G.S. 90A-39; 90A-42;
150A-23;
Eff. February 1, 1976.

.0103 APPLYING FOR TEMPORARY CERTIFICATION

An application must be filed with appropriate fee and required letter or statement from the owner of the facility.

History Note: Statutory Authority G.S. 90A-39; 90A-42;
Eff. February 1, 1976.

.0104 APPLYING FOR TEMPORARY CERTIFICATION RENEWAL

An application requesting renewal of temporary certification must be filed 60 days prior to the expiration date of the original temporary certification. The appropriate fee and required letter or statement from the owner of the facility must accompany the application.

History Note: Statutory Authority G.S. 90A-39; 90A-42;
Eff. February 1, 1976.

.0105 APPLYING FOR CERTIFICATION BY RECIPROCITY

An application requesting certification by reciprocity must be filed with the appropriate fee, the required letter or statement from the owner of the facility, and a copy of the certificate issued by another state, territory or possession of the United States.

History Note: Statutory Authority G.S. 90A-39;
90A-40(b); 90A-42;
Eff. February 1, 1976;
Amended Eff. February 20, 1980.

.0106 APPLYING FOR CONDITIONAL CERTIFICATION

An application requesting a conditional certificate must be filed with the appropriate fee and letter or statement required of the owner of the facility.

History Note: Statutory Authority G.S. 90A-39; 90A-42(4);
Eff. February 1, 1976;
Amended Eff. February 20, 1980.

.0107 APPLYING FOR VOLUNTARY CONVERSION CERTIFICATION

An application must be filed with appropriate fee in addition to a copy of the certificate issued under the voluntary certification program.

History Note: Statutory Authority G.S. 90A-39; 90A-42;
Eff. February 1, 1976.

.0108 ADDRESS FOR REQUESTING AND RETURNING APPLICATIONS

Applications are obtainable from and should be returned to: Chairman, Wastewater Treatment Plant Operators Certification Commission, Department of Natural Resources and Community Development, P.O. Box 27687, Raleigh, North Carolina 27611.

History Note: Statutory Authority G.S. 90A-39; 90A-42;
Eff. February 1, 1976;
Amended Eff. August 1, 1978.

.0109 REQUIREMENT FOR NOTIFICATION OF CHANGE IN ADDRESS

Holders of certificates under this program shall notify the Chairman, Wastewater Treatment Plant Operators Certification Commission, Department of Natural Resources and Community Development, P.O. Box 27687, Raleigh, North Carolina 27611, of any change in address.

History Note: Statutory Authority G.S. 90A-35; 90A-43;
Eff. January 1, 1977;
Amended Eff. August 1, 1978.

SECTION .0200 - EDUCATION AND EXPERIENCE FOR CERTIFIED WASTEWATER TREATMENT PLANT OPERATORS

.0201 GRADE I WASTEWATER TREATMENT PLANT OPERATOR

An applicant for a grade I certificate (lowest) shall be expected to have a general knowledge of the operation of small treatment plants. The applicant shall have knowledge of equipment usually employed in such plants, and be able to describe the general maintenance requirements for such plant units. The applicant must submit an application showing that one of the following prerequisite combinations of training and experience has been met in order to take the grade I examination:

(1) three years of acceptable experience in wastewater treatment plant operation;
(2) completion of eighth grade of school and two years of acceptable experience in wastewater treatment plant operation;
(3) one approved training school for wastewater treatment plant operators and one year of acceptable experience in wastewater treatment plant operation;
(4) graduate of a high school, or equivalent GED, and three months of acceptable experience in wastewater treatment plant operation;
(5) graduate of a high school or equivalent GED or a two or four year college and completion of approved training school.

History Note: Statutory Authority G.S. 90A-39;
Eff. February 1, 1976;
Amended Eff. July 1, 1983; February 20, 1980.

.0202 GRADE II WASTEWATER TREATMENT PLANT OPERATOR

(a) An applicant for a grade II certificate shall be expected to have a general knowledge of the various types of wastewater treatment plants and the processes involved; a general knowledge of the composition of wastewater and the proper sampling thereof; a general knowledge of the procedure involved in making basic physical and chemical tests and their application to treatment plant control; the ability to make simple calculations; general knowledge of the proper maintenance of the various treatment plant units and the mechanical equipment involved; to keep and interpret records; practice safety and maintain good public relations; and such other information as may be deemed pertinent by the Wastewater Treatment Plant Operators Certification Commission.

(b) The applicant must submit an application showing that one of the following prerequisite combinations of training and experience has been met in order to take the grade II examination:

(1) one approved training school for wastewater treatment plant operators and two years of acceptable experience in a North Carolina class I, or equivalent, wastewater treatment plant or higher;

(2) a North Carolina grade I certificate, or equivalent, and one year of acceptable operator experience in a North Carolina class I, or equivalent, wastewater treatment plant or higher;

(3) graduate of high school, or equivalent GED, and six months of acceptable experience in a North Carolina class I, or equivalent, wastewater treatment plant or higher;

(4) graduate of a recognized two-year college or technical school or college or university and six months of acceptable experience in wastewater treatment operation.

History Note: Statutory Authority G.S. 90A-39;
Eff. February 1, 1976;
Amended Eff. February 20, 1980.

.0203 GRADE III WASTEWATER TREATMENT PLANT OPERATOR

(a) An applicant for a grade III certificate shall be expected to know more, and to answer more highly specialized questions relative to wastewater treatment and plant operation than is required for a grade II certificate. In addition to the requirements mentioned for a grade II certificate, a candidate for a grade III certificate should have a greater knowledge of the physical, chemical and bacteriological tests ordinarily performed in an adequately equipped laboratory for the determination of the nature, type and concentration of various wastewaters. The applicant should be able to perform more advanced calculations including velocity of flow and pressures in pipes, etc., and should have a detailed knowledge of the principles of treatment plant operation, efficiencies, corrosion and its prevention, and the proper maintenance of all items of equipment in a wastewater treatment plant. The applicant should be familiar with various types of pumps commonly used in wastewater treatment plants, their advantages and disadvantages, and be able to calculate pump efficiencies. The applicant should know of the problems created by industrial wastes, their effect on the sewers, treatment plant, and receiving stream. The applicant should be able to measure, by various means, the flow

of wastewaters, to properly make composite samples, and to run the necessary physical, chemical and bacteriological tests necessary to provide the required degree of treatment prior to discharge into the receiving water.

(b) The applicant must submit an application showing that the applicant possesses an active North Carolina grade II certificate or equivalent and that one of the following prerequisite combinations of training and experience has been met in order to take the grade III examination:

(1) four years of acceptable experience in a North Carolina class II, or equivalent, wastewater treatment plant or higher;

(2) graduate of high school, or equivalent GED, and three years of acceptable experience in a North Carolina class II, or equivalent, wastewater treatment plant or higher;

(3) two years of college or associate degree with academic preparation in chemistry, biology, public health, or related fields, and two years of acceptable experience in a North Carolina class II, or equivalent, wastewater treatment plant or higher;

(4) graduate of a recognized two year college or technical school, with an associate degree in environmental sciences, and 18 months of acceptable experience in a North Carolina class II, or equivalent, wastewater treatment plant or higher;

(5) graduate of a recognized college or university with a major in natural or physical sciences, engineering or related field, and one year of acceptable experience in a North Carolina class II or equivalent wastewater treatment plant or higher.

History Note: Statutory Authority G.S. 90A-39;
Eff. February 1, 1976;
Amended Eff. February 20, 1980.

