

Duke Power Company
McGuire Nuclear Generation Department
12700 Hagers Ferry Road (MG01VP)
Huntersville, NC 28078-8985

T. C. McMEEKIN
Vice President
(704)875-4800
(704)875-4809 Fax



DUKE POWER

March 12, 1996

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Subject: McGuire Nuclear Station
Docket Nos. 50-369, 50-370

Pursuant to Duke's Corporate Environmental Manual (formally McGuire Technical Specifications, Appendix B, Section 3.2) please find enclosed copies of NPDES Permit changes for the McGuire Nuclear Station.

Questions concerning this report should be directed to Kay Crane, McGuire Regulatory Compliance at (704) 875-4306.

Very truly yours,

A handwritten signature in dark ink, appearing to read 'T. C. McMeekin'.

T. C. McMeekin, Vice President
McGuire Nuclear Station

cc: Mr. Victor Nerses, Project Manager
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Mr. S. D. Ebner, Regional Administrator
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street - Suite 2900
Atlanta, Georgia 30323

Mr. George Maxwell
Senior Resident Inspector
McGuire Nuclear Station

130151

9603190316 960312
FDR ADOCK 05000369
PDR

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Duke Power Company
Electric System Support
13339 Hagers Ferry Road
Huntersville, NC 28078-7929



DUKE POWER

January 31, 1996

Attention: Central Files
North Carolina Department of
Environment, Health and Natural Resources
Division of Environmental Management
P.O. Box 29535
Raleigh, North Carolina 27626-0535

Subject: NPDES Stormwater Permit, NCS000020
Annual Stormwater Report
McGuire Nuclear Station, Mecklenburg County
File: MC-702.13

In accordance with the subject stormwater permit, attached is the original and one copy of the 1995 annual analysis and also the monitoring inspections that were conducted at the time of the sampling. All other visual monitoring inspection documentation is kept on site with the site's Storm Water Pollution Prevention Plan.

Should you have questions regarding this information, please contact me at (704) 875-5954.

Sincerely,

A handwritten signature in cursive script that reads 'J. S. Carter'.

John S. Carter, Technical Systems Manager
Water Protection

Attachments

cc: w/Attachments
Mr. Rex Gleason, NCDEHNR, Mooresville, N.C.

bc: Dayna Russell - McGuire Nuclear Station
Eddie Faulkner - McGuire Nuclear Station
C.M. Sekerak - Environmental Center
Norma Atherton - Environmental Center

Does this facility perform Vehicle Maintenance Activities using more than 55 gallons of new motor oil per month? yes no
(if yes, complete Part B)

Part B: Vehicle Maintenance Activity Monitoring Requirements

Dulfall No.	Date Sample Collected	50050 Total Flow	00556 Oil and Grease	01051 Lead, Total Recoverable	38260 Detergent (MBAS)	00400 pH	New Motor Oil Usage
	mo/d/yr	MG	mg/l	ug/l	mg/l	unit	gal/mo
SW 008	6/1/95	0.118	0.20	10.2	* Not Detected	6.6	224

Footnotes:

- ¹ Applies only for facilities at which fueling occurs.
- ² Detergent monitoring is required only at facilities which conduct vehicle cleaning operations.

STORM EVENT CHARACTERISTICS:

Date 6/1/95
Total Event Precipitation (inches): 0.66
Event Duration (hours): 7.5 hrs

(if more than one storm event was sampled)

Date _____
Total Event Precipitation (inches): _____
Event Duration (hours): _____

Mail Original and one copy to:
Attn: Central Files
DEHNR
Division of Environmental Mgt.
P.O. Box 29535
Raleigh, NC 27626-0535

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations."

J. S. Carter 1/31/96
(Signature of Permittee) (Date)

* not detected: MDL = 0.30 mg/L

STORMWATER DISCHARGE OUTFALL (SDO) MONITORING REPORT

PERMIT NO. NCS. 000020

SAMPLES COLLECTED DURING CALENDAR YEAR: 1995
(all samples collected during a calendar year shall be reported no later than January 31 of the following year)

FACILITY NAME McGuire Nuclear Station
PERSON COLLECTING SAMPLE(S) Chris Brogden
CERTIFIED LABORATORY(S) Applied Science Ctr. Lab # 248
Lab #

COUNTY MECKLENBURG County
PHONE NO. (704) 875-5954

(SIGNATURE OF PERMITTEE OR DESIGNEE)
By this signature, I certify that this report is accurate
complete to the best of my knowledge

Part A: Specific Monitoring Requirements

[illegible]

* $<LOQ$ $0.5 \mu g/L$



STORMWATER DISCHARGE OUTFALL (SDO)
VISUAL MONITORING REPORT

Certificate of Coverage No. NCG NC5000020
Facility Name: McGuire Nuclear Station Site
County: Mecklenburg Phone No: (704) 875-5155
Inspector: D. E. Faulkner
Date of Inspection: 4/10/95

By this signature, I certify that this report is accurate and complete to the best of my knowledge:

D. E. Faulkner
(Signature of permittee or designee)

1. Outfall Description

Outfall No. 004 Structure (pipe, ditch, etc.): pipe

Receiving Stream: Lake Norman Discharge Canal

Describe the industrial activities that occur within the outfall drainage area:

Warehouse Material Laydown Area & Site Construction

2. SSRP Facility
Color

Describe the color of the discharge using basic colors (red, brown, blue, etc.) and tint (light, medium, dark) as descriptors:

Light light brown

3. Odor

Describe any distinct odors that the discharge may have (i.e. smells strongly of oil, weak chlorine odor, etc.):

None

4. Clarity

Choose the number which best describes the clarity of the discharge where 1 is clear and 10 is very cloudy:

1 2 3 4 5 6 7 8 9 10

5. Solids

Choose the number which best describes the amount of solids in the stormwater discharge where 1 is no solids and 10 is extremely muddy:

1 2 3 4 5 6 7 8 9 10

6. Foam

Is there any foam in the stormwater discharge? YES NO

7. Oil Sheen

Is there an oil sheen in the stormwater discharge? YES NO

8. Outfall Staining

Describe any staining around the stormwater outfall:

None

9. Other Indicators

Describe any other obvious indicators of stormwater pollution:

NOTE: Low clarity, high solids and/or the presence of foam, oil sheens, or outfall staining may be indicative of pollutant exposure. These conditions may warrant further investigation.



STORMWATER DISCHARGE OUTFALL (SDO)
VISUAL MONITORING REPORT

Certificate of Coverage No. NCG NC5000020
Facility Name: M³ Hume Nuclear Station Site
County: Wachterburg Phone No: (704) 875-5158
Inspector: D E Faulkner
Date of Inspection: 4/10/95

By this signature, I certify that this report is accurate and complete to the best of my knowledge:

D E Faulkner
(Signature of permittee or designee)

1. Outfall Description

Outfall No. 006 Structure (pipe, ditch, etc.): Pipe
Receiving Stream: Catawba River

Describe the industrial activities that occur within the outfall drainage area:

General Operation & Maintenance of the MNS Switchyard

2. Color

Describe the color of the discharge using basic colors (red, brown, blue, etc.) and tint (light, medium, dark) as descriptors:

Dist very light

3. Odor

Describe any distinct odors that the discharge may have (i.e. smells strongly of oil, weak chlorine odor, etc.):

None

4. Clarity

Choose the number which best describes the clarity of the discharge where 1 is clear and 10 is very cloudy:

1 (2) 3 4 5 6 7 8 9 10

5. Solids

Choose the number which best describes the amount of solids in the stormwater discharge where 1 is no solids and 10 is extremely muddy:

1 (2) 3 4 5 6 7 8 9 10

6. Foam

Is there any foam in the stormwater discharge? YES (NO)

7. Oil Sheen

Is there an oil sheen in the stormwater discharge? YES (NO)

8. Outfall Staining

Describe any staining around the stormwater outfall:

None

9. Other Indicators

Describe any other obvious indicators of stormwater pollution:

NOTE: Low clarity, high solids and/or the presence of foam, oil sheens, or outfall staining may be indicative of pollutant exposure. These conditions may warrant further investigation.



STORMWATER DISCHARGE OUTFALL (SDO)
VISUAL MONITORING REPORT

Certificate of Coverage No. NCG NC5000020
Facility Name: W. L. H. Lumber Station Site
County: Wachlarburg Phone No: (704) 875-5158
Inspector: D. E. Faulkner
Date of Inspection: 4/10/95

By this signature, I certify that this report is accurate and complete to the best of my knowledge:

D. E. Faulkner
(Signature of permittee or designee)

1. Outfall Description

Outfall No. 008 Structure (pipe, ditch, etc.): Pipe
Receiving Stream: Catawba River

Describe the industrial activities that occur within the outfall drainage area:

General Operation & Maintenance of the McArthur Harbors

2. Color

Describe the color of the discharge using basic colors (red, brown, blue, etc.) and tint (light, medium, dark) as descriptors:

Light brown

3. Odor

Describe any distinct odors that the discharge may have (i.e. smells strongly of oil, weak chlorine odor, etc.):

None

4. Clarity

Choose the number which best describes the clarity of the discharge where 1 is clear and 10 is very cloudy:

1 2 3 4 5 6 7 8 9 10

5. Solids

Choose the number which best describes the amount of solids in the stormwater discharge where 1 is no solids and 10 is extremely muddy:

1 2 3 4 5 6 7 8 9 10

6. Foam

Is there any foam in the stormwater discharge? YES NO

7. Oil Sheen

Is there an oil sheen in the stormwater discharge? YES NO

8. Outfall Staining

Describe any staining around the stormwater outfall:

None

9. Other Indicators

Describe any other obvious indicators of stormwater pollution:

NOTE: Low clarity, high solids and/or the presence of foam, oil sheens, or outfall staining may be indicative of pollutant exposure. These conditions may warrant further investigation.

State of North Carolina
Department of Environment,
Health and Natural Resources
Division of Environmental Management

James B. Hunt, Jr., Governor
Jonathan B. Howes, Secretary
A. Preston Howard, Jr., P.E., Director



DEF

ENVIRONMENTAL PROTECTION SECTION

November 27, 1995

DEC 1 1995

Mr. John S. Carter
Duke Power Company
Electric System Support Dept.
13339 Hagers Ferry Road
Huntersville, North Carolina 28078-7929

☐ FILE
☐ TICKLER DATE

☒ COPY DJR

Subject: Line Flush
NPDES Permit No. NC0024392-NGA-File
McGuire Nuclear Station
Mecklenburg County

Dear Mr. Carter:

The Division of Environmental Management received your letter dated August 22, 1995 requesting that the subject permit be modified to include the periodic flushing of the raw water lines which serve the Nuclear Service Water system. The Division is allowing this discharge under the subject permit.

Please find the enclosed amended supplement sheet which should be inserted into your permit. The old page should be discarded. All other terms and conditions contained in the original permit remain unchanged and in full effect. This permit modification is issued pursuant to the requirements of North Carolina General Statutes 143-215.1 and the Memorandum of Agreement between North Carolina and the U. S. Environmental Protection Agency.

If any parts, measurement frequencies or sampling requirements contained in this permit modification are unacceptable to you, you have the right to an adjudicatory hearing upon written request within thirty (30) days following receipt of this letter. This request must be in the form of a written petition, conforming to Chapter 150B of the North Carolina General Statutes, and filed with the Office of Administrative Hearings, Post Office Drawer 27447, Raleigh, North Carolina 27611-7447. Unless such demand is made, this decision shall be final and binding.

If you have any questions concerning this revision, please contact Mr. Jay Lucas, P.E., at telephone number (919) 733-5083, ext. 502.

Sincerely,

David A. Goodrich
for A. Preston Howard, Jr., P.E.

cc: Central Files
Mooresville Regional Office, Water Quality
Permits and Engineering Unit

SUPPLEMENT TO PERMIT COVER SHEET

Duke Power Company

is hereby authorized to:

1. Continue to operate wastewater treatment facilities necessary to comply with final effluent limitations contained in this permit and located at McGuire Nuclear Station, northwest of Charlotte in Mecklenburg County, and
2. Continue to discharge condenser cooling water, low pressure service water, and nuclear service water through outfall 001 at the location specified on the attached map into Lake Norman which is classified Class WS-IV B waters in the Catawba River Basin, and
3. Continue to discharge from turbine building sumps, water treatment room sumps, condensate demineralizer backwashes, closed cooling systems, the Standby Shutdown Facility, laboratory drains, landfill leachate, steam generator blowdown, wet lay-up, and unwatering pumps after treatment in the conventional wastewater treatment system consisting of a 200,000 gallon concrete lined initial holdup pond, two parallel 2.5 MG clay-lined settling ponds, a concrete lined 1 MG final holdup pond, chemical addition of coagulants, oxidants, catalysts, pH control, and effluent pH adjustment by CO₂ addition with discharge through outfall 002 at the location specified on the attached map into the Catawba River (Mountain Island Lake) which is classified WS-IV waters in the Catawba River Basin, and
4. Continue to discharge from vehicle maintenance facility building washdown drains, office complex building shop drains, medical facility photographic wastes, nondestructive examination photographic wastes and domestic wastes through the domestic wastewater treatment system which includes a four cell aerated lagoon followed by a sand filter, tablet disinfection with contact tank, and a parshall flume with discharge through outfall 003 at the location specified on the attached map into the Catawba River (Mountain Island Lake) which is classified WS-IV waters in the Catawba River Basin, and
5. Continue to discharge from the radwaste liquid monitoring system, floor and equipment drains, laundry drains, and ventilation unit drains through outfall 004 at the location specified on the attached map into Lake Norman which is classified Class WS-IV B waters in the Catawba River Basin, and
6. Continue to discharge treated sanitary effluent (from outfall 003), standby nuclear service pond overflow, administrative building drains (HVAC sump, floor drains, janitorial sinks, hot water boiler, chiller water system), main condenser cooling unwatering, filtered water, HVAC unit drains, yard drains, reverse osmosis reject flows, and Nuclear Service Water system flush water through the wastewater collection basin consisting of a 13.4 acre settling pond and surface skimmer with discharge through outfall 005 at the location specified on the attached map into the Catawba River (Mountain Island Lake) which is classified WS-IV waters in the Catawba River Basin, and
7. Continue to discharge chemical metal cleaning wastes from outfall 006 through outfall 002 at the location specified on the attached map into the Catawba River (Mountain Island Lake) which is classified WS-IV waters in the Catawba River Basin and through outfall 004 at the location specified on the attached map into Lake Norman which is classified Class WS-IV B waters in the Catawba River Basin.



DUKE POWER

November 21, 1995

Mr. Mike Parker
North Carolina Department of Environment,
Health, and Natural Resources
Division of Environmental Management
Mooresville Regional Office
P.O. Box 950
Mooresville, NC 28115

Re: Duke Power Company - McGuire Nuclear Station
Sanitary Waste Treatment System Modification
File: GAH-0207

Dear Mr. Parker:

As you know, we are in the process of re-routing the sanitary waste from the TTC System on the Island (NPDES Permit # NC0026255) to the Sanitary Treatment System and the Conventional Waste Treatment Systems at McGuire (NPDES Permit # NC0024392). This is being done under Authorization to Construct Permit # WQ0010555. A portion of this modification will be the decommissioning of the TTC System on the Island. Listed below is our plan for this portion of the project.

- The Lagoon will be dewatered by EWR, Inc (Environmental Waste Recycling) out of Advance, NC. They will use a belt filter press to dewater the material.
- The dewatered caked will be stored in roll-offs on site for disposal in the McGuire Landfarm (Permit # WQ0002877).
- The filtrate from the operation will be pumped into a lift station (SS2) and routed to the McGuire Sanitary Waste (WT) System for treatment.
- The dewatering operation is expected to take approximately 7 to 10 days (assuming 12 hour days).

The liner will be pressure washed with a fire hose and disposed of in the McGuire Sanitary Landfill (Solid Waste Permit # 60-04) along with the aeration tubing, the dose tank, the sand and the sand filter, the chlorinator pit and the chlorinator, the retention tank, the flume, pipes, valves, concrete, and steel from the remaining parts of the system. The cover, the pumps, the air compressor, the backup generator, and the dechlorination unit will be salvaged.

We expect to begin removing sludge from the lagoon in the late March, early April time frame.

If you have any questions or need additional information regarding this project, please call me at (704)875-5939. We will proceed with this decommissioning plan unless you notify us otherwise.

Sincerely,

A handwritten signature in cursive script, reading "Tami Carpenter".

Tami Carpenter, Engineer
Environmental Division
Electric System Support

xc: D.L. Cline
N.G. Atherton
R.L. Smith
L.G. Goodman
D.E. Faulkner
D.L. Scronce
J. B. Craver
Central Records



DUKE POWER

November 13, 1995

Mr. Rex Gleason
Regional Manager, Water Quality Section
Department of Environmental, Health and Natural Resources
919 North Main Street
Mooresville, North Carolina 28115

**RE: Duke Power Training and Technology Center
NPDES Permit NC 0026255 and McGuire Nuclear Station
NPDES Permit NC 0024392**

Dear Mr. Gleason:

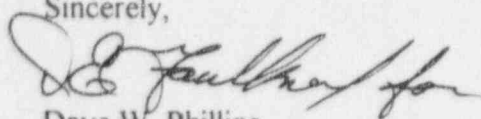
Pursuant to Part II, Section E (6)(B)(2,3) of the Duke Power Training and Technology Center (TTC) NPDES permit (NC0026255), and Part II, Section D (6)(d) of the McGuire Nuclear Station NPDES Permit (NC0024392) this is a follow-up written report to the North Carolina Department of Environmental, Health and Natural Resources (NCDEHNR) of two recent non-compliance associated with the TTC's sanitary treatment system discharge and the McGuire Nuclear Station sanitary treatment system discharge. Telephone notification was made to Mr. Richard Bridgeman of the Mooresville Regional Office on November 9, 1995, at approximately 3:00 PM by Eddie Faulkner of Duke Power Nuclear Site, Environmental Management.

The nature of the non-compliance's was the exceedance of the daily maximum fecal coliform limit of 400 colonies per 100 ml. This occurred at the TTC's sanitary treatment system (outfall 001) and McGuire sanitary treatment system (outfall 003). The daily maximum exceedances occurred on November 6, 1995, and the analysis results were 1600 colonies per 100 ml. The reason for the elevated fecal coliform results and subsequent non-compliance's were attributed to high nitrates and heavy rains along with the turnover of the lagoon. Additional chlorination has been implemented for both areas.

Additional samples were taken on November 9, 1995 and both reported less than 200 colonies per ml. Therefore, we feel we have the situation under control.

If you require and additional information, please contact Eddie Faulkner at (704) 875-5158.

Sincerely,

A handwritten signature in cursive script, appearing to read "D. Phillips", written in dark ink.

Dave W. Phillips
Environmental Manager
McGuire Nuclear Station

xc: Mr. Dave Goodrich, NCDEHNR, Raleigh, NC

bc: J.S. Carter - MG03A5
J.M. Trepel - PB05E
N.G. Atherton - MG03A5
R.P. Michael - MG01CH
D.L. Cline - MG01CH
K.A. Finley - MG03A3
D.H. Triece - MG01CH
D.E. Faulkner - MG01EM

Duke Power Company
Nuclear System Support Department
12709 Hepers Ferry Road
Huntersville, NC 28078-7929



DUKE POWER

August 22, 1995

Mr. David Goodrich
NPDES Permits Group
North Carolina Department of Environment,
Health and Natural Resources
Division of Environmental Management
P.O.Box 29535
Raleigh, North Carolina 27626-0535

Subject: McGuire Nuclear Station
NPDES Permit No. NC0024392
Mecklenburg County
Request Permission to Perform Piping Flushes
File: MC-702.13

Dear Mr. Goodrich:

Due to Nuclear Regulatory Commission (NRC) Generic Letter 89-13 (Raw Water Piping Concerns), McGuire Nuclear Station will be required by the NRC to perform periodic flushes of raw water lines. Since this activity was not previously identified in the permit renewal application, we would like to inform you of this activity.

The Generic Letter will require that McGuire Nuclear Station perform a periodic surveillance to ensure that "stagnant" raw water lines on safety related systems are free of obstructions that could cause operational problems if the lines needed to be utilized. The Nuclear Service Water (RN) system which supplies assured makeup water to the Auxillary Feedwater (CA) pumps qualifies as a stagnant loop. The best method for assuring their operability is periodic flushing. Reverse flushing, using CA condensate water, will produce the most satisfactory results.

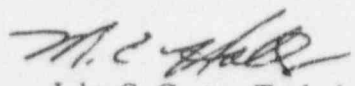
To perform this reverse flush, the Auxiliary Feedwater Condensate Storage Tank will be aligned to the RN system discharge header and discharged to the Standby Nuclear Service Water Pond (SNSWP). For the station, 6 flushing activities will be performed, producing a total of 30,000 gallons of waste flush water. This water will contain approximately 10 ppm of Methylpropylamine (MPA), 120 ppb of Hydrazine, 1 ppm of Boric Acid, and 1 ppm of Ammonia.

The final effluent concentration at Outfall 005, assuming 100% mixing with both the SNSWP and the Waste Water Collection Basin (WWCB), will be no greater than 1.348 ppb MPA, 0.016 ppb Hydrazine, 0.135 ppb Boric Acid and 0.135 ppb Ammonia. These values are conservative since we are assuming no treatment is occurring. All pollutants discharged to the ponds would be subject to at least mixing, settling, precipitation, neutralization and oxidation.

Operations personnel will be performing this flushing operation under approved procedures to control the flush quality and repeatability. This surveillance will be performed every 2 years. In the supplemental information of the permit application, the Standby Nuclear Service Water Pond discharges to the WWCB is monitored at Outfall 005 for chronic toxicity quarterly. Other parameters which are monitored monthly at this outfall are BOD, Total Suspended Solids, Total Copper, Total Iron, Total Phosphorus, TKN, NO₂ plus NO₃, Ammonia Nitrogen, Fecal Coliform, and pH. Total Suspended Solids are measured twice per month.

We will be performing this first flush in the outage scheduled to begin in early November 1995. If a permit modification fee is required, please notify us. If you have questions or need additional information, please contact me at (704) 875-5954 or Norma Atherton at (704) 875-5963.

Sincerely,

 (for JS Carter)

John S. Carter, Technical System Manager
Environmental Division
Water Protection

xc: Mr. Rex Gleason, NCDEHNR, Mooresville, N.C.

xc: Nuclear Regulatory Commission
Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

U.S. Nuclear Regulatory Commission
101 Marietta St., NW, Suite 2900
Atlanta, Georgia 30329

Mr. George Maxwell
NRC Resident Inspector
McGuire Nuclear Station
12700 Hagers Ferry Road
Huntersville, N.C. 28078-8985

bc: M.A. Lascara - MG03A5
J.S. Carter - MG03A5
J.M. Trepel - PB05E
D.W. Phillips - MG01EM
R.P. Michael - MG01CH
D.L. Cline - MG01CH
K.A. Finley - MG03A3
G.W. Sain - EC07D
D.H. Triece - MG01CH
D.E. Faulkner - MG01EM
J.R. Pring - MG01SE

State of North Carolina
Department of Environment,
Health and Natural Resources
Division of Environmental Management

James B. Hunt, Jr., Governor
Jonathan B. Howes, Secretary
A. Preston Howard, Jr., P.E., Director



August 18, 1995

Mr. John S. Carter
Duke Power Company
13339 Hagers Ferry Road
Huntersville, North Carolina 28078-7929

☒ COPY MAL
DWP
☒ ROUTE UGA
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Subject: NPDES Permit Modification
Permit No. NC0024392
McGuire Nuclear Station
Mecklenburg County

Dear Mr. Carter:

It has come to the attention of the Division that several errors exist in your currently issued NPDES permit. In accordance with this determination, your NPDES permit has been modified to reflect appropriate changes. In the July 31, 1995 correspondence to this office from Norma Atherton of Duke Power, several issues were raised. These issues have been addressed as follows:

1. Outfall 001 limit for Total Residual Chlorine has been modified to 0.20 mg/l daily maximum with no monthly average specified.
2. Although the cover letter accompanying the issued permit stated "After September 1, 1997, the limits will change to 30 mg/l and 60 mg/l" the permit reflects the appropriate phased limits of 30 mg/l and 100 mg/l for TSS at outfall 003.
3. The units for MBAS at Outfall 003 have been changed to mg/l.
4. The units for iron and copper at Outfall 005 have been changed to $\mu\text{g/l}$.
5. The definition of a time weighted composite sample for the acute toxicity test at Outfall 001 has been defined in the footnote on the effluent page.
6. The cover letter accompanying the issued permit erroneously stated "outfall 004 effluent limitation and monitoring requirements" with respect to Part III, Condition G. The reference should have been to Outfall 002, but does not affect the issued permit.
7. The acute toxicity sample for Outfall 002 has been changed to a grab sample as specified on the effluent page and in Part III, Condition G.

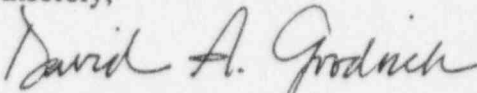
Attached to this correspondence are the amended pages which should be inserted into your permit. The corresponding existing pages should be discarded. All other terms and conditions contained in the issued permit remain unchanged and in full effect. These permit modifications are issued pursuant to the requirements of North Carolina General Statutes 143-215.1 and the Memorandum

of Agreement between North Carolina and the U.S. Environmental Protection Agency. This permit modification becomes effective immediately.

If any parts, measurement frequencies or sampling requirements contained in this permit are unacceptable to you, you have the right to an adjudicatory hearing upon written request within thirty (30) days following receipt of this letter. This request must be in the form of a written petition, conforming to Chapter 150B of the North Carolina General Statutes, and filed with the Office of Administrative Hearings, Post Office Drawer 27447, Raleigh, North Carolina 27611-7447. Unless such demand is made, this decision shall be final and binding.

If you have any questions, please contact Jeanette Powell of my staff at (919) 733-5083, extension 537.

Sincerely,


for A. Preston Howard, Jr., P.E.

cc: Central Files
Mooresville Regional Office, Water Quality Section
Mr. Roosevelt Childress, EPA
Permits and Engineering Unit
Facilities Assessment Unit
Aquatic Survey and Toxicology Unit

A. (1). EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - PLANT

Permit No. NC00243

During the period beginning on the effective date of the permit and lasting until expiration, the Permittee is authorized to discharge from outfall(s) serial number 001 - Once Through Cooling Water. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements				
	Monthly	Avg.	Daily	Max.	Measurement Frequency	Sample Type	Sample Location ¹
Intake Flow (BGD)					Daily	Pump Logs	I
Temperature (October-June)	95° F				Daily	Recorder	DCB
Temperature (July-September)	99° F				Daily	Recorder	DCB
Hydrazine ²			0.06 mg/l			Calculations	DCP
Acute Toxicity ³					Quarterly	Composite	DCB
Total Residual Chlorine ⁴			0.20 mg/l		Weekly	Multiple Grab ⁵	DS
Time of Chlorine Addition ⁶							

Footnotes:

¹ Sample Location: I - intake, DCB - discharge canal bridge, DS - discharge structure corresponding to an individual unit.

² Hydrazine daily maximum shall be the calculated hydrazine concentration at the discharge canal bridge based upon hydrazine monitoring results at Outfall 004 and shall be calculated once on any day which a discharge of hydrazine occurs from the radwaste system and turbine building sumps (based on process knowledge). The calculations shall take into account flows from the once-through cooling water and the radwaste system or turbine building sumps.

³ Acute Toxicity (Daphnid 24 hr.) No significant mortality at 90% with a composite sample of equal volumes collected at one hour intervals for a 24 hour period: February, May, August, and November. See Part III, Condition F.

⁴ Monitoring of total residual chlorine is not except during and subsequent to chlorination. Monitoring shall begin immediately upon start-up of chlorination and shall discontinue when total residual chlorine is no longer detected. Total residual chlorine may not be discharged from any single generating unit for more than two hours per day unless the discharger demonstrates to the State that discharge for more than two hours is required for macroinvertebrate control.

⁵ Multiple grabs shall consist of grab samples collected at the approximate beginning of Total Residual Chlorine discharge and once every 15 minutes thereafter until TRC is no longer detectable. "Daily Maximum" TRC is the instantaneous maximum at any time.

⁶ The permittee shall maintain a log of all chlorination events within each unit. The log shall be maintained on file at the plant and shall be available for review or submitted to the DEM upon request by any representative of this Division. For each chlorination event, the log shall list: (1) each system that is chlorinated, (2) the volume of the system (gpm), (3) the chlorination begin and end time, and (4) the total time of the chlorination event (minutes).

DISCHARGE OF ANY PRODUCT REGISTERED UNDER THE FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT IS PROHIBITED UNLESS SPECIFICALLY AUTHORIZED ELSEWHERE IN THIS PERMIT.

THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

A. (2). EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FINAL

Permit No. NC0024392

During the period beginning on the effective date of the permit and lasting until expiration, the Permittee is authorized to discharge from outfall(s) serial number 002 - Conventional Wastewater Treatment Facility. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements				
	Monthly	Avg.	Daily	Max.	Measurement Frequency	Sample Type	Sample Location ¹
Flow (MGD)					Daily	Instantaneous	E
Oil and Grease	15.0 mg/l		20.0 mg/l		Monthly	Grab	E
Total Suspended Solids	30.0 mg/l		100.0 mg/l		Monthly	Grab	E
Total Residual Chlorine ² (mg/l)					Monthly	Grab	E
pH ³					Monthly	Grab	E
Hydrazine			4.4 mg/l		Weekly	Grab	E
MBAS (mg/l)					Monthly	Grab	E
Sulfate (mg/l)					Monthly	Grab	E
Acute Toxicity ⁴					Quarterly	Grab	E
BOD ₅ (mg/l)					Monthly	Grab	E

Footnotes:

- ¹ Sample Location: E - Effluent, with sampling performed prior to mixing with any other waste streams.
- ² Total Residual Chlorine shall be monitored once per batch within 24 hours of injection when chlorine is used for treatment purposes.
- ³ The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored as indicated above.
- ⁴ Acute Toxicity (Daphnid 48 hr.) LC₅₀ 80% with samples collected in February, May, August and November. See Part III, Condition G.

THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

A. (3). EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FINAL

Permit No. NC0024392

During the period beginning on the effective date of the permit and lasting until August 31, 1997, the Permittee is authorized to discharge from outfall(s) serial number 003 - Domestic Wastewater Treatment Facility. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Monthly	Avg.	Measurement Frequency	Sample Type	Sample Location ¹
Flow (MGD)			Weekly	Instantaneous	E
BOD ₅	30.0 mg/l		2/Month	Grab	E
Total Suspended Solids	90.0 mg/l		2/Month	Grab	E
Total Residual Chlorine (mg/l)			Weekly	Grab	E
Fecal Coliform	200 /100 ml		2/Month	Grab	E
pH			Monthly	Grab	E
Oil and Grease	30.0 mg/l		**	Grab	E
Silver (µg/l) ²			2/Month	Grab	E
MBAS (mg/l)			Monthly	Grab	E

Footnotes:

¹ Sample Location: E - Effluent

² If, after six months of silver monitoring according to the above monitoring requirements, the data do not indicate significant concentrations of silver in the discharge from this outfall, the permittee may petition the Division for reduced silver effluent limitations and monitoring requirements.

** Samples to be collected every other month.

THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

A. (4). EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FINAL

Permit No. NC0024392

During the period beginning on September 1, 1997 and lasting until expiration, the Permittee is authorized to discharge from outfall(s) serial number 003 - Domestic Wastewater Treatment Facility. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent	Characteristics	Discharge Limitations		Monitoring Requirements				
		Monthly	Avg.	Daily	Max.	Measurement Frequency	Sample Type	Sample Location ¹
	Flow (MGD)					Weekly	Instantaneous	E
	BOD ₅	30.0	mg/l	45.0	mg/l	2/Month	Grab	E
	Total Suspended Solids	30.0	mg/l	100.0	mg/l	2/Month	Grab	E
	Total Residual Chlorine (mg/l)					Weekly	Grab	E
	Fecal Coliform	200	/100 ml	400	/100 ml	2/Month	Grab	E
	pH					Monthly	Grab	E
	Oil and Grease	15.0	mg/l	20.0	mg/l	**	Grab	E
	Silver (µg/l)					2/Month	Grab	E
	MBAS (mg/l)					Monthly	Grab	E

Footnotes:

¹ Sample Location: E - Effluent

** Samples to be collected every other month.

THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

A. (6). EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FINAL

Permit No. NC00024392

During the period beginning on the effective date of the permit and lasting until expiration, the Permittee is authorized to discharge from outfall(s) serial number 005 - Wastewater Collection Basin. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Monthly Avg.	Daily Max.	Measurement Frequency	Sample Type	Sample Location ¹
Flow (MGD)			Weekly	Instantaneous	E
BOD ₅ (mg/l)			Monthly	Grab	E
Total Suspended Solids	30.0 mg/l	100.0 mg/l	Monthly	Grab	E
Fecal Coliform (/100 ml)			Monthly	Grab	E
Oil and Grease	15.0 mg/l	20.0 mg/l	2/Month	Grab	E
Total Copper (µg/l)			Monthly	Grab	E
Total Iron (µg/l)			Monthly	Grab	E
Chronic Toxicity ²			Quarterly	Grab	E
Alkalinity [CaCO ₃] (mg/l)			Monthly	Grab	E
Total Phosphorus (mg/l)			Monthly	Grab	E
TKN (mg/l)			Monthly	Grab	E
NO ₂ + NO ₃ (mg/l)			Monthly	Grab	E
NH ₃ -N (mg/l)			Monthly	Grab	E
pH (s.u.)			Monthly	Grab	E

Footnotes:

¹ Sample Location: E - Effluent

² Chronic Toxicity (Ceriodaphnia) Pass/Fail at 12% with samples collected in January, April, July, and October. See Part III, Condition H.

THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

data. Total residual chlorine of the effluent toxicity sample must be measured and reported if chlorine is employed for disinfection of the waste stream.

Should any single quarterly monitoring indicate a failure to meet specified limits, then monthly monitoring will begin immediately until such time that a single test is passed. Upon passing, this monthly test requirement will revert to quarterly in the months specified above.

Should any test data from either these monitoring requirements or tests performed by the North Carolina Division of Environmental Management indicate potential impacts to the receiving stream, this permit may be re-opened and modified to include alternate monitoring requirements or limits.

NOTE: Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival and appropriate environmental controls, shall constitute an invalid test and will require immediate retesting (within 30 days of initial monitoring event). Failure to submit suitable test results will constitute noncompliance with monitoring requirements.

G. ACUTE TOXICITY PERMIT LIMIT (QUARTERLY)

The permittee shall conduct acute toxicity tests on a quarterly basis using protocols defined as definitive in E.P.A. Document 600/4-90/027F entitled "Methods for Measuring the Acute Toxicity of Effluents and receiving Waters to Freshwater and Marine Organisms, Fourth Edition." The monitoring shall be performed as a *Daphnia pulex* or *Ceriodaphnia* 48 hour static test, using effluent collected as a grab sample. The LC50 of this effluent using the previously stated methodology may at no time in any toxicity test be less than 80%. Effluent samples for self-monitoring purposes must be obtained during representative effluent discharge below all waste treatment. The first test will be performed after thirty days from the effective date of this permit during the months of February, May, August, and November.

The parameter code for this test if using *Daphnia pulex* is TAA3D. The parameter code for this test if using *Ceriodaphnia* is TAA3B. All toxicity testing results required as part of this permit condition will be entered on the Effluent Discharge Monitoring Form (MR-1) for the month in which it was performed, using the appropriate parameter code. Additionally, DEM Form AT-1 (original) is to be sent to the following address:

Attention: Environmental Sciences Branch
North Carolina Division of Environmental Management
4401 Reedy Creek Road
Raleigh, N.C. 27607

Test data shall be complete and accurate and include all supporting chemical/physical measurements performed in association with the toxicity tests, as well as all dose/response data. Total residual chlorine of the effluent toxicity sample must be measured and reported if chlorine is employed for disinfection of the waste stream.

Should any single quarterly monitoring indicate a failure to meet specified limits, then monthly monitoring will begin immediately until such time that a single test is passed. Upon passing, this monthly test requirement will revert to quarterly in the months specified above.

State of North Carolina
Department of Environment,
Health and Natural Resources
Division of Environmental Management

James B. Hunt, Jr., Governor
Jonathan B. Howes, Secretary
A. Preston Howard, Jr., P.E., Director



ENVIRONMENTAL PROTECTION

July 10, 1995

Mr. John S. Carter
Duke Power Company
13339 Hagers Ferry Road
Huntersville, North Carolina 28078-7929

JUL 11 7, 1995 *oe*
8/7/95

☐ FILE
☐ TICKLER DATE _____

Subject: NPDES Permit Renewal COPY
Permit No. NC0024392
McGuire Nuclear Station
Mecklenburg County ROUTE VGA

Dear Mr. Carter:

In accordance with your application for discharge permit received on July 5, 1994, we are forwarding herewith the subject state - NPDES permit. This permit is issued pursuant to the requirements of North Carolina General Statute 143-215 .1 and the Memorandum of Agreement between North Carolina and the US Environmental Protection agency dated December 6, 1983.

The following comments are provided in response, and in corresponding order, to the issues raised in your June 20, 1995 comments on the draft permit:

Outfall 001

- The federal effluent guidelines specify Free Available Chlorine monitoring. However, Total Residual Chlorine is a more stringent requirement, and as such, Total Residual Chlorine monitoring is included in the permit renewal as requested. This change also resolves the ambiguity contained in footnote "5".
- The chlorine monitoring language contained in the previous permit is included in the permit renewal as requested.
- Selenium is not a byproduct of nuclear generation and monitoring has been deleted as requested.

Outfall 002

- As requested, nutrient monitoring parameters have been deleted for outfall 002 in favor of monitoring at the final outfall prior to discharge.
- The frequency for MBAS monitoring remains at monthly intervals. This frequency is deemed necessary to characterize a representative discharge at this outfall. The currently scheduled 1997 addition of a car wash at this outfall will also require a minimum of monthly monitoring for MBAS.
- The draft permit included MBAS with specified units of $\mu\text{g/l}$, in keeping with the state water quality standard units. The units have been changed to mg/l as requested.
- Because this facility is actively working towards connecting all possible discharges to the municipal sewer system, the permittee may petition the Division to evaluate the requirement for

BOD monitoring at this outfall if Monitoring under the terms of this permit indicates that BOD is not a parameter of concern based on data collected during a one year period.

