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Am-29 to DPR-62

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

July 25, 1977

Docket Nos. 50-325
and 50-324

Carolina Power & Light Company
ATTN: Mr. J. A. Jones
Executive Vice President
336 Fayetteville Street
Raleigh, North Carolina 27602

Gentlemen:

The Commission has issued the enclosed Amendment Nos. 7 and 29 to Facility Operating License Nos. DPR-71 and DPR-62 for the Brunswick Steam Electric Plant, Unit Nos. 1 and 2. The amendments consist of changes to the Technical Specifications in response to your request dated January 11, 1977.

The amendments revise numerous provisions in the Environmental Technical Specifications (Appendix B) relating to limitations and monitoring requirements for non-radiological liquid effluents.

Certain ETS limits have been eliminated pursuant to your request. In other cases, we have conformed the ETS to your current NPDES limits as we discussed in our letter to you dated March 29, 1977. In the area of environmental monitoring, we have made changes which make the ETS consistent with the Cape Fear Estuary Study Program. These modifications to your request were discussed with your staff and agreed to prior to issuance of these amendments. In addition, these amendments correct a pagination error which occurred when Amendment Nos. 2 and 24 were issued.

Since the amendments apply only to non-radiological liquid effluents, they do not involve significant new safety information of a type not considered by a previous Commission safety review of the facilities. They do not involve a significant increase in the probability or consequences of an accident, do not involve a significant decrease in a safety margin, and therefore do not involve a significant hazards consideration. We have also concluded that there is reasonable assurance that the health and safety of the public will not be endangered by this action.

Copies of our Environmental Impact Appraisal and Notice of Issuance are also enclosed.

Sincerely,

A. Schwencer, Chief
Operating Reactors Branch #1
Division of Operating Reactors

Enclosures:
1. Amendment No. 7 to DPR-71
2. Amendment No. 29 to DPR-62
3. Environmental Impact Appraisal
4. Notice of Issuance

cc w/encl:
See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

CAROLINA POWER & LIGHT COMPANY

DOCKET NO. 50-325

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 7
License No. DPR-71

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Carolina Power & Light Company (the licensee) dated January 11, 1977, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-71 is hereby amended to read as follows:

"(2) Technical Specifications

The Technical Specifications contained in Appendices A, A-Prime and B, as revised through Amendment No. 7 are hereby incorporated in this license. Appendix A shall be effective from the date of issuance of the Unit 1 operating license until the Appendix A-Prime becomes effective on or before the initial criticality of Brunswick Unit 2 following its initial refueling outage. Carolina Power & Light Company shall operate the facility in accordance with the Technical Specifications as indicated above. The licensee shall inform the Office of Inspection and Enforcement, Region II, of the date that the Appendix A-Prime becomes effective."

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

A. Schwencer, Chief
Operating Reactors Branch #1
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: July 25, 1977

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

CAROLINA POWER & LIGHT COMPANY

DOCKET NO. 50-324

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 29
License No. DPR-62

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Carolina Power & Light Company (the licensee) dated January 11, 1977, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commisison's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-62 is hereby amended to read as follows:

"2.C.(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 29 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications."

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

A. Schwencer, Chief
Operating Reactors Branch #1
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: July 25, 1977

ATTACHMENT TO LICENSE AMENDMENTS

AMENDMENT NO. 7 TO FACILITY LICENSE NO. DPR-71

AMENDMENT NO. 29 TO FACILITY LICENSE NO. DPR-62

DOCKET NOS. 50-325 AND 50-324

Revise Appendix B as follows:

Remove pages	Insert new pages
i/ii	i/ii
iii/blank	iii/blank
2-1/2-2	2-1/2-2
2-3/2-4	2-3/2-4
2-5/2-6	2-5/2-6
2-15/2-16	2-15/2-15a
	2-16/blank
4-1/4-2	4-1/4-2
4-3/4-4	4-3/4-4
4-5/4-6	4-5/4-5a
	4-6/blank
5-2/blank	5-2/5-3
5-3/blank	5-3a/5-4
5-4/blank	5-5/5-5a
5-5/5-5a	
6-3/6-4	6-3/6-4
6-5/6-6	6-5/6-6
6-7/6-8	6-7/blank
6-9/blank	
Figures 4.1-1 thru 4.1-6	

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 & 2

ENVIRONMENTAL TECHNICAL SPECIFICATIONS

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2.0 ENVIRONMENTAL PROTECTION CONDITIONS

General: During a national power emergency, regional emergency, reactor emergency, when the health, safety, or welfare of the public may be endangered by the inability of Carolina Power & Light Company to supply electricity, the protection limits provided in these environmental technical specifications shall be inapplicable. During such emergencies, however, the protection limits shall not be exceeded except as is necessitated by the emergency.