.0204 GRADE IV WASTEWATER TREATMENT PLANT OPERATOR

(a) An applicant for a grade IV certificate (highest) shall be expected to have more specific knowledge covering the entire field of wastewater treatment than the applicant for a grade III certificate. The applicant should have more advanced knowledge of the design and construction of wastewater treatment facilities as well as more advanced knowledge of the chemistry and biology involved in the various processes of wastewater treatment. The applicant should be familiar with various industrial wastes and know how to measure flow, sample and run the common physical, chemical and bacteriological tests necessary to provide the

proper pretreatment or treatment thereof. The applicant should 509
have a good knowledge of the proper operation and maintenance of 510
the various units in a modern wastewater treatment plant
including pumps, motors, and electrical equipment. The applicant 511
should be familiar with new developments in the field of 512
wastewater treatment and should have a good knowledge of the laws 513
and regulations relating to stream sanitation. The applicant 515
should be able to develop necessary records and prepare required
reports, etc. The applicant should be able to properly supervise 517
other employees and place into practice good public relations and 518
safety programs, etc.

(b) The applicant must submit an application showing that the 519
applicant possesses an active North Carolina grade III 520
certificate or equivalent and that one of the following 521
prerequisite combinations of training and experience has been met 522
in order to take the grade IV examination:

(1) five years of acceptable experience in a North Carolina 523
class III, or equivalent, wastewater treatment plant or 524
higher;

(2) graduate of high school, or equivalent GED, and four 525
years of acceptable experience in a North Carolina 526
class III, or equivalent wastewater treatment plant or 527
higher;

(3) two years of college or associate degree with academic 528
preparation in chemistry, bacteriology, public health, 529
or related fields and three years of acceptable 530
experience in a North Carolina class III, or
equivalent, wastewater treatment plant or higher; 531

(4) graduate of a recognized two year college or technical 532
school, with an associate degree in environmental 533
sciences, and 30 months of acceptable experience in a 534
North Carolina class III, or equivalent, wastewater
treatment plant or higher;

(5) graduate of a recognized college or university with a 535
major in natural or physical sciences, engineering, or 536
related field, and two years of acceptable experience 537
in a North Carolina class III, or equivalent, 538
wastewater treatment plant or higher.

History Note: Statutory Authority G.S. 90A-39; 541
Eff. February 1, 1976; 542
Amended Eff. February 20, 1980. 543

545
.0205 DEFINITIONS

(a) Acceptable experience shall mean the total time spent in 547
wastewater treatment plant operation and related fields of which 548

at least 50 percent must be actual operating experience in a wastewater treatment plant.

(b) Training school shall mean a non-degree technical course approved by the Wastewater Treatment Plant Operators Certification Commission.

(c) Recognized two year college or technical school shall mean an accredited two year institution awarding degrees on the associate level.

(d) Recognized college or university shall mean an accredited four-year institution awarding degrees on the bachelors level.

History Note: Statutory Authority G.S. 90A-39;
Eff. February 1, 1976;
Amended Eff. February 20, 1980.

.0206 WAIVER OF EXAMINATION ELIGIBILITY REQUIREMENTS

(a) The educational and/or experience requirements for eligibility for examinations for permanent certification may be waived by the commission, in its discretion, on a case-by-case basis provided it finds:

(1) The applicant is uniquely qualified through education and/or experience for the grade certification sought although the education or experience requirements in 8B .0201 to .0204 of this Chapter may not be strictly met; or

(2) That the plant at which the applicant is currently the operator in responsible charge has been reclassified a minimum of two grade levels higher, such that the applicant cannot meet all the education and/or experience requirements for certification at the grade to which the plant has been classified.

The declaration of eligibility for examination for certification to a grade by waiver of requirements is an extraordinary action in the sole discretion of the commission, and is not the right of any applicant.

(b) The procedure to be followed in requesting of the commission a waiver of the education and/or experience requirements for eligibility for examination for permanent certification shall be as follows:

(1) Applicant must petition the commission for a waiver of education or experience requirements;

(2) Petition must document the circumstances which qualify the applicant under (a)(1) or (2) of this Rule;

(3) Staff will review the petition and submit it to the commission at its next regularly scheduled meeting with the recommendations;

(4) The applicant may appear at the meeting at which the commission considers the petition;

(5) The commission will consider the petition, and decide whether or not to make a waiver in the applicant's case and the chairman shall inform the applicant in writing of the commission's decision.

History Note: Statutory Authority G.S. 90A-39;
Eff. February 15, 1978.

SECTION .0300 - CERTIFICATION BY EXAMINATION 607

.0301 TIME AND PLACE OF EXAMINATION 609

The certification commission or its representatives shall 611
conduct examinations for certification at the time and place 613
hereinafter designated:

(1) An examination will be given following the annual 614
wastewater treatment plant operators' school as sponsored 615
by the North Carolina Water Pollution Control Association 616
and the Wastewater Treatment Plant Operators Certification
Commission. The date, time, and place of examination will 617
be determined by the certification commission.
Announcements of the school and examination will be mailed 618
to the owners of all wastewater treatment plants and to
others as deemed appropriate by the certification 619
commission. Each applicant filing for examination will be
notified in writing of the date, time, and place of the 620
examination and the required grade for passing the 621
examination.

(2) Examinations may be administered following regional 622
wastewater treatment plant operator's schools. The 623
examination will be scheduled at the same location at 624
which the school is held or at another convenient 625
location. Announcements of the school will be mailed to 626
all wastewater treatment plants in the region in which the 627
school will be held. In addition, the date and time of 628
the examination will be announced at the school and each
applicant will be notified in writing of the date, time, 629
and place of the examination and the required grade for 630
passing the examination.

(3) Special examinations may be given by the commission at any 631
time or place when a sufficient number of applications 632
have been filed to justify an examination, as determined 633
by the commission. Each applicant filing for examination 634
will be notified in writing of the date, time, and place 635
of the examination and the required grade for passing the 636
examination.

History Note: Statutory Authority G.S. 90A-39; 93B-8; 639
Eff. February 1, 1976; 640
Amended Eff. February 20, 1980. 641

.0302 CONDUCTING AND GRADING EXAMINATIONS 643

Examinations, prepared by members of the commission or its 645
authorized representatives and approved by the commission, will 647
be given only to those who, after filing proper application, have 648

been determined to be eligible. Examinations will be conducted and graded under the supervision of a representative of the commission, or its authorized representatives. Assistance in conducting and grading the examinations may be sought from members of the division of environmental management, and other appropriate persons with the approval of the commission. Examinations will be prenumbered; therefore, examinee's paper will be identified by number rather than by name. When each examinee receives his examination paper, he will identify himself by way of his drivers license or other form of identification satisfactory to the proctor, and the identification number will be recorded on the face of the examination paper.

History Note: Statutory Authority G.S. 90A-39; 93B-8;
Eff. February 1, 1976;
Amended Eff. February 20, 1980; January 1, 1977.

.0303 EXAMINATION RESULTS AND ISSUANCE OF CERTIFICATES

(a) Within as short a period as feasible, after an examination, the examinee will be informed, in writing only, by the commission or its authorized representatives as to the results of his examination. If a passing score is made, such notification constitutes certification by the commission that the applicant is a qualified operator in the appropriate grade. After each examination, a list of those certified shall be drawn up and made a part of the permanent records of the commission. Copies of these lists will be provided each commission member and official approval of certification will be made by the commission at its regularly scheduled meetings. Upon completion of the lettering, the qualifying applicant will be issued a certificate designating his level of competency.

(b) Under normal circumstances, neither the examination grade nor the examination paper of any applicant will be made available to anyone other than the members of the commission and those approved persons who assist in conducting and grading the examinations. The examination papers will be held for a period of six months following notification to the examinee. Questions by the applicant concerning the examination must be made in writing to the commission within that period. An applicant who fails to pass an examination shall be entitled to and notified of the privilege to review his examination in the presence of one or more commission members or its authorized representative in the Raleigh office, or upon request, at a regional office of the Department of Natural Resources and Community Development, or other appropriate place.