Outfall 003

- The draft permit contained total suspended solids limits per the federal effluent guidelines, which are meant to sample discharges prior to mixing with other waste streams. Because Duke Power is scheduled to delete this outfall when the system is connected to CMUD by September 1, 1997, these new effluent guideline limitations will be phased in. The current permit limits of 90 mg/l and 135 mg/l shall remain in place until September 1, 1997. After September 1, 1997 the limits will change to 30 mg/l and 60 mg/l.
- Oil and grease limits shall be phased in along with the total suspended solids limits described above. The oil and grease monitoring frequency has been changed to every other month as requested.
- The proposed pH limits have been deleted from the permit as requested.
- The ammonia nitrogen, total phosphorus, and total nitrogen monitoring requirements have been deleted at this outfall in favor of nutrient monitoring at outfall 005.
- The draft permit included MBAS with specified units of $\mu\text{g/l}$, which reflect the state water quality standard units. The units have been changed to mg/l as requested.
- Selenium is not a byproduct of nuclear generation and monitoring has been deleted as requested.
- The permit has been revised to indicate that the permittee may petition the Division to evaluate the effluent monitoring requirement for silver if, after 6 months of monitoring under the terms of the permit, the resulting data indicates that silver is not a parameter of concern. Six months of monitoring will allow the Division to review a minimum of twelve data points.

Outfall 004

- The monitoring frequency for hydrazine has been changed to "batch" as requested.
- The draft permit lists weekly flow monitoring and is unchanged since weekly flow monitoring was requested.
- The monitoring frequency for total suspended solids and oil and grease should have been listed as quarterly in the draft permit and have been changed to quarterly as requested.
- Application documents indicate that outfall 004 combines with outfall 001 prior to discharge and that turbine building sumps may be discharged through outfall 002. Outfall 002 is the conventional water treatment system and incorporates the same effluent limits as outfall 004. Therefore, the wording has been changed to "In the event the turbine building sumps are discharged through Outfall 001 instead of Outfall 002, the above discharge limitations shall also apply to the turbine building sump discharge" as requested.

Outfall 005

- Nutrient monitoring requirements at outfalls 002 and 003 have been deleted in favor of monitoring nutrients at this outfall where the flows combine prior to discharge to the Catawba River.

Outfall 006

- The footnote "There shall be no discharge of floating solids or visible foam in other than trace amounts" has been removed from this outfall as requested.

Special Conditions

- Part III, Condition F has been corrected to specify a daphnid test organism with samples collected during February, May, August, and November.
- The standard acute toxicity quarterly pass/fail permit limit language has been incorporated into the permit.
- The document reference in Part III, Condition G has been changed to Document 600/4-90/027F entitled "Methods for Measuring the Acute Toxicity of Effluents and receiving Waters to Freshwater and Marine Organisms, Fourth Edition."
- Part III, Condition G specifies a 24-hour composite sample and the outfall 004 effluent limitation and monitoring requirements page has been accordingly modified.


If any parts, measurement frequencies or sampling requirements contained in this permit are unacceptable to you, you have the right to an adjudicatory hearing upon written request within thirty (30) days following receipt of this letter. This request must be in the form of a written petition, conforming to Chapter 150B of the North Carolina General Statutes, and filed with the Office of Administrative Hearings, Post Office Drawer 27447, Raleigh, North Carolina 27611-7447. Unless such demand is made, this decision shall be final and binding.

Please take notice this permit is not transferable. Part II, E.4. addresses the requirements to be followed in case of change in ownership or control of this discharge.

This permit does not affect the legal requirements to obtain other permits which may be required by the Division of Environmental Management or permits required by the Division of Land Resources, Coastal Area Management Act or any other Federal or Local governmental permit that may be required.

If you have any questions concerning this permit, please contact Jeanette Powell at telephone number (919) 733-5083, ext. 537.

Sincerely,


for A. Preston Howard, Jr., P. E.

cc: Central Files
Mooresville Regional Office
Mr. Roosevelt Childress, EPA
Permits and Engineering Unit
Facilities Assessment Unit
Mecklenburg County Health Department
Aquatic Survey and Toxicology Unit
Operator Training and Certification Unit

STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT, HEALTH, AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL MANAGEMENT

PERMIT

TO DISCHARGE WASTEWATER UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of North Carolina General Statute 143-215.1, other lawful standards and regulations promulgated and adopted by the North Carolina Environmental Management Commission, and the Federal Water Pollution Control Act, as amended,

Duke Power Company

is hereby authorized to discharge wastewater from a facility located at

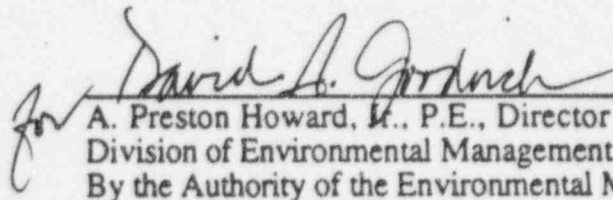
McGuire Nuclear Station
Highway 73
Charlotte
Mecklenburg County

to receiving waters designated as the Catawba River (Lake Norman and Mountain Island Lake) in the Catawba River Basin
in accordance with the discharge limitations, monitoring requirements, and other conditions set forth in Parts I, II, III, and IV hereof.

This permit shall become effective August 1, 1995.

This permit and the authorization to discharge shall expire at midnight on June 30, 2000.

Signed this day July 10, 1995.

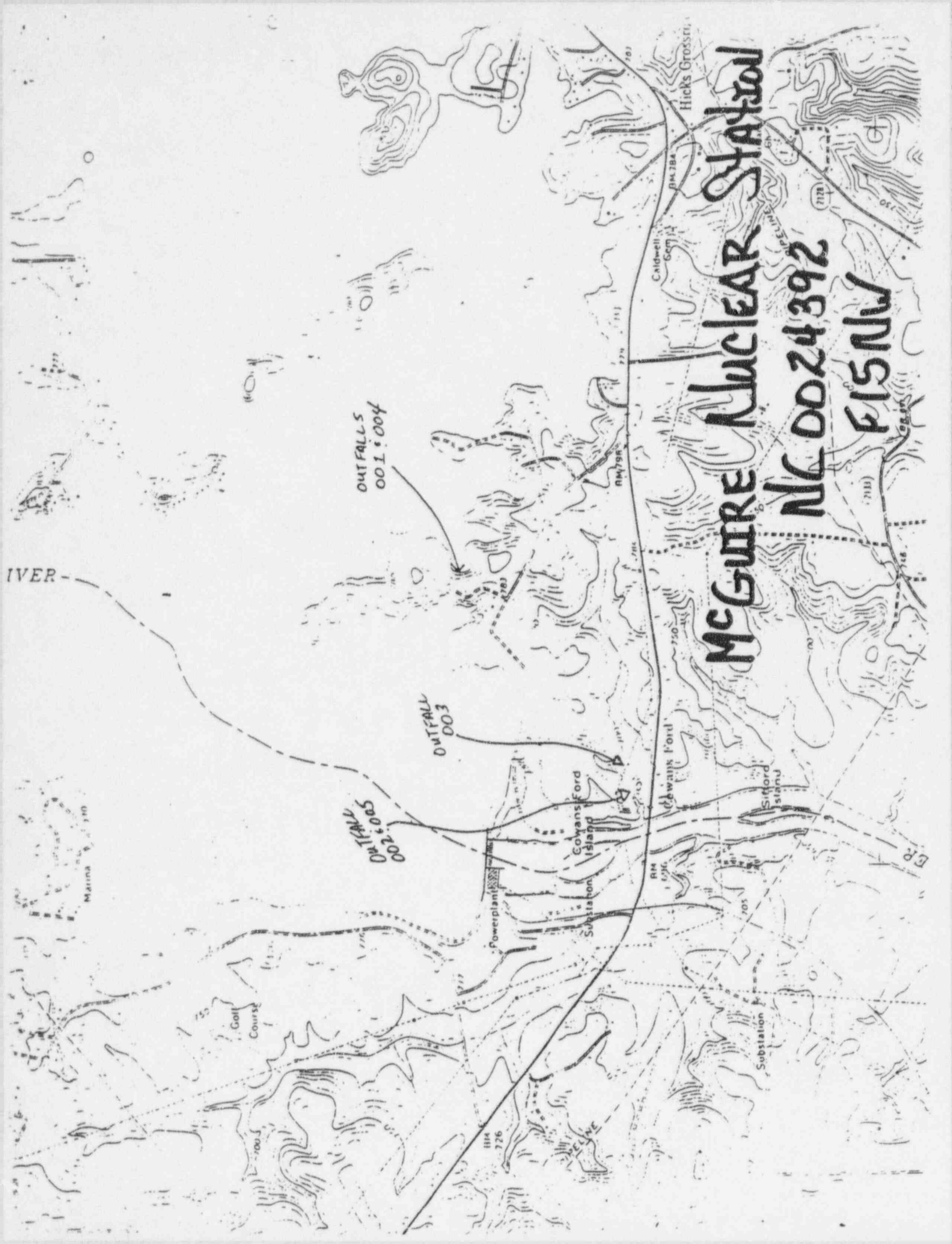

A. Preston Howard, Jr., P.E., Director
Division of Environmental Management
By the Authority of the Environmental Management Commission

SUPPLEMENT TO PERMIT COVER SHEET

Duke Power Company

is hereby authorized to:

1. Continue to operate wastewater treatment facilities necessary to comply with final effluent limitations contained in this permit and located at McGuire Nuclear Station, northwest of Charlotte in Mecklenburg County, and
2. Continue to discharge condenser cooling water, low pressure service water, and nuclear service water through outfall 001 at the location specified on the attached map into Lake Norman which is classified Class WS-IV B waters in the Catawba River Basin, and
3. Continue to discharge from turbine building sumps, water treatment room sumps, condensate demineralizer backwashes, closed cooling systems, the Standby Shutdown Facility, laboratory drains, landfill leachate, steam generator blowdown, wet lay-up, and unwatering pumps after treatment in the conventional wastewater treatment system consisting of a 200,000 gallon concrete lined initial holdup pond, two parallel 2.5 MG clay-lined settling ponds, a concrete lined 1 MG final holdup pond, chemical addition of coagulants, oxidants, catalysts, pH control, and effluent pH adjustment by CO₂ addition with discharge through outfall 002 at the location specified on the attached map into the Catawba River (Mountain Island Lake) which is classified WS-IV waters in the Catawba River Basin, and
4. Continue to discharge from vehicle maintenance facility building washdown drains, office complex building shop drains, medical facility photographic wastes, nondestructive examination photographic wastes and domestic wastes through the domestic wastewater treatment system which includes a four cell aerated lagoon followed by a sand filter, tablet disinfection with contact tank, and a parshall flume with discharge through outfall 003 at the location specified on the attached map into the Catawba River (Mountain Island Lake) which is classified WS-IV waters in the Catawba River Basin, and
5. Continue to discharge from the radwaste liquid monitoring system, floor and equipment drains, laundry drains, and ventilation unit drains through outfall 004 at the location specified on the attached map into Lake Norman which is classified Class WS-IV B waters in the Catawba River Basin, and
6. Continue to discharge treated sanitary effluent (from outfall 003), standby nuclear service pond overflow, administrative building drains (HVAC sump, floor drains, janitorial sinks, hot water boiler, chiller water system), main condenser cooling, unwatering, filtered water, HVAC unit drains, yard drains, and reverse osmosis reject flows through the wastewater collection basin consisting of a 13.4 acre settling pond and surface skimmer with discharge through outfall 005 at the location specified on the attached map into the Catawba River (Mountain Island Lake) which is classified WS-IV waters in the Catawba River Basin, and
7. Continue to discharge chemical metal cleaning wastes from outfall 006 through outfall 002 at the location specified on the attached map into the Catawba River (Mountain Island Lake) which is classified WS-IV waters in the Catawba River Basin and through outfall 004 at the location specified on the attached map into Lake Norman which is classified Class WS-IV B waters in the Catawba River Basin.



McGuire Nuclear Station

2624392

F15NW

OUTFALLS
001 & 004

OUTFALL
003

OUTFALL
002 & 005

IVER

Caldwell,
Conn.

RM 784

Hicks Crossin

Cowan's Ford
Island

Sinford
Island

Substation

Powerplant

Golf
Course

726

Substation

During the period beginning on the effective date of the permit and lasting until expiration, the Permittee is authorized to discharge from outfall(s) serial number 001 - Once Through Cooling Water. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements				
	Monthly	Avg.	Daily	Max.	Measurement Frequency	Sample Type	Sample Location ¹
Intake Flow (BGD)					Daily	Pump Logs	I
Temperature (October-June)		95° F			Daily	Recorder	DCB
Temperature (July-September)		99° F			Daily	Recorder	DCB
Hydrazine ²				0.06 mg/l		Calculations	DCB
Acute Toxicity ³					Quarterly	Composite	DCB
Total Residual Chlorine ⁴		0.20 mg/l		0.50 mg/l	Weekly	Multiple Grab ⁵	DS
Time of Chlorine Addition ⁶							

Footnotes:

Sample Location: I - intake, DCB - discharge canal bridge, DS - discharge structure corresponding to an individual unit.

Hydrazine daily maximum shall be the calculated hydrazine concentration at the discharge canal bridge based upon hydrazine monitoring results at Outfall 04 and shall be calculated once on any day which a discharge of hydrazine occurs from the radwaste system and turbine building sumps (based on process knowledge). The calculations shall take into account flows from the once-through cooling water and the radwaste system or turbine building sumps.

Acute Toxicity (Daphnid 24 hr.) No significant mortality at 90% with samples collected in February, May, August, and November. See Part III, Condition F.

Monitoring of total residual chlorine is not except during and subsequent to chlorination. Monitoring shall begin immediately upon start-up of chlorination and shall discontinue when total residual chlorine is no longer detected. Total residual chlorine may not be discharged from any single generating unit for more than two hours per day unless the discharger demonstrates to the State that discharge for more than two hours is required for macroinvertebrate control.

Multiple grabs shall consist of grab samples collected at the approximate beginning of Total Residual Chlorine discharge and once every 15 minutes thereafter until TRC is no longer detectable. "Daily Maximum" TRC is the instantaneous maximum at any time.

The permittee shall maintain a log of all chlorination events within each unit. The log shall be maintained on file at the plant and shall be available for review or submitted to the DEM upon request by any representative of this Division. For each chlorination event, the log shall list: (1) each system that is chlorinated, (2) the volume of the system (gpm), (3) the chlorination begin and end time, and (4) the total time of the chlorination event (minutes).

DISCHARGE OF ANY PRODUCT REGISTERED UNDER THE FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT IS PROHIBITED UNLESS SPECIFICALLY AUTHORIZED ELSEWHERE IN THIS PERMIT.

THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

A. (2). EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FINAL

Permit No. NC0024392

During the period beginning on the effective date of the permit and lasting until expiration, the Permittee is authorized to discharge from outfall(s) serial number 002 - Conventional Wastewater Treatment Facility. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Monthly	Avg.	Measurement Frequency	Sample Type	Sample Location ¹
Flow (MGD)			Daily	Instantaneous	E
Oil and Grease			Monthly	Grab	E
Total Suspended Solids	15.0 mg/l		Monthly	Grab	E
Total Residual Chlorine ² (mg/l)	30.0 mg/l		Monthly	Grab	E
pH ³			Monthly	Grab	E
Hydrazine			Monthly	Grab	E
MBAS (mg/l)		4.4 mg/l	Weekly	Grab	E
Sulfate (mg/l)			Monthly	Grab	E
Acute Toxicity ⁴			Monthly	Grab	E
BOD ₅ (mg/l)			Quarterly		E
			Monthly	Grab	E

Footnotes:

- ¹ Sample Location: E - Effluent, with sampling performed prior to mixing with any other waste streams.
- ² Total Residual Chlorine shall be monitored once per batch within 24 hours of injection when chlorine is used for treatment purposes.
- ³ The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored as indicated above.
- ⁴ Acute Toxicity (Daphnid 48 hr.) LC₅₀ 80% with samples collected in February, May, August and November. See Part III, Condition G.

THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

During the period beginning on the effective date of the permit and lasting until August 31, 1997, the Permittee is authorized to discharge from outfall(s) serial number 003 - Domestic Wastewater Treatment Facility. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations				Monitoring Requirements		
	Monthly	Avg.	Daily	Max.	Measurement Frequency	Sample Type	Sample Location ¹
Flow (MGD)					Weekly	Instantaneous	E
BOD ₅	30.0 mg/l		45.0 mg/l		2/Month	Grab	E
Total Suspended Solids	90.0 mg/l		135.0 mg/l		2/Month	Grab	E
Total Residual Chlorine (mg/l)					Weekly	Grab	E
Fecal Coliform	200 /100 ml		400 /100 ml		2/Month	Grab	E
pH					Monthly	Grab	E
Oil and Grease	30.0 mg/l		60.0 mg/l		**	Grab	E
Silver (µg/l) ²					2/Month	Grab	E
MBAS (µg/l)					Monthly	Grab	E

Footnotes:

¹ Sample Location: E - Effluent

² If, after six months of silver monitoring according to the above monitoring requirements, the data do not indicate significant concentrations of silver in the discharge from this outfall, the permittee may petition the Division for reduced silver effluent limitations and monitoring requirements.

** Samples to be collected every other month.

THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

During the period beginning on September 1, 1997 and lasting until expiration, the Permittee is authorized to discharge from outfall(s) serial number 003 - Domestic Wastewater Treatment Facility. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Monthly Avg.	Daily Max.	Measurement Frequency	Sample Type	Sample Location ¹
Flow (MGD)			Weekly	Instantaneous	E
BOD ₅	30.0 mg/l	45.0 mg/l	2/Month	Grab	E
Total Suspended Solids	30.0 mg/l	100.0 mg/l	2/Month	Grab	E
Total Residual Chlorine (mg/l)			Weekly	Grab	E
Fecal Coliform	200 /100 ml	400 /100 ml	2/Month	Grab	E
pH			Monthly	Grab	E
Oil and Grease	15.0 mg/l	20.0 mg/l	**	Grab	E
Silver (µg/l)			2/Month	Grab	E
MBAS (µg/l)			Monthly	Grab	E

Footnotes:

¹ Sample Location: E - Effluent

** Samples to be collected every other month.

THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

During the period beginning on the effective date of the permit and lasting until expiration, the Permittee is authorized to discharge from outfall(s) serial number 004 - Radwaste Liquid Waste Monitoring System*. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent	Characteristics	Discharge Limitations		Monitoring Requirements				
		Monthly	Avg.	Daily	Max.	Measurement Frequency	Sample Type	Sample Location ¹
Flow (MGD)						Weekly	Instantaneous	E
Total Suspended Solids		30.0	mg/l	100.0	mg/l	Quarterly	Grab	E
Oil and Grease		15.0	mg/l	20.0	mg/l	Quarterly	Grab	E
Hydrazine (mg/l)						*	Grab	E

Footnotes:

- ¹ Sample Location: E - Effluent, with samples collected after radwaste treatment, but prior to any dilution with cooling water.
- * Hydrazine monitoring shall be performed on each batch that contains hydrazine that is collected in the radwaste system or turbine building sumps.

NOTE: In the event the turbine building sumps are discharged through Outfall 001 instead of Outfall 002, the above discharge limitations shall also apply to the turbine building sump discharge. Each discharge from the turbine building sumps shall be monitored as specified above for flow, total suspended solids, oil and grease, and hydrazine, if applicable.

THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

A. (6). EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS. 3 FINAL

Permit No. NC0024392

During the period beginning on the effective date of the permit and lasting until expiration, the Permittee is authorized to discharge from outfall(s) serial number 005 - Wastewater Collection Basin. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Monthly	Avg.	Measurement Frequency	Sample Type	Sample Location ¹
Flow (MGD)			Weekly	Instantaneous	E
BOD ₅ (mg/l)			Monthly	Grab	E
Total Suspended Solids	30.0 mg/l		Monthly	Grab	E
Fecal Coliform (/100 ml)		100.0 mg/l	Monthly	Grab	E
Oil and Grease	15.0 mg/l		Monthly	Grab	E
Total Copper (µg/l)		20.0 mg/l	2/Month	Grab	E
Total Iron (mg/l)			Monthly	Grab	E
Chronic Toxicity ²			Monthly	Grab	E
Alkalinity [CaCO ₃] (mg/l)			Quarterly	Grab	E
Total Phosphorus (mg/l)			Monthly	Grab	E
TKN (mg/l)			Monthly	Grab	E
NO ₂ + NO ₃ (mg/l)			Monthly	Grab	E
NH ₃ -N (mg/l)			Monthly	Grab	E
pH (s.u.)			Monthly	Grab	E
			Monthly	Grab	E

Footnotes:

¹ Sample Location: E - Effluent

² Chronic Toxicity (Ceriodaphnia) Pass/Fail at 12% with samples collected in January, April, July, and October. See Part III, Condition H.

THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

A. (7). EF EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FINAL

Permit No. IN-0024392

During the period beginning on the effective date of the permit and lasting until expiration, the Permittee is authorized to discharge from outfall(s) serial number 006 - Chemical Metal Cleaning Wastes*. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent	Characteristics	Discharge Limitations		Monitoring Requirements				
		Monthly	Avg.	Daily	Max.	Measurement Frequency	Sample Type	Sample Location
	Flow (MGD)					1/Batch	Instantaneous	E
	Total Suspended Solids	30.0	mg/l	100.0	mg/l	1/Batch	Grab	E
	Oil and Grease	15.0	mg/l	20.0	mg/l	1/Batch	Grab	E
	Total Copper	1.0	mg/l	1.0	mg/l	1/Batch	Grab	E
	Total Iron	1.0	mg/l	1.0	mg/l	1/Batch	Grab	E
	pH ²					1/Batch	Grab	E

Footnotes:

¹ Sample Location: E - Effluent

² The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored as indicated above.

MONITORING AND REPORTING UNDER THESE EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS IS REQUIRED ONLY WHEN CHEMICAL METAL CLEANING IS PERFORMED.

*** THESE LIMITATIONS SHALL APPLY TO ALL CHEMICAL METAL CLEANING WASTES TREATED AT THE FACILITY.** The treated wastewater from the chemical metal cleaning wastes operation may be discharged through any permitted outfall. All limitations imposed upon outfall 006, with the possible exception of pH, are applicable to all chemical metal cleaning waste discharges, and must be met prior to mixing with any other wastestream. For pH, if the waste stream is sent through the conventional wastewater treatment facility prior to discharge, then the pH limitation must be met at the outfall from the conventional wastewater treatment facility.

PART I

Section B. Schedule of Compliance

1. The permittee shall comply with Final Effluent Limitations specified for discharges in accordance with the following schedule:

Permittee shall comply with Final Effluent Limitations by the effective date of the permit unless specified below.

2. Permittee shall at all times provide the operation and maintenance necessary to operate the existing facilities at optimum efficiency.

3. 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 schedule requirements.

PART II
STANDARD CONDITIONS FOR NPDES PERMITS

SECTION A. DEFINITIONS

1. Permit Issuing Authority

The Director of the Division of Environmental Management.

2. DEM or Division

Means the Division of Environmental Management, Department of Environment, Health and Natural Resources.

3. EMC

Used herein means the North Carolina Environmental Management Commission.

4. Act or "the Act"

The Federal Water Pollution Control Act, also known as the Clean Water Act, as amended, 33 USC 1251, et. seq.

5. Mass/Day Measurements

- a. The "monthly average discharge" is defined as the total mass of all daily discharges sampled and/or measured during a calendar month on which daily discharges are sampled and measured, divided by the number of daily discharges sampled and/or measured during such month. It is therefore, an arithmetic mean found by adding the weights of the pollutant found each day of the month and then dividing this sum by the number of days the tests were reported. The limitation is identified as "Monthly Average" in Part I of the permit.
- b. The "weekly average discharge" is defined as the total mass of all daily discharges sampled and/or measured during the calendar week (Sunday - Saturday) on which daily discharges are sampled and measured, divided by the number of daily discharges sampled and/or measured during such week. It is, therefore, an arithmetic mean found by adding the weights of pollutants found each day of the week and then dividing this sum by the number of days the tests were reported. This limitation is identified as "Weekly Average" in Part I of the permit.
- c. The "maximum daily discharge" is the total mass (weight) of a pollutant discharged during a calendar day. If only one sample is taken during any calendar day the weight of pollutant calculated from it is the "maximum daily discharge." This limitation is identified as "Daily Maximum," in Part I of the permit.
- d. The "average annual discharge" is defined as the total mass of all daily discharges sampled and/or measured during the calendar year on which daily discharges are sampled and measured, divided by the number of daily discharges sampled and/or measured during such year. It is, therefore, an arithmetic mean found by adding the weights of pollutants found each day of the year and then dividing this sum by the number of days the tests were reported. This limitation is defined as "Annual Average" in Part I of the permit.

6. Concentration Measurement

- a. The "average monthly concentration," other than for fecal coliform bacteria, is the sum of the concentrations of all daily discharges sampled and/or measured during a calendar month on which daily discharges are sampled and measured, divided by the number of daily discharges sampled and/or measured during such month (arithmetic mean of the daily concentration values). The daily concentration value is equal to the concentration of a composite sample or in the case of grab samples is the arithmetic mean (weighted by flow value) of all the samples collected during that calendar day. The average monthly count for fecal coliform bacteria is the geometric mean of the counts for samples collected during a calendar month. This limitation is identified as "Monthly Average" under "Other Limits" in Part I of the permit.
- b. The "average weekly concentration," other than for fecal coliform bacteria, is the sum of the concentrations of all daily discharges sampled and/or measured during a calendar week (Sunday/Saturday) on which daily discharges are sampled and measured divided by the number of daily discharges sampled and/or measured during such week (arithmetic mean of the daily concentration values). The daily concentration value is equal to the concentration of a composite sample or in the case of grab samples is the arithmetic mean (weighted by flow value) of all the samples collected during that calendar day. The average weekly count for fecal coliform bacteria is the geometric mean of the counts for samples collected during a calendar week. This limitation is identified as "Weekly Average" under "Other Limits" in Part I of the permit.
- c. The "maximum daily concentration" is the concentration of a pollutant discharge during a calendar day. If only one sample is taken during any calendar day the concentration of pollutant calculated from it is the "Maximum Daily Concentration". It is identified as "Daily Maximum" under "Other Limits" in Part I of the permit.
- d. The "average annual concentration," other than for fecal coliform bacteria, is the sum of the concentrations of all daily discharges sampled and/or measured during a calendar year on which daily discharges are sampled and measured divided by the number of daily discharges sampled and/or measured during such year (arithmetic mean of the daily concentration values). The daily concentration value is equal to the concentration of a composite sample or in the case of grab samples is the arithmetic mean (weighted by flow value) of all the samples collected during that calendar day. The average yearly count for fecal coliform bacteria is the geometric mean of the counts for samples collected during a calendar year. This limitation is identified as "Annual Average" under "Other Limits" in Part I of the permit.
- e. The "daily average concentration" (for dissolved oxygen) is the minimum allowable amount of dissolved oxygen required to be available in the effluent prior to discharge averaged over a calendar day. If only one dissolved oxygen sample is taken over a calendar day, the sample is considered to be the "daily average concentration" for the discharge. It is identified as "daily average" in the text of Part I.
- f. The "quarterly average concentration" is the average of all samples taken over a calendar quarter. It is identified as "Quarterly Average Limitation" in the text of Part I of the permit.
- g. A calendar quarter is defined as one of the following distinct periods: January through March, April through June, July through September, and October through December.

7. Other Measurements

- a. Flow, (MGD): The flow limit expressed in this permit is the 24 hours average flow, averaged monthly. It is determined as the arithmetic mean of the total daily flows recorded during the calendar month.
- b. An "instantaneous flow measurement" is a measure of flow taken at the time of sampling, when both the sample and flow will be representative of the total discharge.
- c. A "continuous flow measurement" is a measure of discharge flow from the facility which occurs continually without interruption throughout the operating hours of the facility. Flow shall be monitored continually except for the infrequent times when there may be no flow or for infrequent maintenance activities on the flow device.

8. Types of Samples

- a. Composite Sample: A composite sample shall consist of:
 - (1) a series of grab samples collected at equal time intervals over a 24 hour period of discharge and combined proportional to the rate of flow measured at the time of individual sample collection, or
 - (2) a series of grab samples of equal volume collected over a 24 hour period with the time intervals between samples determined by a preset number of gallons passing the sampling point. Flow measurement between sample intervals shall be determined by use of a flow recorder and totalizer, and the present gallon interval between sample collection fixed at no greater than 1/24 of the expected total daily flow at the treatment system, or
 - (3) a single, continuous sample collected over a 24 hour period proportional to the rate of flow.

In accordance with (1) above, the time interval between influent grab samples shall be no greater than once per hour, and the time interval between effluent grab samples shall be no greater than once per hour except at wastewater treatment systems having a detention time of greater than 24 hours. In such cases, effluent grab samples may be collected at time intervals evenly spaced over the 24 hour period which are equal in number of hours to the detention time of the system in number of days. However, in no case may the time interval between effluent grab samples be greater than six (6) hours nor the number of samples less than four (4) during a 24 hour sampling period.

- b. Grab Sample: Grab samples are individual samples collected over a period of time not exceeding 15 minutes; the grab sample can be taken manually. Grab samples must be representative of the discharge or the receiving waters.

9. Calculation of Means

- a. Arithmetic Mean: The arithmetic mean of any set of values is the summation of the individual values divided by the number of individual values.
- b. Geometric Mean: The geometric mean of any set of values is the Nth 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).

- c. Weighted by Flow Value: Weighted by flow value means the summation of each concentration times its respective flow divided by the summation of the respective flows.

10. Calendar Day

A calendar day is defined as the period from midnight of one day until midnight of the next day. However, for purposes of this permit, any consecutive 24-hour period that reasonably represents the calendar day may be used for sampling.

11. Hazardous Substance

A hazardous substance means any substance designated under 40 CFR Part 116 pursuant to Section 311 of the Clean Water Act.

12. Toxic Pollutant

A toxic pollutant is any pollutant listed as toxic under Section 307(a)(1) of the Clean Water Act.

SECTION B. GENERAL CONDITIONS

1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

- a. The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the Clean Water Act within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.
- b. The Clean Water Act provides that any person who violates a permit condition is subject to a civil penalty not to exceed \$25,000 per day for each violation. Any person who negligently violates any permit condition is subject to criminal penalties of \$2,500 to \$25,000 per day of violation, or imprisonment for not more than 1 year, or both. Any person who knowingly violates permit conditions is subject to criminal penalties of \$5,000 to \$50,000 per day of violation, or imprisonment for not more than 3 years, or both. Also, any person who violates a permit condition may be assessed an administrative penalty not to exceed \$10,000 per violation with the maximum amount not to exceed \$125,000. [Ref: Section 309 of the Federal Act 33 U.S.C. 1319 and 40 CFR 122.41 (a)]
- c. Under state law, a civil penalty of not more than ten thousand dollars (\$10,000) per violation may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of a permit. [Ref: North Carolina General Statutes § 143-215.6A]
- d. Any person may be assessed an administrative penalty by the Administrator for violating section 301, 302, 306, 307, 308, 318, or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act. Administrative penalties for Class I violations are not to exceed \$10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed \$25,000.

Penalties for Class II violations are not to exceed \$10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed \$125,000.

2. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

3. Civil and Criminal Liability

Except as provided in permit conditions on "Bypassing" (Part II, C-4) and "Power Failures" (Part II, C-7), nothing in this permit shall be construed to relieve the permittee from any responsibilities, liabilities, or penalties for noncompliance pursuant to NCGS 143-215.3, 143-215.6 or Section 309 of the Federal Act, 33 USC 1319. Furthermore, the permittee is responsible for consequential damages, such as fish kills, even though the responsibility for effective compliance may be temporarily suspended.

4. 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 to under NCGS 143-215.75 et seq. or Section 311 of the Federal Act, 33 USC 1321. Furthermore, the permittee is responsible for consequential damages, such as fish kills, even though the responsibility for effective compliance may be temporarily suspended.

5. Property Rights

The issuance of this permit 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.

6. 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.

7. 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 circumstances, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

8. Duty to Provide Information

The permittee shall furnish to the Permit Issuing Authority, within a reasonable time, any information which the Permit Issuing Authority may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Permit Issuing Authority upon request, copies of records required to be kept by this permit.

9. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit.

10. Expiration of Permit

The permittee is not authorized to discharge after the expiration date. In order to receive automatic 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. Any permittee that has not requested renewal at least 180 days prior to expiration, or any permittee that does not have a permit after the expiration and has not requested renewal at least 180 days prior to expiration, will subject the permittee to enforcement procedures as provided in NCGS 143-215.6 and 33 USC 1251 et. seq.

11. Signatory Requirements

All applications, reports, or information submitted to the Permit Issuing Authority shall be signed and certified.

a. All permit applications shall be signed as follows:

- (1) For a corporation: by a responsible corporate officer. For the purpose of this Section, a responsible corporate officer means: (a) a president, secretary, treasurer or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation, or (b) the manager of one or more manufacturing production or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding 25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
- (2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or
- (3) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.

b. All reports required by the permit and other information requested by the Permit Issuing Authority shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

- (1) The authorization is made in writing by a person described above;
- (2) The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or well field, superintendent, a position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and
- (3) The written authorization is submitted to the Permit Issuing Authority.

- c. Certification. Any person signing a document under paragraphs a. or b. of this section shall make the following certification:

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations."

12. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

13. Permit Modification, Revocation and Reissuance, or Termination

The issuance of this permit does not prohibit the permit issuing authority from reopening and modifying the permit, revoking and reissuing the permit, or terminating the permit as allowed by the laws, rules, and regulations contained in Title 40, Code of Federal Regulations, Parts 122 and 123; Title 15A of the North Carolina Administrative Code, Subchapter 2H .0100; and North Carolina General Statute 143-215.1 et. al.

14. Previous Permits

All previous National Pollutant Discharge Elimination System Permits issued to this facility, whether for operation or discharge, are hereby revoked by issuance of this permit. [The exclusive authority to operate this facility arises under this permit. The authority to operate the facility under previously issued permits bearing this number is no longer effective.] The conditions, requirements, terms, and provisions of this permit authorizing discharge under the National Pollutant Discharge Elimination System govern discharges from this facility.

SECTION C. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Certified Operator

Pursuant to Chapter 90A-44 of North Carolina General Statutes, and upon classification of the facility by the Certification Commission, the permittee shall employ a certified wastewater treatment plant operator in responsible charge (ORC) of the wastewater treatment facilities. Such operator must hold a certification of the grade equivalent to or greater than the classification assigned to the wastewater treatment facilities by the Certification Commission. The permittee must also employ a certified back-up operator of the appropriate type and any grade to comply with the conditions of Title 15A, Chapter 8A .0202. The ORC of the facility must visit each Class I facility at least weekly and each Class II, III, and IV facility at least daily, excluding weekends and holidays, and must properly manage and document daily operation and maintenance of the facility and must comply with all other conditions of Title 15A, Chapter 8A .0202. Once the facility is classified, the permittee shall submit a letter to the Certification Commission which designates the operator in responsible charge within thirty days after the wastewater treatment facilities are 50% complete.

2. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

3. Need to Halt or Reduce not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the condition of this permit.

4. Bypassing of Treatment Facilities

a. Definitions

- (1) "Bypass" means the known diversion of waste streams from any portion of a treatment facility including the collection system, which is not a designed or established or operating mode for the facility.
- (2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Bypass not exceeding limitations.

The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Paragraphs c. and d. of this section.

c. Notice

- (1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass; including an evaluation of the anticipated quality and affect of the bypass.
- (2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Part II, E. 6. of this permit. (24 hour notice).

d. Prohibition of Bypass

- (1) Bypass is prohibited and the Permit Issuing Authority may take enforcement action against a permittee for bypass, unless:
 - (A) Bypass was unavoidable to prevent loss of life, personal injury or severe property damage;
 - (B) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes or maintenance during normal

periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(C) The permittee submitted notices as required under Paragraph c. of this section.

(2) The Permit Issuing Authority may approve an anticipated bypass, after considering its adverse affects, if the Permit Issuing Authority determines that it will meet the three conditions listed above in Paragraph d. (1) of this section.

5. Upsets

a. Definition.

"Upset " means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. Effect of an upset.

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph c. of this condition are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions necessary for a demonstration of upset.

A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

- (1) An upset occurred and that the permittee can identify the cause(s) of the upset;
- (2) The permittee facility was at the time being properly operated; and
- (3) The permittee submitted notice of the upset as required in Part II, E. 6. (b) (B) of this permit.
- (4) The permittee complied with any remedial measures required under Part II, B. 2. of this permit.

d. Burden of proof.

In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

6. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be utilized/disposed of in accordance with NCGS 143-215.1 and in a manner such as to prevent any pollutant from such materials from entering waters of the State or navigable waters of the United States. The permittee shall comply with all existing federal

regulations governing the disposal of sewage sludge. Upon promulgation of 40 CFR Part 503, any permit issued by the Permit Issuing Authority for the utilization/disposal of sludge may be reopened and modified, or revoked and reissued, to incorporate applicable requirements at 40 CFR Part 503. The permittee shall comply with applicable 40 CFR Part 503 Standards for the Use and Disposal of Sewage Sludge (when promulgated) within the time provided in the regulation, even if the permit is not modified to incorporate the requirement. The permittee shall notify the Permit Issuing Authority of any significant change in its sludge use or disposal practices.

7. Power Failures

The permittee is responsible for maintaining adequate safeguards as required by DEM Regulation, Title 15A, North Carolina Administrative Code, Subchapter 2H, .0124 Reliability, 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.

SECTION D. MONITORING AND RECORDS

1. Representative Sampling

Samples collected and measurements taken, as required herein, shall be characteristic of the volume and nature of the permitted discharge. Samples collected at a frequency less than daily shall be taken on a day and time that is characteristic of the discharge over the entire period which the sample represents. All samples shall be taken at the monitoring points specified in this permit and, unless otherwise specified, before the effluent joins or is diluted by any other wastestream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the Permit Issuing Authority.

2. Reporting

Monitoring results obtained during the previous month(s) shall be summarized for each month and reported on a monthly Discharge Monitoring Report (DMR) Form (DEM No. MR 1, 1.1, 2, 3) or alternative forms approved by the Director, DEM, postmarked no later than the 30th day following the completed reporting period.

The first DMR is due on the last day of the month following the issuance of the permit or in the case of a new facility, on the last day of the month following the commencement of discharge. Duplicate signed copies of these, and all other reports required herein, shall be submitted to the following address:

Division of Environmental Management
Water Quality Section
ATTENTION: Central Files
Post Office Box 29535
Raleigh, North Carolina 27626-0535

3. Flow Measurements

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to ensure that the accuracy of the measurements are consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than + 10% from the true discharge rates throughout the range of expected

discharge volumes. Once-through condenser cooling water flow which is monitored by pump logs, or pump hour meters as specified in Part I of this permit and based on the manufacturer's pump curves shall not be subject to this requirement.

4. Test Procedures

Test procedures for the analysis of pollutants shall conform to the EMC regulations published pursuant to NCGS 143-215.63 et. seq, the Water and Air Quality Reporting Acts, and to regulations published pursuant to Section 304(g), 33 USC 1314, of the Federal Water Pollution Control Act, as Amended, and Regulation 40 CFR 136; or in the case of sludge use or disposal, approved under 40 CFR 136, unless otherwise specified in 40 CFR 503, unless other test procedures have been specified in this permit.