2.1 THERMAL

2.1.1 Maximum Temperature Rise

Objective: The purpose of this specification is to limit thermal stress to the aquatic ecosystem at the discharge to the Atlantic Ocean.

Specification: The temperature of the thermal discharge shall not exceed an increase of 32°F above the intake temperature during normal operation except for periods necessary for condenser heat treatment, operation with less than four circulating water pumps, and operation with one condenser isolated for inspection or other unusual circumstances. Should the discharge temperature exceed the above values for more than 48 hours, a report will be made as outlined in Section 5.4.2, Non-Routine Reports.

3.0 SURVEILLANCE REQUIREMENTS

3.1 THERMAL

3.1.1 Maximum Temperature Rise

Specification: Temperature of the discharge will be monitored continuously at the condenser outlet and recorded on an hourly basis; temperature of the intake will be monitored continuously and recorded on an hourly basis. In the event the monitoring system is out of service, temperature of the discharge will be monitored and recorded on an hourly basis utilizing a sensor located at the plant. Should both systems be out of service for more than 24 hours, the discharge temperature will be monitored manually once per shift.

2.0 ENVIRONMENTAL PROTECTION CONDITIONS	3.0 SURVEILLANCE REQUIREMENTS
2.1 THERMAL	3.1 THERMAL
2.1.2 Rate of Change of Discharge Temperature	3.1.2 Rate of Change of Discharge Temperature
N/A	N/A

2.0 ENVIRONMENTAL PROTECTION CONDITIONS	3.0 SURVEILLANCE REQUIREMENTS
2.1 THERMAL	3.1 THERMAL
2.1.3 Heat Treatment of Circulating Water System Objective: The objective of this specification is to limit unnecessary thermal stress on aquatic organisms by limiting the frequency, duration, and time of heat treating to that amount necessary for reliable operation of the plant. Specification: During heat treatment, the condenser water shall not exceed a temperature rise of 54°F. The duration of maximum temperature during heat treatment shall be limited to one hour per week for each condenser box. This limit is based on projected requirements for growth control when the plant becomes operational. If it is determined that the above cycle time is not sufficient to adequately protect plant circulating water system equipment or operation, an evaluation shall be made of additional operation of the heat treatment, including an estimate of incremental environmental impact, and submitted to AEC for their review and approval.	3.1.3 Heat Treatment of Circulating Water System Specification: During the periods of heat treatment, temperature of the inlet and outlet pipes of the condenser box being backwashed will be monitored continuously and recorded every 15 minutes.

2.0 ENVIRONMENTAL PROTECTION CONDITIONS	3.0 SURVEILLANCE REQUIREMENTS
2.2 CHEMICAL Objective: The purpose of these specifications is to limit the stress to the aquatic ecosystem that might be caused by the discharge of excess concentrations of chemicals.	3.2 CHEMICAL Objective: The purpose of these specifications is to ensure that chemical effluent releases are maintained within the specified levels.
2.2.1 Chlorine Specification: If the need for chlorination arises, each condenser shall be chlorinated alternately such that there shall be no discharge of total residual chlorine from one unit while another unit is being chlorinated. The concentration of free available chlorine shall not exceed a maximum instantaneous value of 0.5 mg/l nor an average value of 0.2 mg/l during the chlorination periods conducted in a calendar day. The maximum total duration of discharge of total residual chlorine from any unit shall not exceed 2 hrs/day. This Protection Condition shall be applicable under normal station operation and continue until approval for termination or modification is obtained from NRC per Section 5.4.2.c.	3.2.1 Chlorine Specification: Both free available chlorine and total residual chlorine concentration shall be measured during a chlorination period at the outlet corresponding to the individual unit being chlorinated. The frequency of sampling and measurement shall be once per week. The results of the monitoring conducted under this section shall be summarized, analyzed, interpreted and reported under Section 5.4.1.1. For each measurement, the date of the analysis, the free available chlorine concentration, the total residual chlorine concentration, and the method of analysis used shall be recorded. A non-routine report as specified in Section 5.4.2 shall be made for any measurement of free available chlorine or total residual chlorine that is in excess of the effluent limitations prescribed by the U.S. Environmental Protection Agency and the State of North Carolina in the permits and certificates issued to the licensee pursuant to the provisions of Section 401 and 402 of PL 92-500.
2.2.2 Other Chemicals N/A	

2.0 ENVIRONMENTAL PROTECTION CONDITIONS	3.0 SURVEILLANCE REQUIREMENTS
	3.2 CHEMICAL 3.2.2 Other Chemicals N/A
2.2.3 Hydrogen Ion Specification: The pH value in the normalizer tanks shall be within the range of 6.0 to 9.0 prior to discharge from the tanks.	3.2.3. Hydrogen Ion Specification: pH of the normalizer tanks shall be monitored prior to discharge from the tanks on a weekly basis.