(c) In order to assure active certification, a five dollar ($5.00) annual renewal fee will be required.

History Note: Statutory Authority G.S. 90A-39; 90A-40; 93B-3; 93B-8;
Eff. February 1, 1976;
Amended Eff. February 20, 1980; August 1, 1978; January 1, 1977.

.0304 CONDITIONAL CERTIFICATION

The certification commission may issue a conditional certification with examination when, in the opinion of the commission, the situation warrants special consideration. A conditional certificate with examination may be issued at the discretion of the commission when the commission finds that this is most appropriate for ensuring the proper operation of wastewater treatment facilities. Conditional certificates with examination will generally be limited to circumstances where the nature of the wastes and wastewater treatment processes at certain facilities may be sufficiently different from conventional domestic wastewater treatment as to warrant the issuance of a conditional certificate with examination. The commission may require that proposals for conditional certification with examination include a training program in accordance with Rules 8E .0103 and 8E .0107(3) of this Chapter. Generally, such proposals will be considered only if rendered by an association representing the particular treatment facilities involved in a specific type process. A conditional certification with examination issued under these circumstances will be valid for use by the holder only in the type of treatment facility for which the operator is certified. Generally, these will be identified by a specific standard industrial classification number. In order to assure an active conditional certificate, a five dollar ($5.00) annual renewal fee will be required. A request for a conditional certificate with examination will be made by application and submitted with appropriate fee to the commission. Examination for conditional certification will be prepared and administered as directed by the certification commission.

History Note: Statutory Authority G.S. 90A-37; 90A-40(a); 90A-42(4);
Eff. February 1, 1976;
Amended Eff. February 20, 1980.

SECTION .0400 - CERTIFICATION WITHOUT EXAMINATION

.0401 VOLUNTARY CONVERSION TO MANDATORY CERTIFICATION

(a) Those certificates which were issued under the former voluntary certification program are not valid unless replaced by an official certificate under the mandatory program.

(b) Those who hold certificates under the former voluntary certification program will be certified in the grade of competency which they hold.

(c) Holders of such certificates shall make application to the commission for certificates in the appropriate grade. The applicant shall furnish proof, satisfactory to the commission, that he holds a voluntary certificate. The appropriate certificate fee shall accompany the application.

(d) Examples of proof which may be satisfactory to the commission follow:

(1) The applicant may submit a copy of his voluntary certificate or a copy of the letter which transmitted the certificate or a certified copy thereof;

(2) Records of the division of environmental management or the North Carolina Water Pollution Control Association may be used when these are available;

(3) Other proof satisfactory to the commission.

(e) If eligible, the applicant will be issued a permanent certificate designating his level of competency.

(f) In order to assure active certification, a five dollar ($5.00) annual renewal fee will be required.

History Note: Statutory Authority G.S. 90A-40(c);
Eff. February 1, 1976;
Amended Eff. February 20, 1980; January 1, 1977.

.0402 RECIPROCITY CERTIFICATION

(a) At the commission's discretion, permanent certificates may be issued, without examination, to holders of comparable certificates issued by other states, territories, or possessions of the United States.

(b) The applicant filing for a certificate under the reciprocity clause must submit an application on an official application blank, obtainable from the commission. The application must be accompanied by the appropriate fee. The applicant must submit a copy of his certificate or other proof, satisfactory to the commission, that he holds a certificate issued by a governmental agency of another state, territory or possession of the United States. Such certificate must have been received after passage of an examination at least equivalent to

that given by the North Carolina commission for the level of competency for which application is made and having met all other eligibility requirements. The application, fee, and copy of certificate shall be transmitted by a letter prepared by the owner of the facility in which the applicant is employed. The letter shall verify the employment status and permanent residence of the applicant. The burden of proof shall be upon the applicant. If, after receiving such an application, the commission is satisfied that the applicant qualifies for a certificate, it may, at its discretion award a certificate in the appropriate grade.

(c) A reciprocal certificate will not be issued unless the applicant is employed, or has accepted employment, in a North Carolina wastewater treatment facility and is a resident in the vicinity of the facility. If eligible, the applicant will be issued a permanent certificate designating his level of competency.

(d) In order to assure active certification, a five dollar ($5.00) annual renewal fee will be required.

History Note: Statutory Authority G.S. 90A-40(b);
Eff. February 1, 1976;
Amended Eff. February 20, 1980; January 1, 1977.

.0403 CONDITIONAL CERTIFICATION

History Note: Statutory Authority G.S. 90A-37; 90A-40(d);
Eff. February 1, 1976;
Amended Eff. February 20, 1980;
February 15, 1978; January 1, 1977;
Repealed Eff. July 1, 1983.

.0404 TEMPORARY CERTIFICATION

(a) Temporary certification, without examination, may be issued by the certification commission at its discretion. Temporary certificates may be issued with such special conditions or requirements relating to the place of employment of the person holding the certificate or other matters as the commission may deem necessary to protect the public health and maintain the water quality standards in the receiving waters as assigned by the Environmental Management Commission.

(b) Issuance of such temporary certificates shall be limited to situations where the supply of certified operators is found to be inadequate. Circumstances that will be considered by the commission include:

(1) A certified operator in a lower grade level is accumulating experience in order to qualify to take

examination in a higher grade level equal to the classification of the facility for which he is responsible;

(2) When an operator has attempted to secure permanent certification by taking examination and fails;

(3) An employer had unexpectedly lost a certified operator and must secure a certified operator in order to comply with the General Statutes.

(c) Application for a temporary certificate must be made on an official application blank, obtainable from the commission, and must be accompanied by the appropriate certification fee. It must also be accompanied by a statement signed by the mayor, the city manager, the chairman of the governing board or chief administrative officer of the political subdivision or from the owner or officer in responsible charge in the case of a private utility or industry. Such statement shall delineate the reasons why a temporary certificate is being requested, shall designate the applicant as the operator in responsible charge, and shall specify plans to acquire permanent certification by examination.

(d) Temporary certificates are valid for one year at the place of employment for which they are issued.

(e) A temporary certificate may only be requested for "temporary" situations and will be limited to the original one year of issuance plus one year additional renewal period for one individual. A temporary certificate or certificates will be valid at any individual wastewater treatment plant for no more than three consecutive years unless extreme extenuating circumstances are shown.

(f) If for any reason it becomes necessary for the employer to file an application requesting the issuance of a second temporary certificate, such application must be accompanied by documentation of the employer's efforts to employ a properly certified operator in addition to all applicable requirements for temporary certificate issuance.

(g) The applicant for a temporary certificate must possess the capability to become eligible for examination for permanent certification within the period of the requested temporary certificate. Upon becoming qualified by reason of experience, education and training, he is expected to apply for examination and obtain a permanent certificate. Failure to attempt permanent certification will be reason for not granting renewal.

(h) If eligible for temporary certification, the applicant will be issued a temporary certificate of a grade equivalent to the classification of the wastewater treatment facility in which the applicant is employed.

History Note: Statutory Authority G.S. 90A-40(e);

Eff. February 1, 1976;
Amended Eff. April 8, 1980; February 20, 1980;
February 15, 1978; January 1, 1977.

.0405 TEMPORARY CERTIFICATION RENEWAL

(a) Temporary certification renewal must be requested 60 days prior to the expiration date of a temporary certificate. The request must be made by application and accompanied by appropriate fee and a letter or statement prepared by the owner setting forth attempts made by the operator to become permanently certified by examination during the temporary certification period and a documentation of the efforts by the owner to secure a permanently certified operator, and any other information requested by the commission relative to the owner's inability to retain a permanently certified operator.

(b) No temporary certification renewal shall be issued if the operator lacks the capacity to become eligible for examination for permanent certification at the required grade within one year of renewal application date.

(c) The renewal request will be considered for approval by the certification commission and upon approval, a certificate will be issued with the understanding that the commission will not issue a second temporary certificate renewal to the same individual.