To meet the intent of the monitoring required by this permit, all test procedures must produce minimum detection and reporting levels that are below the permit discharge requirements and all data generated must be reported down to the minimum detection or lower reporting level of the procedure. If no approved methods are determined capable of achieving minimum detection and reporting levels below permit discharge requirements, then the most sensitive (method with the lowest possible detection and reporting level) approved method must be used.

5. Penalties for Tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than two years per violation, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than \$20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

6. Records Retention

Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.

7. Recording Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

- a. The date, exact place, and time of sampling or measurements;
- b. The individual(s) who performed the sampling or measurements;
- c. The date(s) analyses were performed;
- d. The individual(s) who performed the analyses;
- e. The analytical techniques or methods used; and
- f. The results of such analyses.

8. Inspection and Entry

The permittee shall allow the Director, or an authorized representative (including an authorized contractor acting as a representative of the Director), upon the presentation of credentials and other documents as may be required by law, to:

- a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
- b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
- c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
- d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

SECTION E. REPORTING 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.

2. Planned Changes

The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

- a. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR Part 122.29 (b); or
- b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR Part 122.42 (a) (1).
- c. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

3. Anticipated Noncompliance

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

4. Transfers

This permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

5. Monitoring Reports

Monitoring results shall be reported at the intervals specified elsewhere in this permit.

- a. Monitoring results must be reported on a Discharge Monitoring Report (DMR) (See Part II, D. 2 of this permit) or forms provided by the Director for reporting results of monitoring of sludge use or disposal practices.
- b. If the permittee monitors any pollutant more frequently than required by the permit, using test procedures specified in Part II, D. 4. of this permit or in the case of sludge use or disposal, approved under 40 CFR 503, or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR.
- c. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.

6. Twenty-four Hour Reporting

- a. The permittee shall report to the central office or the appropriate regional office any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee became aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance, and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.
- b. The following shall be included as information which must be reported within 24 hours under this paragraph:
 - (1) Any unanticipated bypass which exceeds any effluent limitation in the permit.
 - (2) Any upset which exceeds any effluent limitation in the permit.
 - (3) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Director in the permit to be reported within 24 hours.
- c. The Director may waive the written report on a case-by-case basis for reports under paragraph b. above of this condition if the oral report has been received within 24 hours.

7. Other Noncompliance

The permittee shall report all instances of noncompliance not reported under Part II, E. 5 and 6. of this permit at the time monitoring reports are submitted. The reports shall contain the information listed in Part II, E. 6. of this permit.

8. Other Information

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, it shall promptly submit such facts or information.

9. Noncompliance Notification

The permittee shall report by telephone to either the central office or the appropriate regional office of the Division as soon as possible, but in no case more than 24 hours or on the next working day following the occurrence or first knowledge of the occurrence of any of the following:

- a. 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.
- b. 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.
- c. Any failure of a pumping station, sewer line, 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.

Persons reporting such occurrences by telephone shall also file a written report in letter form within 5 days following first knowledge of the occurrence.

10. Availability of Reports

Except for data determined to be confidential under NCGS 143-215.3(a)(2) or Section 308 of the Federal Act, 33 USC 1318, all reports prepared in accordance with the terms shall be available for public inspection at the offices of the Division of Environmental Management. 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 NCGS 143-215.1(b)(2) or in Section 309 of the Federal Act.

11. Penalties for Falsification of Reports

The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than two years per violation, or by both.

PART III
OTHER REQUIREMENTS

A. Construction

No construction of wastewater treatment facilities or additions to add to the plant's treatment capacity or to change the type of process utilized at the treatment plant shall be begun until Final Plans and Specifications have been submitted to the Division of Environmental Management and written approval and Authorization to Construct has been issued.

B. Groundwater Monitoring

The permittee shall, upon-written notice from the Director of the Division of Environmental Management, conduct groundwater monitoring as may be required to determine the compliance of this NPDES permitted facility with the current groundwater standards.

C. Changes in Discharges of Toxic Substances

The permittee shall notify the Permit Issuing Authority as soon as it knows or has reason to believe:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels";

(1) One hundred micrograms per liter (100 ug/l);

(2) Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;

(3) Five (5) times the maximum concentration value reported for that pollutant in the permit application.

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels";

(1) Five hundred micrograms per liter (500 ug/l);

(2) One milligram per liter (1 mg/l) for antimony;

(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application.

D. Requirement to Continually Evaluate Alternatives to Wastewater Discharges

The permittee shall continually evaluate all wastewater disposal alternatives and pursue the most environmentally sound alternative of the reasonably cost effective alternatives. If the facility is in substantial non-compliance with the terms and conditions of the NPDES permit or governing rules, regulations or laws, the permittee shall submit a report in such form and detail as required by the Division evaluating these alternatives and a plan of action within sixty (60) days of notification by the Division.

E. 316(a) Variance

The Division of Environmental Management has approved the submitted 316(a) demonstration and has concluded that the existing thermal limitations are sufficient to protect the aquatic environment of Lake Norman.

Duke Power must perform the following as part of the 316(a) variance:

- a. Monitoring shall include a sampling program with intent to determine the abundance and distribution of fish species, both in time and space, in the mixing zone over the critical summer period. The use of hydroacoustical sampling equipment is suitable for these purposes and is to be performed in conjunction with vertical temperature and dissolved oxygen profiles. In addition, these data will be analyzed where appropriate (using other lake specific information collected either by Duke Power Company or other agencies) with regard to striped bass usage of the mixing zone.
- b. Remodel and assess the impact of 100% load factor during the months of June-August and 90% load factor for the remainder of the year.
- c. Address maximum discharge temperatures from McGuire which will occur each month when the units are operating at maximum output. This discussion shall entail the possible effect on swimmers/fallen skiers in the thermal plume area during the summer months.

F. ACUTE TOXICITY PASS/FAIL PERMIT LIMIT (QUARTERLY)

The permittee shall conduct acute toxicity tests on a quarterly basis using protocols defined in the North Carolina Procedure Document entitled "Pass/Fail Methodology For Determining Acute Toxicity In A Single Effluent Concentration." The monitoring shall be performed as a Daphnia pulex or Ceriodaphnia 24 hour static test. The effluent concentration at which there may be at no time significant acute mortality in any toxicity test is 90% (defined as treatment two in the North Carolina procedure document). Effluent samples for self-monitoring purposes must be obtained during representative effluent discharge below all waste treatment. The first test will be performed after thirty days from the effective date of this permit during the months of February, May, August, and November.

The parameter code for this test if using Daphnia pulex is TGA3D. The parameter code for this test if using Ceriodaphnia is TGA3B. All toxicity testing results required as part of this permit condition will be entered on the Effluent Discharge Form (MR-1) for the month in which it was performed, using the appropriate parameter code. Additionally, DEM Form AT-2 (original) is to be sent to the following address:

Attention: Environmental Sciences Branch
North Carolina Division of
Environmental Management
4401 Reedy Creek Road
Raleigh, N.C. 27607

Test data shall be complete and accurate and include all supporting chemical/physical measurements performed in association with the toxicity tests, as well as all dose/response

data. Total residual chlorine of the effluent toxicity sample must be measured and reported if chlorine is employed for disinfection of the waste stream.

Should any single quarterly monitoring indicate a failure to meet specified limits, then monthly monitoring will begin immediately until such time that a single test is passed. Upon passing, this monthly test requirement will revert to quarterly in the months specified above.

Should any test data from either these monitoring requirements or tests performed by the North Carolina Division of Environmental Management indicate potential impacts to the receiving stream, this permit may be re-opened and modified to include alternate monitoring requirements or limits.

NOTE: Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival and appropriate environmental controls, shall constitute an invalid test and will require immediate retesting (within 30 days of initial monitoring event). Failure to submit suitable test results will constitute noncompliance with monitoring requirements.

G. ACUTE TOXICITY PERMIT LIMIT (QUARTERLY)

The permittee shall conduct acute toxicity tests on a quarterly basis using protocols defined as definitive in E.P.A. Document 600/4-90/027F entitled "Methods for Measuring the Acute Toxicity of Effluents and receiving Waters to Freshwater and Marine Organisms, Fourth Edition." The monitoring shall be performed as a *Daphnia pulex* or *Ceriodaphnia* 48 hour static test, using effluent collected as a 24 hour composite. The LC50 of this effluent using the previously stated methodology may at no time in any toxicity test be less than 80%. Effluent samples for self-monitoring purposes must be obtained during representative effluent discharge below all waste treatment. The first test will be performed after thirty days from the effective date of this permit during the months of February, May, August, and November.

The parameter code for this test if using *Daphnia pulex* is TAA3D. The parameter code for this test if using *Ceriodaphnia* is TAA3B. All toxicity testing results required as part of this permit condition will be entered on the Effluent Discharge Monitoring Form (MR-1) for the month in which it was performed, using the appropriate parameter code. Additionally, DEM Form AT-1 (original) is to be sent to the following address:

Attention: Environmental Sciences Branch
North Carolina Division of Environmental Management
4401 Reedy Creek Road
Raleigh, N.C. 27607

Test data shall be complete and accurate and include all supporting chemical/physical measurements performed in association with the toxicity tests, as well as all dose/response data. Total residual chlorine of the effluent toxicity sample must be measured and reported if chlorine is employed for disinfection of the waste stream.

Should any single quarterly monitoring indicate a failure to meet specified limits, then monthly monitoring will begin immediately until such time that a single test is passed. Upon passing, this monthly test requirement will revert to quarterly in the months specified above.

Should any test data from either these monitoring requirements or tests performed by the North Carolina Division of Environmental Management indicate potential impacts to the receiving stream, this permit may be re-opened and modified to include alternate monitoring requirements or limits.

NOTE: Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival and appropriate environmental controls, shall constitute an invalid test and will require immediate retesting (within 30 days of initial monitoring event). Failure to submit suitable test results will constitute noncompliance with monitoring requirements.

H. CHRONIC TOXICITY PASS/FAIL PERMIT LIMIT (QUARTERLY)

The effluent discharge shall at no time exhibit chronic toxicity using test procedures outlined in:

1.) The North Carolina Ceriodaphnia chronic effluent bioassay procedure (North Carolina Chronic Bioassay Procedure - Revised *September 1989) or subsequent versions.

The effluent concentration at which there may be no observable inhibition of reproduction or significant mortality is 12% (defined as treatment two in the North Carolina procedure document). The permit holder shall perform quarterly monitoring using this procedure to establish compliance with the permit condition. The first test will be performed after thirty days from the effective date of this permit during the months of January, April, July, and October. Effluent sampling for this testing shall be performed at the NPDES permitted final effluent discharge below all treatment processes.

All toxicity testing results required as part of this permit condition will be entered on the Effluent Discharge Monitoring Form (MR-1) for the month in which it was performed, using the parameter code TGP3B. Additionally, DEM Form AT-1 (original) is to be sent to the following address:

Attention: Environmental Sciences Branch
North Carolina Division of Environmental Management
4401 Reedy Creek Road
Raleigh, N.C. 27607

Test data shall be complete and accurate and include all supporting chemical/physical measurements performed in association with the toxicity tests, as well as all dose/response data. Total residual chlorine of the effluent toxicity sample must be measured and reported if chlorine is employed for disinfection of the waste stream.

Should any single quarterly monitoring indicate a failure to meet specified limits, then monthly monitoring will begin immediately until such time that a single test is passed. Upon passing, this monthly test requirement will revert to quarterly in the months specified above.

Should any test data from this monitoring requirement or tests performed by the North Carolina Division of Environmental Management indicate potential impacts to the receiving stream, this permit may be re-opened and modified to include alternate monitoring requirements or limits.

NOTE: Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival and appropriate environmental controls, shall constitute an invalid test and will require immediate retesting (within 30 days of initial monitoring event). Failure to submit suitable test results will constitute noncompliance with monitoring requirements.

I. Best Management Practices

It has been determined from information submitted that the plans and procedures in place at McGuire Nuclear Station are equivalent to that of a Best Management Practice (BMP).

J. Biocides

The permittee shall not use any biocides except those approved in conjunction with the permit application. The permittee shall notify the Director in writing not later than ninety (90) days prior to instituting use of any additional biocide used in cooling systems which may be toxic to aquatic life other than those previously reported to the Division of Environmental Management. Such notification shall include completion of Biocide Worksheet Form 101 and a map locating the discharge point and receiving stream.

K. Chemical Metal Cleaning Waste

The term "chemical metal cleaning waste" means any wastewater resulting from the cleaning of any metal process equipment with chemical compounds including, but not limited to, boiler tube cleaning.

L. Combined Waste Streams

In the event that waste streams from various sources are combined for treatment or discharge, the quantity of each pollutant or pollutant property attributable to each controlled waste source shall not exceed the specified limitation for that waste source.

M. Federal Insecticide, Fungicide, and Rodenticide Act

Discharge of any product registered under the Federal Insecticide, Fungicide, and Rodenticide Act to any waste stream which may ultimately be released to lakes, rivers, streams, or other waters of the United States is prohibited unless specifically authorized elsewhere in this permit. This requirement is not applicable to products used for lawn and agricultural purposes. Discharge of chlorine from the use of chlorine gas, sodium hypochlorite, or other similar chlorination compounds for disinfection in plant potable and service water systems and in sewage treatment is authorized.

N. Intake Screen Backwash

Continued intake screen backwash discharge is permitted without limitations or monitoring requirements. However, the discharge of oil and grease is prohibited from this discharge.

Lake Norman Aquatic Environment Maintenance Monitoring Program

The Lake Norman aquatic environment maintenance monitoring program approved by the Division of Environmental Management shall be continued. The monitoring results shall be submitted annually.

P. Mixing Zone

The mixing zone is defined as containing an area of no more than 3500 acres and lying upstream of the dam and south of a line originating on the west bank of NC coordinates E-1,416,900 and N-633,600 and extending south 70-00 east intersecting the point of land on the eastern shore. Water quality stream standards for temperature shall be met outside the mixing zone.

Q. Other Discharges

The permittee is hereby authorized to discharge as follows:

- a. The Cowans Ford Dam Underdrain discharge to the Catawba River which includes uncontaminated bearing lubrication and gland seal water, and possibly silt from cyclone separators, and
- b. Fire protection water (approved biocides only) to lake Norman (Catawba River).

R. Polychlorinated Biphenyl Compounds

There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.

S. Radioactive Material

Releases of radioactive materials shall be monitored and conducted in accordance with all conditions and limitations required by NRC and as specified in the Final Safety Analysis Report, Technical Specifications and Environmental Statement for the McGuire Nuclear Station.

T. Toxicity Reopener

This permit shall be modified, or revoked and reissued to incorporate toxicity limitations and monitoring requirements in the event toxicity testing or other studies conducted on the effluent or receiving stream indicate that detrimental effects may be expected in the receiving stream as a result of this discharge.

U. Waiver

Nothing in this permit shall be construed as a waiver by the permittee of any right to a hearing it may have pursuant to State or Federal laws or regulations.

V. Yard drains

Yard drains may be discharged without limitation or monitoring requirements.

PART IV
ANNUAL ADMINISTERING AND COMPLIANCE MONITORING FEE REQUIREMENTS

- A. The permittee must pay the annual administering and compliance monitoring fee within 30 (thirty) days after being billed by the Division. Failure to pay the fee in a timely manner in accordance with 15A NCAC 2H .0105(b)(4) may cause this Division to initiate action to revoke the permit.

MEMORANDUM

August 3, 1995

To:	D.W. Phillips	R.P. Michael
	D.E. Faulkner	D.L. Cline
	D.H. Tiece	J.S. Carter
	J.M. Trepel	K.A. Finley
	G.W. Sain	P.C. Franklin

Subject: McGuire Nuclear Station -
Final NPDES Permit
Revised Final Comments

Attached are our revised comments for the *FINAL* NPDES permit for McGuire Nuclear Station. These comments have been faxed to the State for review. At this time, we have not heard from Ms. Powell but she is aware of our time constraint for adjudication.. I believe the State will probably have to reissue the permit or at least write a letter to modify the permit due to the errors they had made on certain parameters. I'll keep you posted.

If you should have questions, I may be reached at 875-5963. Thank you.

Norma Atherton

Norma Atherton, ESS - Water Protection

**DUKE POWER'S COMMENTS ON FINAL NPDES PERMIT
NO. NC0024392 FOR THE McGUIRE NUCLEAR STATION**

OUTFALL 001:

- **DPCo FINAL COMMENTS:** The draft permit had Free Available Chlorine (FAC) monitoring, which, at our request, was changed to Total Residual Chlorine (TRC). However, the limits that were associated with FAC (.20mg/l monthly and .50mg/l daily) were left as limits for TRC. The original permit had no monthly limit for TRC and a daily limit of .20mg/l. Therefore we request that the limit should either be removed or changed to the value in the previous permit.

OUTFALL 003:

- **DPCo DRAFT COMMENTS:** In the draft permit, the monthly average and daily maximum limits for "Total Suspended Solids" (TSS) for the sanitary treatment system have been lowered to Steam Effluent Limitations Guidelines. The new TSS limits are listed as 30.0 mg/L and 100.0 mg/L for monthly average and daily average respectively. We will not be able to meet the new monthly average TSS limit proposed in this draft permit.

Since Outfall 003 is an internal outfall and does not discharge directly to Waters of the State, Steam Effluent Limitations Guidelines should not apply. The sanitary system discharges into the Waste Water Collection Basin which provides additional settling. We therefore request that TSS monitoring be required at Outfall 005. (See comments at Outfall 005)

STATE RESPONSE: The draft permit contained total suspended solids limits per the federal effluent guidelines, which are meant to sample discharges prior to mixing with other waste streams. Because Duke Power is scheduled to delete this outfall when the system is connected to CMUD by September 1, 1997, these new effluent guideline limitations will be phased in. The current permit limits of 90mg/L and 135 mg/L shall remain in place until September 1, 1997. After September 1, 1997, the limits will change to 30 mg/L and 60mg/L.

DPCo FINAL COMMENTS: There appears to be a typographical error in the limits listed in the last sentence above: "After September 1, 1997, the limits will change to 30 mg/L and 100 mg/L."

DPCo FINAL COMMENTS: We would like to clarify the request which was made above. At Outfall 001, our sampling point is the Discharge Canal Bridge (DCB). The bridge spans a canal that is approximately 175 feet, bank to bank at the mouth of Lake Norman. This flow rate through this canal ranges from 1.5 to 2.9 billion gallons per day of once through cooling water. The toxicity sample is collected at this location due to the potential of hydrazine being present in the batch discharges of Outfall 004, radwaste. When a batch is being released, the average flow rate through Outfall 004 can be 0.01 million gallons per day. This flow rate represents 0.00037% of the maximum flow through the discharge canal.

The three definitions of "composite sample" indicate that samples need to be combined proportional to flow rates. Due to the difficulty in trying to measure flow at this location, the operation of a flow proportional sampler would not be possible. According to the definition of composite samples in the previous permit, equal volume samples were collected at one hour intervals for a 24 hour period. Since Outfall 001 is characterized by a constant flow for more than 97% of the time (pump logs and DMR sheets are available), we request a footnote on the Outfall 001 page to allow continued use of composite samples collected in equal volumes over a 24 hour period. Alternatively, the wording in Part III Condition F could be changed to permit the collection of 24 X 1 per hour equal volume composite samples.

SPECIAL CONDITIONS: PART III, CONDITION G

- **DPCo DRAFT COMMENTS:** Also in this section, a reference is made to a 24 hour composite sample. Footnote 4 of "Effluent Limitation and Monitoring Requirements" - Outfall 002 of this draft permit specified "grab sample". We request that this section reference "as specified under Effluent Limitation and Monitoring Requirements".

STATE RESPONSE: *Part III, Condition G, specifies a 24-hour composite sample and the outfall 004 effluent limitation and monitoring requirements page has been accordingly modified.*

DPCo FINAL COMMENTS: Since toxicity testing is not performed on Outfall 004, we suspect that reference to this outfall is a typographical error. The typographical error should be corrected to say either "Footnote 4" or Outfall 002. However, since our comments may not have been very clear, we would like to take the opportunity to restate them.

- **DPCo FINAL COMMENTS:** In this draft permit, MBAS was listed in units of ug/L. Historically, we have reported MBAS as mg/L. We request that MBAS units be maintained as mg/L in order to make paperwork and reporting consistent.

STATE RESPONSE: The draft permit included MBAS with specified units of ug/L, which reflect the state water quality standard units. The units have been changed to mg/L as requested.

DPCo FINAL COMMENTS: The units for MBAS is still shown as ug/L in "Effluent Limitation and Monitoring Requirements", Outfall 003 - MBAS.

OUTFALL 005:

- **DPCo FINAL COMMENTS:** In the new permit just issued, the units of measure for Iron and Copper are listed as mg/L and ug/L, respectively. This may be a typographical error, however, historically both iron and copper were reported in ug/L and in order to maintain consistency we prefer that ug/L be maintained for both.

SPECIAL CONDITIONS: PART III, CONDITION F

- **DPCo DRAFT COMMENTS:** In this Section, the Fathead Minnow is listed as the test organism for the 24 hour static acute toxicity pass/fail test. We request continued approval to use Daphnid in our Acute and Chronic Toxicity tests. We request the wording: "The monitoring shall be performed as a daphnid 24 hour static test, using effluent collected as 24 x 1 equal volume per hour composite during the months of February, May, August and November." The parameter codes that correspond with the 24 hour daphnid test is "TGA3B" for Ceriodaphnia or "TGA3D" for Daphnia pulex. (See, Footnote 3 of "Effluent Limitation and Monitoring Requirements"- Outfall 001 of this draft permit.)

STATE RESPONSE: Part III, Condition F, has been corrected to specify a daphnid test organism with samples collected during February, May, August, and November. The standard acute toxicity quarterly pass/fail permit limit language has been incorporated into the permit.

Under "Effluent Limitation and Monitoring Requirements", Outfall 002 - Acute Toxicity, a "grab sample" was specified in the draft permit as well as the previous permit. Footnote 4 of that page in the draft permit references Part III, Condition G, which specifies a 24 hour composite sample. Due to the wording discrepancy, we requested that Part III, Condition G, reference "as specified under Effluent Limitation and Monitoring Requirements" which indicated a grab sample. However, in the final permit the word "grab" appeared to be deleted from the Effluent Limitation and Monitoring Requirements page at random while the wording in Part III Condition G was retained.

Since the discharges from Outfall 002 are by "batch" and there is not a continuous discharge flow, a "grab sample" is more appropriate than a 24 hour composite. We request that the "Effluent Limitation and Monitoring Requirements" page, Outfall 002, specify "grab sample" for Acute Toxicity and the wording in Part III Condition G be changed to indicate a grab sample as in the previous permit.

State of North Carolina
Department of Environment,
Health and Natural Resources
Division of Environmental Management

James B. Hunt, Jr., Governor
Jonathan B. Howes, Secretary
A. Preston Howard, Jr., P.E., Director



ENVIRONMENTAL PROTECTION SECTION

July 20, 1995

JUL 27 1995

☒ FILE _____
☐ TICKLER DATE _____

Mr. John S. Carter
Duke Power Company
13339 Hagers Ferry Road
Huntersville, N.C. 28078-7929

☒ COPY MTK GEU
DWPhillips
☒ ROUTE NGA-File

Subject: Information Packet for Whole Effluent Toxicity Testing
McGuire Nuclear Station
NC0024392
Mecklenburg County

Dear Mr. Carter,

The North Carolina Division of Environmental Management is required by water quality regulations to protect the waters of the State from all degrees of introduced instream toxicity. The North Carolina DEM has an active program evaluating the toxicity of discharges to surface waters. As you know, your facility has been required by administrative letter or NPDES permit to conduct toxicity testing on representative samples of effluent discharge.

Enclosed is a final copy of the information packet concerning aquatic toxicity testing which may better help you understand and implement your testing requirement. If necessary, please forward this information to personnel who will be working most closely with this issue. You should carefully review the information presented with this document. It may aid you in consultations with either your own environmental staff or a contracted laboratory firm. The purpose and differences between types of toxicity analysis procedures are discussed and copies of North Carolina toxicity testing procedures are provided. Quality laboratory practices are emphasized which may help you in discussions with laboratory personnel regarding the quality assurance requirements of test procedures. Appropriate test conditions and practices for acute and chronic toxicity tests performed to meet North Carolina NPDES permit requirements are also addressed by the attached checklist. The information is being supplied to emphasize the ranges for these parameters necessary to constitute acceptable tests. This information should be used as a checklist for individual tests and does not cover the full range of quality control practices necessary for a successful completion of these analyses including documentation, instrument calibration, reference toxicant testing, etc. We are also supplying the references for these parameter limits as a guideline for the range in which the parameters should fall. Values recorded outside of these limits will constitute an unacceptable test result. A list of laboratories presently certified to conduct certain types of biological testing is included as Appendix G.

State of North Carolina
Department of Environment,
Health and Natural Resources
Division of Environmental Management

James B. Hunt, Jr., Governor
Jonathan B. Howes, Secretary
A. Preston Howard, Jr., P.E., Director



May 5, 1995

ENVIRONMENTAL PROTECTION SECTION

Mr. John S. Carter
Duke Power Company
Electric System Support Department
13339 Hagers Ferry Road
Huntersville, North Carolina 28078-7929

MAY 11 1995

☐ FILE
☐ TICKLER DATE

☒ COPY: N6A

Subject: pH Additive Approval
NPDES Permit NC002438 ROUTE GWARD
Duke Power - McGuire Nuclear Station DW Phillips
Mecklenburg County G Vaughn

Dear Mr. Carter:

This correspondence is in response to your February 13, 1995 request for approval of methoxypropylamine (as the product Nalco 94UF193) as a pH control additive at the subject facility. Your request indicated that Nalco 94UF193 will be used at a concentration of 1 - 10 ppm in the steam cycle with discharge through the Conventional Wastewater Treatment Plant to Outfall 002. The Division hereby grants approval of the use of Nalco 94UF193 as requested. Whole effluent toxicity testing, as provided in the facility NPDES permit, shall provide validation that acute toxicity of the effluent is acceptable. Therefore, the Division requests that Duke Power coordinate toxicity testing to correspond to periods of peak Nalco 94UF193 usage and discharge.

Your correspondence also requested approval of carbonylhydrazide for permanent use at the subject facility based on successful experimental usage and recent toxicity testing results. The Division hereby grants approval of the use of carbonylhydrazine on a permanent basis.

If you have any questions, please contact Jeanette Powell of my staff at (919) 733-5083, extension 537.

Sincerely,

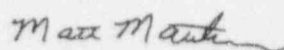
David A. Goodrich
for A. Preston Howard, Jr., P.E.

cc: Central Files
Mooresville Regional Office, Water Quality Section
Permits and Engineering Unit
Mecklenburg County
Aquatic Survey and Toxicology Unit

Also included are the procedural requirements for submitting toxicity test results to the State. Facilities are reminded that the NPDES permit condition for toxicity testing requires that test results be included with the appropriate parameter code on the monthly monitoring report form (MR-1) as well as be submitted with test data on an AT report form under separate cover to the Environmental Sciences Branch. In the situation where the specific toxicity test code is not stated in the NPDES permit condition requiring toxicity testing, the facility may contact the Regional Water Quality Supervisor to receive the appropriate code.

If you would like to discuss any of the information presented, you are encouraged to call staff of our regional offices or me at (919) 733-2136.

Sincerely,

A handwritten signature in cursive script that reads "Matt Matthews".

Matt Matthews
Data Assessment and Certification Group Leader

AQUATIC TOXICITY TESTING
Understanding and Implementing
Your Testing Requirement

Prepared by the Aquatic Toxicology Unit/Environmental Sciences Branch
Water Quality Section
N.C. Division of Environmental Management

FEBRUARY 1994

Introduction

This information packet has been prepared as a resource for NPDES permit holders required to perform effluent toxicity testing or are utilizing toxicity testing as part of a toxicity reduction program. The document explains many of the concepts and terminology used by a regulatory agency regarding toxicity testing. By carefully reading this information it is hoped that further communication with either your own environmental staff or an outside consultant will be made more productive.

Toxicity refers to the potential for a substance to produce an adverse or harmful effect on a living organism. A toxicant is an agent (e.g., whole effluent discharge) that can produce an adverse effect in a biological system, seriously damaging its structure or function or causing death. The adverse response may be defined in terms of a measurement that is outside the "normal" range for healthy organisms, such as abnormal mortality, reproduction or growth.

Toxicity tests are used to determine the level of toxicity, if any, present in an effluent and the duration of exposure required for the toxicity to be expressed as adverse effects. Test organisms are exposed in test chambers to various concentrations of the effluent. The criteria for effects, such as mortality and reproduction, are then evaluated by comparing those organisms which are exposed to different dilutions of the effluent with those organisms (controls) exposed only to a nontoxic dilution water.

Acute effects are those that occur rapidly as a result of short-term exposure. Exposure is considered relative to the organism's life span. The most commonly measured acute effect in aquatic organisms is death. Chronic effects occur when an effluent or toxicant produces adverse effects as a result of a repeated or long-term exposure. Chronic effects include lethal and sublethal responses (such as abnormal growth and/or reproduction).

Statistical analyses and mathematical modeling summarize the data collected during a toxicity test. The specific application of these routines may be quite simple or extremely complex. The final analysis (after these statistics have been performed) however, is easily understood. All statistical routines are specifically defined for each procedure. It is not necessary to completely understand all of the analyses performed by a laboratory in order to utilize data produced by toxicity testing. This document includes an overview of these data interpretations.

In measuring the acute toxicity of an effluent, the objective is to measure a range of effluent concentrations or one specific concentration that produces a readily observable and quantifiable response. The quantifiable response most often observed is mortality, which is then used to calculate an LC_{50} value or determine if significant acute mortality is occurring. The LC_{50} is the concentration estimated to cause mortality in 50% of the test population over a specified time period. Application factors may be applied to a measured LC_{50} to predict the concentration of effluent which may have no adverse impacts over an extended duration (i.e., no chronic toxicity).

Rather than using an acute test with an application factor to evaluate chronic toxicity, it is possible to directly measure chronic impacts with a more sophisticated test procedure. These chronic tests are more difficult to perform but eliminate use of an artificial application factor. The chronic test measures both sublethal and lethal effects over a longer test duration and measures responses during a sensitive period of the organism's life cycle.

General

The toxicity tests which the N.C. Division of Environmental Management utilize and require NPDES permittees to conduct are controlled laboratory experiments in which effluent concentration is the primary variable by which the response is evaluated. These tests are standardized to maximize comparability and reproducibility. Toxicity test protocols typically specify the exposure of test organisms to fixed concentrations of whole effluent for a defined time period. Species selection (test organism) is one element which defines a specific toxicity testing procedure. Test species are selected based upon the ease of laboratory culture, the availability of adequate background information such as its physiology, genetics, and behavior and sensitivity to a wide range of toxicants. All of the toxicity tests include a control (or untreated sample) to ensure that the effects observed are associated with or are attributable to exposure to the test material. This provides the baseline for interpreting the test results by identifying unwanted variables.

An LC_{50} or concentration of effluent lethal to 50% of the test organisms over the test period is calculated from the mortality data using one of the several methods, preferably the probit or Spearman-Kärber analyses, as described in the EPA acute testing protocols (EPA/600/4-90/027). An instream waste concentration (IWC) for the effluent in the receiving stream is calculated (in percent) using the wastewater treatment system permitted flow and receiving stream 7Q10 flow. The LC_{50} and IWC are then used to predict instream toxicity.

In instances where localized effects at the point of discharge are of concern, alternate protection strategies may be required. In these instances it is important that no short term acute effects occur. To address this issue, the Division of Environmental Management will often require the use of an acute test methodology in which acute mortality in a specific effluent concentration, usually 90%, may be statistically determined. The acute pass/fail procedure is a static non-renewal toxicity examination generally using the Fathead Minnow (*Pimephales promelas*) for freshwater or the Mysid Shrimp (*Mysidopsis bahia*) for saltwater dischargers. Two concentrations are utilized in the procedure with a control population specified as treatment one and an effluent treatment specified as treatment two. The actual effluent concentration at which the test is to be performed will be specified in the NPDES permit or by Administrative letter. Each treatment is tested using four identical test vessels each containing ten test organisms. At test termination, organisms are identified as alive or dead. Analysis of the data from the acute pass/fail procedure is performed using a Student's t test to determine if mortality in the effluent treatment (treatment two) is significantly different than the control population. All statistical analyses are performed using arc sine square root transformed data (see referenced EPA document) and tested for significance at a 99% confidence level. Test results are recorded as "Pass" or "Fail" and are to be reported on State form AT-2 (Appendix C). All supporting information requested on the AT-2 form must be provided in order for the report to be considered a complete submittal to the Division of Environmental Management.

Chronic Toxicity Tests

Guidance Documents:

USEPA. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. 2nd edition. EPA/600/4-89/001. March 1989.

USEPA. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms. EPA/600/4-87/028. May 1988.

North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure. North Carolina Department of Environment, Health, and Natural Resources, DEM, Water Quality Section. July 1991. (This document is attached as Appendix D.)

North Carolina Division of Environmental Management. 1985. Revised Sept. 1989. North Carolina *Ceriodaphnia* Chronic Effluent Bioassay Procedure (*Ceriodaphnia* Mini-Chronic Pass/Fail Toxicity Test). (This document is attached as Appendix D.)

Chronic toxicity tests allow evaluation of adverse effects of an effluent under conditions of long-term exposure. Lengthening the test duration to include one or more complete life cycles or performing the test during a sensitive life stage emphasizes more subtle adverse effects, such as reduction in growth and reproduction. Evaluation of these effects from long-term exposure to the effluent can provide a direct estimate of the effects threshold of the toxicant. During life cycle tests with several species of fish and invertebrates, certain developmental stages have consistently been shown to be more sensitive than others. Use of shorter tests with the early developmental stages can also predict chronic toxicity. These methods have been developed to provide quicker and less costly ways to measure chronic toxicity to aquatic organisms.

The Division of Environmental Management often requires a three brood static renewal test using the cladoceran, *Ceriodaphnia dubia*, as the test organism. A static renewal test is one in which the test solutions are renewed periodically by transferring the test organisms to chambers with freshly prepared solutions. The test is initiated with organisms which are less than 24 hours old and born within 8 hours of each other.

Biological Laboratory Certification

The collection of quality toxicity testing data requires good laboratory practices. The EPA guidance documents previously cited discuss quality assurance (QA) methods. QA practices for effluent toxicity tests include all aspects of the test that affect the accuracy and precision of the data such as: effluent sampling and handling; the source and condition of the test organisms; condition of equipment; test conditions; instrument calibration; use of reference toxicants; record keeping, and data evaluation.

Per North Carolina Administrative Code Title 15, 2H Section .1100, any commercial, industrial, or public laboratory performing biological toxicity testing as required by an NPDES permit, must be certified by the Division of Environmental Management. These Rules, effective October 1, 1993, provide that laboratories performing these tests may be certified and decertified by the State of North Carolina. NPDES permittees required to perform whole effluent toxicity testing are responsible for the submittal of quality test data and ensuring that their performing laboratories are certified to conduct specific tests.

To aid you in locating aquatic toxicological testing services, Appendix G provides a list of biological laboratories that have been certified by the Division of Environmental Management. In accordance with the Regulations, these laboratories have been evaluated as having the capability to adequately perform certain aquatic toxicity tests for clients in North Carolina. The list of certified biological laboratories will be kept on file and updated by the Division's Environmental Sciences Branch, and will be available upon request by mail or fax (see DEM contacts listed at the end of this document).

Reporting Toxicity Test Results

Under most circumstances, toxicity testing results from samples taken prior to the permitted discharge point are not required to be reported. Such samples include pre-chlorination samples, treatment process samples, and industrial process samples. However, any result from a test performed on a sample taken from the permitted discharge point must be reported. This requirement applies even to those facilities which do not have toxicity monitoring in their NPDES permit.

The toxicity testing requirement language in NPDES permits states that in addition to including test results on the facility monthly monitoring report form (MR-1), toxicity test results must be submitted to the State on the appropriate DEM AT form within thirty days after the end of the reporting period for which the report is made. A copy of the AT-1, AT-2, and AT-3 forms are attached (Appendix B, C, and E). It is essential that all the information be provided as requested and applicable to the type of test results being submitted. The AT form submittal to the State is to include the signatures of the facility operator in responsible charge and the laboratory supervisor, as provided for on the form. Please note that exclusion of any of the necessary information will constitute an incomplete submission of toxicity test data to the Division. Dual reporting requirements exist for permittees required to conduct toxicity testing by NPDES permit or administrative letter. Discharge Monitoring Report forms should be mailed to the Division's Central Files while the Aquatic Toxicity Test forms should be sent to the address located below. Again, special note should be made that the AT forms and the standard MR-1 reporting forms are sent to different addresses. This is necessary due to the extra degree of quality assurance review given to the aquatic toxicity test data submitted to the Environmental Sciences Branch. You should consider submitting your toxicity self-monitoring reports via certified mail to ensure that your reports are received timely by the Environmental Sciences Branch. The AT forms shall be sent to:

ATTENTION:
ENVIRONMENTAL SCIENCES BRANCH
NORTH CAROLINA DIVISION OF
ENVIRONMENTAL MANAGEMENT
4401 REEDY CREEK ROAD
RALEIGH, NORTH CAROLINA 27607

a pre-specified level of confidence (usually 95%) that this interval contains the true LC_{50} . The test LC_{50} and supporting test data are to be reported on State form AT-1 (attached as Appendix B). EPA acute toxicity testing protocols (EPA/600/4-90/027) describe several methods for estimating the LC_{50} and confidence intervals. Although any of the referenced methods are acceptable, the recommended methods are the probit and Spearman-Kärber methods because their LC_{50} estimates rely on the data in the more stable, central portion of the tolerance distribution.

The Division may require the acute toxicity Pass/Fail test in instances where additional protection of a water body must be provided to reduce the likelihood of localized effects due to incomplete mixing. The analysis employs a Student's *t* test to determine if mortality in a single effluent treatment is significantly different than the control population. All statistical analyses are performed using arc sine square root transformed data (see referenced EPA document 600/4-90/027) and evaluated for significance at a 99% confidence level. Should mortality in the effluent treatment exceed that of the control population and the absolute value of the calculated *t* value exceed the absolute value of the tabular *t* value, then the effluent treatment is considered as having significant acute effects on the test organisms. This would be considered a "Fail." If all vessels within each treatment have the same mortality but at different levels between treatments, then a *t* statistic is not calculable. In this case, if the mortality is identical between treatments then the test is considered a "Pass." If the response in the effluent treatment is greater than the control treatment then the test is considered a "Fail." State form AT-2, the form required to submit results of the acute Pass/Fail test procedure, is provided as Appendix C.

The chronic toxicity tests which are used and required by the Division determine the effects of whole effluents on the mortality and reproduction of a species (*Ceriodaphnia*) for an extended period of time. Mean reproduction and percent mortality results for the effluent concentration are compared to those for the control by performing statistical tests of significance. The EPA chronic toxicity testing protocol (EPA/600/4-89/001) describes mean reproduction as the summation of total number of young produced per female *Ceriodaphnia* until time of death or end of experiment divided by the initial number of females exposed.