2.0 ENVIRONMENTAL PROTECTION CONDITIONS	3.0 SURVEILLANCE REQUIREMENTS
2.3 HYDRAULIC	3.3 HYDRAULIC
2.3.1 Water Level in the Discharge Canal	3.3.1 Water Level in the Discharge Canal
Objective: To minimize impact of the discharge canal on the local groundwater supply.	Specification: Water level in the discharge canal near the plant shall be monitored daily.
Specification: Water level in the discharge canal shall normally be maintained between +3.5 feet msl and +5.5 feet msl at the discharge weir. These limits may be exceeded as required either for plant maintenance or as a result of natural conditions such as heavy rainfall which is beyond the control of plant personnel.	
2.3.2 Piezometric Head	3.3.2 Piezometric Head
Objective: To minimize downwelling of water from the discharge canal.	Specification: Twenty-three piezometer stations which tap the Castle Hayne Aquifer and three which tap the Yorktown aquifer will be monitored at least twice per month (Figure 3.3-1). Four of the twenty-six piezometers in the vicinity of the plant will be monitored for piezometric head on a daily basis during initial pumping. The daily monitoring will be discontinued after the core of depression in the plant vicinity has been adequately defined. The 26 stations will be monitored twice monthly for piezometric head and samples will be collected and analyzed monthly for pH, chlorides, and conductivity. Should one of the piezometers be out of service for more than 2 months, the total outage time and dates of the outage will be reported within 30 days to the U.S. Atomic Energy Commission, Directorate of Licensing.
Specification: Piezometric head of the Castle Hayne Aquifer shall not be lowered below +2 feet msl along the discharge canal near the plant as a result of plant pumping from the aquifer. Should the piezometric pressure drop below +2 feet msl as a result of plant pumping at any monitoring point adjacent to the canal and between the plant and N.C. 133, Production Wells No. 1 and No. 3 will be shut down and plant requirements for water taken from production well No. 2. In the event production well No. 2 is not available, only that water necessary for safe operation of the plant will be taken from production wells 1 & 3. Should the Castle Hayne Aquifer piezometric pressure remain less than +2 feet msl for more than one week, as a result of Plant pumping from the aquifer; pumping from production wells 1 and 3 will halt except for emergency water usage.	On an annual basis the quantity of upwelling and downwelling will be calculated utilizing data from the piezometers.

BASES:

THERMAL - The limits of Specifications 2.1.1 and 3.1.1 will protect the aquatic ecosystem outside of the mixing zone while allowing operational flexibility necessary with only three circulating water pumps operating, operation with one condenser isolated for inspection or other unusual circumstances. During times when the ΔT is high, the circulating water flow will usually be reduced and the mixing zone size will be relatively unaffected.

It is anticipated that the thermal and temperature limits imposed by Specification 2.1.3 will be sufficient to protect circulating water system equipment and will not significantly increase projected impact. The heated water will quickly mix with the discharge from the non-backwashed condenser and be significantly diluted. All estimates of organisms damaged or killed have been based on 100% mortality with a temperature rise of 32°F. These estimates have shown that during the interim period damage would not be unacceptable. Thus, with heat treatment, the occurrance of incremental damage would not be predicted.

CHEMICAL - Chlorination of the station cooling water systems is permitted by the NPDES permit with a control on the concentration of free available chlorine in the discharge, a requirement to monitor both free available and total residual chlorine in the discharge waters of an individual unit prior to mixing, and limitations on the timing and duration of discharges of total residual chlorine from the individual units.

The NRC staff evaluated the results of the Special Chlorination Study conducted under previous Section 6.5 of the ETS (issued with Amendment No. 16 to DPR-62) to determine the likelihood of station operation to meet the threshold criterion for acceptable environmental impact at the ocean outfall with respect to total residual chlorine of up to 0.1 mg/l as stated in the FES Section V.C.2.c. This Special Study involved chlorination of the plant cooling water systems at maximum levels permitted by and at a frequency exceeding that presently allowed by the NPDES permit; total residual chlorine levels remained below the levels evaluated in the FES. The results of the review and analysis indicated that the chlorination procedures permitted by this Specification will result in discharges and resultant impacts which are within the level found acceptable in the FES.

The monitoring requirements will provide information necessary to demonstrate that plant operation is in compliance with the Environmental Protection Condition. The establishment of the specified non-routine report requirement will also alert the NRC staff to the potential for toxic conditions to exist in the vicinity of the station outfall and to unanticipated operating conditions at the station.

The requirements of the Protection Condition and the Monitoring Requirements for chlorine are consistent with the corresponding requirements of the NPDES Permit for the Brunswick Steam Electric Plant.