History Note: Statutory Authority G.S. 90A-40(e);
Eff. February 1, 1976;
Amended Eff. February 20, 1980;
February 15, 1978.

SECTION .0500 - FEES: REINSTATEMENT: AND ANNUAL REPORT 914 915

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.0501 SCHEDULE OF FEES 919

(a) Examination -- Fifteen Dollars ($15.00). This fee shall 919
accompany the application requesting examination and includes the 920
certificate fee provided certificate is earned. In order to 921
maintain the certificate, an annual renewal fee is required. 922

(b) Temporary Certificate -- Twenty-Five Dollars ($25.00). 923
This fee shall be submitted with application and a letter 924
prepared by the owner of the facility designating the operator in 925
responsible charge.

(c) Temporary Certificate Renewal -- Fifty Dollars ($50.00). 926
This fee shall be submitted with application and letter prepared 927
by the owner of the facility designating the operator in 928
responsible charge and which sets forth attempts by the operator 929
to secure permanent certification.

(d) Conditional Certificate -- Twenty-Five Dollars ($25.00). 930
This fee shall be submitted with application requesting 931
conditional certification. In order to maintain the certificate, 932
an annual renewal fee is required.

(e) Voluntary Conversion Certificate -- Ten Dollars ($10.00). 933
This fee shall be submitted with application requesting 934
certification which includes a copy of the certificate earned
under the voluntary certification program. In order to maintain 935
the certificate, an annual renewal fee is required.

(f) Reciprocity Certificate -- Twenty-Five Dollars ($25.00). 936
This fee shall be submitted with application requesting 937
certification which includes a copy of the certificate for which
certification by reciprocity is being requested. In order to 938
maintain the certificate, an annual renewal fee is required.

(g) Annual Renewal Fee -- Five Dollars ($5.00). All certified 939
operators will be billed annually in order to maintain active 940
certification. Annual renewal fees will not be required for 941
temporary certificate holders or for certified operators who earn 942
their certificates within six months of the date the annual
renewal fee is due.

(h) Replacement of Certificate -- Five Dollars ($5.00). This 943
fee shall be submitted when requesting replacement of certificate 944
due to loss, damage or misplacement.

(i) Reinstatement of Operator Certification After Lapse for 945
Nonpayment of Annual Renewal Fee -- Five Dollars ($5.00). This 946
fee is in addition to the regular annual renewal fee called for
in (g) of this Rule.

History Note: Statutory Authority G.S. 90A-42; 949

Eff. February 1, 1976;
Amended Eff. February 20, 1980; January 1, 1977.

.0502 REFUNDING FEES

(a) Examination. An examination fee will only be refunded by the commission when the applicant notifies the commission prior to the examination date of his inability to take the examination on the date scheduled. Only two-thirds or ten dollars ($10.00) of the fifteen dollars ($15.00) fee will be refunded except in the case of conditional examination, the refund will be twenty dollars ($20.00) of the twenty-five dollars ($25.00) fee. Refunds will not be made when applicant fails to notify the commission of his inability to take the examination. No portion of this fee will be refunded upon failure to pass examination. This fee is not transferable to another scheduled examination unless the commission is notified by the applicant prior to the originally scheduled examination date. The entire fee will be refunded when applicant is found to be ineligible to take examination.

(b) Temporary Certification. A temporary certification fee will only be refunded when an applicant is ineligible for temporary certification.

(c) Temporary Certification Renewal. A temporary certification renewal fee will only be refunded when an applicant is ineligible for temporary certification renewal.

(d) Reciprocity Certification. A fee for certification by reciprocity will only be refunded when the applicant is ineligible for certification.

(e) Voluntary Conversion Certification. A fee for certification by voluntary conversion will only be refunded when proof of certification under the voluntary certification program cannot be shown.

(f) Conditional Certification. A fee for conditional certification will only be refunded when such certification is not approved by the certification commission.

History Note: Statutory Authority G.S. 90A-42;
Eff. February 1, 1976;
Amended Eff. July 1, 1983.

.0503 REINSTATEMENT OF OPERATOR CERTIFICATION

Reinstatement of Certificate After Lapse. If a certificate is allowed to lapse by reason of non-payment of annual renewal fee, it may be reinstated by payment of five dollars ($5.00) in addition to the regular annual renewal fee of five dollars ($5.00).

History Note: Statutory Authority G.S. 90A-40; 90A-43; 997
Eff. February 1, 1976; 998
Amended Eff. February 20, 1980. 999

.0504 ANNUAL REPORT 1001
The certification commission shall file with the Secretary of 1003
State and with the Attorney General an annual financial report, 1004
and an annual report containing the following information: 1005
(1) the address of the commission, and the names of its 1006
members and officers; 1007
(2) the number of persons who applied to the commission for 1009
examination;
(3) the number who were refused examination; 1011
(4) the number who took the examination; 1012
(5) the number to whom initial certificates were issued; 1013
(6) the number who applied for certification by reciprocity or 1016
comity;
(7) the number who were granted certificates by reciprocity or 1018
comity;
(8) the number of certificates suspended or revoked; and 1019
(9) the number of certificates terminated for any reason other 1022
than failure to pay the required renewal fee.
The report required by this Rule shall be open to public 1023
inspection. 1024

History Note: Statutory Authority G.S. 93B-2; 1027
Eff. February 1, 1976. 1028

.0505 FEES FOR MAILING LISTS 1030
Upon receipt of requests for mailing lists of wastewater 1032
treatment plant operators and/or plants, such mailing list shall 1034
be made available upon payment of fees at a rate of five dollars 1035
($5.00) per 100 names of facilities and/or certified operators, 1036
with a minimum payment of fifty dollars ($50.00). Fees will not
be applicable in circumstances where owners of wastewater 1037
treatment plants need lists of certified operators that are 1038
available in their areas for employment.

History Note: Statutory Authority G.S. 90A-42; 90A-43; 1041
Eff. January 1, 1977; 1042
Amended Eff. February 20, 1980. 1043

SUBCHAPTER 8C - CLASSIFICATION OF WASTEWATER TREATMENT FACILITIES

.0001 RATING WASTEWATER TREATMENT FACILITIES

(a) The certification commission shall rate and classify all wastewater pretreatment and treatment facilities under the jurisdiction of the Environmental Management Commission. In addition, the commission shall rate and classify those sewage disposal facilities having design capacities in excess of 3,000 gallons per day and non-discharging to surface waters. In making classifications, the commission shall give due regard, among other factors, to the size of the facility, the nature of the wastes to be treated or removed from the wastewater, the treatment process to be employed, and the degree of skill, knowledge and experience that the operator of the wastewater treatment facility must have to supervise the operation of the facility so as to adequately protect the public health and maintain the water quality standards in the receiving waters as assigned by the Environmental Management Commission.

(b) In-plant processes and related control equipment which are an integral part of industrial production shall not be considered waste treatment for the purpose of this Section. Likewise, discharges of wastewater from residences having a design flow of 1,000 gpd or less, shall not be subject to the provisions of this Section.

History Note: Statutory Authority G.S. 143-215.1(c);
143-215.1(d); 130-160; 90A-37;
Eff. February 1, 1976.