Assistance Available

Guidance Documents:

USEPA. Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures. EPA/600/6-91/003. February 1991, Environmental Research Laboratory, Duluth, Minn.

USEPA. Phase II-Toxicity Identification Procedures. EPA 600/R-92/080. September 1993, Environmental Research Laboratory, Duluth, Minn.

USEPA. Phase III-Toxicity Confirmation Procedures. EPA 600/R-92/081. September 1993, Environmental Research Laboratory, Duluth, Minn.

USEPA. Toxicity Reduction Evaluation Protocol For Municipal Wastewater Treatment Plants. EPA/600/2-88/062. April 1989, EPA Risk Reduction Engineering Laboratory, Cincinnati, Ohio.

USEPA. Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations (TREs). EPA 600/2-88/070. 1989, EPA Water Engineering Research Laboratory, Cincinnati, Ohio.

USEPA. Technical Support Document For Water Quality-based Toxics Control. EPA/505/2-90-001. 1991. EPA Office of Water, Washington, D.C.

Appendix H provides a listing of contact persons in each of the Department of Environment, Health, and Natural Resources' Regional Offices. You are encouraged to contact the Regional Water Quality Supervisor in your area Regional office for assistance in understanding and implementing your toxicity test requirement.

Questions concerning aquatic toxicity, analyses, or biological laboratories may be directed to Mr. Larry Ausley, Mr. Matt Matthews, or Mr. Phil Bethea of the Aquatic Toxicology Unit in Raleigh by telephone at (919) 733-2136, FAX at (919) 733-9959 or U.S. Mail at the following address:

Appendix A

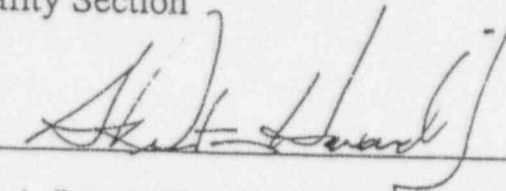
Aquatic Toxicity Testing
Acute Pass/Fail Toxicity
Testing Method

Environmental Sciences Branch
Water Quality Section
Division of Environmental Management
North Carolina Department of Environment, Health, and Natural Resources

Pass/Fail Methodology For Determining
Acute Toxicity In A Single Effluent
Concentration

North Carolina Department of Natural Resources
and Community Development
Division of Environmental Management
Water Quality Section

This procedure has been approved for release by



A. Preston Howard Jr., Acting Director

Date 7-27-92

If all replicates of the control (Treatment 1) have identical responses equal to or less than 10 percent mortality and all replicates of the effluent concentration (Treatment 2) have equal responses though greater than that of the control response, the t value is not calculable. The Wilcoxon Rank Sum Test should be used in this case; it will average the rank sums of all values within each group and report a final sum of 10. This sum is equal to the critical sum of 10, indicating that the responses are statistically different. Therefore, the test result should be reported as "FAIL." See Example 3 below.

If all replicates in both treatments have identical responses which are equal to or less than ten percent mortality, the t value is not calculable. [Wilcoxon Rank Sum Test should not be used in this case, since it will average the rank sums of all values and report a final sum of 18. This sum is greater than the critical sum of 10, causing identical responses to be statistically different.] Therefore, the test result should be reported as "PASS." See Example 4 below.

Data obtained by use of this methodology will be entered on the attached form AT-2 and sent to the designated address. Additionally, the results of this testing should be recorded as "PASS" or "FAIL" on the State MR-1 form for the month in which the test was performed. The appropriate parameter code to enter on the MR-1 is specified in the NPDES permit or Administrative Letter Requirement.

Example 1

(10 Organisms/Replicate)

Replicate		Control (Treatment 1)				Effluent (Treatment 2)			
		1	2	3	4	1	2	3	4
% Mortality		0	0	10	0	20	20	30	20

Shapiro-Wilk's W= 0.663
Critical W (@ 0.01)= 0.749
Result= Not Normally Distributed

F= 1.97
Critical F (@ 0.01)= 47.47
Result= Variances Equal

Calculated t value= 5.86
Critical t value (@ 0.01)= 3.14
Result=FAIL

Wilcoxon Rank Sum= 10
Critical Sum (@ 0.01)= 10
Result= FAIL

In this example, data are not normally distributed. The appropriate final analysis is Wilcoxon Rank Sum Test, which indicates that the test result is "FAIL."

Example 2

(10 Organisms/Replicate)

Replicate		Control (Treatment 1)				Effluent (Treatment 2)			
		1	2	3	4	1	2	3	4
% Mortality		0	0	10	0	50	60	70	50

Shapiro-Wilk's W= 0.807
Critical W (@ 0.01)= 0.749
Result= Normally Distributed

F= 1.46
Critical F (@ 0.01)= 47.47
Result= Variances Equal

Calculated t value= 10.37
Critical t value (@ 0.01)= 3.14
Result=FAIL

Wilcoxon Rank Sum= 10
Critical Sum (@ 0.01)= 10
Result= FAIL

In this example, data are normally distributed and have equal variances. The appropriate final analysis is the t test, which indicates that the test result is "FAIL."

Appendix B

Aquatic Toxicity Testing
AT - 1 Test
Form

Environmental Sciences Branch
Water Quality Section
Division of Environmental Management
North Carolina Department of Environment, Health, and Natural Resources

Effluent Toxicity Report Form- Chronic Pass/Fail and Acute LC50 Date

Facility _____ NPDES#NC _____ Pipe # _____ County _____

Laboratory Performing Test _____

Signature of Operator In Responsible Charge _____

Signature of Laboratory Supervisor _____

Comments _____

MAIL ORIGINAL

Environmental Sciences Branch
Div. of Environmental Management
N.C. Dept. of EHNH
4401 Reedy Creek Road
Raleigh, North Carolina 27607-6445

North Carolina Ceriodaphnia Chronic Pass/Fail Reproduction

CONTROL ORGANISMS

	1	2	3	4	5	6	7	8	9	10	11	12
# Young												
Adult (L)ive (D)ead												

Effluent%

TREATMENT 2 ORGANISMS

	1	2	3	4	5	6	7	8	9	10	11	12
# Young Produced												
Adult (L)ive (D)ead												

Chronic Test Results

Calculated t _____

%Mortality	Avg.Reprod.
Control	Control
Treatment	Treatment 2
% control organisms producing 3rd brood	PASS FAIL
<input type="text"/>	Check One

pH Control 1st 2nd

Treatment 1st 2nd

D.O. Control 1st 2nd

Treatment 1st 2nd

start end

Complete This For Either Test

Test Start Date _____

Collection (Start) Date _____

Sample 1 _____ Sample 2 _____

Sample Type/Duration

Sample	Grab	Comp.	Duration
Sample 1			
Sample 2			

Hardness(mg/i)

Spec.Cond.(µmhos)

Chlorine(mg/l)

Sample temp. at receipt

Dilution

1st Tox Sample (Pass/Fail Only)

2nd Tox Sample (Pass/Fail Only)

LC50/Acute Toxicity Test

(Mortality expressed as %, combining replicates)

%	%	%	%	%	%	%	%	%	%
%	%	%	%	%	%	%	%	%	%

Concentration

Mortality

LC50= _____ %

95% Confidence

_____%-_____%

Method of

Moving

☐

Probit

☐

Spearman

☐

Other

Note: Please Complete This Section

start/end

start/end

Control

High Conc.

pH

D.O.

Organism _____

Appendix C

Aquatic Toxicity Testing
AT - 2 Test
Form

Environmental Sciences Branch
Water Quality Section
Division of Environmental Management
North Carolina Department of Environment, Health, and Natural Resources

Effluent Aquatic Toxicity Report Form - Acute Pass/Fail Date _____

Facility _____ NPDES#NC _____ Pipe # _____ County _____

Laboratory Performing Test _____

Signature of Operator in Responsible Charge _____

Signature of Laboratory Supervisor _____

Comments _____

MAIL ORIGINAL TO:

Environmental Sciences Branch
Div. of Environmental Management
N.C. Dept. of EHNR
4401 Reedy Creek Road
Raleigh, North Carolina 27607-6445

North Carolina Acute Pass/Fail Bioassay

Collection Date: _____		Organism Tested _____																					
Collection Time: _____																							
Test Start Date: _____																							
<p>Sample Type/Duration</p> <table border="1"> <tr> <th>Grab</th> <th>Comp.</th> <th>Duration</th> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </table>		Grab	Comp.	Duration										<p>Dilution</p> <table border="1"> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </table>									
Grab	Comp.	Duration																					
Hardness(mg/l)																							
Spec. Cond.(µmhos)																							
Chlorine(mg/l)																							
Sample temp. at _____																							

Mortality		Replicate				Mean Mortality
Treatment 1 (Control)		A	B	C	D	
		%	%	%	%	%
Treatment 2 (Exposure)		A	B	C	D	
Concentration Tested	%	%	%	%	%	%

(NOTE: If mean control mortality exceeds 10%, the test is considered invalid)

Calculate using Arc-Sine Square Root transformed data	Calculated Student's		PASS	
	Tabular Student's (ONE TAILED)		FAIL	

If the absolute value of the calculated t is less than or equal to the absolute value of the tabular t, check PASS.
If the absolute value of the calculated t is greater than the absolute value of the tabular t, check FAIL.
If all vessels within each treatment have the same response but the treatment two response is greater than the control, check FAIL.

Appendix D

Aquatic Toxicity Testing
Phase II Chronic
Toxicity Testing Method

Environmental Sciences Branch
Water Quality Section
Division of Environmental Management
North Carolina Department of Environment, Health, and Natural Resources

North Carolina *Ceriodaphnia*
Chronic Effluent Toxicity Procedure
December 1985
Revised September 1994

North Carolina Department of Environment,
Health, and Natural Resources
Division of Environmental Management
Water Quality Section

This procedure has been approved for release



A. Preston Howard, Jr., P.E., Director

9-28-94

Date

into five sections which include: 1) Effluent sampling, 2) Major test procedures, 3) Interpretation of results, 4) An outline of daily activities to be performed prior to and during the test period (Table), and 5) the Appendix, which outlines methodology to determine the actual effluent NOEL.

EFFLUENT SAMPLING

Effluent samples may be collected twice as 24 hour composite samples on days 1 through 2 and days 4 through 5 or as single grab samples on days 2 and 5. The NPDES permit specifies the appropriate sample type. Sampling should be performed below the last waste treatment process, including disinfection. There may be no removal of chlorine or any other effluent constituent by either chemical or physical methods prior to testing with the exception of allowable filtration of the effluent through 60 µm nylon screen or plankton netting and reduction of excess dissolved oxygen to the saturation level, as per EPA methods.

Sample collection materials may be tempered glass, polyethylene, perfluorocarbon plastics including Teflon®, 304 or 316 stainless steel, polypropylene, polyvinylchloride, Tygon®, or silicone. All non-perfluorocarbon plastics should be discarded after use. It is the responsibility of the sample collector to assure that contamination is not influencing test results. There may be no chemical residue present which will affect effluent toxicity. Only 500 milliliters of each effluent sample is required in order to perform the test. Although a small surplus should be obtained, a small sample size will minimize shipping expense.

All effluent sampling should be performed using an iced or refrigerated collection device. The sample must be maintained at or below 4°C until the toxicity test procedure is initiated. The shipping container must be completely filled, with no air pocket, to minimize loss of volatiles. Sampling and shipping schedules should be arranged such that neither sample exceeds 72 hours of age prior to its final use in the procedure (setup or renewal). Age of the sample is calculated from the time of collection of a single grab sample or from the time of collection of the last subsample of a composite.

TEST PROCEDURE

The test shall be performed as two treatments exposing 12 female test organisms to each treatment. The first treatment shall be considered the control population and shall be dosed at 0% effluent and 100% dilution water. Dilution water must be the culture water used to maintain the test population or be suitable for that purpose. This treatment will be used to evaluate the significance of effect in treatment two. The pH of the control solution at test initiation and subsequent test solution renewals must fall in the range of 6.5-8.5 standard units. Total hardness must measure between 30 and 50 mg/l. Treatment two will be (unless specified otherwise) a concentration of effluent diluted by the dilution water to the following percent:

$$\% \text{ Effluent} = \frac{\text{Permitted Discharge Volume} \times 100}{\text{Permitted Discharge Volume} + 7Q10^{**}}$$

on day five, as well. Should mortality in treatment two significantly exceed that of treatment one, as determined by Fisher's Exact Test, the test may be terminated at such time and the effluent sample declared a failure due to significant mortality. Reproduction counts should be performed in all vessels used during the initial test period (although there are usually no offspring during this phase in the life cycle). The new test solutions should receive food at this time.

Days six and seven require only that the *Ceriodaphnia* be fed. Day eight requires renewal of the test solutions using the composite sample collected on days four and five. This renewal must take place within 72 hours of the final effluent collection time. Mortality, reproduction, temperature, dissolved oxygen and pH observations must be made and recorded. Reproduction of the initial test organisms must be observed both as total number of young produced as well as brood number of the young produced (i.e first, second or third brood). As stated previously, the test may be terminated if significant mortality has occurred in the effluent treatment (treatment two). On day nine the test organisms should be observed for production of the third brood within the treatment one (control) organisms. If 80% or more of the control organisms have produced a third brood, the test may be terminated. This will also hold true for observations made on day eight. On day ten, the test is terminated after making final mortality, reproduction and chemical/physical observations. Fourth brood neonates will be excluded from the reproduction totals. The test exposure duration will be no greater than seven days regardless of control organism reproductive success.

INTERPRETATION OF RESULTS

The statistical comparisons for evaluating the test results will be performed as outlined in "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Second Edition" (EPA/600/4-89/001) with the exception that reproduction data are to be evaluated at a 99% confidence level. The statistical methods used should be those in Appendix H of the EPA document, titled "Toxicity Screening Test- Comparison of Control with 100% effluent or Instream Waste Concentration." A statistical difference between the control (treatment one) and the effluent (treatment two) caused by decreased effluent reproduction or increased effluent mortality will be considered as a failure of this effluent to meet toxic standards within the receiving stream. Mortality greater than 20% in the control population will be considered as abnormal and the test must be repeated. Reproduction in the control population must be greater than or equal to 15 offspring per surviving female as an average of total reproduction. Mean reproduction is calculated by summing the total number of young produced through three broods per treatment until either time of death or end of the experiment and dividing by the initial number of females exposed per treatment. Note that fourth brood neonates will be excluded from the reproduction totals. If these tests are being performed as an NPDES requirement or by Administrative Letter, then data must be entered on the Effluent Discharge Monitoring Form (MR-1) for the month in which it was performed using the appropriate parameter code. Additionally, DEM Form AT-1 (original) is to be sent to the following address:

Table

MINI CHRONIC TOXICITY TEST

Day One

This test procedure, including sampling, has been designed to minimize weekend work if begun on a Monday. On this day a 24-hour compositing device will be started. Sampling devices should be refrigerated or cooled by ice. The final sample volume should be a minimum of 500 milliliters.

Day Two

The composite sample will be collected, packaged on ice or refrigerant and shipped to the laboratory where the toxicity test will be performed.

Day Three

The test treatments will be set up and test organisms introduced. Dissolved oxygen, temperature and pH will be measured and recorded. Dissolved oxygen should be greater than or equal to 5.0 mg/l and the temperature maintained at 25°C ($\pm 1^\circ\text{C}$). The total residual chlorine level of the whole sample should be measured and recorded. Feed *Ceriodaphnia*.

Day Four

Start second 24-hour effluent composite sample.

Feed *Ceriodaphnia*.

Day Five

Ceriodaphnia should be placed in new solutions of the original composite. Mortality and reproduction counts should be performed at this time (although there are usually no offspring during this early phase of the life cycle). Perform chemical/physical monitoring.

Collect and ship second composite effluent sample. Feed *Ceriodaphnia*.

Day Six

Refrigerate second composite sample ($<4^\circ\text{C}$).

Feed *Ceriodaphnia*.

Day Seven

Feed *Ceriodaphnia*.

Day Eight

Renew all test solutions using second composite sample. Count mortality and reproduction.

Perform chemical/physical monitoring. Measure and record the total residual chlorine level of the second sample. Feed *Ceriodaphnia*.

Day Nine

Feed *Ceriodaphnia* (Optional: Observe reproduction and terminate if greater than 80% of control organisms have produced a third brood).

Day Ten

Perform final mortality and reproduction counts as well as chemical/physical monitoring.

QUALITY ASSURANCE CHECKLIST

The following table summarizes appropriate test conditions for the mini-chronic toxicity test. Values recorded outside of these ranges will result in an analysis being judged a "bad test" upon review by Environmental Sciences Branch personnel. The information should be used as a checklist for individual tests and does not cover the full range of quality control practices necessary for a successful completion of this analysis.

Effluent %	By Permit, SOC, or JOC
Control Mortality	≤20%
Average Reproduction for Control	Not less than 15 per surviving female
% Control Organisms Producing a Third Brood	>80%
pH Control Initial	6.5-8.5 pH units
Minimum D.O. of Control and Treatment 2	>5.0 mg/l
Hardness Dilution Water	Between 30-50 mg/l
Sample Temperature at Receipt	Between 0-4°C
Sample Age at Test Initiation	<72 Hours

Appendix E

Aquatic Toxicity Testing
AT - 3 Test
Form

Environmental Sciences Branch
Water Quality Section
Division of Environmental Management
North Carolina Department of Environment, Health, and Natural Resources

Effluent Aquatic Toxicity Report Form/Phase II Chronic *Ceriodaphnia*

Facility _____ NPDES#: NC Pipe# _____ County _____

Laboratory Performing Test _____

Signature of _____ x Signature of Lab Supervisor _____

Comments _____

Sample Information	Sample 1	Sample 2	Control
Collection Start Date			
Grab			
Composite (Duration)			
Hardness(mg/l)			
Spec. Cond. (µmhos/cm)			
Chlorine(mg/l)			
Sample temp. at receipt	°C	°C	

Test Information*	Start Date	End Date		Start Time	End Time	
	/ /	/ /		:	:	
	Start	Renew1	Renew2	Start	Renew1	Renew2
Treatment	%	%	%	Control	Control	Control
pH Initial						
pH Final						
D.O. Initial						
D.O. Final						
Temp. Initial						
Temp. Final						

		Organism#											
Control	# Young	1	2	3	4	5	6	7	8	9	10	11	12
	Adult (L)ive (D)ead												
Effluent%	# Young	1	2	3	4	5	6	7	8	9	10	11	12
	Adult (L)ive (D)ead												
Effluent%	# Young	1	2	3	4	5	6	7	8	9	10		
	Adult (L)ive (D)ead												
Effluent%	# Young	1	2	3	4	5	6	7	8	9	10		
	Adult (L)ive (D)ead												
Effluent%	# Young	1	2	3	4	5	6	7	8	9	10		
	Adult (L)ive (D)ead												

Chronic Test Results

Final Control Mortality % _____

Mean Control Expro. _____

% Control 3rd Expro. _____

48 Hour Mortality Control _____ IWC _____

of _____ of _____

Significant? ☒ Y ☐ N

Final Mortality Significant @ _____% or No Conc.

Reproduction Analysis:

Repro. LOEC= _____%; NOEC= _____%

Method: _____

Normal Distrib? _____ Method: _____

Statistic: _____ Critical: _____

Equal Variances? _____ Method: _____

Statistic: _____ Critical: _____

Non-Parametric Analysis (if applicable):

Method: _____

Effluent %	Rank Sum	Critical Sum

Overall Analysis:

Result = PASS/FAIL or

Test LOEC= _____%; NOEC= _____%

Chronic Value= _____%

MAIL TO: ATT: Environmental Sciences
Div. of Environmental Management
N.C. Department of EHNR
4401 Reedy Creek Rd.
Raleigh, N.C. 27607

*Should use highest test concentration or highest concentration with D.O. >5.0 mg/l

Appendix F

Aquatic Toxicity Testing
Quality Assurance
Checklist

Environmental Sciences Branch
Water Quality Section
Division of Environmental Management
North Carolina Department of Environment, Health, and Natural Resources

QUALITY ASSURANCE CHECKLIST

The following table summarizes appropriate test conditions for any *Ceriodaphnia* chronic toxicity test performed to fulfill a North Carolina NPDES monitoring requirement. Values recorded outside of these ranges will result in an analysis being judged a "bad test" upon review by Environmental Sciences Branch personnel. The information should be used as a checklist for individual tests and does not cover the full range of quality control practices necessary for a successful completion of this analysis.

Instream Waste Concentration(%)	By Permit, SOC, or JOC
Control Mortality	≤20%
Average Reproduction for Control	Not less than 15 per surviving female
% Control Organisms Producing a Third Brood	≥80%
pH Control Initial	6.5-8.5 pH units
Minimum D.O. of Control and Treatments	≥5.0 mg/l
Hardness of Dilution Water	Between 30-50 mg/l
Sample Temperature at Receipt	Between 0°-4°C
Sample Age at Test Initiation or Renewal	<72 Hours

Appendix G

Aquatic Toxicity Testing
Certified Biological Laboratories
List

Environmental Sciences Branch
Water Quality Section
Division of Environmental Management
North Carolina Department of Environment, Health, and Natural Resources

CERTIFIED BIOLOGICAL LABORATORIES

Category/Parameter

DEM 7/11/95

Private Contract Laboratories

Laboratory

	Acute	Chronic	Aquatic Population Survey	Algal/Aquatic Plant
Burlington Research, Inc. 615 Huffman Mill Road Burlington, NC 27215 Phone: (910) 584-5564 Lab Supervisor Mr. Rick A. Diehl	<i>Ceriodaphnia dubia</i> , <i>Daphnia pulex</i> <i>Daphnia magna</i> , <i>Pimephales promelas</i>	<i>Ceriodaphnia dubia</i>		
Chemico and Environmental Technology P.O. Box 12298 Research Triangle Park, NC 27709 Phone: (919) 467-3090 Lab Supervisor Ms. Terrie H. Lutzenberger	<i>Ceriodaphnia dubia</i>	<i>Ceriodaphnia dubia</i>		
Commonwealth Technology, Inc. 2520 Regency Road Lexington, KY 40503 Phone: (606) 276-3506 Lab Supervisor Mr. Paul W. Patterson	<i>Ceriodaphnia dubia</i> <i>Daphnia pulex</i> <i>Mysidopsis bahia</i> , <i>Menidia beryllina</i> <i>Pimephales promelas</i>	<i>Ceriodaphnia dubia</i> <i>Mysidopsis bahia</i> , <i>Menidia beryllina</i> <i>Pimephales promelas</i>		
Davis & Floyd, Inc. P.O. Drawer 428 Greenwood, SC 29648 Phone: (803) 229-4413 Lab Supervisor Mr. Steven C. Davis	<i>Ceriodaphnia dubia</i>	<i>Ceriodaphnia dubia</i>		

Organism Key

Mysidopsis bahia Mysid shrimp
Menidia beryllina Silverside

Cyprinodon variegatus Sheepshead minnow
Fundulus heteroclitus Mummichog

Pimephales promelas Fathead minnow
Palaemonetes pugio Grass shrimp

CERTIFIED BIOLOGICAL LABORATORIES

DEM 7/17/95

Category/Parameter

Private Contract Laboratories

Laboratory	Acute	Chronic	Aquatic Population Survey	Algal/Aquatic Plant
HydroLogic, Inc. 2500 Gateway Centre Blvd. Suite 900 Morrisville, NC 27560 Phone: (919) 380-9699 Lab Supervisor Ms. Linda M. Mackenzie	<i>Ceriodaphnia dubia</i> , <i>Pimephales promelas</i>	<i>Ceriodaphnia dubia</i> , <i>Pimephales promelas</i>		
James R. Reed and Associates 11864 Canon Blvd. Suite 103 Newport News, VA 23606 Phone: (804) 873-4703 Lab Supervisor Mr. Donald S. Bolinger Jr.	<i>Mysidopsis bahia</i> , <i>Pimephales promelas</i>	<i>Ceriodaphnia dubia</i>		
Pace, Inc. 54 Ravenscroft Drive Asheville, NC 28801 Phone: (704) 254-7176 Lab Supervisor Ms. Cherry Ratzlaff	<i>Ceriodaphnia dubia</i> , <i>Daphnia pulex</i> , <i>Pimephales promelas</i>	<i>Ceriodaphnia dubia</i> , <i>Pimephales promelas</i>		
Pennington & Associates, Inc. P.O. Box 2887 Cookeville, TN 38502-2887 Phone: (615) 526-8038 Lab Supervisor Mr. Wendell L. Pennington			Fish, Macroinvertebrate, algae, zooplankton	

Organism Key

Mysidopsis bahia Mysid shrimp
Acanthocyclops vernalis Silverside

Cyprinodon variegatus Sheepshead minnow
Fundulus heteroclitus Mummichog

Pimephales promelas Fathead minnow
Palaemonetes pugio Grass shrimp

CERTIFIED BIOLOGICAL LABORATORIES

DEM 7/17/95

Category/Parameter

Private Contract Laboratories

Laboratory	Acute	Chronic	Aquatic Population Survey	Algal/Aquatic Plant
Water Technology and Controls, Inc. 642 Tamco Road Reidsville, NC 27320 Phone: (910) 342-4748 Lab Supervisor Mr. Mohammad Afzal	<i>Ceriodaphnia dubia</i> , <i>Pimephales promelas</i>	<i>Ceriodaphnia dubia</i>		
Webb Technical Group, Inc. 4325 Pleasant Valley Rd., Suite 110 Raleigh, NC 27612 Phone: (919) 834-4984 Lab Supervisor Mr. Kirk M. Stafford	<i>Ceriodaphnia dubia</i>	<i>Ceriodaphnia dubia</i>		

Organism Key

Mysidopsis bahia Mysid shrimp
Menidia beryllina Silverside

Cyprinodon variegatus Sheepshead minnow
Fundulus heteroclitus Mummichog

Pimephales promelas Fathead minnow
Palaemonetes pugio Grass shrimp

Appendix H

Aquatic Toxicity Testing
Regional Office
Contacts

Environmental Sciences Branch
Water Quality Section
Division of Environmental Management
North Carolina Department of Environment, Health, and Natural Resources

REGION

OFFICES

ASHEVILLE REGIONAL OFFICE

Roy Davis/Reg. Supervisor
Forrest Westall/ WQ Supv.

Interchange Building
59 Woodfin Place
Asheville, NC 28801
704/251-6208
FAX # 704/251-6452

COURIER

DEHNR
Asheville 06-78-16

Avery	Macon
Buncombe	Madison
Burke	McDowell
Caldwell	Mitchell
Cherokee	Polk
Clay	Rutherford
Graham	Swain
Haywood	Transylvania
Henderson	Yancey
Jackson	

FAYETTEVILLE REGIONAL OFFICE

Tommy Stevens/Reg. Supervisor
Mike Wicker/WQ Supv.

Wachovia Building
Suite 714
Fayetteville, NC 28301
910/486-1541
FAX # 910/486-0707

COURIER

DEHNR
Fayetteville 14-56-25

Anson	Moore
Bladen	Robeson
Cumberland	Richmond
Harnett	Sampson
Hoke	Scotland
Montgomery	

MOORESVILLE REGIONAL OFFICE

Brenda Smith/Reg. Supervisor
Rex Gleason/WQ Supv.

919 North Main Street
 Mooresville, NC 28115
704/663-1699
FAX # 704/663-6040

COURIER

DEHNR
 Mooresville 13-21-07

Alexander	Lincoln
Cabarrus	Mecklenburg
Catawba	Rowan
Cleveland	Stanly
Gaston	Union
Iredell	

WASHINGTON REGIONAL OFFICE

Jim Mulligan/Reg. Supervisor
Roger Thorpe/WQ Supv.

1424 Carolina Avenue
Washington, NC 27889
919/946-6481
FAX # 919/975-3716

COURIER

DEHNR
Washington 16-04-01

Beaufort	Jones
Bertie	Lenoir
Camden	Martin
Chowan	Pamlico
Craven	Pasquotank
Currituck	Perquimans
Dare	Pitt
Gates	Tyrell
Greene	Washington
Hertford	Wayne
Hyde	

WILMINGTON REGIONAL OFFICE

Rick Shiver/Reg. Supervisor
Dave Adkins/WQ Supv.

127 Cardinal Drive Extension
Wilmington, NC 28405-3345
910/395-3900
FAX # 910/350-2004

COURIER

DEHNR
Wilmington 04-16-33

Brunswick	New Hanover
Carteret	Onslow
Columbus	Pender
Duplin	

WINSTON-SALEM REGIONAL OFFICE

Larry Coble/Reg. Supervisor
Steve Mauney/WQ Supv.

8025 North Point Boulevard, Suite 100
Winston-Salem, NC 27106
910/896-7007
FAX # 910/896-7005

COURIER

DEHNR
Winston-Salem 09-27-46

Alamance	Forsyth	Watauga
Alleghany	Guilford	Wilkes
Ashe	Rockingham	Yadkin
Caswell	Randolph	
Davidson	Stokes	
Davie	Surry	

RALEIGH REGIONAL OFFICE

Ken Schuster/Reg. Supervisor
Tim Donnelly/WQ Supv.

3800 Barrett Drive, PO Box 27687
Raleigh, NC 27611
919/571-4700
FAX # 919/571-4718

INTEROFFICE

DEHNR
Raleigh Regional Office

Chatham	Johnston	Vance
Durham	Lee	Wake
Edgecombe	Nash	Warren
Franklin	Northampton	Wilson
Granville	Orange	
Halifax	Person	

Appendix I

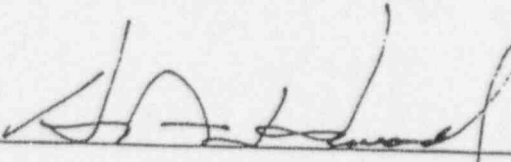
Aquatic Toxicity Testing
Chronic Pass/Fail
Toxicity Test Method

Environmental Sciences Branch
Water Quality Section
Division of Environmental Management
North Carolina Department of Environment, Health, and Natural Resources

North Carolina Phase II
Chronic Whole Effluent Toxicity Test Procedure
July, 1991
Revised September 1994

North Carolina Department of Environment,
Health, and Natural Resources
Division of Environmental Management
Water Quality Section

This procedure has been approved for release


A. Preston Howard, Jr., P.E., Director

9-28-94

Date

EFFLUENT SAMPLING AND HANDLING

All effluent samples collected for this procedure must be 24-hour composites unless grab samples or other alternate sampling regimes are specifically allowed by the facility's permit or monitoring requirement. Sampling should be performed below the last waste treatment process, including disinfection. There may be no removal of chlorine or any other effluent constituent from the sample by either chemical or physical methods prior to testing with the exception of allowable filtration of the effluent through 60 μm nylon screen or plankton netting and reduction of excess dissolved oxygen to the saturation level, as per EPA methods.

Sample collection materials may be tempered glass, polyethylene, perfluorocarbon plastics including Teflon®, 304 or 316 stainless steel, polypropylene, polyvinylchloride, Tygon®, or silicone. All non-perfluorocarbon plastics should be discarded after use. It is the responsibility of the collector to assure that contamination is not influencing test results. Care should be taken that sufficient sample volume is collected in order to perform the test.

Effluent samples must be maintained between 0°C and 4°C, inclusive, from collection, in the case of grab samples, or initiation of collection through the use of an iced or refrigerated sampler, in the case of composite samples, until they are utilized in the toxicity testing procedure. The single allowable exception to this protocol is the situation in which a grab sample is collected and delivered to the performing laboratory and used for test initiation no later than 4 hours following the time of collection. All other samples must be received by the certified biological laboratory at a temperature between 0°C and 4°C, inclusive, or they will be considered invalid.

Each effluent sample collected for this procedure must follow certain timing/scheduling constraints. By definition of this method, each composite sampling must be performed over two calendar days (Day One through Day Two, and Day Four through Day Five, as defined in Table). For purposes of defining the month in which the test is indicative of compliance, the start date of the first sample for any given test will be considered the month (and quarter) in which the test was performed. The sampling schedule is intended to be performed on Monday through Tuesday and Thursday through Friday. Shifting the sampling days is acceptable, assuming that the relative chronology and sequence of sampling and testing activities remains constant and the certified biological laboratory is capable of meeting such a schedule. No sample will be used which exceeds 72 hours of age, measured beginning with collection time of a grab sample or the final sub-sample of a composite sample and extending to the time that the sample is used for test initiation or test renewal. "Use" here is defined as the transfer of test organisms to the solutions. For example, a composite sample initiated on Monday at 10:00 AM and terminated at 10:00 AM on Tuesday should be received by the performing laboratory for test initiation by 10:00 AM on Wednesday, with the first renewal using that sample taking place by 10:00 AM on Friday. Likewise, the second sample,

Dilution water must be the culture water used to maintain the test population or be suitable for that purpose. The pH of this water at test initiation and initiation of subsequent test solution renewals must fall in the range of 6.5-8.5 standard units. Total hardness must measure between 30 and 50 mg/l.

Ten test organisms will be exposed to each treatment in individual test chambers. The test will run until at least 80% of the surviving control organisms produce three broods of young, not to exceed a seven day exposure, using the chronology specified in the Table. (Termination should be contingent upon whether the control reproduction mean has reached the minimum acceptable value of 15 young per surviving female.)

The objective of this test is to determine the effluent's No-Observed-Effect Concentration (NOEC), Lowest-Observed-Effect Concentration (LOEC), and Chronic Value (ChV). The NOEC and LOEC are determined by identifying which effluent concentrations tested have significant detrimental impact upon reproduction and/or survival as compared to the control population. The lowest effluent concentration tested which displays significant impact upon survival or reproduction is the LOEC. The highest effluent concentration tested which does not display significant impact to either survival or reproduction as compared to the control population is the NOEC. The ChV is defined as the geometric mean of the NOEC and LOEC.

After effluent collection on Days One and Two, the test treatments will be prepared and the test initiated on Day Three (Table). An aliquot of the first composite sample is brought to room temperature and utilized to mix test solutions, which are then distributed to the test vessels. (Effluent samples are to be refrigerated at a temperature between 0° and 4° C except when aliquots are drawn for mixing test solutions.) The pH, dissolved oxygen and temperature must be checked and recorded prior to the introduction of the test organisms. At all times temperature of the test solutions must be 25°C (±1°C) and dissolved oxygen must be equal to or greater than 5.0 mg/l.

The test organisms are placed singly in test vessels each containing 15 milliliters of solution. The organisms must all be less than 24 hours old, all within 8 hours of the same age, from the third or subsequent brood, and from broods in which the adult produced at least 8 neonates. All test organisms must be produced by "individual" cultures as defined by "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Second Edition" (EPA/600/4-89/001). Neonates are transferred using an eye dropper, such that the organism is never removed from solution. There should be as little water transferred with the organism as is reasonably practical. All *Ceriodaphnia* should be fed at this time and daily thereafter. Each daily feeding will consist of addition of 0.05 ml of YCT food and 0.05 ml of a solution of the algae *Selenastrum capricornutum* (with a cell concentration of 1.71×10^7 cells/ml) per 15 milliliters of test solution. Preparation of food supplies are described by EPA/600/4-89/001 (alternative algal media preparation methods are described in "North Carolina Biological Laboratory Certification/Procedures Document"), though feeding rates have been modified for this protocol. The photoperiod must be maintained at 16 hours of light and 8 hours of darkness.

INTERPRETATION OF RESULTS

The statistical comparisons for evaluating the test results should be performed as outlined on pages 128-143 and in Appendices B through G in EPA/600/4-89/001. To test for normality of data, the chi-square test for goodness of fit may be used if the Kolmogorov statistic is not available (note that the Shapiro-Wilks test should be utilized to assess the normality of datasets with 50 or fewer datapoints). The chi-square procedure is available in most basic statistics books. Confidence levels for each statistical procedure will be those specified in EPA/600/4-89/001.

Mortality greater than 20% in the control population will be considered as abnormal, and the test must be declared invalid. In addition, average reproduction in the control population must exceed 15 offspring per surviving female, or the test must be declared invalid. For data analysis, mean reproduction is calculated by summing the total number of young produced per treatment until either time of death or end of the experiment and dividing by the number of females exposed per treatment. Note that fourth brood neonates will be excluded from the reproduction totals. A chronic value (ChV) is determined as the geometric mean of the LOEC and NOEC from the toxicity test results. If the lowest effluent concentration is also the LOEC, then the ChV will be considered the geometric mean of the LOEC and one-half the LOEC. If the highest effluent concentration is also the NOEC, then the ChV will be considered the NOEC.

If these tests are being performed as an NPDES requirement or by Administrative Letter, then the ChV must be entered on the Effluent Discharge Monitoring Form (MR-1) for the month during which the first effluent sample was collected using the parameter code THP3B. Additionally, DEM Form AT-3 (original) is to be sent to the following address:

Environmental Sciences Branch
North Carolina Division of Environmental Management
4401 Reedy Creek Road
Raleigh, North Carolina 27607-6445

APPENDIX

This appendix provides an optional means of determining compliance by comparing a single effluent treatment to a control. Discretion should be used when choosing this option. Given that the result does not produce a no-effect level, an artificial endpoint will be generated which may or may not be advantageous from a compliance standpoint. The option to perform this variation of the chronic procedure may only be exercised as the first test of the monitoring quarter. If a failure should result, at least two multiple concentration tests (one per month) must be performed by the end of the monitoring quarter.

All effluent sampling, test conditions, and test procedures are identical to those outlined in the main section of this document except for the test concentrations, number of organisms per treatment, and statistical evaluations of data. Twelve organisms will be used for each treatment. There will be only two treatments: a control and an effluent concentration equal to the IWC as defined previously. Due to the limited ability of this modification to define a chronic no-observed-effect level, the test performed using this appendix procedure may be terminated at 48 hours should the mortality in the effluent treatment significantly exceed that of the control treatment as determined by the Fisher's Exact test.

The statistical comparisons for evaluating the test results should be performed as outlined in Appendix H (entitled "Toxicity Screening Test - Comparison of Control with 100% Effluent or Instream Waste Concentration") of EPA/600/4-89/001, with the exception that reproduction data are to be evaluated at a 99% confidence level. A statistical difference between the control (Treatment 1) and the effluent (Treatment 2) caused by decreased reproduction or increased mortality in the effluent treatment will be considered as a failure of this effluent to meet toxicity standards within the receiving stream. For compliance purposes, a "Fail" result will be averaged with other quarterly monitoring data as a chronic value (ChV) equal to the geometric mean of the IWC and one-half the IWC. In the event of a "Pass" result, the ChV will be considered to be a value greater than the IWC (" $>XX\%$ "). The ChV must be entered on the Effluent Discharge Monitoring Form (MR-1) for the month during which the first effluent sample was collected using the parameter code THP3B. Additionally, DEM Form AT-3 (original) is to be sent to the same address noted above.

References

- United States Environmental Protection Agency. 1985. Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. EPA/600/4-85/014, 162 pp.
- United States Environmental Protection Agency. 1985. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. Third Edition. EPA/600/4-85/013, 216 pp.
- United States Environmental Protection Agency. 1989. Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Second Edition. EPA/600/4-89/001, 249 pp.