The pH range allowed by Specifications 2.2.3 and 3.2.3 provides adequate neutralization for protection for the resident aquatic organisms. In addition, the releases will immediately mix with the large volume of circulating water in the cooling system.

Specifications 2.3.1 and 3.3.1 maintain the discharge canal water level within a range that will minimize the potential for upwelling and downwelling effects on the aquifer.

Specifications 2.3.2 and 3.3.2 provide protective limits on drawdown of the Castle Hayne Aquifer which are designed to restrict withdrawals before adverse impact would occur. Specification 3.2.5 establishes a piezometric monitoring program that will monitor changes on the aquifer resulting from the canal operation.

Specification 2.4 provides the meteorological parameters which are measured at the plant will provide the information necessary to estimate potential radiation doses to the public from routine or accidental releases of radioactive materials to the atmosphere and meet the requirements of subparagraph 50.36a (a) (2) of 10CFR Part 50 and Appendices D and F to 10CFR 50.

RADIOACTIVE DISCHARGES

LIQUID WASTE EFFLUENTS - The release of radioactive material in liquid effluents to unrestricted areas shall not exceed the concentration limits specified in 10 CFR Part 20 and should be as low as practicable in accordance with the requirements of 10 CFR Part 50.36a. These specifications provide reasonable assurance that the resulting annual dose to the total body or any organ of an individual in an unrestricted area will not exceed 5 mrem. At the same time, these specifications permit the flexibility of operation, compatible with considerations of health and safety, to assure that the public is provided a dependable source of power under unusual operating conditions which may temporarily result in releases higher than the design objective levels but still within the concentration limits specified in 10 CFR Part 20. It is expected that by using this operational flexibility under unusual operating conditions, and exerting every effort to keep levels of radioactive material in liquid wastes as low as practicable, the annual releases will not exceed a small fraction of the concentration limits specified in 10 CFR Part 20.

The design objectives have been developed based on operating experience, taking into account a combination of variables including defective fuel, primary system leakage, and the performance of the various waste treatment systems, and are consistent with Appendix I to 10 CFR Part 50.

4.0 Environmental Monitoring

4.1 Nonradiological Monitoring: General

A. Scope and Objective of Monitoring Program

Nonradiological monitoring commenced prior to the operation of Unit 2 (the first BSEP unit to become operational and has been continued, with approved modifications, through start-up of Unit 1. The scope of these ETS program elements was developed to monitor for environmental impacts occurring during the interim period before installation of closed-cycle cooling (FES, page v).

An EPA adjudicatory hearing was held during June 1976 on the licensee's request for delay in determining whether cooling system modifications at the Brunswick plant were necessary. A final EPA decision on contested matters is pending. Following the hearing, the licensee developed an intensive program of studies on the Cape Fear Estuary (hereafter identified as the Cape Fear Estuary Study Program). Acting on a recommendation by the State of North Carolina during the EPA hearing, the licensee invited participation by State and Federal agencies and concerned citizens groups on a Program Review Committee*. The NRC technical staff is represented on that committee.

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*Letter from W. T. Hogarth (CP&L) to Charles Trammell (NRC), et al., dated November 15, 1976, RE: Carolina Power and Light Company's Brunswick Units 1 and 2.

The scope of the original ETS program for nonradiological monitoring has been greatly expanded by the licensee**. However, by encompassing the original objective, i.e., to determine whether a serious, unanticipated, environmental impact is occurring during interim once-through plant operation, the licensee's Cape Fear Estuary Study Program also satisfies the original objective.

B. Modification of Monitoring Program

Elements of the licensee's Cape Fear Estuary Study Program which are not specifically addressed in these ETS may be modified without prior NRC staff notification or approval. Such modifications shall be governed by the recommendations of the Program Review Committee.

C. Reporting Requirements

Results of the Cape Fear Estuary Study Program shall be reported to the NRC staff as specified in Section 5.4.1.

**Letter w/enclosures from W. T. Hogarth (CP&L) to Charles Trammell (NRC) et al., dated December 3, 1976, RE: Carolina Power & Light Company's Brunswick Units 1 and 2.

4.1.1 Entrainment of Organisms

Objective

The objective of this monitoring program is to extend the data base to cover periods of full two-unit plant operation. Results will be used in confirmatory assessment of the direct entrainment losses of selected zooplankton and early life stages of important species of fish and shellfish.

Environmental Monitoring Requirement

Organisms passing through the circulating water system shall be monitored to estimate losses of selected zooplankton and early life stages of important species of fish and shellfish. Replicate samples shall be collected at three hour intervals over a 24-hour period each week.

Action

Description of the program results and interpretative analysis of any impacts shall be reported in accordance with Section 5.4.1.