.0002 RATING SCALE FOR CLASSIFICATION OF FACILITIES

The following scale is used for rating wastewater treatment facilities:

	ITEM	POINTS
(1)	Pretreatment Units (see definition No. 34)	2
(2)	DESIGN FLOW OF PLANT IN gpd (not applicable to non-contaminated cooling waters and non-discharging systems)	
	0 -- 20,000	1
	20,001 -- 50,000	2
	50,001 -- 100,000	3
	100,001 -- 250,000	4
	250,001 -- 500,000	5
	500,001 -- 1,000,000	8
	1,000,001 -- 2,000,000	10

2,000,001 (and up)- rate 1 point additional for each 200,000 gpd capacity up to a maximum of:................ 30

Design Flow (gpd): _______________

(3) Preliminary UNITS (see definition no. 35)

(a) Influent Pumps (including air lift)... 3

(b) Bar Screens........................... 1

or

(c) Mechanical Screens, Static Screens or or Comminuting Devices.................. 2

(d) Grit Removal.......................... 1

or

(e) Mechanical or Aerated Grit Removal.... 2

(f) Flow Measuring Device................. 1

or

(g) Instrumented Flow Measurement......... 2

(h) Preaeration or Equalization........... 1

(i) Grease or Oil Separators -- Gravity... 2

Mechanical. 3

Aerated.... 5

(j) Chemical Conditioning................. 5

(4) PRIMARY TREATMENT UNITS

(a) Septic Tank (see definition no. 44)... 2

(b) Imhoff Tank........................... 3

(c) Primary Clarifiers (including sludge air lifts)........................... 5

(d) Settling Ponds or Settling Tanks for Inorganic Non-toxic Materials Involving a Discharge to the Surface Waters (sand, gravel, stone, and other mining operations except recreational activities such as gem or gold mining)............................ 10

(5) SECONDARY TREATMENT UNITS

(a) Carbonaceous Stage

(i) Aeration - High Purity Oxygen System.......................... 20

Diffused Air System... 10

Mechanical Air System (fixed, floating or rotor)............... 8

Separate Sludge Reaeration............ 3

(ii) Trickling Filer - High Rate...... 7

Standard Rate.. 5

Packed Tower... 5

(iii) Aerated Lagoons................. 10

(iv)	Rotating Biological Contractors (biodisc)........................	10
(v)	Sand Filters (intermitten biological)........................	2
(vi)	Stabilization Lagoons with Outlet to Stream........................	5
(vii)	Clarifier (including sludge air lifts)........................	5
(b)	Nitrogenous Stage	
(i)	Aeration - High Purity Oxygen System........................	20
	Diffused Air System...	10
	Mechanical Air System (fixed, floating, or rotor)................	8
	Separate Sludge Reaeration............	3
(ii)	Trickling Filter - High Rate.....	7
	Standard Rate.	5
	Packed Tower..	5
(iii)	Rotating Biological Contactors (biodisc)........................	10
(iv)	Sand Filter (intermittent biological)........................	2
(v)	Clarifier (including sludge air lifts)........................	5
(6)	TERTIARY OR ADVANCED TREATMENT UNITS	
(a)	Activated Carbon Beds - without carbon regeneration..	5
	with carbon regeneration..	15
(b)	Powdered or Granular Activated Carbon Feed - without carbon regeneration..	5
	with carbon regeneration..	15
(c)	Ammonia Stripping	18
(d)	Chemical Additions........................	5
(e)	Denitrification Process (separate process)	10
(f)	Electrodialysis........................	5
(g)	Foam Separation........................	5
(h)	Ion Exchange........................	5
(i)	Land Application (see definition no. 23b) .... [not applicable for facilities under	5

10 (a)]	
(j) Microscreens..........................	5
(k) Phosphorus Removal....................	20
(l) Polishing Ponds - without aeration....	2
with aeration.......	5
(m) Post Aeration - cascade...............	0
diffused or mechanical	5
(n) Pre-Package Unit for Removal of Oil and Grease..........................	30
(o) Reverse Osmosis.......................	5
(p) Sand or Mixed-Media Filters -- low rate...	2
high rate..	5
(7) SLUDGE TREATMENT	
(a) Sludge Digestion Tank -- Heated.......	10
Aerobic......	5
Unheated.....	3
(b) Sludge Stabilization (chemical or thermal)............................	10
(c) Sludge Drying Beds	2
(d) Sludge Elutriation....................	5
(e) Sludge Conditioner (chemical or thermal)............................	5
(f) Sludge Thickener......................	2
(g) Sludge Gas Utilization (including gas storage)............................	2
(h) Sludge Holding Tank - Aerated.........	5
Non-aerated.....	2
(i) Sludge Incinerator (not including activated carbon regeneration)........	10
(j) Vacuum Filter, Centrifuge or Filter Press.............................	10
(8) SLUDGE DISPOSAL (including incinerated ash)	
(a) Lagoons...............................	2
(b) Land Application (surface and subsurface) (see definition 23a)........	10
(c) Landfilled (burial)..................	5
(9) DISINFECTION	
(a) Pre...................................	1
(b) Intermediate..........................	2
(c) Post..................................	3
(d) Dechlorination........................	5
(e) Chlorine or Ozone Generation..........	5
(f) Radiation.............................	3
(10) MISCELLANEOUS UNITS	
(a) Holding Ponds or Holding Tanks for Inorganic, Non-toxic Materials with	

no Discharge to the Surface Waters.... 2
(Sludge handling facilities for water purification plants, sand, gravel, crushed stone and other similar operations--see definition no. 10).

(b) Holding Ponds or Holding Tanks for Organic or Toxic Materials with no Discharge to the Surface Waters....... 4
(Any pump, valve, or other mechanical control subject to failure creating a potential for bypass or discharge from the holding ponds or tanks will necessitate a minimum classification of class I requiring a certified operator.)

(c) Holding Pond for Effluent Flow Equilization and/or Stage Discharge................ 5

(d) Effluent Pumps......................... 3

(e) In-Plant Pumps (including air lifts).. 2

(f) Stand-By Power Supply................. 3

(g) Thermal Pollution Control Device...... 3

(h) Treatment Processes for Removal of Metal or Cyanide and Other Toxic Materials.............................. 30

TOTAL POINTS ______

CLASSIFICATION

Class I..................................5 - 25 Points
Class II.................................26 - 50 Points
Class III................................51 - 65 Points
Class IV.................................66 - Up Points

Facilities having a rating of one through four points, inclusive, do not require a certified operator. Classification of all other facilities requires a comparable grade operator in responsible charge.

History Note: Statutory Authority G.S. 90A-37;
Eff. February 1, 1976;
Amended Eff. July 1, 1983; February 15, 1978.

.0003 CLASSIFICATION CATEGORIES

History Note: Statutory Authority G.S. 90A-37;
Eff. February 1, 1976;
Repealed Eff. July 1, 1983.

1293

.0004 DEFINITIONS 1295

The following definitions shall apply throughout this 1296
Subchapter:

(1) Activated Carbon Beds. A physical/chemical method for 1297
reducing soluble organic material from wastewater 1298
effluent; The column-type beds used in this method will 1299
have a flow rate varying from two to eight gallons per 1300
minute per square foot and may be either upflow or
downflow carbon beds. Carbon may or may not be 1301
regenerated on the wastewater treatment plant site;

(2) Aerated Lagoons. A basin in which all solids are 1302
maintained in suspension and by which biological oxidation 1303
or organic matter is reduced through artificially 1304
accelerated transfer of oxygen on a flow-through basis;

(3) Aeration. A process of bringing about intimate contact 1305
between air or high purity oxygen and a liquid by 1306
spraying, agitation or diffusion;

(4) Ammonia Stripping. A process by which the ammonium ion is 1307
first converted to dissolved ammonia (pH adjustment) with 1308
the ammonia then released to the atmosphere by physical 1309
means;

(5) Carbon Regeneration. The regeneration of exhausted carbon 1310
by the use of a furnace to provide extremely high 1311
temperature which volatilize and oxidize the absorbed 1312
impurities;

(6) Carbonaceous/Combined Carbon and Nitrogen Stage. A 1313
stage(s) of wastewater treatment designed to achieve 1314
"secondary" effluent limits, or a single stage treatment 1315
plant that can achieve advanced effluent limits within the 1316
same biological reactor;