State of North Carolina
Department of Environment,
Health and Natural Resources
Division of Environmental Management

James B. Hunt, Jr., Governor
Jonathan B. Howes, Secretary
A. Preston Howard, Jr., P.E., Director



ENVIRONMENTAL PROTECTION

July 10, 1995

JUL 17, 1995 *02*
07/17/95

Mr. John S. Carter
Duke Power Company
13339 Hagers Ferry Road
Huntersville, North Carolina 28078-7929

☐ FILE
☐ TICKLER DATE _____

Subject: NPDES Permit Renewal COPY
Permit No. NC0024392
McGuire Nuclear Station
Mecklenburg County ROUTE *UGA*

Dear Mr. Carter:

In accordance with your application for discharge permit received on July 5, 1994, we are forwarding herewith the subject state - NPDES permit. This permit is issued pursuant to the requirements of North Carolina General Statute 143-215 .1 and the Memorandum of Agreement between North Carolina and the US Environmental Protection agency dated December 6, 1983.

The following comments are provided in response, and in corresponding order, to the issues raised in your June 20, 1995 comments on the draft permit:

Outfall 001

- The federal effluent guidelines specify Free Available Chlorine monitoring. However, Total Residual Chlorine is a more stringent requirement, and as such, Total Residual Chlorine monitoring is included in the permit renewal as requested. This change also resolves the ambiguity contained in footnote "5".
- The chlorine monitoring language contained in the previous permit is included in the permit renewal as requested.
- Selenium is not a byproduct of nuclear generation and monitoring has been deleted as requested.

Outfall 002

- As requested, nutrient monitoring parameters have been deleted for outfall 002 in favor of monitoring at the final outfall prior to discharge.
- The frequency for MBAS monitoring remains at monthly intervals. This frequency is deemed necessary to characterize a representative discharge at this outfall. The currently scheduled 1997 addition of a car wash at this outfall will also require a minimum of monthly monitoring for MBAS.
- The draft permit included MBAS with specified units of $\mu\text{g/l}$, in keeping with the state water quality standard units. The units have been changed to mg/l as requested.
- Because this facility is actively working towards connecting all possible discharges to the municipal sewer system, the permittee may petition the Division to evaluate the requirement for

BOD monitoring at this outfall if Monitoring under the terms of this permit indicates that BOD is not a parameter of concern based on data collected during a one year period.

Outfall 003

- The draft permit contained total suspended solids limits per the federal effluent guidelines, which are meant to sample discharges prior to mixing with other waste streams. Because Duke Power is scheduled to delete this outfall when the system is connected to CMUD by September 1, 1997, these new effluent guideline limitations will be phased in. The current permit limits of 90 mg/l and 135 mg/l shall remain in place until September 1, 1997. After September 1, 1997 the limits will change to 30 mg/l and 60 mg/l.
- Oil and grease limits shall be phased in along with the total suspended solids limits described above. The oil and grease monitoring frequency has been changed to every other month as requested.
- The proposed pH limits have been deleted from the permit as requested.
- The ammonia nitrogen, total phosphorus, and total nitrogen monitoring requirements have been deleted at this outfall in favor of nutrient monitoring at outfall 005.
- The draft permit included MBAS with specified units of $\mu\text{g/l}$, which reflect the state water quality standard units. The units have been changed to mg/l as requested.
- Selenium is not a byproduct of nuclear generation and monitoring has been deleted as requested.
- The permit has been revised to indicate that the permittee may petition the Division to evaluate the effluent monitoring requirement for silver if, after 6 months of monitoring under the terms of the permit, the resulting data indicates that silver is not a parameter of concern. Six months of monitoring will allow the Division to review a minimum of twelve data points.

Outfall 004

- The monitoring frequency for hydrazine has been changed to "batch" as requested.
- The draft permit lists weekly flow monitoring and is unchanged since weekly flow monitoring was requested.
- The monitoring frequency for total suspended solids and oil and grease should have been listed as quarterly in the draft permit and have been changed to quarterly as requested.
- Application documents indicate that outfall 004 combines with outfall 001 prior to discharge and that turbine building sumps may be discharged through outfall 002. Outfall 002 is the conventional water treatment system and incorporates the same effluent limits as outfall 004. Therefore, the wording has been changed to "In the event the turbine building sumps are discharged through Outfall 001 instead of Outfall 002, the above discharge limitations shall also apply to the turbine building sump discharge" as requested.

Outfall 005

- Nutrient monitoring requirements at outfalls 002 and 003 have been deleted in favor of monitoring nutrients at this outfall where the flows combine prior to discharge to the Catawba River.

Outfall 006

- The footnote "There shall be no discharge of floating solids or visible foam in other than trace amounts" has been removed from this outfall as requested.

Special Conditions

- Part III, Condition F has been corrected to specify a daphnid test organism with samples collected during February, May, August, and November.
- The standard acute toxicity quarterly pass/fail permit limit language has been incorporated into the permit.
- The document reference in Part III, Condition G has been changed to Document 600/4-90/027F entitled "Methods for Measuring the Acute Toxicity of Effluents and receiving Waters to Freshwater and Marine Organisms, Fourth Edition."
- Part III, Condition G specifies a 24-hour composite sample and the outfall 004 effluent limitation and monitoring requirements page has been accordingly modified.

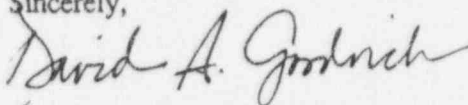
If any parts, measurement frequencies or sampling requirements contained in this permit are unacceptable to you, you have the right to an adjudicatory hearing upon written request within thirty (30) days following receipt of this letter. This request must be in the form of a written petition, conforming to Chapter 150B of the North Carolina General Statutes, and filed with the Office of Administrative Hearings, Post Office Drawer 27447, Raleigh, North Carolina 27611-7447. Unless such demand is made, this decision shall be final and binding.

Please take notice this permit is not transferable. Part II, E.4. addresses the requirements to be followed in case of change in ownership or control of this discharge.

This permit does not affect the legal requirements to obtain other permits which may be required by the Division of Environmental Management or permits required by the Division of Land Resources, Coastal Area Management Act or any other Federal or Local governmental permit that may be required.

If you have any questions concerning this permit, please contact Jeanette Powell at telephone number (919) 733-5083, ext. 537.

Sincerely,


for A. Preston Howard, Jr., P. E.

cc: Central Files
Mooresville Regional Office
Mr. Roosevelt Childress, EPA
Permits and Engineering Unit
Facilities Assessment Unit
Mecklenburg County Health Department
Aquatic Survey and Toxicology Unit
Operator Training and Certification Unit

STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT, HEALTH, AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL MANAGEMENT

PERMIT

TO DISCHARGE WASTEWATER UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of North Carolina General Statute 143-215.1, other lawful standards and regulations promulgated and adopted by the North Carolina Environmental Management Commission, and the Federal Water Pollution Control Act, as amended,

Duke Power Company

is hereby authorized to discharge wastewater from a facility located at

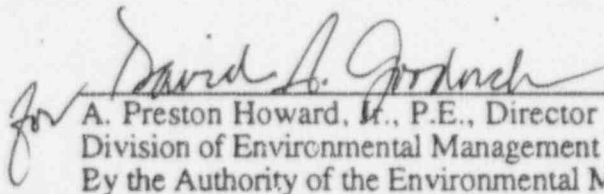
McGuire Nuclear Station
Highway 73
Charlotte
Mecklenburg County

to receiving waters designated as the Catawba River (Lake Norman and Mountain Island Lake) in the Catawba River Basin in accordance with the discharge limitations, monitoring requirements, and other conditions set forth in Parts I, II, III, and IV hereof.

This permit shall become effective August 1, 1995.

This permit and the authorization to discharge shall expire at midnight on June 30, 2000.

Signed this day July 10, 1995.


for A. Preston Howard, Jr., P.E., Director
Division of Environmental Management
By the Authority of the Environmental Management Commission

SUPPLEMENT TO PERMIT COVER SHEET

Duke Power Company

is hereby authorized to:

1. Continue to operate wastewater treatment facilities necessary to comply with final effluent limitations contained in this permit and located at McGuire Nuclear Station, northwest of Charlotte in Mecklenburg County, and
2. Continue to discharge condenser cooling water, low pressure service water, and nuclear service water through outfall 001 at the location specified on the attached map into Lake Norman which is classified Class WS-IV B waters in the Catawba River Basin, and
3. Continue to discharge from turbine building sumps, water treatment room sumps, condensate demineralizer backwashes, closed cooling systems, the Standby Shutdown Facility, laboratory drains, landfill leachate, steam generator blowdown, wet lay-up, and unwatering pumps after treatment in the conventional wastewater treatment system consisting of a 200,000 gallon concrete lined initial holdup pond, two parallel 2.5 MG clay-lined settling ponds, a concrete lined 1 MG final holdup pond, chemical addition of coagulants, oxidants, catalysts, pH control, and effluent pH adjustment by CO₂ addition with discharge through outfall 002 at the location specified on the attached map into the Catawba River (Mountain Island Lake) which is classified WS-IV waters in the Catawba River Basin, and
4. Continue to discharge from vehicle maintenance facility building washdown drains, office complex building shop drains, medical facility photographic wastes, nondestructive examination photographic wastes and domestic wastes through the domestic wastewater treatment system which includes a four cell aerated lagoon followed by a sand filter, tablet disinfection with contact tank, and a parshall flume with discharge through outfall 003 at the location specified on the attached map into the Catawba River (Mountain Island Lake) which is classified WS-IV waters in the Catawba River Basin, and
5. Continue to discharge from the radwaste liquid monitoring system, floor and equipment drains, laundry drains, and ventilation unit drains through outfall 004 at the location specified on the attached map into Lake Norman which is classified Class WS-IV B waters in the Catawba River Basin, and
6. Continue to discharge treated sanitary effluent (from outfall 003), standby nuclear service pond overflow, administrative building drains (HVAC sump, floor drains, janitorial sinks, hot water boiler, chiller water system), main condenser cooling, unwatering, filtered water, HVAC unit drains, yard drains, and reverse osmosis reject flows through the wastewater collection basin consisting of a 13.4 acre settling pond and surface skimmer with discharge through outfall 005 at the location specified on the attached map into the Catawba River (Mountain Island Lake) which is classified WS-IV waters in the Catawba River Basin, and
7. Continue to discharge chemical metal cleaning wastes from outfall 006 through outfall 002 at the location specified on the attached map into the Catawba River (Mountain Island Lake) which is classified WS-IV waters in the Catawba River Basin and through outfall 004 at the location specified on the attached map into Lake Norman which is classified Class WS-IV B waters in the Catawba River Basin.

A. (1). EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FINAL

Permit No. NC0024392

During the period beginning on the effective date of the permit and lasting until expiration, the Permittee is authorized to discharge from outfall(s) serial number 001 - Once Through Cooling Water. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent	Characteristics	Discharge Limitations		Monitoring Requirements				
		Monthly	Avg.	Daily	Max.	Measurement Frequency	Sample Type	Sample Location ¹
	Intake Flow (BGD)					Daily	Pump Logs	I
	Temperature (October-June)		95° F			Daily	Recorder	DCB
	Temperature (July-September)		99° F			Daily	Recorder	DCB
	Hydrazine ²				0.06 mg/l		Calculations	DCB
	Acute Toxicity ³					Quarterly	Composite	DCB
	Total Residual Chlorine ⁴		0.20 mg/l		0.50 mg/l	Weekly	Multiple Grab ⁵	DS
	Time of Chlorine Addition ⁶							

Footnotes:

¹ Sample Location: I - intake, DCB - discharge canal bridge, DS - discharge structure corresponding to an individual unit.

² Hydrazine daily maximum shall be the calculated hydrazine concentration at the discharge canal bridge based upon hydrazine monitoring results at Outfall 004 and shall be calculated once on any day which a discharge of hydrazine occurs from the radwaste system and turbine building sumps (based on process knowledge). The calculations shall take into account flows from the once-through cooling water and the radwaste system or turbine building sumps.

³ Acute Toxicity (Daphnid 24 hr.) No significant mortality at 90% with samples collected in February, May, August, and November. See Part III, Condition F.

⁴ Monitoring of total residual chlorine is not except during and subsequent to chlorination. Monitoring shall begin immediately upon start-up of chlorination and shall discontinue when total residual chlorine is no longer detected. Total residual chlorine may not be discharged from any single generating unit for more than two hours per day unless the discharger demonstrates to the State that discharge for more than two hours is required for macroinvertebrate control.

⁵ Multiple grabs shall consist of grab samples collected at the approximate beginning of Total Residual Chlorine discharge and once every 15 minutes thereafter until TRC is no longer detectable. "Daily Maximum" TRC is the instantaneous maximum at any time.

⁶ The permittee shall maintain a log of all chlorination events within each unit. The log shall be maintained on file at the plant and shall be available for review or submitted to the DEM upon request by any representative of this Division. For each chlorination event, the log shall list: (1) each system that is chlorinated, (2) the volume of the system (gpm), (3) the chlorination begin and end time, and (4) the total time of the chlorination event (minutes).

DISCHARGE OF ANY PRODUCT REGISTERED UNDER THE FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT IS PROHIBITED UNLESS SPECIFICALLY AUTHORIZED ELSEWHERE IN THIS PERMIT.

THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

A. (2). EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FINAL

Permit No. NC0024392

During the period beginning on the effective date of the permit and lasting until expiration, the Permittee is authorized to discharge from outfall(s) serial number 002 - Conventional Wastewater Treatment Facility. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent	Characteristics	Discharge Limitations		Monitoring Requirements				
		Monthly	Avg.	Daily	Max.	Measurement Frequency	Sample Type	Sample Location ¹
	Flow (MGD)					Daily	Instantaneous	E
	Oil and Grease	15.0 mg/l		20.0 mg/l		Monthly	Grab	E
	Total Suspended Solids	30.0 mg/l		100.0 mg/l		Monthly	Grab	E
	Total Residual Chlorine ² (mg/l)					Monthly	Grab	E
	pH ³					Monthly	Grab	E
	Hydrazine			4.4 mg/l		Weekly	Grab	E
	MBAS (mg/l)					Monthly	Grab	E
	Sulfate (mg/l)					Monthly	Grab	E
	Acute Toxicity ⁴					Quarterly		E
	BOD ₅ (mg/l)					Monthly	Grab	E

Footnotes:

¹ Sample Location: E - Effluent, with sampling performed prior to mixing with any other waste streams.

² Total Residual Chlorine shall be monitored once per batch within 24 hours of injection when chlorine is used for treatment purposes.

³ The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored as indicated above.

⁴ Acute Toxicity (Daphnid 48 hr.) LC₅₀ 80% with samples collected in February, May, August and November. See Part III, Condition G.

THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

A. (3). EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FINAL

Permit No. NC0024392

During the period beginning on the effective date of the permit and lasting until August 31, 1997, the Permittee is authorized to discharge from outfall(s) serial number 003 - Domestic Wastewater Treatment Facility. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent	Characteristics	Discharge Limitations		Monitoring Requirements				
		Monthly	Avg.	Dai'y	Max.	Measurement Frequency	Sample Type	Sample Location
Flow (MGD)						Weekly	Instantaneous	E
BOD ₅		30.0 mg/l		45.0 mg/l		2/Month	Grab	E
Total Suspended Solids		90.0 mg/l		135.0 mg/l		2/Month	Grab	E
Total Residual Chlorine (mg/l)						Weekly	Grab	E
Fecal Coliform		200 /100 ml		400 /100 ml		2/Month	Grab	E
pH						Monthly	Grab	E
Oil and Grease		30.0 mg/l		60.0 mg/l		**	Grab	E
Silver (µg/l) ²						2/Month	Grab	E
MBAS (µg/l)						Monthly	Grab	E

Footnotes:

¹ Sample Location: E - Effluent

² If, after six months of silver monitoring according to the above monitoring requirements, the data do not indicate significant concentrations of silver in the discharge from this outfall, the permittee may petition the Division for reduced silver effluent limitations and monitoring requirements.

** Samples to be collected every other month.

THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

A. (4). EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FINAL

Permit No. NC0024392

During the period beginning on September 1, 1997 and lasting until expiration, the Permittee is authorized to discharge from outfall(s) serial number 003 - Domestic Wastewater Treatment Facility. Such discharges shall be limited and monitored by the permittee as specified below:

<u>Effluent</u>	<u>Characteristics</u>		<u>Discharge Limitations</u>		<u>Monitoring Requirements</u>		
	<u>Monthly</u>	<u>Avg.</u>	<u>Daily</u>	<u>Max.</u>	<u>Measurement Frequency</u>	<u>Sample Type</u>	<u>Sample Location</u> ¹
Flow (MGD)					Weekly	Instantaneous	E
BOD ₅	30.0	mg/l	45.0	mg/l	2/Month	Grab	E
Total Suspended Solids	30.0	mg/l	100.0	mg/l	2/Month	Grab	E
Total Residual Chlorine (mg/l)					Weekly	Grab	E
Fecal Coliform	200	/100 ml	400	/100 ml	2/Month	Grab	E
pH					Monthly	Grab	E
Oil and Grease	15.0	mg/l	20.0	mg/l	**	Grab	E
Silver (µg/l)					2/Month	Grab	E
MBAS (µg/l)					Monthly	Grab	E

Footnotes:

¹ Sample Location: E - Effluent

** Samples to be collected every other month.

THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

A. (5). EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FINAL

Permit No. NC0024392

During the period beginning on the effective date of the permit and lasting until expiration, the Permittee is authorized to discharge from outfall(s) serial number 004 - Radwaste Liquid Waste Monitoring System*. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent	Characteristics	Discharge Limitations		Monitoring Requirements				
		Monthly	Avg.	Daily	Max.	Measurement Frequency	Sample Type	Sample Location ¹
	Flow (MGD)					Weekly	Instantaneous	E
	Total Suspended Solids	30.0	mg/l	100.0	mg/l	Quarterly	Grab	E
	Oil and Grease	15.0	mg/l	20.0	mg/l	Quarterly	Grab	E
	Hydrazine (mg/l)					*	Grab	E

Footnotes:

¹ Sample Location: E - Effluent, with samples collected after radwaste treatment, but prior to any dilution with cooling water.

* Hydrazine monitoring shall be performed on each batch that contains hydrazine that is collected in the radwaste system or turbine building sumps.

NOTE: In the event the turbine building sumps are discharged through Outfall 001 instead of Outfall 002, the above discharge limitations shall also apply to the turbine building sump discharge. Each discharge from the turbine building sumps shall be monitored as specified above for flow, total suspended solids, oil and grease, and hydrazine, if applicable.

THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

A. (6). EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FINAL

Permit No. NC0024392

During the period beginning on the effective date of the permit and lasting until expiration, the Permittee is authorized to discharge from outfall(s) serial number 005 - Wastewater Collection Basin. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent	Characteristics	Discharge Limitations		Monitoring Requirements				
		Monthly	Avg.	Daily	Max.	Measurement Frequency	Sample Type	Sample Location ¹
Flow (MGD)						Weekly	Instantaneous	E
BOD ₅ (mg/l)						Monthly	Grab	E
Total Suspended Solids		30.0 mg/l		100.0 mg/l		Monthly	Grab	E
Fecal Coliform (/100 ml)						Monthly	Grab	E
Oil and Grease		15.0 mg/l		20.0 mg/l		2/Month	Grab	E
Total Copper (µg/l)						Monthly	Grab	E
Total Iron (mg/l)						Monthly	Grab	E
Chronic Toxicity ²						Quarterly	Grab	E
Alkalinity [OH ⁻] (mg/l)						Monthly	Grab	E
Total Phosphorus (mg/l)						Monthly	Grab	E
TKN (mg/l)						Monthly	Grab	E
NO ₂ + NO ₃ (mg/l)						Monthly	Grab	E
NH ₃ -N (mg/l)						Monthly	Grab	E
pH (s.u.)						Monthly	Grab	E

Footnotes:

¹ Sample Location: E - Effluent

² Chronic Toxicity (Ceriodaphnia) Pass/Fail at 12% with samples collected in January, April, July, and October. See Part III, Condition H.

THERE SHALL BE NO DISCHARGE OF FLOATING SOLIDS OR VISIBLE FOAM IN OTHER THAN TRACE AMOUNTS.

A. (7). EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FINAL

Permit No. NC0024392

During the period beginning on the effective date of the permit and lasting until expiration, the Permittee is authorized to discharge from outfall(s) serial number 006 - Chemical Metal Cleaning Wastes*. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics	Discharge Limitations		Monitoring Requirements		
	Monthly	Avg.	Daily Max.	Measurement Frequency	Sample Type Location ¹
Flow (MGD)				1/Batch	Instantaneous E
Total Suspended Solids	30.0 mg/l		100.0 mg/l	1/Batch	Grab E
Oil and Grease	15.0 mg/l		20.0 mg/l	1/Batch	Grab E
Total Copper	1.0 mg/l		1.0 mg/l	1/Batch	Grab E
Total Iron	1.0 mg/l		1.0 mg/l	1/Batch	Grab E
pH ²				1/Batch	Grab E

Footnotes:

¹ Sample Location: E - Effluent

² The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored as indicated above.

MONITORING AND REPORTING UNDER THESE EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS IS REQUIRED ONLY WHEN CHEMICAL METAL CLEANING IS PERFORMED.

* THESE LIMITATIONS SHALL APPLY TO ALL CHEMICAL METAL CLEANING WASTES TREATED AT THE FACILITY. The treated wastewater from the chemical metal cleaning wastes operation may be discharged through any permitted outfall. All limitations imposed upon outfall 006, with the possible exception of pH, are applicable to all chemical metal cleaning waste discharges, and must be met prior to mixing with any other wastestream. For pH, if the waste stream is sent through the conventional wastewater treatment facility prior to discharge, then the pH limitation must be met at the outfall from the conventional wastewater treatment facility.

PART I

Section B. Schedule of Compliance

1. The permittee shall comply with Final Effluent Limitations specified for discharges in accordance with the following schedule:

Permittee shall comply with Final Effluent Limitations by the effective date of the permit unless specified below.

2. Permittee shall at all times provide the operation and maintenance necessary to operate the existing facilities at optimum efficiency.

3. 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 schedule requirements.

PART II
STANDARD CONDITIONS FOR NPDES PERMITS

SECTION A. DEFINITIONS

1. Permit Issuing Authority

The Director of the Division of Environmental Management.

2. DEM or Division

Means the Division of Environmental Management, Department of Environment, Health and Natural Resources.

3. EMC

Used herein means the North Carolina Environmental Management Commission.

4. Act or "the Act"

The Federal Water Pollution Control Act, also known as the Clean Water Act, as amended, 33 USC 1251, et. seq.

5. Mass/Day Measurements

- a. The "monthly average discharge" is defined as the total mass of all daily discharges sampled and/or measured during a calendar month on which daily discharges are sampled and measured, divided by the number of daily discharges sampled and/or measured during such month. It is therefore, an arithmetic mean found by adding the weights of the pollutant found each day of the month and then dividing this sum by the number of days the tests were reported. The limitation is identified as "Monthly Average" in Part I of the permit.
- b. The "weekly average discharge" is defined as the total mass of all daily discharges sampled and/or measured during the calendar week (Sunday - Saturday) on which daily discharges are sampled and measured, divided by the number of daily discharges sampled and/or measured during such week. It is, therefore, an arithmetic mean found by adding the weights of pollutants found each day of the week and then dividing this sum by the number of days the tests were reported. This limitation is identified as "Weekly Average" in Part I of the permit.
- c. The "maximum daily discharge" is the total mass (weight) of a pollutant discharged during a calendar day. If only one sample is taken during any calendar day the weight of pollutant calculated from it is the "maximum daily discharge." This limitation is identified as "Daily Maximum," in Part I of the permit.
- d. The "average annual discharge" is defined as the total mass of all daily discharges sampled and/or measured during the calendar year on which daily discharges are sampled and measured, divided by the number of daily discharges sampled and/or measured during such year. It is, therefore, an arithmetic mean found by adding the weights of pollutants found each day of the year and then dividing this sum by the number of days the tests were reported. This limitation is defined as "Annual Average" in Part I of the permit.

6. Concentration Measurement

- a. The "average monthly concentration," other than for fecal coliform bacteria, is the sum of the concentrations of all daily discharges sampled and/or measured during a calendar month on which daily discharges are sampled and measured, divided by the number of daily discharges sampled and/or measured during such month (arithmetic mean of the daily concentration values). The daily concentration value is equal to the concentration of a composite sample or in the case of grab samples is the arithmetic mean (weighted by flow value) of all the samples collected during that calendar day. The average monthly count for fecal coliform bacteria is the geometric mean of the counts for samples collected during a calendar month. This limitation is identified as "Monthly Average" under "Other Limits" in Part I of the permit.
- b. The "average weekly concentration," other than for fecal coliform bacteria, is the sum of the concentrations of all daily discharges sampled and/or measured during a calendar week (Sunday/Saturday) on which daily discharges are sampled and measured divided by the number of daily discharges sampled and/or measured during such week (arithmetic mean of the daily concentration values). The daily concentration value is equal to the concentration of a composite sample or in the case of grab samples is the arithmetic mean (weighted by flow value) of all the samples collected during that calendar day. The average weekly count for fecal coliform bacteria is the geometric mean of the counts for samples collected during a calendar week. This limitation is identified as "Weekly Average" under "Other Limits" in Part I of the permit.
- c. The "maximum daily concentration" is the concentration of a pollutant discharge during a calendar day. If only one sample is taken during any calendar day the concentration of pollutant calculated from it is the "Maximum Daily Concentration". It is identified as "Daily Maximum" under "Other Limits" in Part I of the permit.
- d. The "average annual concentration," other than for fecal coliform bacteria, is the sum of the concentrations of all daily discharges sampled and/or measured during a calendar year on which daily discharges are sampled and measured divided by the number of daily discharges sampled and/or measured during such year (arithmetic mean of the daily concentration values). The daily concentration value is equal to the concentration of a composite sample or in the case of grab samples is the arithmetic mean (weighted by flow value) of all the samples collected during that calendar day. The average yearly count for fecal coliform bacteria is the geometric mean of the counts for samples collected during a calendar year. This limitation is identified as "Annual Average" under "Other Limits" in Part I of the permit.
- e. The "daily average concentration" (for dissolved oxygen) is the minimum allowable amount of dissolved oxygen required to be available in the effluent prior to discharge averaged over a calendar day. If only one dissolved oxygen sample is taken over a calendar day, the sample is considered to be the "daily average concentration" for the discharge. It is identified as "daily average" in the text of Part I.
- f. The "quarterly average concentration" is the average of all samples taken over a calendar quarter. It is identified as "Quarterly Average Limitation" in the text of Part I of the permit.
- g. A calendar quarter is defined as one of the following distinct periods: January through March, April through June, July through September, and October through December.

7. Other Measurements

- a. Flow, (MGD): The flow limit expressed in this permit is the 24 hours average flow, averaged monthly. It is determined as the arithmetic mean of the total daily flows recorded during the calendar month.
- b. An "instantaneous flow measurement" is a measure of flow taken at the time of sampling, when both the sample and flow will be representative of the total discharge.
- c. A "continuous flow measurement" is a measure of discharge flow from the facility which occurs continually without interruption throughout the operating hours of the facility. Flow shall be monitored continually except for the infrequent times when there may be no flow or for infrequent maintenance activities on the flow device.

8. Types of Samples

- a. Composite Sample: A composite sample shall consist of:
 - (1) a series of grab samples collected at equal time intervals over a 24 hour period of discharge and combined proportional to the rate of flow measured at the time of individual sample collection, or
 - (2) a series of grab samples of equal volume collected over a 24 hour period with the time intervals between samples determined by a preset number of gallons passing the sampling point. Flow measurement between sample intervals shall be determined by use of a flow recorder and totalizer, and the present gallon interval between sample collection fixed at no greater than $1/24$ of the expected total daily flow at the treatment system, or
 - (3) a single, continuous sample collected over a 24 hour period proportional to the rate of flow.

In accordance with (1) above, the time interval between influent grab samples shall be no greater than once per hour, and the time interval between effluent grab samples shall be no greater than once per hour except at wastewater treatment systems having a detention time of greater than 24 hours. In such cases, effluent grab samples may be collected at time intervals evenly spaced over the 24 hour period which are equal in number of hours to the detention time of the system in number of days. However, in no case may the time interval between effluent grab samples be greater than six (6) hours nor the number of samples less than four (4) during a 24 hour sampling period.

- b. Grab Sample: Grab samples are individual samples collected over a period of time not exceeding 15 minutes; the grab sample can be taken manually. Grab samples must be representative of the discharge or the receiving waters.

9. Calculation of Means

- a. Arithmetic Mean: The arithmetic mean of any set of values is the summation of the individual values divided by the number of individual values.
- b. Geometric Mean: The geometric mean of any set of values is the Nth 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).

- c. **Weighted by Flow Value:** Weighted by flow value means the summation of each concentration times its respective flow divided by the summation of the respective flows.

10. Calendar Day

A calendar day is defined as the period from midnight of one day until midnight of the next day. However, for purposes of this permit, any consecutive 24-hour period that reasonably represents the calendar day may be used for sampling.

11. Hazardous Substance

A hazardous substance means any substance designated under 40 CFR Part 116 pursuant to Section 311 of the Clean Water Act.

12. Toxic Pollutant

A toxic pollutant is any pollutant listed as toxic under Section 307(a)(1) of the Clean Water Act.

SECTION B. GENERAL CONDITIONS

1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

- a. The permittee shall comply with effluent standards or prohibitions established under section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the Clean Water Act within the time provided in the regulations that establish these standards or prohibitions or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.
- b. The Clean Water Act provides that any person who violates a permit condition is subject to a civil penalty not to exceed \$25,000 per day for each violation. Any person who negligently violates any permit condition is subject to criminal penalties of \$2,500 to \$25,000 per day of violation, or imprisonment for not more than 1 year, or both. Any person who knowingly violates permit conditions is subject to criminal penalties of \$5,000 to \$50,000 per day of violation, or imprisonment for not more than 3 years, or both. Also, any person who violates a permit condition may be assessed an administrative penalty not to exceed \$10,000 per violation with the maximum amount not to exceed \$125,000. [Ref: Section 309 of the Federal Act 33 U.S.C. 1319 and 40 CFR 122.41 (a)]
- c. Under state law, a civil penalty of not more than ten thousand dollars (\$10,000) per violation may be assessed against any person who violates or fails to act in accordance with the terms, conditions, or requirements of a permit. [Ref: North Carolina General Statutes § 143-215.6A]
- d. Any person may be assessed an administrative penalty by the Administrator for violating section 301, 302, 306, 307, 308, 318, or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act. Administrative penalties for Class I violations are not to exceed \$10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed \$25,000.

Penalties for Class II violations are not to exceed \$10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed \$125,000.

2. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

3. Civil and Criminal Liability

Except as provided in permit conditions on "Bypassing" (Part II, C-4) and "Power Failures" (Part II, C-7), nothing in this permit shall be construed to relieve the permittee from any responsibilities, liabilities, or penalties for noncompliance pursuant to NCGS 143-215.3, 143-215.6 or Section 309 of the Federal Act, 33 USC 1319. Furthermore, the permittee is responsible for consequential damages, such as fish kills, even though the responsibility for effective compliance may be temporarily suspended.

4. 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 to under NCGS 143-215.75 et seq. or Section 311 of the Federal Act, 33 USC 1321. Furthermore, the permittee is responsible for consequential damages, such as fish kills, even though the responsibility for effective compliance may be temporarily suspended.

5. Property Rights

The issuance of this permit 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.

6. 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.

7. 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 circumstances, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

8. Duty to Provide Information

The permittee shall furnish to the Permit Issuing Authority, within a reasonable time, any information which the Permit Issuing Authority may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Permit Issuing Authority upon request, copies of records required to be kept by this permit.

9. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit.

10. Expiration of Permit

The permittee is not authorized to discharge after the expiration date. In order to receive automatic 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. Any permittee that has not requested renewal at least 180 days prior to expiration, or any permittee that does not have a permit after the expiration and has not requested renewal at least 180 days prior to expiration, will subject the permittee to enforcement procedures as provided in NCGS 143-215.6 and 33 USC 1251 et. seq.

11. Signatory Requirements

All applications, reports, or information submitted to the Permit Issuing Authority shall be signed and certified.

a. All permit applications shall be signed as follows:

(1) For a corporation: by a responsible corporate officer. For the purpose of this Section, a responsible corporate officer means: (a) a president, secretary, treasurer or vice president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation, or (b) the manager of one or more manufacturing production or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding 25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(3) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.

b. All reports required by the permit and other information requested by the Permit Issuing Authority shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described above;

(2) The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or well field, superintendent, a position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.); and

(3) The written authorization is submitted to the Permit Issuing Authority.

- c. Certification. Any person signing a document under paragraphs a. or b. of this section shall make the following certification:

"I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations."

12. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

13. Permit Modification, Revocation and Reissuance, or Termination

The issuance of this permit does not prohibit the permit issuing authority from reopening and modifying the permit, revoking and reissuing the permit, or terminating the permit as allowed by the laws, rules, and regulations contained in Title 40, Code of Federal Regulations, Parts 122 and 123; Title 15A of the North Carolina Administrative Code, Subchapter 2H .0100; and North Carolina General Statute 143-215.1 et. al.

14. Previous Permits

All previous National Pollutant Discharge Elimination System Permits issued to this facility, whether for operation or discharge, are hereby revoked by issuance of this permit. [The exclusive authority to operate this facility arises under this permit. The authority to operate the facility under previously issued permits bearing this number is no longer effective.] The conditions, requirements, terms and provisions of this permit authorizing discharge under the National Pollutant Discharge Elimination System govern discharges from this facility.

SECTION C. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Certified Operator

Pursuant to Chapter 90A-44 of North Carolina General Statutes, and upon classification of the facility by the Certification Commission, the permittee shall employ a certified wastewater treatment plant operator in responsible charge (ORC) of the wastewater treatment facilities. Such operator must hold a certification of the grade equivalent to or greater than the classification assigned to the wastewater treatment facilities by the Certification Commission. The permittee must also employ a certified back-up operator of the appropriate type and any grade to comply with the conditions of Title 15A, Chapter 8A .0202. The ORC of the facility must visit each Class I facility at least weekly and each Class II, III, and IV facility at least daily, excluding weekends and holidays, and must properly manage and document daily operation and maintenance of the facility and must comply with all other conditions of Title 15A, Chapter 8A .0202. Once the facility is classified, the permittee shall submit a letter to the Certification Commission which designates the operator in responsible charge within thirty days after the wastewater treatment facilities are 50% complete.

2. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

3. Need to Halt or Reduce not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the condition of this permit.

4. Bypassing of Treatment Facilities

a. Definitions

- (1) "Bypass" means the known diversion of waste streams from any portion of a treatment facility including the collection system, which is not a designed or established or operating mode for the facility.
- (2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Bypass not exceeding limitations.

The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Paragraphs c. and d. of this section.

c. Notice

- (1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass; including an evaluation of the anticipated quality and affect of the bypass.
- (2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Part II, E. 6. of this permit. (24 hour notice).

d. Prohibition of Bypass

- (1) Bypass is prohibited and the Permit Issuing Authority may take enforcement action against a permittee for bypass, unless:
 - (A) Bypass was unavoidable to prevent loss of life, personal injury or severe property damage;
 - (B) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes or maintenance during normal

periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(C) The permittee submitted notices as required under Paragraph c. of this section.

(2) The Permit Issuing Authority may approve an anticipated bypass, after considering its adverse affects, if the Permit Issuing Authority determines that it will meet the three conditions listed above in Paragraph d. (1) of this section.

5. Upsets

a. Definition.

"Upset " means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. Effect of an upset.

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph c. of this condition are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions necessary for a demonstration of upset.

A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

- (1) An upset occurred and that the permittee can identify the cause(s) of the upset;
- (2) The permittee facility was at the time being properly operated; and
- (3) The permittee submitted notice of the upset as required in Part II, E. 6. (b) (B) of this permit.
- (4) The permittee complied with any remedial measures required under Part II, B. 2. of this permit.

d. Burden of proof.

In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

6. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be utilized/disposed of in accordance with NCGS 143-215.1 and in a manner such as to prevent any pollutant from such materials from entering waters of the State or navigable waters of the United States. The permittee shall comply with all existing federal

regulations governing the disposal of sewage sludge. Upon promulgation of 40 CFR Part 503, any permit issued by the Permit Issuing Authority for the utilization/disposal of sludge may be reopened and modified, or revoked and reissued, to incorporate applicable requirements at 40 CFR Part 503. The permittee shall comply with applicable 40 CFR Part 503 Standards for the Use and Disposal of Sewage Sludge (when promulgated) within the time provided in the regulation, even if the permit is not modified to incorporate the requirement. The permittee shall notify the Permit Issuing Authority of any significant change in its sludge use or disposal practices.

7. Power Failures

The permittee is responsible for maintaining adequate safeguards as required by DEM Regulation, Title 15A, North Carolina Administrative Code, Subchapter 2H, .0124 Reliability, 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.

SECTION D. MONITORING AND RECORDS

1. Representative Sampling

Samples collected and measurements taken, as required herein, shall be characteristic of the volume and nature of the permitted discharge. Samples collected at a frequency less than daily shall be taken on a day and time that is characteristic of the discharge over the entire period which the sample represents. All samples shall be taken at the monitoring points specified in this permit and, unless otherwise specified, before the effluent joins or is diluted by any other wastestream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the Permit Issuing Authority.

2. Reporting

Monitoring results obtained during the previous month(s) shall be summarized for each month and reported on a monthly Discharge Monitoring Report (DMR) Form (DEM No. MR 1, 1.1, 2, 3) or alternative forms approved by the Director, DEM, postmarked no later than the 30th day following the completed reporting period.

The first DMR is due on the last day of the month following the issuance of the permit or in the case of a new facility, on the last day of the month following the commencement of discharge. Duplicate signed copies of these, and all other reports required herein, shall be submitted to the following address:

Division of Environmental Management
Water Quality Section
ATTENTION: Central Files
Post Office Box 29535
Raleigh, North Carolina 27626-0535

3. Flow Measurements

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to ensure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to ensure that the accuracy of the measurements are consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than + 10% from the true discharge rates throughout the range of expected

discharge volumes. Once-through condenser cooling water flow which is monitored by pump logs, or pump hour meters as specified in Part I of this permit and based on the manufacturer's pump curves shall not be subject to this requirement.

4. Test Procedures

Test procedures for the analysis of pollutants shall conform to the EMC regulations published pursuant to NCGS 143-215.63 et. seq, the Water and Air Quality Reporting Acts, and to regulations published pursuant to Section 304(g), 33 USC 1314, of the Federal Water Pollution Control Act, as Amended, and Regulation 40 CFR 136; or in the case of sludge use or disposal, approved under 40 CFR 136, unless otherwise specified in 40 CFR 503, unless other test procedures have been specified in this permit.