Results shall include, but not be limited to: sampling date, species or taxon of selected zooplankters and important fish and shellfish collected, life stage, estimated density (number per 1000 cubic meters), and estimated total entrainment using the actual plant flow rate during the sampling period.

Bases

The environmental assessment made in the FES, January 1974, identified entrainment of organisms as a major potential impact (FES, p. V-1) of the Brunswick Plant. The staff anticipated that substantial numbers of shrimp, spot, and blue crabs from the Walden Creek and Snow's March environs would eventually pass through the plant (FES, p. V-26). The staff further assumed that all entrained organisms would be killed during passage through the circulating water system (FES, p. V-30). At the time of the FES assessment, the staff noted that no information was available on the density of organisms which will pass through the traveling screens (FES, p. V-30).

The licensee has presented data on entrainment of organisms during partial one-unit operation which provides information on species composition and densities. Extrapolation of these results to two-unit operation cannot be made with a high degree of certainty. These data will provide estimates of entrainment losses for selected zooplankters and important species of fish and shellfish during the interim two-unit once-through cooling mode.

4.1.2 Impingement of Organisms

Objective

The objective of this monitoring program is to estimate the species, numbers, weight and size classes of those organisms impinged under conditions of full two-unit operation.

Environmental Monitoring Requirement

Organisms impinged during a continuous twenty-four hour period shall be monitored once per week. Organisms collected shall be separated by species, counted and weighed. Length frequencies shall be determined for a representative sub-sample of selected important species.

Action

Description of the program results and interpretative analysis of any impacts shall be reported in accordance with Section 5.4.1.

Results shall include, but not be limited to: sampling date, number and weight of each species collected and length frequencies for the selected important species.

Organisms collected from the traveling screens during periods other than required by this monitoring program shall be disposed of in a manner consistent with requirements of appropriate Federal, state and local regulatory agencies.

Bases

The magnitude of loss to the aquatic ecosystem in the vicinity of the Brunswick Plant resulting from impingement on the traveling screens during conditions of full two-unit operation has not been adequately established nor is it determinable on a theoretical basis alone. Impingement monitoring has been conducted by the licensee during partial one-unit operation, however, these results may not provide an adequate basis for estimating two-unit impingement by simple linear extrapolation using flow rates. Results to date indicate that impingement losses might be reduced with the nekton return system which has been approved by the State of North Carolina, Department of Natural and Economic Resources (letter from Edward G. McCoy to J. A. Jones, August 6, 1975). The impingement sampling effort required by this specification will provide an estimate of losses while serving the desire of the State to return the majority of live nekton to the estuary.

4.2 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Objective: To provide an evaluation of the environmental impact of operating releases of radioactive materials from the Brunswick Plant.

Specification: The Radiological Environmental Monitoring Program is described in Sections 4.2.1 to 4.2.16 and summarized in Tables 4.2-1 and 4.2-2. Approximate locations of sampling points are given in Figures 4.2-1A and 4.2-1B. The frequency of sampling, sample volume and attendant sensitivity outlined in Sections 4.2.1 to 4.2.16 and Tables 4.2-1 and 4.2-2 will depend on availability of sample material. Inclement weather, the absence of sample material, instrumentation failures and other similar problems may preclude the collection of certain samples on occasion. Missed samples will be documented giving the reasons that the samples were not collected. An effort will be made to correct deviations from the sampling schedule prior to the end of the next sampling period.

Routine reports of environmental radiological monitoring data submitted to the NRC in accordance with Section 5.4.1 will include a table similar to Table 4.2-3, providing a summary of the environmental radiological data. The minimum detectable activities given in Tables 4.2-4a and 4.2-4b will routinely be achieved. However, the minimum detectable activity will vary depending on sample size, the concentration of interfering nuclides in the sample and other factors. Therefore, on occassion the minimum detectable activities given in Tables 4.2-4a and 4.2-4b may not be achieved. Control stations for each sample type are listed in Table 4.2-5.

A survey of the location of milch animals within 5 miles of the plant will be conducted in April and August of each year. A field survey will be conducted within one mile of the plant by driving along each public road, except within the city limits of Southport and on the Sunny Point Army Terminal, and visually checking for the presence of milch animals.

b. Review by PNSC and CNS of changes or modifications to plant systems or equipment which are determined by the Plant Manager to have a significant adverse effect on the environment and the evaluated impact of the change.

c. Review by PNSC and CNS of written procedures and changes thereto as described in Section 5.3.2 which are determined by the Plant Manager to detrimentally affect the plant's environmental impact.

d. Investigation by the PNSC of reported instances where an environmental protection limit is exceeded or the occurrence of an unusual environmental event associated with operation of the plant which involves a significant environmental impact. The report and recommendations that result from the PNSC investigation will be reviewed by the CNS.

e. Corporate quality assurance audit of plant operations and written procedures for implementation of these Technical Specifications by CQAA.