(7) Centrifuge. A mechanical device in which centrifugal 1317
force is used to separate solids from liquids and/or to 1318
separate liquids of different densities; 1319

(8) Chemical Additions. The addition of chemical(s) to 1320
wastewater for purposes of improving solids removal, pH 1321
adjustment, alkalinity control, etc.; 1322

(9) Chemical Sludge Conditioning. The addition of a chemical 1323
compound such as lime, ferric chloride, or a polymer to 1324
wet sludge to coalesce the mass prior to its application 1325
to a dewatering device;

(10) Closed Cycle Systems. Use of holding ponds or holding 1327
tanks for containment of wastewater containing inorganic, 1328
non-toxic materials from sludge handling facilities for 1329
water purification plants; wastewater from sand, gravel, 1330
crushed stone or other similar operations, from which
there is no discharge to the surface waters; Such systems 1331

shall carry a maximum of two points regardless of pumping facilities or any other appurtenances;

(11) De-chlorination. The partial or complete reduction of residual chlorine in a liquid by any chemical or physical process;

(12) Denitrification Process. The conversion of nitrate-nitrogen to nitrogen gas;

(13) Effluent Pumps. Pumps used for lifting treated wastewater from the plant to a discharge point;

(14) Electrodialysis. Process for removing ionized salts from water through the use of ion-selective ion-exchange membranes;

(15) Filter Press. A process operated mechanically for partially dewatering sludge;

(16) Foam Separation. The planned frothing of wastewater or wastewater effluent as a means of removing excessive amounts of detergent materials through the introduction of air in the form of fine bubbles; also called foam fractionation;

(17) Grit Removal. The process of removing grit and other heavy mineral matter from wastewater;

(18) Imhoff Tank. A deep two story wastewater tank consisting of an upper sedimentation chamber and a lower sludge digestion chamber;

(19) Influent Pumps. Pumps which are located in a treatment plant before primary treatment;

(20) In-plant Pumps. Pumps essentially located within the treatment plant to provide continuous multi-stage treatment, including sludge pumps and recirculation pumps;

(21) Instrumented Flow Measurement. A device which indicates and/or records rate of flow;

(22) Ion Exchange. A chemical process in which ions from two different molecules are exchanged;

(23) Land application:

(a) Sludge Disposal. A final sludge disposal method by which wet sludge may be applied to land either by spraying on the surface or by subsurface injection (i.e., chisel plow); [not applicable for types of sludge described in (10) of this Rule];

(b) Wastewater. The process of spraying wastewater onto a land area or other methods of application of wastewater onto a land area as a means of final disposal;

(24) Microscreen. A low speed, continuously back-washed, rotating drum filter operating under gravity conditions as a polishing method for removing suspended solids from effluent;

(25) Nitrification Process. The biochemical conversion of unoxidized nitrogen (ammonia and organic nitrogen) to oxidize nitrogen (usually nitrate);

(26) Nitrogenous Stage. A separate stage of wastewater treatment designed for the specific purpose of converting ammonia nitrogen to nitrate nitrogen;

(27) Phosphate Removal. The removal of phosphate from wastewater by chemical precipitation or other means;

(28) Polishing Pond. A holding pond following secondary treatment with sufficient detention time to allow settling of finely suspended solids;

(29) Post Aeration. Aeration following conventional secondary treatment units to increase effluent D.O. or for any other purpose;

(30) Post Aeration. (Cascade) A polishing method by which dissolved oxygen is added to the effluent by a nonmechanical, gravity means of flowing down a series of steps or weirs; The flow occurring across the steps or weirs moves in a fairly thin layer and the operation of the cascade requires no operator adjustment; thus, zero points are assigned even though this is an essential step to meeting the limits of the discharge permit;

(31) Powdered or Granular Activated Carbon Feed. A biophysical carbon process that utilizes biological activity and organic absorption by using powdered or granular activated carbon; Virgin and/or regenerated carbon is feed controlled into the system;

(32) Preaeration or Equalization. A tank so constructed to provide aeration prior to primary treatment or equalize flow through the plant;

(33) Pre-packaged Unit for Removal of Oil and Grease. A unit used for the removal of oil and greese from wastewater by chemical precipitation, mechanical devices, or other means of separation;

(34) Pre-treatment. The conditioning of a waste at its source before discharge, to remove or to neutralize substances injurious to sewers and treatment processes or to effect a partial reduction in load on the treatment process;

(35) Preliminary Units. In the treatment process, unit operations, such as screening and comminution, that prepare the liquor for subsequent major operations;

(36) Primary Clarifiers. The first settling tanks through which wastewater is passed in a treatment works for the purpose of removing settleable and suspended solids and BOD which is associated with the solids;

(37) Radiation. Disinfection and/or sterilization process utilizing devices emitting ultraviolet or gamma rays;

(38) Reverse Osmosis. A treatment process in which a heavy contaminated liquid is pressurized through a membrane forming nearly pure liquid free from suspended solids;

(39) Rotating Biological Contactors. A fixed biological growth process in which wastewater flows through tanks in which a series of partially submerged circular surfaces are rotated;

(40) Sand Filters (Intermittent Biological). Filtration of effluent following septic tanks, lagoons, or some other treatment process in which further biodecomposition is expected to produce desired effluents; Hydraulic loading rates on these filters are computed in gpd/ac and have a resulting low gpm/sf (less than one);

(41) Sand or Mixed-Media Filters. A polishing process by which effluent limits are achieved through a further reduction of suspended solids:

(a) low rate -- gravity, hydraulically loaded filter with loading rates in the one to three gmp-sf range;

(b) high rate -- a pressure, hydraulically loaded filter with loading rates in the five gmp/sf range; At any rate, the loading rate will exceed three gmp/sf;

(42) Secondary Clarifiers. A tank which follows the biological unit of a treatment plant and which has the purpose of removing sludges associated with the biological treatment units;

(43) Separate Sludge Reaeration. A part of the contact stabilization process where the activated sludge is transferred to a stabilization tank where aeration is continued before returning it to the aeration basin;

(44) Septic Tank. A single-story settling tank in which settled sludge is in contact with the wastewater flowing through the tank; shall not be applicable for septic tank systems serving single family residences having capacity of 2,000 gallons or less or which do not result in a discharge to surface waters;

(45) Sludge Conditioner (Thermal). A conditioning process by which heat is added for a protracted period of time to improve the dewaterability of sludge by the solubilizing and hydraulizing of the smaller and more highly hydrated sludge particles;

(46) Sludge Digestion. The process by which organic or volatile matter and sludge is gasified, liquefied, mineralized or converted into more stable organic matter through the activity of living organisms, which includes aerated holding tanks;

_(47) Sludge Drying Beds. An area comprising natural or artificial layers of porous materials upon which digested sewage sludge is dried by drainage and evaporation;

_(48) Sludge Elutriation. A process of sludge conditioning in which certain constituents are removed by successive washings with fresh water or plant effluent;

_(49) Sludge Gas Utilization. The process of using sewage gas for the purpose of heating buildings, driving engines, etc.;

_(50) Sludge Holding Tank (Aerated and Nonaerated). A tank utilized for small wastewater treatment plants not containing a digester in which sludge may be kept fresh, and supernatant withdrawn prior to a drying method (i.e. sludge drying beds); This may be done by adding a small amount of air simply to keep the sludge fresh, but not necessarily an amount that would be required to achieve stabilization of organic matter. A nonaerated tank would simply be used to decant sludge prior to dewatering and would not allow long periods (several days of detention) without resulting odor problems;

_(51) Sludge Incinerators. A furnace designed to burn sludge and to remove all moisture and combustible materials and reduce the sludge to a sterile ash;

_(52) Sludge Stabilization (Chemical or Thermal). A process to make treated sludge less odorous and putrescible, and to reduce the pathogenic organism content; This may be done by pH adjustment, chlorine dosing, or by heat treatment;