To meet the intent of the monitoring required by this permit, all test procedures must produce minimum detection and reporting levels that are below the permit discharge requirements and all data generated must be reported down to the minimum detection or lower reporting level of the procedure. If no approved methods are determined capable of achieving minimum detection and reporting levels below permit discharge requirements, then the most sensitive (method with the lowest possible detection and reporting level) approved method must be used.

5. Penalties for Tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate, any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than two years per violation, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than \$20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

6. Records Retention

Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.

7. Recording Results

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

- a. The date, exact place, and time of sampling or measurements;
- b. The individual(s) who performed the sampling or measurements;
- c. The date(s) analyses were performed;
- d. The individual(s) who performed the analyses;
- e. The analytical techniques or methods used; and
- f. The results of such analyses.

8. Inspection and Entry

The permittee shall allow the Director, or an authorized representative (including an authorized contractor acting as a representative of the Director), upon the presentation of credentials and other documents as may be required by law, to;

- a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
- b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
- c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
- d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

SECTION E. REPORTING 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.

2. Planned Changes

The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

- a. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR Part 122.29 (b); or
- b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR Part 122.42 (a) (1).
- c. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alternation, addition or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

3. Anticipated Noncompliance

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

4. Transfers

This permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permittee and incorporate such other requirements as may be necessary under the Clean Water Act.

5. Monitoring Reports

Monitoring results shall be reported at the intervals specified elsewhere in this permit.

- a. Monitoring results must be reported on a Discharge Monitoring Report (DMR) (See Part II. D. 2 of this permit) or forms provided by the Director for reporting results of monitoring of sludge use or disposal practices.
- b. If the permittee monitors any pollutant more frequently than required by the permit, using test procedures specified in Part II, D. 4. of this permit or in the case of sludge use or disposal, approved under 40 CFR 503, or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR.
- c. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.

6. Twenty-four Hour Reporting

- a. The permittee shall report to the central office or the appropriate regional office any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee became aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance, and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.
- b. The following shall be included as information which must be reported within 24 hours under this paragraph:
 - (1) Any unanticipated bypass which exceeds any effluent limitation in the permit.
 - (2) Any upset which exceeds any effluent limitation in the permit.
 - (3) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Director in the permit to be reported within 24 hours.
- c. The Director may waive the written report on a case-by-case basis for reports under paragraph b. above of this condition if the oral report has been received within 24 hours.

7. Other Noncompliance

The permittee shall report all instances of noncompliance not reported under Part II. E. 5 and 6. of this permit at the time monitoring reports are submitted. The reports shall contain the information listed in Part II. E. 6. of this permit.

8. Other Information

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, it shall promptly submit such facts or information.

9. Noncompliance Notification

The permittee shall report by telephone to either the central office or the appropriate regional office of the Division as soon as possible, but in no case more than 24 hours or on the next working day following the occurrence or first knowledge of the occurrence of any of the following:

- a. 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.
- b. 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.
- c. Any failure of a pumping station, sewer line, 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.

Persons reporting such occurrences by telephone shall also file a written report in letter form within 5 days following first knowledge of the occurrence.

10. Availability of Reports

Except for data determined to be confidential under NCGS 143-215.3(a)(2) or Section 308 of the Federal Act, 33 USC 1318, all reports prepared in accordance with the terms shall be available for public inspection at the offices of the Division of Environmental Management. 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 NCGS 143-215.1(b)(2) or in Section 309 of the Federal Act.

11. Penalties for Falsification of Reports

The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than two years per violation, or by both.

PART III OTHER REQUIREMENTS

A. Construction

No construction of wastewater treatment facilities or additions to add to the plant's treatment capacity or to change the type of process utilized at the treatment plant shall be begun until Final Plans and Specifications have been submitted to the Division of Environmental Management and written approval and Authorization to Construct has been issued.

B. Groundwater Monitoring

The permittee shall, upon-written notice from the Director of the Division of Environmental Management, conduct groundwater monitoring as may be required to determine the compliance of this NPDES permitted facility with the current groundwater standards.

C. Changes in Discharges of Toxic Substances

The permittee shall notify the Permit Issuing Authority as soon as it knows or has reason to believe:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels";

(1) One hundred micrograms per liter (100 ug/l);

(2) Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;

(3) Five (5) times the maximum concentration value reported for that pollutant in the permit application.

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels";

(1) Five hundred micrograms per liter (500 ug/l);

(2) One milligram per liter (1 mg/l) for antimony;

(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application.

D. Requirement to Continually Evaluate Alternatives to Wastewater Discharges

The permittee shall continually evaluate all wastewater disposal alternatives and pursue the most environmentally sound alternative of the reasonably cost effective alternatives. If the facility is in substantial non-compliance with the terms and conditions of the NPDES permit or governing rules, regulations or laws, the permittee shall submit a report in such form and detail as required by the Division evaluating these alternatives and a plan of action within sixty (60) days of notification by the Division.

E. 316(a) Variance

The Division of Environmental Management has approved the submitted 316(a) demonstration and has concluded that the existing thermal limitations are sufficient to protect the aquatic environment of Lake Norman.

Duke Power must perform the following as part of the 316(a) variance:

- a. Monitoring shall include a sampling program with intent to determine the abundance and distribution of fish species, both in time and space, in the mixing zone over the critical summer period. The use of hydroacoustical sampling equipment is suitable for these purposes and is to be performed in conjunction with vertical temperature and dissolved oxygen profiles. In addition, these data will be analyzed where appropriate (using other lake specific information collected either by Duke Power Company or other agencies) with regard to striped bass usage of the mixing zone.
- b. Remodel and assess the impact of 100% load factor during the months of June-August and 90% load factor for the remainder of the year.
- c. Address maximum discharge temperatures from McGuire which will occur each month when the units are operating at maximum output. This discussion shall entail the possible effect on swimmers/fallen skiers in the thermal plume area during the summer months.

F. ACUTE TOXICITY PASS/FAIL PERMIT LIMIT (QUARTERLY)

The permittee shall conduct acute toxicity tests on a quarterly basis using protocols defined in the North Carolina Procedure Document entitled "Pass/Fail Methodology For Determining Acute Toxicity In A Single Effluent Concentration." The monitoring shall be performed as a Daphnia pulex or Ceriodaphnia 24 hour static test. The effluent concentration at which there may be at no time significant acute mortality in any toxicity test is **90%** (defined as treatment two in the North Carolina procedure document). Effluent samples for self-monitoring purposes must be obtained during representative effluent discharge below all waste treatment. The first test will be performed *after thirty days* from the effective date of this permit *during the months of* **February, May, August, and November.**

The parameter code for this test if using Daphnia pulex is TGA3D. The parameter code for this test if using Ceriodaphnia is TGA3B. All toxicity testing results required as part of this permit condition will be entered on the Effluent Discharge Form (MR-1) for the month in which it was performed, using the appropriate parameter code. Additionally, DEM Form AT-2 (original) is to be sent to the following address:

Attention: Environmental Sciences Branch
North Carolina Division of
Environmental Management
4401 Reedy Creek Road
Raleigh, N.C. 27607

Test data shall be complete and accurate and include all supporting chemical/physical measurements performed in association with the toxicity tests, as well as all dose/response

data. Total residual chlorine of the effluent toxicity sample must be measured and reported if chlorine is employed for disinfection of the waste stream.

Should any single quarterly monitoring indicate a failure to meet specified limits, then monthly monitoring will begin immediately until such time that a single test is passed. Upon passing, this monthly test requirement will revert to quarterly in the months specified above.

Should any test data from either these monitoring requirements or tests performed by the North Carolina Division of Environmental Management indicate potential impacts to the receiving stream, this permit may be re-opened and modified to include alternate monitoring requirements or limits.

NOTE: Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival and appropriate environmental controls, shall constitute an invalid test and will require immediate retesting (within 30 days of initial monitoring event). Failure to submit suitable test results will constitute noncompliance with monitoring requirements.

G. ACUTE TOXICITY PERMIT LIMIT (QUARTERLY)

The permittee shall conduct acute toxicity tests on a quarterly basis using protocols defined as definitive in E.P.A. Document 600/4-90/027F entitled "Methods for Measuring the Acute Toxicity of Effluents and receiving Waters to Freshwater and Marine Organisms, Fourth Edition." The monitoring shall be performed as a *Daphnia pulex* or *Ceriodaphnia* 48 hour static test, using effluent collected as a 24 hour composite. The LC50 of this effluent using the previously stated methodology may at no time in any toxicity test be less than 80%. Effluent samples for self-monitoring purposes must be obtained during representative effluent discharge below all waste treatment. The first test will be performed after thirty days from the effective date of this permit during the months of February, May, August, and November.

The parameter code for this test if using *Daphnia pulex* is TAA3D. The parameter code for this test if using *Ceriodaphnia* is TAA3B. All toxicity testing results required as part of this permit condition will be entered on the Effluent Discharge Monitoring Form (MR-1) for the month in which it was performed, using the appropriate parameter code. Additionally, DEM Form AT-1 (original) is to be sent to the following address:

Attention: Environmental Sciences Branch
North Carolina Division of Environmental Management
4401 Reedy Creek Road
Raleigh, N.C. 27607

Test data shall be complete and accurate and include all supporting chemical/physical measurements performed in association with the toxicity tests, as well as all dose/response data. Total residual chlorine of the effluent toxicity sample must be measured and reported if chlorine is employed for disinfection of the waste stream.

Should any single quarterly monitoring indicate a failure to meet specified limits, then monthly monitoring will begin immediately until such time that a single test is passed. Upon passing, this monthly test requirement will revert to quarterly in the months specified above.

Should any test data from either these monitoring requirements or tests performed by the North Carolina Division of Environmental Management indicate potential impacts to the receiving stream, this permit may be re-opened and modified to include alternate monitoring requirements or limits.

NOTE: Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival and appropriate environmental controls, shall constitute an invalid test and will require immediate retesting (within 30 days of initial monitoring event). Failure to submit suitable test results will constitute noncompliance with monitoring requirements.

H. CHRONIC TOXICITY PASS/FAIL PERMIT LIMIT (QUARTERLY)

The effluent discharge shall at no time exhibit chronic toxicity using test procedures outlined in:

1.) The North Carolina Ceriodaphnia chronic effluent bioassay procedure (North Carolina Chronic Bioassay Procedure - Revised *September 1989) or subsequent versions.

The effluent concentration at which there may be no observable inhibition of reproduction or significant mortality is 12% (defined as treatment two in the North Carolina procedure document). The permit holder shall perform quarterly monitoring using this procedure to establish compliance with the permit condition. The first test will be performed after thirty days from the effective date of this permit during the months of January, April, July, and October. Effluent sampling for this testing shall be performed at the NPDES permitted final effluent discharge below all treatment processes.

All toxicity testing results required as part of this permit condition will be entered on the Effluent Discharge Monitoring Form (MR-1) for the month in which it was performed, using the parameter code TGP3B. Additionally, DEM Form AT-1 (original) is to be sent to the following address:

Attention: Environmental Sciences Branch
North Carolina Division of Environmental Management
4401 Reedy Creek Road
Raleigh, N.C. 27607

Test data shall be complete and accurate and include all supporting chemical/physical measurements performed in association with the toxicity tests, as well as all dose/response data. Total residual chlorine of the effluent toxicity sample must be measured and reported if chlorine is employed for disinfection of the waste stream.

Should any single quarterly monitoring indicate a failure to meet specified limits, then monthly monitoring will begin immediately until such time that a single test is passed. Upon passing, this monthly test requirement will revert to quarterly in the months specified above.

Should any test data from this monitoring requirement or tests performed by the North Carolina Division of Environmental Management indicate potential impacts to the receiving stream, this permit may be re-opened and modified to include alternate monitoring requirements or limits.

NOTE: Failure to achieve test conditions as specified in the cited document, such as minimum control organism survival and appropriate environmental controls, shall constitute an invalid test and will require immediate retesting (within 30 days of initial monitoring event). Failure to submit suitable test results will constitute noncompliance with monitoring requirements.

I. Best Management Practices

It has been determined from information submitted that the plans and procedures in place at McGuire Nuclear Station are equivalent to that of a Best Management Practice (BMP).

J. Biocides

The permittee shall not use any biocides except those approved in conjunction with the permit application. The permittee shall notify the Director in writing not later than ninety (90) days prior to instituting use of any additional biocide used in cooling systems which may be toxic to aquatic life other than those previously reported to the Division of Environmental Management. Such notification shall include completion of Biocide Worksheet Form 101 and a map locating the discharge point and receiving stream.

K. Chemical Metal Cleaning Waste

The term "chemical metal cleaning waste" means any wastewater resulting from the cleaning of any metal process equipment with chemical compounds including, but not limited to, boiler tube cleaning.

L. Combined Waste Streams

In the event that waste streams from various sources are combined for treatment or discharge, the quantity of each pollutant or pollutant property attributable to each controlled waste source shall not exceed the specified limitation for that waste source.

M. Federal Insecticide, Fungicide, and Rodenticide Act

Discharge of any product registered under the Federal Insecticide, Fungicide, and Rodenticide Act to any waste stream which may ultimately be released to lakes, rivers, streams, or other waters of the United States is prohibited unless specifically authorized elsewhere in this permit. This requirement is not applicable to products used for lawn and agricultural purposes. Discharge of chlorine from the use of chlorine gas, sodium hypochlorite, or other similar chlorination compounds for disinfection in plant potable and service water systems and in sewage treatment is authorized.

N. Intake Screen Backwash

Continued intake screen backwash discharge is permitted without limitations or monitoring requirements. However, the discharge of oil and grease is prohibited from this discharge.

O. Lake Norman Aquatic Environment Maintenance Monitoring Program

The Lake Norman aquatic environment maintenance monitoring program approved by the Division of Environmental Management shall be continued. The monitoring results shall be submitted annually.

P. Mixing Zone

The mixing zone is defined as containing an area of no more than 3500 acres and lying upstream of the dam and south of a line originating on the west bank of NC coordinates E-1,416,900 and N-633,600 and extending south 70-00 east intersecting the point of land on the eastern shore. Water quality stream standards for temperature shall be met outside the mixing zone.

Q. Other Discharges

The permittee is hereby authorized to discharge as follows:

- a. The Cowans Ford Dam Underdrain discharge to the Catawba River which includes uncontaminated bearing lubrication and gland seal water, and possibly silt from cyclone separators, and
- b. Fire protection water (approved biocides only) to lake Norman (Catawba River).

R. Polychlorinated Biphenyl Compounds

There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.

S. Radioactive Material

Releases of radioactive materials shall be monitored and conducted in accordance with all conditions and limitations required by NRC and as specified in the Final Safety Analysis Report, Technical Specifications and Environmental Statement for the McGuire Nuclear Station.

T. Toxicity Reopener

This permit shall be modified, or revoked and reissued to incorporate toxicity limitations and monitoring requirements in the event toxicity testing or other studies conducted on the effluent or receiving stream indicate that detrimental effects may be expected in the receiving stream as a result of this discharge.

U. Waiver

Nothing in this permit shall be construed as a waiver by the permittee of any right to a hearing it may have pursuant to State or Federal laws or regulations.

V. Yard drains

Yard drains may be discharged without limitation or monitoring requirements.

PART IV
ANNUAL ADMINISTERING AND COMPLIANCE MONITORING FEE REQUIREMENTS

- A. The permittee must pay the annual administering and compliance monitoring fee within 30 (thirty) days after being billed by the Division. Failure to pay the fee in a timely manner in accordance with 15A NCAC 2H .0105(b)(4) may cause this Division to initiate action to revoke the permit.

State of North Carolina
Department of Environment,
Health and Natural Resources
Division of Environmental Management

James B. Hunt, Jr., Governor
Jonathan B. Howes, Secretary
A. Preston Howard, Jr., P.E., Director



May 5, 1995

ENVIRONMENTAL PROTECTION SECTION

MAY 11 1995

☐ FILE
☐ TICKLER DATE

☒ COPY: NGA

Subject: pH Additive Approval G. WARD
NPDES Permit NC000243 ROUTE
Duke Power - McGuire Nuclear Station Dw Phillips
Mecklenburg County G. Vaughn

Mr. John S. Carter
Duke Power Company
Electric System Support Department
13339 Hagers Ferry Road
Huntersville, North Carolina 28078-7929

Dear Mr. Carter:

This correspondence is in response to your February 13, 1995 request for approval of methoxypropylamine (as the product Nalco 94UF193) as a pH control additive at the subject facility. Your request indicated that Nalco 94UF193 will be used at a concentration of 1 - 10 ppm in the steam cycle with discharge through the Conventional Wastewater Treatment Plant to Outfall 002. The Division hereby grants approval of the use of Nalco 94UF193 as requested. Whole effluent toxicity testing, as provided in the facility NPDES permit, shall provide validation that acute toxicity of the effluent is acceptable. Therefore, the Division requests that Duke Power coordinate toxicity testing to correspond to periods of peak Nalco 94UF193 usage and discharge.

Your correspondence also requested approval of carbonylhydrazide for permanent use at the subject facility based on successful experimental usage and recent toxicity testing results. The Division hereby grants approval of the use of carbonylhydrazine on a permanent basis.

If you have any questions, please contact Jeanette Powell of my staff at (919) 733-5083, extension 537.

Sincerely,

David A. Goodrich
for A. Preston Howard, Jr., P.E.

cc: Central Files
Mooresville Regional Office, Water Quality Section
Permits and Engineering Unit
Mecklenburg County
Aquatic Survey and Toxicology Unit

State of North Carolina
Department of Environment,
Health and Natural Resources
Division of Environmental Management

James B. Hunt, Jr., Governor
Jonathan B. Howes, Secretary
A. Preston Howard, Jr., P.E., Director



ENVIRONMENTAL PROTECTION SECTION

July 20, 1995

JUL 27 1995

Mr. John S. Carter
Duke Power Company
13339 Hagers Ferry Road
Huntersville, N.C. 28078-7929

☒ FILE _____
☐ TICKLER DATE _____

☒ COPY MTK GEU
DWPhillips
☒ ROUTE NGA-File

Subject: Information Packet for Whole Effluent Toxicity Testing
McGuire Nuclear Station
NC0024392
Mecklenburg County

Dear Mr. Carter,

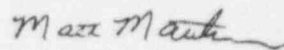
The North Carolina Division of Environmental Management is required by water quality regulations to protect the waters of the State from all degrees of introduced instream toxicity. The North Carolina DEM has an active program evaluating the toxicity of discharges to surface waters. As you know, your facility has been required by administrative letter or NPDES permit to conduct toxicity testing on representative samples of effluent discharge.

Enclosed is a final copy of the information packet concerning aquatic toxicity testing which may better help you understand and implement your testing requirement. If necessary, please forward this information to personnel who will be working most closely with this issue. You should carefully review the information presented with this document. It may aid you in consultations with either your own environmental staff or a contracted laboratory firm. The purpose and differences between types of toxicity analysis procedures are discussed and copies of North Carolina toxicity testing procedures are provided. Quality laboratory practices are emphasized which may help you in discussions with laboratory personnel regarding the quality assurance requirements of test procedures. Appropriate test conditions and practices for acute and chronic toxicity tests performed to meet North Carolina NPDES permit requirements are also addressed by the attached checklist. The information is being supplied to emphasize the ranges for these parameters necessary to constitute acceptable tests. This information should be used as a checklist for individual tests and does not cover the full range of quality control practices necessary for a successful completion of these analyses including documentation, instrument calibration, reference toxicant testing, etc. We are also supplying the references for these parameter limits as a guideline for the range in which the parameters should fall. Values recorded outside of these limits will constitute an unacceptable test result. A list of laboratories presently certified to conduct certain types of biological testing is included as Appendix G.

Also included are the procedural requirements for submitting toxicity test results to the State. Facilities are reminded that the NPDES permit condition for toxicity testing requires that test results be included with the appropriate parameter code on the monthly monitoring report form (MR-1) as well as be submitted with test data on an AT report form under separate cover to the Environmental Sciences Branch. In the situation where the specific toxicity test code is not stated in the NPDES permit condition requiring toxicity testing, the facility may contact the Regional Water Quality Supervisor to receive the appropriate code.

If you would like to discuss any of the information presented, you are encouraged to call staff of our regional offices or me at (919) 733-2136.

Sincerely,

A handwritten signature in dark ink, appearing to read "Matt Matthews", with a stylized flourish at the end.

Matt Matthews
Data Assessment and Certification Group Leader

AQUATIC TOXICITY TESTING
Understanding and Implementing
Your Testing Requirement

Prepared by the Aquatic Toxicology Unit/Environmental Sciences Branch
Water Quality Section
N.C. Division of Environmental Management

FEBRUARY 1994

Introduction

This information packet has been prepared as a resource for NPDES permit holders required to perform effluent toxicity testing or are utilizing toxicity testing as part of a toxicity reduction program. The document explains many of the concepts and terminology used by a regulatory agency regarding toxicity testing. By carefully reading this information it is hoped that further communication with either your own environmental staff or an outside consultant will be made more productive.

Toxicity refers to the potential for a substance to produce an adverse or harmful effect on a living organism. A toxicant is an agent (e.g., whole effluent discharge) that can produce an adverse effect in a biological system, seriously damaging its structure or function or causing death. The adverse response may be defined in terms of a measurement that is outside the "normal" range for healthy organisms, such as abnormal mortality, reproduction or growth.

Toxicity tests are used to determine the level of toxicity, if any, present in an effluent and the duration of exposure required for the toxicity to be expressed as adverse effects. Test organisms are exposed in test chambers to various concentrations of the effluent. The criteria for effects, such as mortality and reproduction, are then evaluated by comparing those organisms which are exposed to different dilutions of the effluent with those organisms (controls) exposed only to a nontoxic dilution water.

Acute effects are those that occur rapidly as a result of short-term exposure. Exposure is considered relative to the organism's life span. The most commonly measured acute effect in aquatic organisms is death. Chronic effects occur when an effluent or toxicant produces adverse effects as a result of a repeated or long-term exposure. Chronic effects include lethal and sublethal responses (such as abnormal growth and/or reproduction).

Statistical analyses and mathematical modeling summarize the data collected during a toxicity test. The specific application of these routines may be quite simple or extremely complex. The final analysis (after these statistics have been performed) however, is easily understood. All statistical routines are specifically defined for each procedure. It is not necessary to completely understand all of the analyses performed by a laboratory in order to utilize data produced by toxicity testing. This document includes an overview of these data interpretations.

In measuring the acute toxicity of an effluent, the objective is to measure a range of effluent concentrations or one specific concentration that produces a readily observable and quantifiable response. The quantifiable response most often observed is mortality, which is then used to calculate an LC_{50} value or determine if significant acute mortality is occurring. The LC_{50} is the concentration estimated to cause mortality in 50% of the test population over a specified time period. Application factors may be applied to a measured LC_{50} to predict the concentration of effluent which may have no adverse impacts over an extended duration (i.e., no chronic toxicity).

Rather than using an acute test with an application factor to evaluate chronic toxicity, it is possible to directly measure chronic impacts with a more sophisticated test procedure. These chronic tests are more difficult to perform but eliminate use of an artificial application factor. The chronic test measures both sublethal and lethal effects over a longer test duration and measures responses during a sensitive period of the organism's life cycle.

General

The toxicity tests which the N.C. Division of Environmental Management utilize and require NPDES permittees to conduct are controlled laboratory experiments in which effluent concentration is the primary variable by which the response is evaluated. These tests are standardized to maximize comparability and reproducibility. Toxicity test protocols typically specify the exposure of test organisms to fixed concentrations of whole effluent for a defined time period. Species selection (test organism) is one element which defines a specific toxicity testing procedure. Test species are selected based upon the ease of laboratory culture, the availability of adequate background information such as its physiology, genetics, and behavior and sensitivity to a wide range of toxicants. All of the toxicity tests include a control (or untreated sample) to ensure that the effects observed are associated with or are attributable to exposure to the test material. This provides the baseline for interpreting the test results by identifying unwanted variables.

Acute Toxicity Tests

Guidance Documents:

- United States Environmental Protection Agency. 1991. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. Fourth Edition. EPA/600/4-90/027. 293 pp.
- North Carolina Pass/Fail Methodology for Determining Acute Toxicity in a Single Effluent Concentration. North Carolina Department of Environment, Health, and Natural Resources, DEM, Water Quality Section. December 1987. Revised July 1992. (This document is attached as Appendix A.)
- Hamilton, M.A., Russo, R.C., and Thurston, R.V. Trimmed Spearman-Kärber Method for Estimating Median Lethal Concentrations in Toxicity Bioassays. Environmental Science & Technology, Vol.11, No. 7, July 1977.

Acute toxicity tests determine whether some concentration of test material or effluent will produce an adverse effect on a group of test organisms during a short-term exposure under controlled conditions. Experimentally, a 50% lethal response (concentration at which 50% of the test organisms die) is the most reproducible measure of acute toxicity. When the median lethal concentration (LC_{50}) is calculated, the 95% confidence limits associated with that value are also reported. An acute toxicity test required by the Division may have a test duration of 24, 48 or 96 hours. The test species is usually one of the following: the water fleas *Daphnia pulex* or *Ceriodaphnia dubia*, the fathead minnow, *Pimephales promelas*, or the mysid shrimp, *Mysidopsis bahia*, representing salt water species. Other species may be utilized to address a specific concern. These tests are typically static, meaning the organisms are maintained in the original test solutions for the duration of the test.

Prior to collecting an effluent sample and performing a toxicity test, sampling glassware and stainless steel or teflon equipment are washed with soap and hot water, then rinsed in nitric acid, acetone, and distilled/deionized water to remove toxicants and contaminants. Plastic containers and equipment may be used on a one-time or disposable basis, or dedicated to use with a particular effluent. The effluent sample used in the static tests is collected below chlorination as a grab or 24 hour composite (depending on permit requirements). The sample must be collected and stored with an amount of ice sufficient to maintain its temperature between 0° and 4°C until receipt at the laboratory. The only allowable exception to this sample shipment policy is the situation where the time lapse between the collection of a grab sample and its use in the laboratory that same day does not exceed four (4) hours. DEM defines "use" of a sample as the introduction of the test organisms into the test solutions. This exception is based on an approximate time necessary for a chilled sample to reach room or testing temperature on its own, after being removed from ice or refrigeration. Where this exception is used, appropriate chain-of-custody documentation should be submitted with test results showing, at minimum, collection time and date, collector, method of collection, sample temperature on receipt in the laboratory, and the time and date at which the toxicity test on this sample was initiated. All laboratories certified by the State of North Carolina to perform toxicity testing are required to measure sample temperature on receipt in their laboratories. Should this temperature exceed allowable standards, the sample does not qualify for the performance of valid tests and such results will be rejected for use in NPDES compliance determinations. Additionally, the sample is not to be frozen under any circumstances. Frozen samples will be rejected for use in NPDES compliance determinations. It is suggested that coordination of sampling and sample shipment methods be discussed with the laboratory performing the analyses so that these criteria are met.

The effluent samples are prepared for testing by being thoroughly mixed, allowed to reach standard test temperature, and aerated if dissolved oxygen (DO) is below 4 mg/l. Total residual chlorine is measured. The effluent is then diluted with control water, typically to five concentrations (with the appropriate number of replicates) from 0 to 100% effluent. The test vessels are then filled with the appropriate volume of test solution. Test organisms are then transferred to test chambers in a random manner. Initial DO and pH are measured in separate vessels of dilution and effluent solutions. The test is incubated at 25°C with a 16:8 hour light:dark cycle. Mortality of the test organisms is recorded after the defined test period along with final pH, dissolved oxygen, and temperature. This test data is to be entered on State form AT-1 (Appendix B) for submittal to the Division.

An LC₅₀ or concentration of effluent lethal to 50% of the test organisms over the test period is calculated from the mortality data using one of the several methods, preferably the probit or Spearman-Kärber analyses, as described in the EPA acute testing protocols (EPA/600/4-90/027). An instream waste concentration (IWC) for the effluent in the receiving stream is calculated (in percent) using the wastewater treatment system permitted flow and receiving stream 7Q10 flow. The LC₅₀ and IWC are then used to predict instream toxicity.

In instances where localized effects at the point of discharge are of concern, alternate protection strategies may be required. In these instances it is important that no short term acute effects occur. To address this issue, the Division of Environmental Management will often require the use of an acute test methodology in which acute mortality in a specific effluent concentration, usually 90%, may be statistically determined. The acute pass/fail procedure is a static non-renewal toxicity examination generally using the Fathead Minnow (*Pimephales promelas*) for freshwater or the Mysid Shrimp (*Mysidopsis bahia*) for saltwater dischargers. Two concentrations are utilized in the procedure with a control population specified as treatment one and an effluent treatment specified as treatment two. The actual effluent concentration at which the test is to be performed will be specified in the NPDES permit or by Administrative letter. Each treatment is tested using four identical test vessels each containing ten test organisms. At test termination, organisms are identified as alive or dead. Analysis of the data from the acute pass/fail procedure is performed using a Student's t test to determine if mortality in the effluent treatment (treatment two) is significantly different than the control population. All statistical analyses are performed using arc sine square root transformed data (see referenced EPA document) and tested for significance at a 99% confidence level. Test results are recorded as "Pass" or "Fail" and are to be reported on State form AT-2 (Appendix C). All supporting information requested on the AT-2 form must be provided in order for the report to be considered a complete submittal to the Division of Environmental Management.

Chronic Toxicity Tests

Guidance Documents:

USEPA. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. 2nd edition. EPA/600/4-89/001. March 1989.

USEPA. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms. EPA/600/4-87/028. May 1988.

North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure. North Carolina Department of Environment, Health, and Natural Resources, DEM, Water Quality Section. July 1991. (This document is attached as Appendix D.)

North Carolina Division of Environmental Management. 1985. Revised Sept. 1989. North Carolina *Ceriodaphnia* Chronic Effluent Bioassay Procedure (*Ceriodaphnia* Mini-Chronic Pass/Fail Toxicity Test). (This document is attached as Appendix I).

Chronic toxicity tests allow evaluation of adverse effects of an effluent under conditions of long-term exposure. Lengthening the test duration to include one or more complete life cycles or performing the test during a sensitive life stage emphasizes more subtle adverse effects, such as reduction in growth and reproduction. Evaluation of these effects from long-term exposure to the effluent can provide a direct estimate of the effects threshold of the toxicant. During life cycle tests with several species of fish and invertebrates, certain developmental stages have consistently been shown to be more sensitive than others. Use of shorter tests with the early developmental stages can also predict chronic toxicity. These methods have been developed to provide quicker and less costly ways to measure chronic toxicity to aquatic organisms.

The Division of Environmental Management often requires a three brood static renewal test using the cladoceran, *Ceriodaphnia dubia*, as the test organism. A static renewal test is one in which the test solutions are renewed periodically by transferring the test organisms to chambers with freshly prepared solutions. The test is initiated with organisms which are less than 24 hours old and born within 8 hours of each other.

The *Ceriodaphnia* chronic toxicity test measures both survival and reproduction during the test period. The original neonate (newly born *Ceriodaphnia*) introduced into each test container at the beginning of the test is monitored for survival as well as for the number of offspring it produces. Exposure of the organisms to differing concentrations of effluent can determine the concentration of effluent expected to cause significant mortality or suppression of reproduction, as compared to control populations. The endpoints of these multiple concentration tests can often be described by the highest concentration which causes no observed effect or the NOEC (No Observed Effect Concentration) and by the lowest concentration which causes an observed effect or the LOEC (Lowest Observed Effect Concentration). The geometric mean of these concentrations, termed the chronic value or ChV, represents the effluent concentration at which observed effects begin to appear. An important effluent concentration to compare to the ChV is the instream waste concentration or IWC. This represents the percentage of the receiving stream comprised by the effluent during periods of low stream flow and maximum permitted effluent flow per the equation:

$$\frac{\text{Maximum Permitted Discharge Volume} \times 100}{\text{Maximum Permitted Discharge Volume} + 7Q_{10}}$$

The 7Q₁₀ is the lowest average 7 day flow in the receiving stream which has a probability of recurrence every ten years. Comparison of the facility IWC to the ChV of the test, can predict whether an impact will occur on sensitive organisms in the receiving stream. The multiple concentration analysis is typical of procedures such as the EPA described chronic toxicity test and the North Carolina Phase II chronic toxicity analysis referenced previously.

The statistical comparisons for evaluating the significance of chronic analysis test results are generally performed as outlined in the EPA guidance documents previously referenced (EPA/600/4-89/001, EPA/600/4-87/028) or by the specific NC DEM modified method. Statistical significance may be evaluated in part by calculation of Dunnett's t value. The use of this test is discussed in the EPA document as well as on the back of the State AT-3 form (Appendix E), the form required for submission of multiple concentration chronic test data. Significant differences in mortality rates are determined by use of the Fisher's Exact Test as discussed in the cited EPA document.

Chronic toxicity analysis quality control parameters for control organisms include average total reproduction which must equal or exceed 15 offspring per surviving female. Also, mortality greater than 20% in the control population will be considered abnormal, invalidating the test results. Other quality control components of the test include incubating the test chambers for temperature control, maintaining a photoperiod of 16 hours of light and 8 hours of darkness, use of samples within 72 hours of collection and maintenance of samples between 0-4°C during shipping and storage. This packet includes a checklist of quality control parameters to assist facility personnel in evaluating test acceptability (Appendix F).

For the North Carolina test procedure, effluent samples are collected twice below chlorination as 24 hour composites, unless otherwise specified by the permit. The samples must be collected and stored with an amount of ice sufficient to maintain a sample's temperature between 0° and 4°C until receipt at the laboratory. The only allowable exception to this sample shipment policy is the situation where the time lapse between the collection of a grab sample and its use in the laboratory does not exceed four (4) hours. DEM defines "use" of samples as the introduction of the test organisms into the test solutions. This exception is based on an approximate time necessary for a chilled sample to reach room or testing temperature on its own, after being removed from ice or refrigeration. In such instances appropriate chain-of-custody documentation should be submitted with test results showing, at minimum, collection time and date, collector, method of collection, sample temperature on receipt in the laboratory, and the time and date at which the toxicity test on this sample was initiated. All laboratories certified by the State of North Carolina to perform toxicity testing are required to measure sample temperature on receipt in their laboratories. Should this temperature exceed allowable standards, the sample does not qualify for the performance of valid tests and such results will be rejected for use in NPDES compliance determinations. Additionally, the sample is not to be frozen under any circumstances. Frozen samples will be rejected for use in NPDES compliance determinations. It is suggested that coordination of sampling and sample shipment methods be discussed with the laboratory performing the analyses so that these criteria are met.

The collection of these samples should accommodate the schedule outlined in the protocol being used. The effluent samples are prepared for testing by being thoroughly mixed, adjusted to standard test temperature of 25°C, and aerated if dissolved oxygen is below 5 mg/l. The effluent samples are also analyzed for total residual chlorine.

Biological Laboratory Certification

The collection of quality toxicity testing data requires good laboratory practices. The EPA guidance documents previously cited discuss quality assurance (QA) methods. QA practices for effluent toxicity tests include all aspects of the test that affect the accuracy and precision of the data such as: effluent sampling and handling; the source and condition of the test organisms; condition of equipment; test conditions; instrument calibration; use of reference toxicants; record keeping, and data evaluation.

Per North Carolina Administrative Code Title 15, 2H Section .1100, any commercial, industrial, or public laboratory performing biological toxicity testing as required by an NPDES permit, must be certified by the Division of Environmental Management. These Rules, effective October 1, 1993, provide that laboratories performing these tests may be certified and decertified by the State of North Carolina. NPDES permittees required to perform whole effluent toxicity testing are responsible for the submittal of quality test data and ensuring that their performing laboratories are certified to conduct specific tests.

To aid you in locating aquatic toxicological testing services, Appendix G provides a list of biological laboratories that have been certified by the Division of Environmental Management. In accordance with the Regulations, these laboratories have been evaluated as having the capability to adequately perform certain aquatic toxicity tests for clients in North Carolina. The list of certified biological laboratories will be kept on file and updated by the Division's Environmental Sciences Branch, and will be available upon request by mail or fax (see DEM contacts listed at the end of this document).

Reporting Toxicity Test Results

Under most circumstances, toxicity testing results from samples taken prior to the permitted discharge point are not required to be reported. Such samples include pre-chlorination samples, treatment process samples, and industrial process samples. However, any result from a test performed on a sample taken from the permitted discharge point must be reported. This requirement applies even to those facilities which do not have toxicity monitoring in their NPDES permit.

The toxicity testing requirement language in NPDES permits states that in addition to including test results on the facility monthly monitoring report form (MR-1), toxicity test results must be submitted to the State on the appropriate DEM AT form within thirty days after the end of the reporting period for which the report is made. A copy of the AT-1, AT-2, and AT-3 forms are attached (Appendix B, C, and E). It is essential that all the information be provided as requested and applicable to the type of test results being submitted. The AT form submittal to the State is to include the signatures of the facility operator in responsible charge and the laboratory supervisor, as provided for on the form. Please note that exclusion of any of the necessary information will constitute an incomplete submission of toxicity test data to the Division. Dual reporting requirements exist for permittees required to conduct toxicity testing by NPDES permit or administrative letter. Discharge Monitoring Report forms should be mailed to the Division's Central Files while the Aquatic Toxicity Test forms should be sent to the address located below. Again, special note should be made that the AT forms and the standard MR-1 reporting forms are sent to different addresses. This is necessary due to the extra degree of quality assurance review given to the aquatic toxicity test data submitted to the Environmental Sciences Branch. You should consider submitting your toxicity self-monitoring reports via certified mail to ensure that your reports are received timely by the Environmental Sciences Branch. The AT forms shall be sent to:

ATTENTION:
ENVIRONMENTAL SCIENCES BRANCH
NORTH CAROLINA DIVISION OF
ENVIRONMENTAL MANAGEMENT
4401 REEDY CREEK ROAD
RALEIGH, NORTH CAROLINA 27607

Test results may be rejected due to inappropriate sampling, inadequate control organism survival, or in the case of chronic tests, inadequate control organism reproduction. Division staff term such an analysis a "bad test" (bt). Under these circumstances a follow-up test must be initiated within 30 days of the initial monitoring event.

At times the laboratory may be aware of QA problems during or immediately following a test that will prevent the data from being accepted. Additionally, a test may be scheduled which cannot be completed due to sample collection or shipment problems. In such cases the analysis should be rescheduled within 30 days of the initial monitoring attempt. If the analysis cannot be rescheduled during the permit defined monitoring month, a letter should be drafted to the Environmental Sciences Branch at the above address which explains why the analysis could not be completed during the appropriate monitoring month and specifies the rescheduled date of the analysis. While this letter does not relieve the facility from completing the monitoring, it will help to prevent Notices of Violation for failure to perform the initial monitoring.

Most new permits issued with a quarterly monitoring requirement specify that any failure to meet a permit limit increases the monitoring frequency to monthly until a test result is generated which meets the permit limit. Good lines of communication with the contracting laboratory are essential to ensure that appropriate follow-up testing is scheduled regardless of the circumstances requiring such testing.

In the event that no discharge of flow occurs from a facility during a month that toxicity testing is required, you should complete the information block located at the top of the AT form indicating the facility name, permit number, pipe number, county, and the month/year of the subject report. You should write "NO FLOW" on the AT form and submit to the Environmental Sciences Branch following normal procedures.