5.2 ACTION TO BE TAKEN IN THE EVENT OF AN ENVIRONMENTAL EVENT DURING PLANT OPERATIONS

5.2.1 An environmental event shall be reported promptly to the Manager of Nuclear Generation and reviewed by the Plant Nuclear Safety Committee. The Plant Manager shall take action to abate any impact, immediately following his determination of appropriate action permitted by the technical specifications.

5.2.2 As specified in Section 5.4.2, a report of each environmental event shall be reviewed by the Plant Nuclear Safety Committee. This report shall include an evaluation of the cause of the event, a record of the corrective action taken, and the recommendations for appropriate action to prevent or reduce the probability of a recurrence.

5.2.3 Copies of all such reports shall be submitted to the Manager of Nuclear Generation and the Manager of Corporate Nuclear Safety for review.

5.2.4 The circumstances of any environmental event shall be reported to the NRC as specified in Section 5.4.2.

5.3 OPERATING PROCEDURES

5.3.1 Written procedures shall be prepared and approved as specified in Section 5.3.2 for operation to ensure compliance with the environmental protection conditions and associated surveillance requirements of Sections 2 and 3. Procedures will include sampling, analysis, and actions to be taken when environmental protection conditions are exceeded. Quality assurance procedures will be developed for monitoring, sample collection, and sample analysis. Testing frequency of any alarms will also be included.

5.3.2 Procedures described in Section 5.3.1 above, and changes thereto, determined by the Plant Manager to detrimentally affect the plant's environmental impact, shall be reviewed as specified in Section 5.1 and approved by the Plant Manager prior to implementation. Temporary changes to procedures which do not change the intent of the original procedure may be made, provided such changes are approved by two members of the plant management staff. Such changes shall be documented, and subsequently reviewed by the Plant Nuclear Safety Committee and approved by the Plant Manager prior to implementation as permanent procedure changes.

5.3.3 Procedures described in Section 5.3.1 above, and changes thereto, which are determined by the Plant Manager to not detrimentally affect the plant's environmental impact shall be reviewed and approved by the Plant Manager or other member of the plant management staff designated by the Plant Manager prior to implementation.

5.3.4 Written procedures shall be prepared and approved

as specified in Section 5.3.5 for operation and carrying out the Environmental Surveillance Programs described in Section 4 and those surveillance programs described in Section 3 which are not associated with the environmental protection conditions. Procedures will include sampling and analysis. Quality assurance procedures shall be developed which will assure the accuracy of the results obtained.

5.3.5 The Environmental Surveillance Programs may be carried out by the plant organization, another organization within the Company or by a contractor. For those programs carried out by the plant staff, the procedures and changes thereto will be reviewed and approved as described in Section 5.3.3. For those programs carried out off-site, a procedure review and approval program will be established adequate to ensure the accuracy of the program and results.

5.4 PLANT REPORTING REQUIREMENTS

5.4.1 Routine Reports

5.4.1.1 A semiannual report covering the previous six months' operation shall be submitted within 60 days after January 1 and July 1 of each year. The first such period shall begin with the semiannual period following that in which the Environmental Technical Specifications are issued. These reports shall include the following:

a. A summary of the quantities of radioactive effluents released from the plant and potential doses, as outlined in the NRC Regulatory Guide 1.21.

b. Summary of meteorological data as outlined in NRC Regulatory Guide 1.21.

c. Records of changes as described in Section 5.4.2.c(1) and (2).

d. Records of maintenance dredging performed in the canals including: dates, locations, types of dredging, disposition of spoil material (location and, if available, an estimate of the amount of spoil material).

e. The results of any thermal monitoring in the ocean outfall area that is required by the State of North Carolina during the period covered by the report.

5.4.1.2 A separate annual environmental radiological report covering the previous 12 months of operation shall be submitted within 90 days after January 1 of each year. The first such report shall be submitted for the 12-month calendar period during which initial criticality is achieved. Data not available for inclusion in the report will be submitted as soon as

possible in a supplementary report. The report shall include the following:

a. Summary records of monitoring requirements surveys and samples.

b. Analysis of environmental data.

5.4.1.3 A copy of each quarterly progress report on non-radiological monitoring and special studies, sent to the Interagency Review Committee, shall also be submitted within 15 days to the NRC, Division of Operating Reactors.

5.4.2 Non-Routine Reports

a. Nonradiological Reports

A written report shall be made to the Director of the appropriate regional office (copy to the Director of Nuclear Reactor Regulation), within 14 days of an environmental event.