_(53) Sludge Thickener. A type of sedimentation tank in which the sludge is permitted to settle and thicken through agitation and gravity;

_(54) Stabilization Lagoon. A type of oxidation lagoon in which biological oxidation of organic matter is effected by natural transfer of oxygen to the water from air (not a polishing pond);

_(55) Stand-By Power Supply. On site or portable electrical generating equipment;

_(56) Static Screens. A stationary screen designed to remove solids, including non-biodegradable particulate (floatable solids, suspended solids and BOD reduction) from municipal and industrial wastewater treatment systems;

_(57) Tertiary Treatment. A stage of treatment following secondary which is primarily for the purpose of effluent polishing; A settling lagoon or sand or coal filter might be employed for this purpose;

_(58) Thermal Pollution Control Device. A device providing for the transfer of heat from a fluid flowing in tubes to

another fluid outside the tubes, or vice versa; or, other means of regulating liquid temperatures;

(59) Toxic Materials. Those wastes or combinations of wastes, including disease-causing agents which after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly from the environment or indirectly by ingestion through food chains, will cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring; Toxic materials include, by way of illustration and not limitation: lead, cadmium, chromium, mercury, vanadium, arsenic, zinc, ortho-nitro-chlorobenzene (ONCB), polychlorinated biphenyls (PCBs) and dichlorodiphenyl trichloroethane (DDT); and any other materials that have or may hereafter be determined to have toxic properties;

(60) Trickling Filter. A biological treatment unit consisting of a material such as broken stone or rock over which wastewater is distributed; A high rate trickling filter is one which is operated at between 10 and 30 mgd per acre. A low rate trickling filter is one which is designed to operate at one to four mgd per acre;

(61) Trickling Filter (Packed Tower). A plug flow type of operation in which wastewater flows down through successive layers of media or filtrate material; Organic material is removed continually by the active biological fixed growth in each successive layer. This method may produce "secondary" quality effluent, or may be adapted to produce a nitrified effluent;

(62) Vacuum Filters (Centrifuges or Filter Presses). Devices which are designed to remove excess water from either digested or undigested sludge prior to disposal or further treatment.

History Note: Statutory Authority G.S. 90A-37;
Eff. February 1, 1976;
Amended Eff. July 1, 1983; March 18, 1980;
February 20, 1980; February 15, 1978.

SUBCHAPTER 8D - POWERS AND ENFORCEMENT

.0001 POWERS

History Note: Statutory Authority G.S. 143B-300;
Eff. February 1, 1976;
Repealed Eff. July 1, 1983.

.0002 CLASSIFICATION OF WASTEWATER TREATMENT FACILITIES

(a) The certification commission shall classify wastewater treatment facilities in accordance with the rating scale set out in Subchapter 8C of this Title.

(b) An owner of a facility may appeal the classification assigned to his facility by filing a written request with the commission within 60 days of notice of the assignment. In such instances, the commission shall provide a hearing in accordance with 15 NCAC 8A .0302.

History Note: Statutory Authority G.S. 90A-35; 90A-37;
150A-3; 150A-23;
Eff. February 1, 1976;
Amended Eff. January 1, 1977.

.0003 CERTIFIED OPERATORS REQUIRED

History Note: Statutory Authority G.S. 90A-35; 90A-43;
90A-44; 150A-3; 150A-23;
Eff. February 1, 1976;
Repealed Eff. July 1, 1983.

.0004 REVOCATION OF CERTIFICATION

(a) The certification commission may revoke the certification of an operator when it is found that the operator has practiced fraud or deception; that reasonable care, judgement, or the application of his knowledge or ability was not used in the performance of his duties; or that the operator is incompetent or unable to properly perform his duties.

(b) Notice of proposed revocation shall be given the operator personally or by registered mail at least 20 days prior to taking action. The notice shall contain the alleged facts or conduct upon which the proposed revocation is based and shall inform the operator of the opportunity to contest the action. The procedures to be followed shall be as specified in 15 NCAC 8A .0302.

History Note: Statutory Authority G.S. 90A-41;

150A-3; 150A-23;
Eff. February 1, 1976;
Amended Eff. January 1, 1977.

.0005 NOTIFICATION TO ENVIRONMENTAL MANAGEMENT COMMISSION

The commission shall notify the Environmental Management Commission of the failure of an owner of a wastewater treatment facility to provide a certified operator or of the revocation of the certificate of any operator.

History Note: Statutory Authority G.S. 90A-35; 90A-43;
Eff. February 1, 1976.

SUBCHAPTER 8E - TRAINING WASTEWATER TREATMENT PLANT OPERATORS

SECTION .0100 - SCHOOLS: SPECIAL COURSES: LABORATORIES: FILM LIBRARY: AND OTHER OPPORTUNITIES

History Note: Statutory Authority G.S. 90A-43;
Eff. February 1, 1976;
Repealed Eff. July 1, 1983.

SECTION .0200 - STUDY MATERIALS ADOPTED

.0201 OFFICIAL TEXT BOOKS
.0202 ADDITIONAL STUDY MATERIALS

History Note: Statutory Authority G.S. 90A-43;
Eff. February 1, 1976;
Repealed Eff. February 15, 1978.

.0203 STUDY MATERIALS
.0204 AVAILABILITY OF STUDY MATERIAL LIST

History Note: Statutory Authority G.S. 90A-43;
Eff. February 15, 1978;
Repealed Eff. July 1, 1983.

APPLICATION FOR CERTIFICATION

as

Wastewater Treatment Plant Operator
to the
Wastewater Treatment Plant Operators Certification Commission

A. INSTRUCTIONS

1. Read carefully the instructions before filling out application.
2. Application shall be typed or legibly filled out by applicant in ink and sent to Chairman, Certification Commission, North Carolina Department of Natural Resources and Community Development, P.O. Box 27687, Raleigh, North Carolina 27611.
3. Application shall be carefully and completely filled out. Each statement must be true and correct. All statements are subject to investigation. Incomplete or incorrect statements on the application may be cause for disapproval.
4. If examination is required, application must be on file in the Office of the Chairman, Certification Commission, at least 20 working days prior to but not including the date of examination. **Applications received after the application due date cannot be processed and will be returned to the applicant.**
5. **FEES:** (Fees must accompany applications.)

Examination	- $15.00*	Conditional Certificate	- $25.00
Temporary Certificate	- $25.00	Conversion from Voluntary Program	- $10.00
Temporary Certificate Renewal	- $50.00	Reciprocity Certificate	- $25.00

* (Includes Certificate if Earned)

Make check or money order payable to Wastewater Treatment Plant Operators Certification Commission.

6. Application must be signed by applicant in Section H; and applicant's supervisor in Section I. All attachments to application must also be signed by applicant and supervisor.
7. If applying for certification by examination, **please read carefully the eligibility requirements on page 2 of this application before continuing.**

B. APPLICATION

Application is hereby made for certification under the provisions of Article 3, Chapter 90A, General Statutes of North Carolina as a Wastewater Treatment Plant Operator.

Circle Grade Applied For: I II III IV

CHECK ONE: With Examination ( ) Place of Examination: ______________________
*Temporary ( ) **Conversion From Voluntary Program ( )
Conditional ( ) **Reciprocity ( )

*An appropriate letter as designated in the "N.C. Administrative Code" adopted by the Certification Commission must accompany application requesting Temporary Certification.
**A photographic copy of certificate to be converted should accompany application.