Statistical Significance

Guidance Documents:

United States Environmental Protection Agency. 1991. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. Fourth Edition. EPA/600/4-90/027. 293 pp.

USEPA. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. 2nd edition. EPA/600/4-89/001 March 1989.

USEPA. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms. EPA/600/4-87/028. May 1988.

Hamilton, M.A., Russo, R.C., and Thurston, R.V. Trimmed Spearman-Kärter Method for Estimating Median Lethal Concentrations in Toxicity Bioassays. Environmental Science & Technology, Vol 11, No. 7, July 1977.

State DEM form AT-1(3/87) rev. 9/89 (attached as Appendix B).

State DEM form AT-2(10/90) (attached as Appendix C)

State DEM form AT-3(7/91) (attached as Appendix E)

Presenting and interpreting acute and chronic toxicity test results requires the use of statistical analysis. Supporting statistics are used to evaluate the level of confidence that may be associated with the test results. The test statistics must be reported on the State AT-1, AT-2, and AT-3 forms, the required forms for submitting toxicity test results. Otherwise, the submission of test data will be considered incomplete.

In an acute toxicity test, the primary purpose of the test is generally an estimation of the concentration of the test material or percentage of effluent that is lethal to 50% of the test organisms within a specific length of time. This measure is called an LC_{50} . The LC_{50} is chosen in most acute toxicity tests because an estimate of the median tolerance (50% kill) for a fixed sample size is most reproducible in this range. The LC_{50} is statistically estimated because it is unlikely that one of the concentrations selected in the experiment will kill exactly 50% of the exposed test population. A confidence interval for the true LC_{50} is computed along with this point estimate and asserts with

a pre-specified level of confidence (usually 95%) that this interval contains the true LC_{50} . The test LC_{50} and supporting test data are to be reported on State form AT-1 (attached as Appendix B). EPA acute toxicity testing protocols (EPA/600/4-90/027) describe several methods for estimating the LC_{50} and confidence intervals. Although any of the referenced methods are acceptable, the recommended methods are the probit and Spearman-Kärber methods because their LC_{50} estimates rely on the data in the more stable, central portion of the tolerance distribution.

The Division may require the acute toxicity Pass/Fail test in instances where additional protection of a water body must be provided to reduce the likelihood of localized effects due to incomplete mixing. The analysis employs a Student's t test to determine if mortality in a single effluent treatment is significantly different than the control population. All statistical analyses are performed using arc sine square root transformed data (see referenced EPA document 600/4-90/027) and evaluated for significance at a 99% confidence level. Should mortality in the effluent treatment exceed that of the control population and the absolute value of the calculated t value exceed the absolute value of the tabular t value, then the effluent treatment is considered as having significant acute effects on the test organisms. This would be considered a "Fail." If all vessels within each treatment have the same mortality but at different levels between treatments, then a t statistic is not calculable. In this case, if the mortality is identical between treatments then the test is considered a "Pass." If the response in the effluent treatment is greater than the control treatment then the test is considered a "Fail." State form AT-2, the form required to submit results of the acute Pass/Fail test procedure, is provided as Appendix C.

The chronic toxicity tests which are used and required by the Division determine the effects of whole effluents on the mortality and reproduction of a species (*Ceriodaphnia*) for an extended period of time. Mean reproduction and percent mortality results for the effluent concentration are compared to those for the control by performing statistical tests of significance. The EPA chronic toxicity testing protocol (EPA/600/4-89/001) describes mean reproduction as the summation of total number of young produced per female *Ceriodaphnia* until time of death or end of experiment divided by the initial number of females exposed.

Assistance Available

Guidance Documents:

USEPA. Methods for Aquatic Toxicity Identification Evaluations: Phase I Toxicity Characterization Procedures. EPA/600/6-91/003. February 1991, Environmental Research Laboratory, Duluth, Minn.

USEPA. Phase II-Toxicity Identification Procedures. EPA 600/R-92/080. September 1993, Environmental Research Laboratory, Duluth, Minn.

USEPA. Phase III-Toxicity Confirmation Procedures. EPA 600/R-92/081. September 1993, Environmental Research Laboratory, Duluth, Minn.

USEPA. Toxicity Reduction Evaluation Protocol For Municipal Wastewater Treatment Plants. EPA/600/2-88/062. April 1989, EPA Risk Reduction Engineering Laboratory, Cincinnati, Ohio.

USEPA. Generalized Methodology for Conducting Industrial Toxicity Reduction Evaluations (TREs). EPA 600/2-88/070. 1989, EPA Water Engineering Research Laboratory. Cincinnati, Ohio.

USEPA. Technical Support Document For Water Quality-based Toxics Control. EPA/505/2-90-001. 1991. EPA Office of Water, Washington, D.C.

Appendix H provides a listing of contact persons in each of the Department of Environment, Health, and Natural Resources' Regional Offices. You are encouraged to contact the Regional Water Quality Supervisor in your area Regional office for assistance in understanding and implementing your toxicity test requirement.

Questions concerning aquatic toxicity, analyses, or biological laboratories may be directed to Mr. Larry Ausley, Mr. Matt Matthews, or Mr. Phil Bethea of the Aquatic Toxicology Unit in Raleigh by telephone at (919) 733-2136, FAX at (919) 733-9959 or U.S. Mail at the following address:

ENVIRONMENTAL SCIENCES BRANCH
NORTH CAROLINA DIVISION OF
ENVIRONMENTAL MANAGEMENT
4401 REEDY CREEK ROAD
RALEIGH, NORTH CAROLINA 27607

Assistance is also available for industries and local governments to help identify and apply ways to reduce, recycle, and minimize wastes before they become toxic pollutants. The Pollution Prevention Program is a non-regulatory program within the Department of Environment, Health, and Natural Resources which provides technical assistance, research and education, and matching grants for such toxicity reduction efforts.

The Pollution Prevention Program is an information clearinghouse with access to over 1600 references, case studies, and contacts on waste reduction options. If additional information is needed, a customized computer literature search can be conducted. Based on the production process, an industry-specific report providing economic and technical evaluations of available waste reduction techniques can be developed. More specific alternatives can be identified through an on-site visit. The Pollution Prevention Program offers matching funds (\$5,000 of a \$10,000 project) to businesses and communities through the Challenge Grants for Waste Reduction and Minimization Projects. Inquiries should be directed to the Pollution Prevention Program at (919) 571-4100.

Appendix A

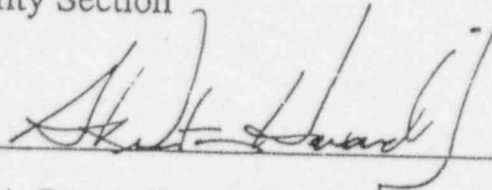
Aquatic Toxicity Testing
Acute Pass/Fail Toxicity
Testing Method

Environmental Sciences Branch
Water Quality Section
Division of Environmental Management
North Carolina Department of Environment, Health, and Natural Resources

Pass/Fail Methodology For Determining
Acute Toxicity In A Single Effluent
Concentration

North Carolina Department of Natural Resources
and Community Development
Division of Environmental Management
Water Quality Section

This procedure has been approved for release by



A. Preston Howard Jr., Acting Director

Date 7-27-92

Pass/Fail Methodology for Determining Acute Toxicity In A Single Effluent Concentration

It is the intent of this document to provide a method by which significant mortality in a single effluent concentration may be determined. It may be applied to any concentration of effluent, but is specifically designed to test higher effluent concentrations where a measured LC50 may not necessarily protect for acute toxicity. This would occur in situations where the receiving stream or mixing zone is almost entirely effluent. In these instances it is important that short term acute effects not occur. These methods are based upon the standard methodology specified in the EPA guidance document, Methods for Measuring the Acute Toxicity of Whole Effluents to Freshwater and Marine Organisms, Fourth Edition, EPA/600/4-90/027, September, 1991. This document is intended to specify exact procedural modifications of the above cited methodology for performing analyses of this type. Unless specifically modified by this procedure, all other test conditions and requirements will be as specified in the EPA acute toxicity document.

Methodology

The procedure shall be performed as an acute, static, non-renewal toxicity test using either the fathead minnow (*Pimephales promelas*, 1 to 14 days in age), *Daphnia pulex*, or *Ceriodaphnia dubia*. There will be two concentrations utilized in this procedure. The control population will be specified as Treatment 1, and the effluent treatment will be specified as Treatment 2. Typically, the effluent concentration utilized for this procedure will be 90%. The actual effluent concentration at which the test is to be performed, as well as the test duration and test species, will be specified through the NPDES Permit or Administrative Letter requirement.

Each treatment will be tested using four identical test vessels, each containing 10 test organisms for a total of 80 test organisms. At the end of the test, all organisms will be observed as being either alive or dead and recorded on the appropriate laboratory forms. If all chemical and physical protocols have been met, data analysis can proceed. If testing protocols have not been met, the analysis must be repeated.

Data Analysis

If mortality in the control population exceeds 10%, the test is considered invalid. The test data are then analyzed to determine whether mortality in the effluent treatment (Treatment 2) is significantly different from that of the control population (Treatment 1). The procedures required for data analysis are contained in Section 11.3 [*Determination of No-Observed-Adverse-Effect Concentration (NOAEC) From Multi-Concentration Tests, And Determination of Pass or Fail (Pass/Fail) For Single-Concentration (Paired) Tests*] of the EPA acute manual referenced above. All statistical analyses are performed using arc sine square root transformed data. This transformation is described on pages 91-94, sub-section 11.3.5.1 ("Arc Sine Square Root Transformation").

The assumption of normality of the transformed data should be tested with the Shapiro-Wilk's Test at the 0.01 level of significance, according to sub-section 11.3.6.2 (pages 100-101). Additional statistical tables used with this analysis are contained on pages 94-99 of the acute manual. The F test for equality of variances should also be performed at the 0.01 level of significance, as stated in sub-section 11.3.6.3 on page 101.

Final comparisons of control and treatment responses should be made at the 0.01 level of significance with a t test, a modified t test (for cases when variances are not equal), or the non-parametric Wilcoxon Rank Sum Test. Note: These analyses are to be performed at a different level of significance than that specified in Section 11.3.6 of the EPA manual. [The F test for equality of variances is not possible when the response proportion of all four replicates within the control or treatment set are equal. This results in a variance of 0 in the denominator of the F equation, which is not valid. In this case, the modified t test should be used, since the assumption of equality of variances can not be made.]

Two sample data sets analyzed according to these procedures are presented below in Examples 1 and 2. In addition, examples of two data situations which can not be analyzed by the above statistical procedures due to constant rate of response are also presented.

If all replicates of the control (Treatment 1) have identical responses equal to or less than 10 percent mortality and all replicates of the effluent concentration (Treatment 2) have equal responses though greater than that of the control response, the t value is not calculable. The Wilcoxon Rank Sum Test should be used in this case; it will average the rank sums of all values within each group and report a final sum of 10. This sum is equal to the critical sum of 10, indicating that the responses are statistically different. Therefore, the test result should be reported as "FAIL." See Example 3 below.

If all replicates in both treatments have identical responses which are equal to or less than ten percent mortality, the t value is not calculable. [Wilcoxon Rank Sum Test should not be used in this case, since it will average the rank sums of all values and report a final sum of 18. This sum is greater than the critical sum of 10, causing identical responses to be statistically different.] Therefore, the test result should be reported as "PASS." See Example 4 below.

Data obtained by use of this methodology will be entered on the attached form AT-2 and sent to the designated address. Additionally, the results of this testing should be recorded as "PASS" or "FAIL" on the State MR-1 form for the month in which the test was performed. The appropriate parameter code to enter on the MR-1 is specified in the NPDES permit or Administrative Letter Requirement.

Example 1

(10 Organisms/Replicate)

(10 Organisms/Replicate)		Control (Treatment 1)				Effluent (Treatment 2)			
Replicate	1	2	3	4	1	2	3	4	
% Mortality	0	0	10	0	20	20	30	20	

Shapiro-Wilk's W = 0.663
Critical W (@ 0.01) = 0.749
Result = Not Normally Distributed

F = 1.97
Critical F (@ 0.01) = 47.47
Result = Variances Equal

Calculated t value = 5.86
Critical t value (@ 0.01) = 3.14
Result = FAIL

Wilcoxon Rank Sum = 10
Critical Sum (@ 0.01) = 10
Result = FAIL

In this example, data are not normally distributed. The appropriate final analysis is Wilcoxon Rank Sum Test, which indicates that the test result is "FAIL."

Example 2

(10 Organisms/Replicate)

(10 Organisms/Replicate)	Control (Treatment 1)				Effluent (Treatment 2)			
Replicate	1	2	3	4	1	2	3	4
% Mortality	0	0	10	0	50	60	70	50

Shapiro-Wilk's W = 0.807
Critical W (@ 0.01) = 0.749
Result = Normally Distributed

F = 1.46
Critical F (@ 0.01) = 47.47
Result = Variances Equal

Calculated t value = 10.37
Critical t value (@ 0.01) = 3.14
Result = FAIL

Wilcoxon Rank Sum = 10
Critical Sum (@ 0.01) = 10
Result = FAIL

In this example, data are normally distributed and have equal variances. The appropriate final analysis is the t test, which indicates that the test result is "FAIL."

Example 3
(10 Organisms/Replicate)

(10 Organisms/Replicate)		Control (Treatment 1)				Effluent (Treatment 2)			
Replicate	1	2	3	4	1	2	3	4	
% Mortality	0	0	0	0	10	10	10	10	

Shapiro-Wilk's W= Incalculable

F= Incalculable

Calculated t value= Incalculable

Wilcoxon Rank Sum= 10
Critical Sum (@ 0.01)= 10
Result= FAIL

In this example, the t test (as well as the Shapiro-Wilk's and F tests) can not be performed due to the constant responses within each group. The appropriate final analysis is Wilcoxon Rank Sum Test, which indicates that the test result is "FAIL."

Example 4
(10 Organisms/Replicate)

(10 Organisms/Replicate)		Control (Treatment 1)				Effluent (Treatment 2)			
Replicate	1	2	3	4	1	2	3	4	
% Mortality	10	10	10	10	10	10	10	10	

Shapiro-Wilk's W= Incalculable

F= Incalculable

Calculated t value= Incalculable

Wilcoxon Rank Sum= 18
Critical Sum (@ 0.01)= 10
Result= Not Appropriate Test

In this example, the t test (as well as the Shapiro-Wilk's and F tests) can not be performed due to the constant responses across both groups. Wilcoxon Rank Sum Test is not appropriate (see above). This test should be reported as a "PASS."

(If mortality is equal in every replicate and greater than 10%, the result is an invalid test due to high control mortality.)

Appendix B

Aquatic Toxicity Testing
AT - 1 Test
Form

Environmental Sciences Branch
Water Quality Section
Division of Environmental Management
North Carolina Department of Environment, Health, and Natural Resources

Effluent Toxicity Report Form- Chronic Pass/Fail and Acute LC50 Date _____

Facility _____ NPDES#NC _____ Pipe # _____ County _____

Laboratory Performing Test _____

☒ Signature of Operator in Responsible Charge

☒ Signature of Laboratory Supervisor

Comments _____

MAIL ORIGINAL

Environmental Sciences Branch
Div. of Environmental Management
N.C. Dept. of EHNH
4401 Reedy Creek Road
Raleigh, North Carolina 27607-6445

North Carolina Ceriodaphnia Chronic Pass/Fail Reproduction

CONTROL ORGANISMS 1 2 3 4 5 6 7 8 9 10 11 12

# Young												
Adult (L)ive (D)ead												

Effluent%

TREATMENT 2 ORGANISMS 1 2 3 4 5 6 7 8 9 10 11 12

# Young Produced												
Adult (L)ive (D)ead												

Chronic Test Results	
Calculated t	
%Mortality	Avg.Reprod.
Control	Control
Treatment	Treatment 2
% control organisms producing 3rd brood	PASS FAIL
<input type="text"/>	<input type="text"/> <input type="text"/>
	Check One

pH	Control	1st	1st	2nd
	Treatment	start end	start end	start end
D.O.	Control	1st	1st	2nd
	Treatment	start end	start end	start end

Complete This For Either Test			Test Start Date
Collection (Start) Date			
Sample 1	/	/	Sample 2 / /
Sample Type/Duration			
Sample 1	Grab	Comp.	Duration
Sample 2			
Hardness(mg/l)			
Spec.Cond.(µmhos)			
Chlorine(mg/l)			
Sample temp. at receipt			
Dilution			1st Tox Sample (Pass/Fail Only)
			2nd Tox Sample (Pass/Fail Only)

LC50/Acute Toxicity Test

(Mortality expressed as %, combining replicates)

%	%	%	%	%	%	%	%	%	%
%	%	%	%	%	%	%	%	%	%

Concentration

Mortality

Method of

LC50= _____ %

95% Confidence

_____%-_____%

Moving

Spearman

☐

Probit

☐

Other

Note: Please Complete This Section

start/end	Control	start/end
<input type="text"/>	<input type="text"/>	<input type="text"/>
High Conc.		
pH		D.O.

Organism _____

STATISTICAL ANALYSES

The Ceriodaphnia chronic toxicity test measures the chronic toxicity of whole effluents through both mortality and reproduction. Statistically significant toxic responses are to be detected using a t test (EPA/600/4-89/001, pg. 240) to compare mean reproduction in the effluent concentration and the control. As described in EPA chronic toxicity testing protocol (EPA/600/4-89/001) mean reproduction is calculated by summing the total number of young produced per female until either the time of death or the end of the experiment and dividing by the initial number of females exposed. An analysis of variance (ANOVA) provides an estimate of the pooled variance which is incorporated in the calculation of a t statistic. Based on a comparison of the calculated t value with the tabled critical value for a one-sided comparison at a 0.01 confidence level, effluent chronic toxicity is determined to be either a PASS or a FAIL. In the case where there is only one treatment to be compared with the control, this t statistic is comparable to the Student t statistic for comparison of means from independent random samples. The t value is to be reported with test results.

The LC50 (acute toxicity section) represents the expected concentration of effluent* that is lethal to 50% of the test organisms within the test period. A statistical estimation method must be used to obtain an estimate of the LC50 from concentration/mortality data. Uncertainty is quantified through confidence intervals expressing the range of values within which the "true" LC50 could occur.

EPA acute toxicity testing protocols (EPA/600/4-85/013) detail several methods for estimating the LC50 and confidence intervals including: probit analysis, logit analysis, the Litchfield-Wilcoxon method, the moving average angle method, and the trimmed Spearman-Kärber method. The recommended method is the trimmed Spearman-Kärber method because it is both model free and robust (i.e., not sensitive to anomalous responses), however, any of the above methods is acceptable. Confidence limits are an essential part of LC50 estimation and are to be included in reported toxicity test data.

Appendix C

Aquatic Toxicity Testing
AT - 2 Test
Form

Environmental Sciences Branch
Water Quality Section
Division of Environmental Management
North Carolina Department of Environment, Health, and Natural Resources

Effluent Aquatic Toxicity Report Form - Acute Pass/Fail Date _____

Facility _____ NPDES#NC _____ Pipe # _____ County _____

Laboratory Performing Test _____

x _____
Signature of Operator in Responsible Charge

x _____
Signature of Laboratory Supervisor

Comments _____

MAIL ORIGINAL TO:

Environmental Sciences Branch
Div. of Environmental Management
N.C. Dept. of EHNR
4401 Reedy Creek Road
Raleigh, North Carolina 27607-6445

North Carolina Acute Pass/Fail Bioassay

Collection Date: _____				Organism Tested _____																			
Collection Time: _____																							
Test Start Date: _____																							
Sample Type/Duration				<p>pH Control <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table></p> <p>Treatment <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table></p> <p style="text-align: center;">s t a r t</p> <p>D.O. Control <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table></p> <p>Treatment <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table></p> <p style="text-align: center;">e n d</p>																			
Grab	Comp.	Duration																					
Hardness(mg/l)				<p style="text-align: center;">Dilution Toxicant</p> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> <tr><td></td><td></td></tr> </table>																			
Spec. Cond. (µmhos)																							
Chlorine(mg/l)																							
Sample temp. at _____																							

Mortality		Replicate				Mean Mortality
		A	B	C	D	
Treatment 1 (Control)		%	%	%	%	%
Treatment 2 (Exposure)		A	B	C	D	
Concentration Tested	%	%	%	%	%	%

(NOTE: If mean control mortality exceeds 10%, the test is considered invalid)

Calculate using Arc-Sine Square Root transformed data	Calculated Student's	<table border="1" style="width: 100%; height: 30px;"></table>	PASS	<table border="1" style="width: 100%; height: 30px;"></table>
	Tabular Student's (ONE TAILED)	<table border="1" style="width: 100%; height: 30px;"></table>	FAIL	<table border="1" style="width: 100%; height: 30px;"></table>

If the absolute value of the calculated t is less than or equal to the absolute value of the tabular t, check PASS.
If the absolute value of the calculated t is greater than the absolute value of the tabular t, check FAIL.
If all vessels within each treatment have the same response but the treatment two response is greater than the control, check FAIL.

Appendix D

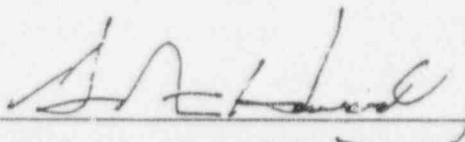
Aquatic Toxicity Testing
Phase II Chronic
Toxicity Testing Method

Environmental Sciences Branch
Water Quality Section
Division of Environmental Management
North Carolina Department of Environment, Health, and Natural Resources

North Carolina *Ceriodaphnia*
Chronic Effluent Toxicity Procedure
December 1985
Revised September 1994

North Carolina Department of Environment,
Health, and Natural Resources
Division of Environmental Management
Water Quality Section

This procedure has been approved for release



A. Preston Howard, Jr., P.E., Director

9-28-94

Date

North Carolina *Ceriodaphnia*
Chronic Effluent Toxicity Procedure
(*Ceriodaphnia* Mini-Chronic Toxicity Test)

This procedure has been established as a modification of the U.S. Environmental Protection Agency document entitled "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (EPA/600/4-85/014) and its subsequent edition entitled "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Second Edition" (EPA/600/4-89/001). This procedure has been reduced in complexity in order to provide a relatively inexpensive means of assessing suitable water quality with respect to chronically toxic substances.

The test as outlined within the main section of this document may be used as a routine monitoring tool and yields data that accepts or rejects an effluent for discharge to a specific receiving water body under defined flow conditions. It does not determine the no-effect level. At times, determining the actual no-effect level may be necessary in order to evaluate the degree of toxicity reduction needed. This may be performed using an expanded series of dilutions. Additions to the methodology outlined here which will estimate the no-effect level are outlined in the Appendix.

This test procedure has been approved by the Director of the North Carolina Division of Environmental Management under the Fresh Surface Water Classification Standards (.0211) as suitable for evaluation of the effects of toxic substances to sensitive aquatic species. It shall be considered as an acceptable proof that the effluent is not causing impacts to aquatic life in the receiving streams due to toxic substances. It does not directly address mutagens, carcinogens, teratogens or disease causing agents and may be superseded by other water quality regulations. Depending on the use designation and specialized concerns of a particular water body (or effluent discharge), additional monitoring and/or restrictions (either chemical or biological) may be required. These monitoring requirements may include, but are not limited to, additional toxicity testing using alternate test organisms, unmodified EPA protocols and increased sampling or test solution renewal frequencies.

The test organism used for this pass/fail test is *Ceriodaphnia dubia*, a small cladoceran common in lakes and larger rivers commonly used as an aquatic toxicity test organism. The organism has a rapid life cycle at 25°C, potentially producing numerous offspring during a seven day period. This particular test is not used to determine a no effect level of the effluent discharge; it is intended to evaluate whether the discharge toxicity is acceptable or not in relation to a pre-established No-Observed-Effect Level (NOEL).

The measures of effect used within this test are number of offspring produced and the mortality within the test period. This document will outline major procedural differences from the EPA procedure. Only those modifications outlined here may be made to the EPA guidelines. This document is organized

into five sections which include: 1) Effluent sampling, 2) Major test procedures, 3) Interpretation of results, 4) An outline of daily activities to be performed prior to and during the test period (Table), and 5) the Appendix, which outlines methodology to determine the actual effluent NOEL.

EFFLUENT SAMPLING

Effluent samples may be collected twice as 24 hour composite samples on days 1 through 2 and days 4 through 5 or as single grab samples on days 2 and 5. The NPDES permit specifies the appropriate sample type. Sampling should be performed below the last waste treatment process, including disinfection. There may be no removal of chlorine or any other effluent constituent by either chemical or physical methods prior to testing with the exception of allowable filtration of the effluent through 60 µm nylon screen or plankton netting and reduction of excess dissolved oxygen to the saturation level, as per EPA methods.

Sample collection materials may be tempered glass, polyethylene, perfluorocarbon plastics including Teflon®, 304 or 316 stainless steel, polypropylene, polyvinylchloride, Tygon®, or silicone. All non-perfluorocarbon plastics should be discarded after use. It is the responsibility of the sample collector to assure that contamination is not influencing test results. There may be no chemical residue present which will affect effluent toxicity. Only 500 milliliters of each effluent sample is required in order to perform the test. Although a small surplus should be obtained, a small sample size will minimize shipping expense.

All effluent sampling should be performed using an iced or refrigerated collection device. The sample must be maintained at or below 4°C until the toxicity test procedure is initiated. The shipping container must be completely filled, with no air pocket, to minimize loss of volatiles. Sampling and shipping schedules should be arranged such that neither sample exceeds 72 hours of age prior to its final use in the procedure (setup or renewal). Age of the sample is calculated from the time of collection of a single grab sample or from the time of collection of the last subsample of a composite.

TEST PROCEDURE

The test shall be performed as two treatments exposing 12 female test organisms to each treatment. The first treatment shall be considered the control population and shall be dosed at 0% effluent and 100% dilution water. Dilution water must be the culture water used to maintain the test population or be suitable for that purpose. This treatment will be used to evaluate the significance of effect in treatment two. The pH of the control solution at test initiation and subsequent test solution renewals must fall in the range of 6.5-8.5 standard units. Total hardness must measure between 30 and 50 mg/l. Treatment two will be (unless specified otherwise) a concentration of effluent diluted by the dilution water to the following percent:

$$\% \text{ Effluent} * \frac{\text{Permitted Discharge Volume} \times 100}{\text{Permitted Discharge Volume} + 7Q10^{**}}$$

*Treatment Two

**Where 7Q10 is defined as the lowest average 7-day flow in the receiving stream which has a probability of reoccurrence every ten years. All terms must have equivalent units.

Twelve test organisms will be exposed to each treatment in individual test chambers. The test will run for the period required for at least 80% of the control organisms to produce three broods of young, not to exceed a seven day exposure, using the chronology specified in the Table. (Termination prior to seven days should be contingent upon whether the control reproduction mean has reached the minimum acceptable value of 15 young per surviving female).

The objective of this test is to determine whether treatment two, which exposes the test population to an effluent concentration equal to instream low flow values, has significant detrimental impact upon reproduction and survival as compared to the control population (treatment one). If there is no significant detrimental impact compared to the control population then the effluent is not considered chronically toxic to instream inhabitants and is considered to have passed the test. A failure will be considered as a significant difference between treatments with either reproduction being reduced or mortality increased in the effluent treatment.

After effluent collection on days one and two, the test treatments will be established and the test initiated on day three (Table). The pH, dissolved oxygen and temperature must be checked and recorded prior to the introduction of test organisms. At all times test solution temperature must be 25°C ($\pm 1^\circ\text{C}$) and dissolved oxygen levels must be greater than or equal to 5.0 mg/l.

The test organisms are placed singly in test vessels each containing 15 mls of solution. The organisms must be less than 24 hours old, within 8 hours of the same age, from the third or subsequent brood, and from broods in which the adult produced at least 8 neonates. The test organisms must be produced by "individual" cultures as defined by "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Second Edition" (EPA/600/4-89/001). Neonates are transferred using an eye dropper, such that the organism is never removed from solution. There should be as little water transferred with the organism as is reasonably practical. The *Ceriodaphnia* should be fed at this time and daily thereafter. Each daily feeding will consist of addition of 0.05 ml of YCT food and 0.05 ml of a solution of the algae *Selenastrum capricornutum* (with a cell concentration of 1.71×10^7 cells/ml) per 15 mls of test solution. Preparation of food supplies are described by "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Second Edition" (EPA/600/4-89/001), though feeding rates have been modified for this protocol. Test chambers should be incubated for temperature control with the photoperiod maintained at 16 hours of light and 8 hours of darkness.

On days four and five, a second effluent composite is collected to be used for renewal of the test solutions on day eight. Also on day five the original test organisms are transferred to new test vessels containing new solutions of treatment one (control) and the original treatment two (effluent concentration). The original sample is to be refrigerated between uses on days three and five. Mortality should be recorded

on day five, as well. Should mortality in treatment two significantly exceed that of treatment one, as determined by Fisher's Exact Test, the test may be terminated at such time and the effluent sample declared a failure due to significant mortality. Reproduction counts should be performed in all vessels used during the initial test period (although there are usually no offspring during this phase in the life cycle). The new test solutions should receive food at this time.

Days six and seven require only that the *Ceriodaphnia* be fed. Day eight requires renewal of the test solutions using the composite sample collected on days four and five. This renewal must take place within 72 hours of the final effluent collection time. Mortality, reproduction, temperature, dissolved oxygen and pH observations must be made and recorded. Reproduction of the initial test organisms must be observed both as total number of young produced as well as brood number of the young produced (i.e first, second or third brood). As stated previously, the test may be terminated if significant mortality has occurred in the effluent treatment (treatment two). On day nine the test organisms should be observed for production of the third brood within the treatment one (control) organisms. If 80% or more of the control organisms have produced a third brood, the test may be terminated. This will also hold true for observations made on day eight. On day ten, the test is terminated after making final mortality, reproduction and chemical/physical observations. Fourth brood neonates will be excluded from the reproduction totals. The test exposure duration will be no greater than seven days regardless of control organism reproductive success.

INTERPRETATION OF RESULTS

The statistical comparisons for evaluating the test results will be performed as outlined in "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Second Edition" (EPA/600/4-89/001) with the exception that reproduction data are to be evaluated at a 99% confidence level. The statistical methods used should be those in Appendix H of the EPA document, titled "Toxicity Screening Test- Comparison of Control with 100% effluent or Instream Waste Concentration." A statistical difference between the control (treatment one) and the effluent (treatment two) caused by decreased effluent reproduction or increased effluent mortality will be considered as a failure of this effluent to meet toxic standards within the receiving stream. Mortality greater than 20% in the control population will be considered as abnormal and the test must be repeated. Reproduction in the control population must be greater than or equal to 15 offspring per surviving female as an average of total reproduction. Mean reproduction is calculated by summing the total number of young produced through three broods per treatment until either time of death or end of the experiment and dividing by the initial number of females exposed per treatment. Note that fourth brood neonates will be excluded from the reproduction totals. If these tests are being performed as an NPDES requirement or by Administrative Letter, then data must be entered on the Effluent Discharge Monitoring Form (MR-1) for the month in which it was performed using the appropriate parameter code. Additionally, DEM Form AT-1 (original) is to be sent to the following address:

Environmental Sciences Branch
North Carolina Division of Environmental Management
4401 Reedy Creek Road
Raleigh, North Carolina 27607

MINI CHRONIC TOXICITY TEST

Day One

This test procedure, including sampling, has been designed to minimize weekend work if begun on a Monday. On this day a 24-hour compositing device will be started. Sampling devices should be refrigerated or cooled by ice. The final sample volume should be a minimum of 500 milliliters.

Day Two

The composite sample will be collected, packaged on ice or refrigerant and shipped to the laboratory where the toxicity test will be performed.

Day Three

The test treatments will be set up and test organisms introduced. Dissolved oxygen, temperature and pH will be measured and recorded. Dissolved oxygen should be greater than or equal to 5.0 mg/l and the temperature maintained at 25°C ($\pm 1^\circ\text{C}$). The total residual chlorine level of the whole sample should be measured and recorded. Feed *Ceriodaphnia*.

Day Four

Start second 24-hour effluent composite sample.

Feed *Ceriodaphnia*.

Day Five

Ceriodaphnia should be placed in new solutions of the original composite. Mortality and reproduction counts should be performed at this time (although there are usually no offspring during this early phase of the life cycle). Perform chemical/physical monitoring.

Collect and ship second composite effluent sample. Feed *Ceriodaphnia*.

Day Six

Refrigerate second composite sample ($<4^\circ\text{C}$).

Feed *Ceriodaphnia*.

Day Seven

Feed *Ceriodaphnia*.

Day Eight

Renew all test solutions using second composite sample. Count mortality and reproduction.

Perform chemical/physical monitoring. Measure and record the total residual chlorine level of the second sample. Feed *Ceriodaphnia*.

Day Nine

Feed *Ceriodaphnia* (Optional: Observe reproduction and terminate if greater than 80% of control organisms have produced a third brood).

Day Ten

Perform final mortality and reproduction counts as well as chemical/physical monitoring.

APPENDIX

In order to measure a no-effect level, the *Ceriodaphnia* are exposed to a series of effluent concentrations. This contrasts with the above procedure which uses only one concentration and a control. The reproduction within each effluent concentration is subject to a statistical analysis as defined in the EPA methods document to determine the chronic value. If the chronic value is greater than the previously defined pass/fail concentration, then the test is reported as a "Pass."

Procedures for performing this analysis are described in "North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure," July 1991, Rev. August 1994. All effluent sampling, test conditions, and test procedures are identical to those outlined in the main section of this document except for the test concentrations, number of organisms per treatment, and statistical evaluations of data. Ten organisms will be used for each treatment. The analysis of these data will be performed using methods outlined by EPA/600/4-89/001 for multiple concentration tests. Note that evaluation of reproduction effects will be based on a 95% confidence level.

QUALITY ASSURANCE CHECKLIST

The following table summarizes appropriate test conditions for the mini-chronic toxicity test. Values recorded outside of these ranges will result in an analysis being judged a "bad test" upon review by Environmental Sciences Branch personnel. The information should be used as a checklist for individual tests and does not cover the full range of quality control practices necessary for a successful completion of this analysis.

Effluent %	By Permit, SOC, or JOC
Control Mortality	≤20%
Average Reproduction for Control	Not less than 15 per surviving female
% Control Organisms Producing a Third Brood	>80%
pH Control Initial	6.5-8.5 pH units
Minimum D.O. of Control and Treatment 2	>5.0 mg/l
Hardness Dilution Water	Between 30-50 mg/l
Sample Temperature at Receipt	Between 0-4°C
Sample Age at Test Initiation	<72 Hours

References

- United States Environmental Protection Agency. 1985. Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. EPA/600/4-85/014, 162 pp.
- United States Environmental Protection Agency. 1985. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. Third Edition. EPA/600/4-85/013. 216 pp.
- United States Environmental Protection Agency. 1989. Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Second Edition. EPA/600/4-89/001, 249 pp.
- North Carolina Division of Environmental Management. December 1985. North Carolina *Ceriodaphnia* Bioassay Procedure. Rev. February 1987, June 1988, September 1989.

Appendix E

Aquatic Toxicity Testing
AT - 3 Test
Form

Environmental Sciences Branch
Water Quality Section
Division of Environmental Management
North Carolina Department of Environment, Health, and Natural Resources

Effluent Aquatic Toxicity Report Form/Phase II Chronic *Ceriodaphnia*

Facility _____	NPDES#: <u>NC</u>	Pipe# _____	County _____
Laboratory Performing Test _____		Comments _____ _____ _____	
x			
Signature of _____	Signature of Lab Supervisor _____		

Sample Information	Sample 1	Sample 2	Control	Test Information*	Start Date	End Date	Start Time	End Time
Collection Start Date					/ /	/ /	:	:
Grab				Treatment	%	%	%	Control Control Control
Composite (Duration)				pH Initial				
Hardness(mg/l)				pH Final				
Spec. Cond. (µmhos/cm)				D.O. Initial				
Chlorine(mg/l)				D.O. Final				
Sample temp. at receipt	°C	°C		Temp. Initial				
				Temp. Final				

		Organism#											
		1	2	3	4	5	6	7	8	9	10	11	12
Control	# Young												
	Adult (L)ive (D)ead												
Effluent%	# Young												
	Adult (L)ive (D)ead												
Effluent%	# Young												
	Adult (L)ive (D)ead												
Effluent%	# Young												
	Adult (L)ive (D)ead												
Effluent%	# Young												
	Adult (L)ive (D)ead												
Effluent%	# Young												
	Adult (L)ive (D)ead												

Chronic Test Results	
Final Control Mortality %	
Mean Control Repro.	
% Control 3rd Brood	
48 Hour Mortality	
Control	IWC
_____ of _____	_____ of _____
Significant? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N	
Final Mortality Significant @ _____% or No Conc.	

Reproduction Analysis:	
Repro. LOEC= _____%	NOEC= _____%
Method: _____	
Normal Distrib? _____	Method: _____
Statistic: _____	Critical: _____
Equal Variances? _____	Method: _____
Statistic: _____	Critical: _____

Non-Parametric Analysis (if applicable):		
Method: _____		
Effluent %	Rank Sum	Critical Sum
_____	_____	_____
_____	_____	_____
_____	_____	_____

Overall Analysis:	
Result = PASS/FAIL or	
Test LOEC= _____%	NOEC= _____%
Chronic Value= _____%	

MAIL TO:

ATT: Environmental Sciences
Div. of Environmental Management
N.C. Department of EHN
4401 Reedy Creek Rd.
Raleigh, N.C. 27607

*Should use highest test concentration or highest concentration with D.O. >5.0 mg/l

Appendix F

Aquatic Toxicity Testing
Quality Assurance
Checklist

Environmental Sciences Branch
Water Quality Section
Division of Environmental Management
North Carolina Department of Environment, Health, and Natural Resources

QUALITY ASSURANCE CHECKLIST

The following table summarizes appropriate test conditions for any *Ceriodaphnia* chronic toxicity test performed to fulfill a North Carolina NPDES monitoring requirement. Values recorded outside of these ranges will result in an analysis being judged a "bad test" upon review by Environmental Sciences Branch personnel. The information should be used as a checklist for individual tests and does not cover the full range of quality control practices necessary for a successful completion of this analysis.