The written report shall (a) describe, analyze, and evaluate the event, including extent and magnitude of the impact; (b) describe the cause of the event, and (c) indicate the corrective action (including any significant changes made in procedures) taken to preclude repetition of the event and to prevent similar events involving similar components or systems.

b. Radiological Reports

Violations of an Environmental Technical Specification, including unplanned release of radioactive materials of significant quantities from the site shall be reported in the same manner as described in Section 5.4.2.a. (Non-radiological Reports). The environmental protection conditions for radiological discharges are described in Section 2.5. The radiological environmental monitoring is described in Section 4.2.

C. Environmental Monitoring

A monitoring system has been set at the Oak Island Coast Guard station, near the main discharge canal-dike site on Oak Island, and in the Snow's Marsh-Walden Creek area. Solar radiation, air temperature, tidal amplitude, soil temperature and soil solution is being monitored (Figure 6.1-6). This environmental data will help determine the causes of any changes that might occur in the marsh.

6.2 (Deleted)

6.3 (Deleted)

6.4 SALT DEPOSITION MONITORING

General: This monitoring program is being included in Section 6 even though it does not relate directly to the biological monitoring programs associated with a once-through cooling system at BSEP.

The complete salt monitoring program is now being developed and a full description of such plans will be submitted to the AEC by July 1, 1975. The program now envisioned will incorporate suggestions made in informal discussions with EPA. The finalized program is expected to include ambient air monitoring and soil analyses. Suggestions made at a meeting between CP&L and AEC on October 30, 1974 will be included in the final program.

Personnel: Carolina Power & Light Company
Raleigh, N. C.
In House Studies

Objectives:
(1) To monitor ambient levels of salt depositon and aerosol concentration in the area surrounding the plant site.
(2) Extend IR photo to drift (predicted) field once per year.

Schedule: To be determined.

Sampling Stations: Mainland area collection points have been established within a 5-mile radius of the BSEP site.

Methods: Sample collection containers will be placed at each station and periodically the samples will be brought to the laboratory

for anal_ _s of selected ions including _ ium and chloride, with appropriate control station(s) included.

Range gauges will be located at selected stations throughout the area to monitor rainfall. Salt deposition data will also be correlated with data from the meteorological tower at BSEP.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

ENVIRONMENTAL IMPACT APPRAISAL BY THE OFFICE OF NUCLEAR REACTOR REGULATION SUPPORTING AMENDMENT NO. 7 TO FACILITY OPERATING LICENSE NO. DPR-71 AND AMENDMENT NO. 29 TO FACILITY OPERATING LICENSE NO. DPR-62

CAROLINA POWER & LIGHT COMPANY

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2

DOCKET NOS. 50-325 AND 50-324

1. Description of Proposed Action

By letter dated January 11, 1977, the Carolina Power and Light Company (CP&L) requested changes to the Brunswick Unit No. 1 (License No. DPR-71) and Unit No. 2 (License No. DPR-62) Environmental Technical Specifications (ETS). CP&L proposes the deletion of ETS limitations and monitoring requirements which pertain to non-radiological liquid effluents and other matters within the jurisdiction of the Federal Water Pollution Control Act (FWPCA), as amended (22 USC § 1251 et seq.). ETS sections covered by this appraisal are 2.2.1, 3.2.1, 4.1.1, 4.1.2, 4.1.3, 4.1.4, 6.2, 6.3, 2.1.1, 3.1.1, 2.1.2, 3.1.2, 2.2.2, 3.2.2, 2.2.3, 3.2.3, 2.1.3, and 3.1.3.

2. Environmental Impacts of Proposed Action

A. Removal of Chemical Environmental Protection Condition - Chlorine

Section 2.2.1 requires that alternate chlorination of station condensers for maximum periods of 3 hours per day per condenser result in a maximum total residual chlorine concentration of up to 0.5 ppm and a 24 hour average concentration of up to 0.2 ppm when measured in

the discharge canal near the plant; that the total residual chlorine concentration at the ocean outfall not exceed 0.1 ppm during the special chlorination study. Section 3.2.1 requires that both free available and total residual chlorine be monitored in the discharge canal near the plant during each chlorination period.

The existing limitation in the ETS on residual chlorine is based upon the determination by the staff in the FES that the discharge of up to 0.1 ppm total residual chlorine at the ocean outfall for up to 3 hours per day is not an unacceptable impact on the receiving waters. The staff analysis concluded that this level would not be exceeded by the licensee's planned chlorination schedule whereby the individual unit cooling waters would be sequentially chlorinated to a maximum free available chlorine concentration at the plant discharge to the discharge canal of 0.5 ppm (FES Sec. V.C.2.c).