Mr.
Mrs.
Ms.
Name of Applicant Miss ______________________________ ______________
(As you wish it to appear on certificate.) Application Date

Position Title ______________________ Social Security No. ____________

Employer's Name ______________________ Telephone Number ____________

Place of Employment ____
(Street) (City) (State) (Zip Code)

Name of Plant ______________ Class of Plant ______ Telephone Number ____________

Name of Operator in Responsible Charge of Plant ______________________

Certificates Presently Held by Applicant: Wastewater — Grade ______ Number ________ Year ______
Water — Grade ______ Number ________ Year ______
Annual Renewal Number ________ Year ______

C. ELIGIBILITY REQUIREMENTS FOR TAKING EXAMINATION

MINIMUM REQUIREMENTS OF EDUCATION AND EXPERIENCE FOR CERTIFIED WASTEWATER TREATMENT PLANT OPERATORS

STATUTORY AUTHORITY G.S. 90A-39 EFF. FEBRUARY 1980

GRADE I

(1) 3 years of acceptable experience in WTP* operation; or,

(2) completion of 8th grade of school and 2 years of acceptable experience in WTP operation; or,

(3) 1 approved training school for WTP operators and 1 year of acceptable experience in WTP operation; or,

(4) graduate of a high school, or equivalent GED, and 3 months of acceptable experience in WTP operation; or,

(5) graduate of a high school or equivalent GED or a two or four year college and completion of approved training school.

GRADE II

(1) 1 approved training school for WTP* operators and 2 years of acceptable experience in a N.C. Class I, or equivalent WTP or higher; or,

(2) a N,C. Grade I certificate, or equivalent, and 1 year of acceptable operator experience in a N.C. Class I, or equivalent, WTP or higher; or,

(3) graduate of high school, or equivalent GED and 6 months of acceptable experience in a N.C. Class I, or equivalent, WTP or higher; or,

(4) graduate of a recognized 2 year college or technical school or college or university and 6 months of acceptable experience in wastewater treatment operation.

*Wastewater Treatment Plant

GRADE III

An active N.C. Grade II certificate and one of the following:

(1) 4 years of acceptable experience in a N.C. Class II, or equivalent, WTP* or higher; or,

(2) graduate of high school, or equivalent GED, and 3 years of acceptable experience in a N.C. Class II, or equivalent, WTP or higher; or,

(3) 2 years of college or associate degree with academic preparation in chemistry, biology, public health, or related fields, and 2 years of acceptable experience in a N.C. Class II, or equivalent, WTP or higher; or,

(4) graduate of a recognized 2 year college or technical school, with an associate degree in environmental sciences, and 18 months of acceptable experience in a N.C. Class II, or equivalent, WTP or higher; or,

(5) graduate of a recognized college or university with a major in natural or physical sciences, engineering or related field, and 1 year of acceptable experience in a N.C. Class II, or equivalent WTP or higher.

GRADE IV

An active N.C. Grade III certificate and one of the following:

(1) 5 years of acceptable experience in a N.C. Class III, or equivalent, WTP* or higher; or,

(2) graduate of high school, or equivalent GED, and 4 years of acceptable experience in a N.C. Class III, or equivalent WTP; or,

(3) 2 years of college or associate degree with academic preparation in chemistry, bacteriology, public health, or related fields, and 3 years of acceptable experience in a N.C. Class III, or equivalent, WTP or higher; or,

(4) graduate of a recognized 2 year college or technical school, with an associate degree in environmental sciences, and 30 months of acceptable experience in a N.C. Class III, or equivalent, WTP or higher; or,

(5) graduate of a recognized college or university with a major in natural or physical sciences, engineering, or related field, and 2 years of acceptable experience in a N.C. Class III, or equivalent, WTP or higher.

DEFINITIONS

1. **Acceptable Experience** — The total time spent in wastewater treatment plant operation and related fields (See Section G for related fields) of which at least 50 per cent must be actual operating experience in a wastewater treatment plant.
2. **Training School** — Shall mean a non-degree technical course approved by the Wastewater Treatment Plant Operators Certification Commission.
3. **Recognized Two Year College or Technical School** — Shall mean an accredited two year institution awarding degrees on the associate level.
4. **Recognized College or University** — An accredited four-year institution awarding degrees on the bachelors level.

D. ACADEMIC

1. Circle highest school grade completed: 1 2 3 4 5 6 7 8 9 10 11 12

Graduated Yes _____ No _____ (High School Equivalency) GED _____

Indicate School _____ And Place _____

2. College Attended _____ Location _____

Dates _____ to _____

Equivalent years completed, circle one: 1 2 3 4 Graduate Work _____

Did you receive your degree? Yes _____ No _____ If so, give date _____

Kind of Degree: Major _____ Minor _____

E. IN SERVICE TRAINING (List Location of Each and Year Attended)

Annual Short Courses: _____

Regional Schools: _____

Other Related Training: _____

F. ACTUAL OPERATING EXPERIENCE IN A WASTEWATER TREATMENT PLANT

(See page 2, Section C, Definition No. 1)

List below positions held in wastewater treatment plant operation employment. Attach additional sheet, if needed.

EMPLOYED				NAME OF EMPLOYER City or Firm - Location	TITLE AND DUTIES (Describe Actual Work Performed)	CLASS of PLANT
From		To				
Mo.	Yr.	Mo.	Yr.			

G. RELATED EXPERIENCE

List below positions held in fields related to wastewater treatment operation. (The Commission has recognized the fields of Water Facility Operator; Wastewater Laboratory — Chemist, Lab. Tech., etc.; Operation & Maintenance of Wastewater Collection Systems; Operation and Maintenance of Water Distribution Systems; Project Engineers involved in both designing and overseeing construction of WTP's.) Other related experience must be justified by the applicant. Attach additional sheet, if needed.

EMPLOYED				NAME OF EMPLOYER City or Firm - Location	TITLE AND DUTIES (Describe Actual Work Performed)	CLASS of PLANT
From		To				
Mo.	Yr.	Mo.	Yr.			

H. APPLICANT'S STATEMENT OF CERTIFICATION

I certify that the information given is correct to the best of my knowledge. I understand that recording false information may lead to revocation of certificate.

Applicant's Signature: ______________________ Date: __________ Res. Telephone Number __________

Res. Mailing Address: ____
(Street) (City) (State) (Zip Code)

I. RECOMMENDATION BY APPLICANT'S SUPERVISOR:

I have reviewed this application and hereby verify that all statements are true and correct to the best of my knowledge. I, therefore, recommend that applicant be considered for certification by the Certification Commission. I understand that I am responsible for verifying the experience of applicant and that false information can lead to revocation of the certificate.

Name of Supervisor: ______________________ Title: ______________________
(Please Print)

Business Address: ____
(Street) (City) (State) (Zip Code)

Telephone Number: __________ ______________________
(Supervisor's Signature)

J. ACTION STAFF REVIEW

(Do Not Write Below This Line)

I have reviewed the information on this application and have found that:

__________ Applicant is eligible to take Grade ______ exam.

__________ Applicant is not eligible to take Grade ______ exam because:

( ) Applicant lacks acceptable experience in a wastewater treatment plant. ______ years ______ months are required and only ______ years ______ months are recorded in application.

( ) Applicant lacks certification by progression:
An active Grade ______ Certificate is required.

( ) Other: ______________________________

__________ Applicant is eligible for Grade ______ Temporary Certification.

__________ Applicant is not eligible for Grade ______ Temporary Certification because

____

__________ Applicant is eligible for Grade ______ Certification by Reciprocity.

__________ Applicant is not eligible for Grade ______ Certification by Reciprocity because

____

__________ Application cannot be processed because ______________________________

____

Fee Paid: Yes ______ No ______ Reviewed by: ______________________ Date: __________

K. ACTION BY CERTIFICATION COMMISSION

Examination Grade __________ Passed __________ Failed __________

Grade Certificate Issued __________ Certificate Number __________

Date Issued __________ Date Mailed __________

Expiration Date for Temporary Certificate __________

Other Action Taken ______________________________

____

Revised
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APPENDIX - VI

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List of Equipment Suppliers

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APPENDIX - VII

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