Instream Waste Concentration(%)	By Permit, SOC, or JOC
Control Mortality	≤20%
Average Reproduction for Control	Not less than 15 per surviving female
% Control Organisms Producing a Third Brood	≥80%
pH Control Initial	6.5-8.5 pH units
Minimum D.O. of Control and Treatments	≥5.0 mg/l
Hardness of Dilution Water	Between 30-50 mg/l
Sample Temperature at Receipt	Between 0°-4°C
Sample Age at Test Initiation or Renewal	<72 Hours

Appendix G

Aquatic Toxicity Testing
Certified Biological Laboratories
List

Environmental Sciences Branch
Water Quality Section
Division of Environmental Management
North Carolina Department of Environment, Health, and Natural Resources

CERTIFIED BIOLOGICAL LABORATORIES

Category/Parameter

DEM 7/17/95

Private Contract Laboratories

Laboratory	Acute	Chronic	Aquatic Population Survey	Algal/Aquatic Plant
Burlington Research, Inc. 615 Huffman Mill Road Burlington, NC 27215 Phone: (910) 584-5564 Lab Supervisor Mr. Rick A. Diehl	<i>Ceriodaphnia dubia</i> , <i>Daphnia pulex</i> <i>Daphnia magna</i> , <i>Pimephales promelas</i>	<i>Ceriodaphnia dubia</i>		
Chemical and Environmental Technology P.O. Box 12298 Research Triangle Park, NC 27709 Phone: (919) 467-3090 Lab Supervisor Ms. Terrie H. Lutzenberger	<i>Ceriodaphnia dubia</i>	<i>Ceriodaphnia dubia</i>		
Commonwealth Technology, Inc. 2520 Regency Road Lexington, KY 40503 Phone: (606) 276-3506 Lab Supervisor Mr. Paul W. Patterson	<i>Ceriodaphnia dubia</i> <i>Daphnia pulex</i> <i>Mysidopsis bahia</i> , <i>Menidia beryllina</i> <i>Pimephales promelas</i>	<i>Ceriodaphnia dubia</i> <i>Mysidopsis bahia</i> , <i>Menidia beryllina</i> <i>Pimephales promelas</i>		
Davis & Floyd, Inc. P.O. Drawer 428 Greenwood, SC 29648 Phone: (803) 229-4413 Lab Supervisor Mr. Steven C. Davis	<i>Ceriodaphnia dubia</i>	<i>Ceriodaphnia dubia</i>		

Organism Key

Mysidopsis bahia Mysid shrimp
Menidia beryllina Silverside

Cyprinodon variegatus Sheepshead minnow
Fundulus heteroclitus Mummichog

Pimephales promelas Fathead minnow
Palaemonetes pugio Grass shrimp

CERTIFIED BIOLOGICAL LABORATORIES

DEM 7/17/95

Category/Parameter

Private Contract Laboratories

Laboratory	Acute	Chronic	Aquatic Population Survey	Algal/Aquatic Plant
EA Engineering, Science, and Technology, Inc. Hunt Valley / Loveton Center 15 Loveton Circle Sparks, MD 21152 Phone: (410) 771-4950 Lab Supervisor Mr. Richard S. Hartzell		<i>Ceriodaphnia dubia</i>		
Eckenfelder Inc. 227 French Landing Drive Nashville, TN 37228 Phone: (615) 255-2288 Lab Supervisor Ms. Sandra L. Brewer-Swartz	<i>Ceriodaphnia dubia</i> , <i>Daphnia pulex</i> , <i>Daphnia magna</i> , <i>Pimephales promelas</i>	<i>Ceriodaphnia dubia</i> , <i>Pimephales promelas</i>		
ERM-Southeast, Inc. 215 Centerview Drive Suite 110 Brentwood, TN 37027 Phone: (615) 373-3350 Lab Supervisor Mr. James R. Orr		<i>Ceriodaphnia dubia</i>		
ETT Environmental, Inc. P.O. Box 16414 Greenville, SC 29606-7414 Phone: (803) 877-6942 Lab Supervisor Dr. Robert W. Kelley	<i>Ceriodaphnia dubia</i> , <i>Pimephales promelas</i>	<i>Ceriodaphnia dubia</i>		

Organism Key

Mysidopsis bahia Mysid shrimp
Menidia beryllina Silverside

Cyprinodon variegatus Sheepshead minnow
Fundulus heteroclitus Mummichog

Pimephales promelas Fathead minnow
Palaemonetes pugio Grass shrimp

CERTIFIED BIOLOGICAL LABORATORIES

DEM 7/17/95

Category/Parameter

Private Contract Laboratories

Laboratory	Acute	Chronic	Aquatic Population Survey	Algal/Aquatic Plant
HydroLogic, Inc. 2500 Gateway Centre Blvd. Suite 900 Morrisville, NC 27560 Phone: (919) 380-9699 Lab Supervisor Ms. Linda M. Mackenzie	<i>Ceriodaphnia dubia</i> , <i>Pimephales promelas</i>	<i>Ceriodaphnia dubia</i> , <i>Pimephales promelas</i>		
James R. Reed and Associates 11864 Canon Blvd. Suite 103 Newport News, VA 23606 Phone: (804) 873-4703 Lab Supervisor Mr. Donald S. Bolinger Jr.	<i>Mysidopsis bahia</i> , <i>Pimephales promelas</i>	<i>Ceriodaphnia dubia</i>		
Pace, Inc. 54 Ravenscroft Drive Asheville, NC 28801 Phone: (704) 254-7176 Lab Supervisor Ms. Sherry Ratzlaff	<i>Ceriodaphnia dubia</i> , <i>Daphnia pulex</i> , <i>Pimephales promelas</i>	<i>Ceriodaphnia dubia</i> , <i>Pimephales promelas</i>		
Pennington & Associates, Inc. P.O. Box 2887 Cookeville, TN 38502-2887 Phone: (615) 526-6038 Lab Supervisor Mr. Wendell L. Pennington			Fish, Macroinvertebrate, algae, zooplankton	

Organism Key

Mysidopsis bahia Mysid shrimp
Menidia beryllina Silverside

Cyprinodon variegatus Sheepshead minnow
Fundulus heteroclitus Mummichog

Pimephales promelas Fathead minnow
Palaemonetes pugio Grass shrimp

CERTIFIED BIOLOGICAL LABORATORIES

DEM 7/17/95

Category/Parameter

Private Contract Laboratories

Laboratory	Acute	Chronic	Aquatic Population Survey	Algal/Aquatic Plant
Research and Analytical Labs, Inc. P.O. Box 473 Kernersville, NC 27285 Phone: (910) 996-2841 Lab Supervisor Mr. James M. Cheshire	<i>Ceriodaphnia dubia</i> , <i>Daphnia pulex</i> , <i>Pimephales promelas</i>	<i>Ceriodaphnia dubia</i>		
RMT, Inc. P.O. Box 16778 Greenville, SC 29606 Phone: (803) 281-0030 Lab Supervisor Mr. Jeff N. Crisp	<i>Ceriodaphnia dubia</i>	<i>Ceriodaphnia dubia</i>		
Robert J. Goldstein & Associates, Inc. 8480 Garvey Drive Raleigh, NC 27604 Phone: (919) 872-1174 Lab Supervisor Ms. Tracey L. Daly	<i>Ceriodaphnia dubia</i> <i>Daphnia pulex</i> <i>Daphnia magna</i>	<i>Ceriodaphnia dubia</i>		
The Advent Group, Inc. P.O. Box 1147 Brentwood, TN 37024-1147 Phone: (615) 377-4775 Lab Supervisor Ms. Erika M. Godwin-Saad	<i>Ceriodaphnia dubia</i> , <i>Daphnia pulex</i> , <i>Daphnia magna</i> , <i>Pimephales promelas</i>	<i>Ceriodaphnia dubia</i> , <i>Pimephales promelas</i>		

Organism Key

Mysidopsis bahia Mysid shrimp
Menidia beryllina Silverside

Cyprinodon variegatus Sheepshead minnow
Fundulus heteroclitus Mummichog

Pimephales promelas Fathead minnow
Palaemonetes pugio Grass shrimp

CERTIFIED BIOLOGICAL LABORATORIES

DEM 7/17/95

Category/Parameter

Private Contract Laboratories

Laboratory	Acute	Chronic	Aquatic Population Survey	Algal/Aquatic Plant
Water Technology and Controls, Inc. 642 Tamco Road Reidsville, NC 27320 Phone: (910) 342-4748 Lab Supervisor Mr. Mohammad Afzal	<i>Ceriodaphnia dubia</i> , <i>Pimephales promelas</i>	<i>Ceriodaphnia dubia</i>		
Webb Technical Group, Inc. 4325 Pleasant Valley Rd., Suite 110 Raleigh, NC 27612 Phone: (919) 834-4984 Lab Supervisor Mr. Kirk M. Stafford	<i>Ceriodaphnia dubia</i>	<i>Ceriodaphnia dubia</i>		

Organism Key

Mysidopsis bahia Mysid shrimp
Menidia beryllina Silverside

Cyprinodon variegatus Sheepshead minnow
Fundulus heteroclitus Mummichog

Pimephales promelas Fathead minnow
Palaemonetes pugio Grass shrimp

CERTIFIED BIOLOGICAL LABORATORIES

DEM 7/17/95

Category/Parameter

Municipal / Public Utility Laboratories

Laboratory	Acute	Chronic	Aquatic Population Survey	Algal/Aquatic Plant
CP&L Environmental Services P.O. Box 327 New Hill, NC 27562 Phone: (919) 362-3288 Lab Supervisor Mr. W. Reid Garrett Jr.	<i>Ceriodaphnia dubia</i> , <i>Pimephales promelas</i>	<i>Ceriodaphnia dubia</i>	Fish, Macroinvertebrate, Algae, Macrophyte, Zooplankton	
Duke Power Company, Environmental Center (MG03A3) Training and Tech Center 13339 Hagers Ferry Rd. Huntersville, NC 28078 Phone: (704) 875-5240 Lab Supervisor Mr. Gene E. Vaughan	<i>Ceriodaphnia dubia</i>	<i>Ceriodaphnia dubia</i>	Fish, Macroinvertebrate, Algae, Macrophyte, Zooplankton	
High Point Central Lab Services P.O. Box 230 High Point, NC 27261 Phone: (910) 883-3410 Lab Supervisor Mr. William D. Frazier	<i>Ceriodaphnia dubia</i>	<i>Ceriodaphnia dubia</i>		

Organism Key

Mysidopsis bahia Mysid shrimp
Menidia beryllina Silverside

Cyprinodon variegatus Sheepshead minnow
Fundulus heteroclitus Mummichog

Pimephales promelas Fathead minnow
Palaemonetes pugio Grass shrimp

Appendix H

Aquatic Toxicity Testing
Regional Office
Contacts

Environmental Sciences Branch
Water Quality Section
Division of Environmental Management
North Carolina Department of Environment, Health, and Natural Resources

REGIONAL OFFICES

ASHEVILLE REGIONAL OFFICE

Roy Davis/Reg. Supervisor
Forrest Westall/ WQ Supv.

Interchange Building
59 Woodfin Place
Asheville, NC 28801
704/251-6208
FAX # 704/251-6452

COURIER

DEHNR

Asheville 06-78-16

Avery	Macon
Buncombe	Madison
Burke	McDowell
Caldwell	Mitchell
Cherokee	Polk
Clay	Rutherford
Graham	Swain
Haywood	Transylvania
Henderson	Yancey
Jackson	

FAYETTEVILLE REGIONAL OFFICE

Tommy Stevens/Reg. Supervisor
Mike Wicker/WQ Supv.

Wachovia Building
Suite 714
Fayetteville, NC 28301
910/486-1541
FAX # 910/486-0707

COURIER

DEHNR

Fayetteville 14-56-25

Anson	Moore
Bladen	Robeson
Cumberland	Richmond
Harnett	Sampson
Hoke	Scotland
Montgomery	

MOORESVILLE REGIONAL OFFICE

Brenda Smith/Reg. Supervisor
Rex Gleason/WQ Supv.

919 North Main Street
Mooresville, NC 28115
704/663-1699
FAX # 704/663-6040

COURIER

DEHNR

Mooresville 13-21-07

Alexander	Lincoln
Cabarrus	Mecklenburg
Catawba	Rowan
Cleveland	Stanly
Gaston	Union
Iredell	

WASHINGTON REGIONAL OFFICE

Jim Mulligan/Reg. Supervisor
Roger Thorpe/WQ Supv.

1424 Carolina Avenue
Washington, NC 27889
919/946-6481
FAX # 919/975-3716

COURIER

DEHNR

Washington 16-04-01

Beaufort	Jones
Bertie	Lenoir
Camden	Martin
Chowan	Pamlico
Craven	Pasquotank
Currituck	Perquimans
Dare	Pitt
Gates	Tyrell
Greene	Washington
Hertford	Wayne
Hyde	

WILMINGTON REGIONAL OFFICE

Rick Shiver/Reg. Supervisor
Dave Adkins/WQ Supv.

127 Cardinal Drive Extension
Wilmington, NC 28405-3845
910/395-3900
FAX # 910/350-2004

COURIER

DEHNR

Wilmington 04-16-33

Brunswick	New Hanover
Carteret	Onslow
Columbus	Pender
Duplin	

WINSTON-SALEM REGIONAL OFFICE

Larry Coble/Reg. Supervisor
Steve Mauney/WQ Supv.

8025 North Point Boulevard, Suite 100
Winston-Salem, NC 27106
910/896-7007
FAX # 910/896-7005

COURIER

DEHNR

Winston-Salem 09-27-46

Alamance	Forsyth	Watauga
Alleghany	Guilford	Wilkes
Ashe	Rockingham	Yadkin
Caswell	Randolph	
Davidson	Stokes	
Davie	Surry	

RALEIGH REGIONAL OFFICE

Ken Schuster/Reg. Supervisor
Tim Donnelly/WQ Supv.

3800 Barrett Drive, PO Box 27687
Raleigh, NC 27611
919/571-4700
FAX # 919/571-4718

INTEROFFICE

DEHNR

Raleigh Regional Office

Chatham	Johnston	Vance
Durham	Lee	Wake
Edgecombe	Nash	Warren
Franklin	Northampton	Wilson
Granville	Orange	
Hallifax	Person	

Appendix I

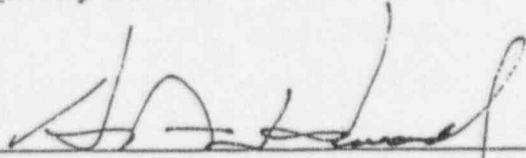
Aquatic Toxicity Testing
Chronic Pass/Fail
Toxicity Test Method

Environmental Sciences Branch
Water Quality Section
Division of Environmental Management
North Carolina Department of Environment, Health, and Natural Resources

North Carolina Phase II
Chronic Whole Effluent Toxicity Test Procedure
July, 1991
Revised September 1994

North Carolina Department of Environment,
Health, and Natural Resources
Division of Environmental Management
Water Quality Section

This procedure has been approved for release


A. Preston Howard, Jr., P.E., Director

9-28-94

Date

North Carolina Phase II Chronic Whole Effluent Toxicity Test Procedure

This procedure has been established as a modification of the U.S. Environmental Protection Agency document entitled "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (EPA/600/4-85/014) and its subsequent edition entitled "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Second Edition" (EPA/600/4-89/001). A further modification of the methodology outlined here which utilizes a single effluent concentration and a control treatment to determine compliance is outlined in the Appendix.

This test procedure has been approved by the Director of the North Carolina Division of Environmental Management under the Fresh Surface Water Classification Standards (15A.NCAC.2B.(211) as suitable for evaluation of the effects of toxic substances to sensitive aquatic species. It shall be considered as an acceptable proof effluents are not causing chronic impacts to aquatic life in the receiving streams due to toxic substances. It does not directly address mutagens, carcinogens, teratogens, or disease-causing agents and may be superseded by other water quality regulations. Depending on the designated use and specialized concerns of a particular water body (or effluent discharge), additional monitoring and/or restrictions (either chemical or biological) may be required. These monitoring requirements may include, but are not limited to, additional toxicity testing using alternate test organisms, unmodified EPA protocols, or increased sampling or test solution renewal frequencies.

The test organism used for this test is *Ceriodaphnia dubia*, a small cladoceran common in lakes and larger rivers frequently used as an aquatic toxicity test organism. The organism has a rapid life cycle at 25°C, potentially producing numerous offspring during a seven-day period.

The measures of effect used in this test are number of offspring produced and mortality within the test period. This document will outline approved variations from the EPA procedure. Only those modifications outlined here or approved by written exception made by NC DEM may be made to the EPA guidelines. This document is organized into five sections which include: 1) Effluent sampling, 2) Major test procedures, 3) Interpretation of results, 4) An outline of daily activities to be performed prior to and during the test period (Table), and 5) Appendix, which outlines methodology to determine permit toxicity limit compliance utilizing one effluent concentration and a control treatment.

EFFLUENT SAMPLING AND HANDLING

All effluent samples collected for this procedure must be 24-hour composites unless grab samples or other alternate sampling regimes are specifically allowed by the facility's permit or monitoring requirement. Sampling should be performed below the last waste treatment process, including disinfection. There may be no removal of chlorine or any other effluent constituent from the sample by either chemical or physical methods prior to testing with the exception of allowable filtration of the effluent through 60 μm nylon screen or plankton netting and reduction of excess dissolved oxygen to the saturation level, as per EPA methods.

Sample collection materials may be tempered glass, polyethylene, perfluorocarbon plastics including Teflon®, 304 or 316 stainless steel, polypropylene, polyvinylchloride, Tygon®, or silicone. All non-perfluorocarbon plastics should be discarded after use. It is the responsibility of the collector to assure that contamination is not influencing test results. Care should be taken that sufficient sample volume is collected in order to perform the test.

Effluent samples must be maintained between 0°C and 4°C, inclusive, from collection, in the case of grab samples, or initiation of collection through the use of an iced or refrigerated sampler, in the case of composite samples, until they are utilized in the toxicity testing procedure. The single allowable exception to this protocol is the situation in which a grab sample is collected and delivered to the performing laboratory and used for test initiation no later than 4 hours following the time of collection. All other samples must be received by the certified biological laboratory at a temperature between 0°C and 4°C, inclusive, or they will be considered invalid.

Each effluent sample collected for this procedure must follow certain timing/scheduling constraints. By definition of this method, each composite sampling must be performed over two calendar days (Day One through Day Two, and Day Four through Day Five, as defined in Table). For purposes of defining the month in which the test is indicative of compliance, the start date of the first sample for any given test will be considered the month (and quarter) in which the test was performed. The sampling schedule is intended to be performed on Monday through Tuesday and Thursday through Friday. Shifting the sampling days is acceptable, assuming that the relative chronology and sequence of sampling and testing activities remains constant and the certified biological laboratory is capable of meeting such a schedule. No sample will be used which exceeds 72 hours of age, measured beginning with collection time of a grab sample or the final sub-sample of a composite sample and extending to the time that the sample is used for test initiation or test renewal. "Use" here is defined as the transfer of test organisms to the solutions. For example, a composite sample initiated on Monday at 10:00 AM and terminated at 10:00 AM on Tuesday should be received by the performing laboratory for test initiation by 10:00 AM on Wednesday, with the first renewal using that sample taking place by 10:00 AM on Friday. Likewise, the second sample,

initiated at 10:00 AM on Thursday and terminated at 10:00 AM on Friday, must be used for the final test renewal by 10:00 AM the following Monday. As such, careful coordination should take place between sampling personnel and the certified biological laboratory so that sampling schedules can be accommodated within protocol constraints of the testing method.

Preparation of split samples must be performed carefully to insure that each laboratory receives and analyzes similar samples. This similarity should take into account possible variables including, but not limited to, sample mixing, sample containers, lack of air space in sample containers, sample temperature, pH, conductance, and total residual chlorine. Additionally, if concurrent analyses are sought on split samples, performing laboratories should coordinate analytical times and dates. Analyses of split samples performed at significantly different times or on different dates will be considered as independent analyses.

TEST PROCEDURE

The test shall be performed as a minimum of six treatments exposing 10 test organisms to each. The first treatment shall be considered the control population and shall be dosed at 0% effluent and 100% dilution water. One of the minimum of five effluent treatments must be a concentration of effluent mixed with dilution water which corresponds to the facility's instream waste concentration (IWC). The IWC is calculated as follows:

$$\% \text{ Effluent(IWC)} = \frac{\text{Permitted Discharge Volume} \times 100}{\text{Permitted Discharge Volume} + 7Q_{10}^*}$$

*Where 7Q₁₀ is defined as the lowest average 7 day flow in the receiving stream which has a probability of reoccurrence every ten years. All terms must have equivalent units.

At least two of the effluent test treatments must be of a lesser effluent concentration than the IWC, with one being one-half the concentration of the IWC. No concentration should be greater than two times that of the next lower concentration or less than one half of the next higher concentration. The following are possible test concentrations for a facility with an IWC of 45%:

22.5%†

35.0%†

45.0%†

70.0%

90.0%

†Indicates required concentrations for this example, i.e. IWC and two lower concentrations.

Dilution water must be the culture water used to maintain the test population or be suitable for that purpose. The pH of this water at test initiation and initiation of subsequent test solution renewals must fall in the range of 6.5-8.5 standard units. Total hardness must measure between 30 and 50 mg/l.

Ten test organisms will be exposed to each treatment in individual test chambers. The test will run until at least 80% of the surviving control organisms produce three broods of young, not to exceed a seven day exposure, using the chronology specified in the Table. (Termination should be contingent upon whether the control reproduction mean has reached the minimum acceptable value of 15 young per surviving female.)

The objective of this test is to determine the effluent's No-Observed-Effect Concentration (NOEC), Lowest-Observed-Effect Concentration (LOEC), and Chronic Value (ChV). The NOEC and LOEC are determined by identifying which effluent concentrations tested have significant detrimental impact upon reproduction and/or survival as compared to the control population. The lowest effluent concentration tested which displays significant impact upon survival or reproduction is the LOEC. The highest effluent concentration tested which does not display significant impact to either survival or reproduction as compared to the control population is the NOEC. The ChV is defined as the geometric mean of the NOEC and LOEC.

After effluent collection on Days One and Two, the test treatments will be prepared and the test initiated on Day Three (Table). An aliquot of the first composite sample is brought to room temperature and utilized to mix test solutions, which are then distributed to the test vessels. (Effluent samples are to be refrigerated at a temperature between 0° and 4° C except when aliquots are drawn for mixing test solutions.) The pH, dissolved oxygen and temperature must be checked and recorded prior to the introduction of the test organisms. At all times temperature of the test solutions must be 25°C (±1°C) and dissolved oxygen must be equal to or greater than 5.0 mg/l.

The test organisms are placed singly in test vessels each containing 15 milliliters of solution. The organisms must all be less than 24 hours old, all within 8 hours of the same age, from the third or subsequent brood, and from broods in which the adult produced at least 8 neonates. All test organisms must be produced by "individual" cultures as defined by "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Second Edition" (EPA/600/4-89/001). Neonates are transferred using an eye dropper, such that the organism is never removed from solution. There should be as little water transferred with the organism as is reasonably practical. All *Ceriodaphnia* should be fed at this time and daily thereafter. Each daily feeding will consist of addition of 0.05 ml of YCT food and 0.05 ml of a solution of the algae *Selenastrum capricornutum* (with a cell concentration of 1.71×10^7 cells/ml) per 15 milliliters of test solution. Preparation of food supplies are described by EPA/600/4-89/001 (alternative algal media preparation methods are described in "North Carolina Biological Laboratory Certification/Procedures Document"), though feeding rates have been modified for this protocol. The photoperiod must be maintained at 16 hours of light and 8 hours of darkness.

On Days Four and Five, a second effluent sample is taken to be used for renewal of the test solutions on Day Eight. Also on Day Five the original test organisms are transferred to new test vessels containing new control and effluent solutions. The effluent solutions are mixed from the original effluent sample. This renewal must take place within 72 hours of the final effluent collection time. **Mortality** must be recorded at this time. Mortality in the treatment equal to the IWC should be compared to mortality in the control using the Fisher's Exact Test at a 95% confidence level. Reproduction counts should be performed in all vessels used during the initial test period (although there are usually no offspring during this phase in the life cycle). Temperature, dissolved oxygen, and pH observations must also be made and recorded for both the old and new test solutions. The new test solutions should receive food at this time.

Days Six and Seven require only that the *Ceriodaphnia* be fed. Day Eight requires renewal of the test solutions using the second effluent sample. This renewal must take place within 72 hours of the final effluent collection time. Mortality, reproduction, temperature, dissolved oxygen, and pH observations must be made and recorded. Reproduction of the initial test organisms must be observed both as total number of young produced as well as brood number of the young produced (i.e. first, second, or third brood). On Day Nine, the test organisms should be observed for production of the third brood by the control organisms. If 80% or more of the control organisms have produced a third brood, the test may be terminated. This will also hold true for observations made on Day Eight. On Day Ten, the test is terminated after making final mortality, reproduction and chemical/physical observations. Fourth brood neonates will be excluded from the reproduction totals. The test exposure duration will be no greater than seven days regardless of control organism reproductive success. All entries to test bench sheets should be initialed by the person making the entry in a manner that will signify which entry was made by which analyst.

INTERPRETATION OF RESULTS

The statistical comparisons for evaluating the test results should be performed as outlined on pages 128-143 and in Appendices B through G in EPA/600/4-89/001. To test for normality of data, the chi-square test for goodness of fit may be used if the Kolmogorov statistic is not available (note that the Shapiro-Wilks test should be utilized to assess the normality of datasets with 50 or fewer datapoints). The chi-square procedure is available in most basic statistics books. Confidence levels for each statistical procedure will be those specified in EPA/600/4-89/001.

Mortality greater than 20% in the control population will be considered as abnormal, and the test must be declared invalid. In addition, average reproduction in the control population must exceed 15 offspring per surviving female, or the test must be declared invalid. For data analysis, mean reproduction is calculated by summing the total number of young produced per treatment until either time of death or end of the experiment and dividing by the number of females exposed per treatment. Note that fourth brood neonates will be excluded from the reproduction totals. A chronic value (ChV) is determined as the geometric mean of the LOEC and NOEC from the toxicity test results. If the lowest effluent concentration is also the LOEC, then the ChV will be considered the geometric mean of the LOEC and one-half the LOEC. If the highest effluent concentration is also the NOEC, then the ChV will be considered the NOEC.

If these tests are being performed as an NPDES requirement or by Administrative Letter, then the ChV must be entered on the Effluent Discharge Monitoring Form (MR-1) for the month during which the first effluent sample was collected using the parameter code THP3B. Additionally, DEM Form AT-3 (original) is to be sent to the following address:

Environmental Sciences Branch
North Carolina Division of Environmental Management
4401 Reedy Creek Road
Raleigh, North Carolina 27607-6445

Table

CHRONIC WHOLE EFFLUENT TOXICITY TEST PROCEDURE
--

Day One

On this day, start a 24-hour composite sampling device. Sampling devices should be refrigerated or cooled by ice.

Day Two

The effluent sample will be collected, sealed, and packaged on ice or refrigerant to maintain a temperature between 0° and 4° C, inclusive, and shipped to the laboratory where the toxicity test will be performed. (Alternatively, a grab sample may be collected on this day if the NPDES permit specifies such a sample.)

Day Three

The test treatments will be set up and test organisms introduced. Dissolved oxygen, temperature, and pH will be measured and recorded. Dissolved oxygen should be ≥ 5.0 mg/l, and the temperature should be maintained at 25°C ($\pm 1^\circ\text{C}$). The total residual chlorine level of the whole sample should be measured and recorded. Feed *Ceriodaphnia*.

Day Four

- Start second 24-hour effluent composite sample.
- Feed *Ceriodaphnia*.

Day Five

- Ceriodaphnia* should be transferred to new solutions of the original sample. Mortality and reproduction counts should be performed and recorded at this time. (There are usually no offspring during this early phase of the life cycle.) Perform chemical/physical monitoring. Collect and ship second effluent sample.
- Feed *Ceriodaphnia*.

Day Six

- Refrigerate second effluent sample (0°-4°C).
- Feed *Ceriodaphnia*.

Day Seven

- Feed *Ceriodaphnia*.

Day Eight

- Renew all test solutions using second effluent sample prior to the sample reaching 72 hours in age. Count and record mortality and reproduction. Perform chemical/physical monitoring. Measure and record the total residual chlorine level of the second sample. Feed *Ceriodaphnia*.

Day Nine

- Feed *Ceriodaphnia*. (Option: Observe stage of reproduction and terminate if 80% or greater of control organisms have produced their third broods.)

Day Ten

- Perform final mortality and reproduction counts as well as chemical/physical monitoring.

APPENDIX

This appendix provides an optional means of determining compliance by comparing a single effluent treatment to a control. Discretion should be used when choosing this option. Given that the result does not produce a no-effect level, an artificial endpoint will be generated which may or may not be advantageous from a compliance standpoint. The option to perform this variation of the chronic procedure may only be exercised as the first test of the monitoring quarter. If a failure should result, at least two multiple concentration tests (one per month) must be performed by the end of the monitoring quarter.

All effluent sampling, test conditions, and test procedures are identical to those outlined in the main section of this document except for the test concentrations, number of organisms per treatment, and statistical evaluations of data. Twelve organisms will be used for each treatment. There will be only two treatments, a control and an effluent concentration equal to the IWC as defined previously. Due to the limited ability of this modification to define a chronic no-observed-effect level, the test performed using this appendix procedure may be terminated at 48 hours should the mortality in the effluent treatment significantly exceed that of the control treatment as determined by the Fisher's Exact test.

The statistical comparisons for evaluating the test results should be performed as outlined in Appendix H (entitled "Toxicity Screening Test - Comparison of Control with 100% Effluent or Instream Waste Concentration") of EPA/600/4-89/001, with the exception that reproduction data are to be evaluated at a 99% confidence level. A statistical difference between the control (Treatment 1) and the effluent (Treatment 2) caused by decreased reproduction or increased mortality in the effluent treatment will be considered as a failure of this effluent to meet toxicity standards within the receiving stream. For compliance purposes, a "Fail" result will be averaged with other quarterly monitoring data as a chronic value (ChV) equal to the geometric mean of the IWC and one-half the IWC. In the event of a "Pass" result, the ChV will be considered to be a value greater than the IWC (">XX%"). The ChV must be entered on the Effluent Discharge Monitoring Form (MR-1) for the month during which the first effluent sample was collected using the parameter code THP3B. Additionally, DEM Form AT-3 (original) is to be sent to the same address noted above.

QUALITY ASSURANCE CHECKLIST

The following table summarizes appropriate test conditions for any *Ceriodaphnia* chronic toxicity test performed to fulfill a North Carolina NPDES monitoring requirement. Values recorded outside of these ranges will result in an analysis being judged a "bad test" upon review by Environmental Sciences Branch personnel. The information should be used as a checklist for individual tests and does not cover the full range of quality control practices necessary for a successful completion of this analysis.

Instream Waste Concentration(%)	By Permit, SOC, or JOC
Control Mortality	≤ 20%
Average Reproduction for Control	Not less than 15 per surviving female
% Control Organisms Producing a Third Brood	≥ 80%
pH Control Initial	6.5-8.5 pH units
Minimum D.O. of Control and Treatments	≥5.0 mg/l
Hardness of Dilution Water	Between 30-50 mg/l
Sample Temperature at Receipt	Between 0°-4°C
Sample Age at Test Initiation	< 72 Hours

References

- United States Environmental Protection Agency. 1985. Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. EPA/600/4-85/014, 162 pp.
- United States Environmental Protection Agency. 1985. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. Third Edition. EPA/600/4-85/013, 216 pp.
- United States Environmental Protection Agency. 1989. Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Second Edition. EPA/600/4-89/001, 249 pp.

State of North Carolina
Department of Environment,
Health and Natural Resources
Division of Environmental Management

James B. Hunt, Jr., Governor
Jonathan B. Howes, Secretary
A. Preston Howard, Jr., P.E., Director



ENVIRONMENTAL PROTECTION SYSTEM

April 13, 1995

APR 24 1995

Mr. J. S. Carter, Technical System Manager
Duke Power Company
1339 Hagers Ferry Road
Huntersville, NC 28078

☐ FILE
☐ TICKLER DATE

Subject: Project Return ☐ CCOPY
Duke Power Company
McGuire Nuclear Station
Additional sewer modifications
Mecklenburg County ☐ McGuire

Dear Mr. Carter:

This is in reference to your additional information letter received March 28, 1995 for the construction and operation of the subject collection system applied under application number WQ0010555.

This additional information letter indicated that four additional pump stations and associated piping were requested to be included with the additional information submitted on March 28, 1995. The North Carolina Statutes and Regulations state strict review and issuance deadlines for received projects. Applications must be reviewed and issued 90 days after receipt of a completed application. With the addition of the four pump stations to this application and the confusion of the application package at the initial submittal (under the NPDES section), the deadline is a concern. We received the original permit application on November 14, 1994. Therefore, the Division must return the request for the additional four pump stations and ask Duke Power Company to resubmit the pump stations as a separate permit modification to the Permit No. WQ0010555.

The permit modification should include three sets of plans and specifications, calculations for the four pump stations, a complete application and a new \$400.00 permit processing fee.

Please be advised that construction and/or operation of wastewater collection, treatment, and/or disposal facilities without a valid permit is a violation of North Carolina General Statute 143-215.1 and may subject Duke Power Company to appropriate enforcement actions in accordance with North Carolina General Statute 143-215.6. Civil penalties of up to \$10,000 per day per violation may be assessed for failure to secure a permit required by North Carolina General Statute 143-215.1.

If you have any questions or comments concerning this matter, please contact Mr. Randy Kepler at (919) 733-5083 ext. 544.

Sincerely,

A. Preston Howard, Jr.
A. Preston Howard, Jr., P.E.

cc: Mooresville Regional Office, Water Quality Section
Permit File WQ0010555

State of North Carolina
Department of Environment,
Health and Natural Resources
Division of Environmental Management

James B. Hunt, Jr., Governor
Jonathan B. Howes, Secretary
A. Preston Howard, Jr., P.E., Director



April 13, 1995

Mr. J.S. Carter, Technical System Manager
Duke Power Company
13339 Hagers Ferry Road
Huntersville, NC 28078

MAY 05 1995

☐ FILE _____
☐ TICKLER DATE _____

☒ COPY DW Phillip

Subject: Permit No. WQ0010555 _____
Duke Power Company _____
McGuire Nuclear ~~Station~~ ROUTE NGA _____
Sewer Modifications/Extension _____
Mecklenburg County _____

Dear Mr. Carter;

In accordance with your application received November 14, 1994, we are forwarding herewith Permit No. WQ0010555 dated April 13, 1995, to Duke Power Company for the construction and operation of the subject wastewater collection modifications/extension.

This permit shall be effective from the date of issuance until rescinded and shall be subject to the conditions and limitations as specified therein.

If any parts, requirements, or limitations contained in this permit are unacceptable, you have the right to request an adjudicatory hearing upon written request within thirty (30) days following receipt of this permit. This request must be in the form of a written petition, conforming to Chapter 150B of the North Carolina General Statutes, and filed with the Office of Administrative Hearings, P.O. Drawer 27447, Raleigh, NC 27611-7447. Unless such demands are made this permit shall be final and binding.

One set of approved plans and specifications is being forwarded to you. If you need additional information concerning this matter, please contact Mr. Randy Kepler at (919) 733-5083 ext. 544.

Sincerely,

Randy W. M. F. Carter

A. Preston Howard, Jr., P.E.

cc: Mecklenburg County Health Department
Mooresville Regional Office, Water Quality Section
Linus G. Goodman, III, P.E. Duke Power Company

5. This permit is not transferable. In the event there is a desire for the facilities to change ownership, or there is a name change of the Permittee, a formal permit request must be submitted to the Division of Environmental Management accompanied by an application fee, documentation from the parties involved, and other supporting materials as may be appropriate. The approval of this request will be considered on its merits and may or may not be approved.
6. Construction of the sewers, pump station(s) and force main shall be scheduled so as not to interrupt service by the existing utilities nor result in an overflow or bypass discharge of wastewater to the surface waters of the State.
7. Upon completion of construction and prior to operation of this permitted facility, a certification must be received from a professional engineer certifying that the permitted facility has been installed in accordance with this permit, the approved plans and specifications, and other supporting materials. Mail the Certification to the Water Quality Permits and Engineering Unit, P.O. Box 29535, Raleigh, NC 27626-0535.
8. A copy of the approved plans and specifications shall be maintained on file by the Permittee for a minimum of five years from the date of the completion of construction.
9. Failure to abide by the conditions and limitations contained in this permit may subject the Permittee to an enforcement action by the Division of Environmental Management, in accordance with North Carolina General Statute 143-215.6(a) to 143-215.6(c).
10. The issuance of this permit does not preclude the Permittee from complying with any and all statutes, rules, regulations, or ordinances which may be imposed by other government agencies (local, state, and federal) which have jurisdiction.
11. The Permittee shall provide for the pump station and force main the following items:
 - a. Pump on/off elevations located so that 2-8 pumping cycles may be achieved per hour in the pump station or adequate measures taken to eliminate odor problems,
 - b. An air relief valve located at all high points along the force main,
 - c. A screened vent for the wet well,
 - d. Fillets located in the wet well at the intersection of the flooring and sidewalls,
 - e. Three feet of cover (minimum) over the force main or the use of ferrous material where three feet cannot be maintained,
 - f. Sufficient devices which will protect the pump station from vandals, and
 - g. Flood protection if the pump station is located below the 100-year flood elevation.
12. In the event that the facilities fail to perform satisfactorily, including the creation of nuisance conditions, the Permittee shall take immediate corrective action, including those as may be required by this Division, such as the construction of additional or replacement wastewater collection facilities.
13. **NONCOMPLIANCE NOTIFICATION:**

The Permittee shall report by telephone to the Mooresville Regional Office, telephone number 704-663-1699, as soon as possible, but in no case more than 24 hours or on the next working day following the occurrence or first knowledge of the occurrence of either of the following:

ENGINEER'S CERTIFICATION

I, _____, as a duly registered Professional Engineer in the State of North Carolina, having been authorized to observe (periodically, weekly, full time) the construction of the project, _____, _____ for the
Project Name *Location*

Permittee hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of this permit, the approved plans and specifications, and other supporting materials.

Signature _____ Registration No. _____

Date _____



DUKE POWER

March 10, 1995

Ms. Coleen Sullins
Permits & Engineering
NCDEHNR
Division of Environmental Management
P.O. Box 29535
Raleigh, NC 27626-0535

Subject: NPDES NCS000020
Delegation of Authority

Dear Ms. Sullins:

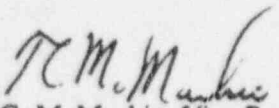
Federal regulation 40 CFR 122.26 as well as Part II of McGuire's Stormwater Permit specify that all reports required by the stormwater permit and other information requested by the permit issuing authority shall be signed by a principal executive officer of at least the level of Vice President or duly authorized representative.

I hereby authorize Mr. John S. Carter - ESS/Water Protection to sign all reports and requested information related to the NPDES Stormwater Permit. In addition, please revise the database to reflect that all correspondence associated with this permit be addressed to Mr. Carter at the address given below. This will prevent any unnecessary delays of correspondence associated with this permit.

Mr. John S. Carter, Manager - ESS/Water Protection
Duke Power Company, MG03A5
13339 Hagers Ferry Road
Huntersville, NC 28078-7929

If you have any questions or need additional information, please contact Mr. Carter at (704)875-5954.

Sincerely,


T.C. McMeekin, Vice President
McGuire Nuclear Station

cc: Mr. Rex Gleason - NCDEHNR Mooresville Regional Office
J.S. Carter - MG03A5
D.W. Phillips - MG02EM
M.T. Kuck - MG03A5