National Pollutant Discharge Elimination System (NPDES) Permit No. NC0007064 dated March 23, 1977 will limit the discharge of free available chlorine from the Brunswick Plant after July 1, 1977. Under this permit, allowable discharges shall not exceed an average concentration of 0.2 mg/l nor an instantaneous maximum concentration of 0.5 mg/l free available chlorine, discharge of neither free available nor total residual chlorine shall occur for more than 2 hours per day and not more than one unit may discharge free available chlorine at any one time, unless the permittee can demonstrate to the Regional Administrator that the unit(s) cannot operate at or below this level of chlorination.

The staff has examined the numerical data from a one year special study being conducted by the Licensee under ETS Section 6.5 which examines the relationship between the applied chlorine dose at the Brunswick station and the measured total residual chlorine concentrations at various locations in the plant discharge downstream of the main condensers (see the ETS Specification 6.5 for full details on the program design).

The staff has examined the numerical results of this special study for the period of June 1976 through April 1977. A total of 501 applications of chlorine were made and monitored for Unit 2. (Chlorination of Unit 1 was not begun until August 1976. Final data on this unit are not yet available; however, they are not expected to yield different results from the Unit 2 study, because the preliminary data covering 7 months of chlorination indicate similar results.) The average number of applications per month during the study was 46, with the maximum occurring during August 1976 with 62 applications. Chlorine dosage was typically within the range of 2268-4082 kg/day (5000-9000 lb/day) for each unit, sufficient during the daily intermittent chlorination periods to achieve a free available chlorine concentration at the condenser outlet of 0.2 mg/l. The data indicate that, during the 501 applications of chlorine to Unit 2, a detectable total residual chlorine concentration (determined amperometrically) was present in the combined station discharge above the discharge weir 137 times or for 27% of the chlorination periods. This detectable total residual chlorine

concentration persisted to the bottom of the discharge weir (i.e., at the head of the discharge canal and separated from the upstream monitoring location by less than 100 m) for 49 of these periods or 10% of the periods. These detectable concentrations were in excess of 0.1 mg/l above and below the discharge weir 72 times (14% of the chlorination periods) and 33 times (7% of the chlorination periods), respectively. No detectable total residual chlorine concentration was measured at the Caswell Beach pumping station for the 49 instances of detectable residuals being found at the bottom of the discharge weir (measurements made after allowance for the proper flow time in the 9600 m [6 mile] discharge canal). This station is immediately upstream of the ocean discharge. This examination of the results on the data collected during the special ETS chlorination study indicates that the detectable residual chlorine concentrations at the point where they enter the receiving waters (i.e., the ocean outfall) are likely to be the same under either the presently imposed ETS limits or the EPA NPDES limits.

Examination of available data on the toxicity of residual chlorine to marine aquatic life is limited. The attached information provides a summary of the available data. Examination of the recent data presented here on the toxicity of chlorine and its reaction products in the marine environment indicates a definite need to control such releases.

Upon examination of the existing ETS requirements, the provisions of the NPDES permit for the Brunswick Station, and the numerical results of the Special Chlorination Study conducted during operation of the plant, we conclude that a change in the allowable unit discharge concentration of free available chlorine and in the frequency of monitoring the levels and monitoring frequency as described above will not result in an unacceptable environmental impact nor an impact not evaluated in the FES. This is consistent with the NPDES Permit NC0007064 dated March 23, 1977.

B. Removal and/or Revision of Aquatic Monitoring Program

Sections 4.1.1 and 4.1.2 of the ETS require determinations of the potential for and direct estimates of organism entrainment and impingement, respectively. Section 4.1.3 requires a determination of the effects on nutrient cycling and nursery utilization due to blockage of tributaries to the Dutchman Creek and adjacent tidal marsh. Section 4.1.4 requires a determination of the role of the lower Cape Fear River in providing nursery sites, residence areas, or migration routes for shrimp, crab, and anadromous and other fish populations. Sections 6.2 and 6.3 involves once-through cooling system effects on the hydrography of the ship channel (salinity and temperature) and on the intake canal and Walden Creek (water velocities), respectively.

The scope of the environmental surveillance section of the ETS covered by this appraisal was developed to monitor for aquatic biological impacts occurring during the interim period before installation of closed-cycle cooling (FES, page v). Monitoring commenced prior to the operation of Unit No. 2 (the first to become operational) and has been continued through start-up of Unit No. 1. An EPA adjudicatory hearing was held during June 1976 on the licensee's request for delay in determining whether cooling system modifications at the BSEP were necessary. Results of the ETS program during partial one-unit operation were presented by the licensee in support of the request for delay. A final EPA decision on contested matters is pending. Biological monitoring during two-unit operation is now being conducted as required by the ETS.

Following the EPA hearing, the licensee developed and implemented (in September 1976) a more intensive program of studies on the Cape Fear Estuary.[1] The scope of this program[2] exceeds the original ETS requirements but encompasses the ETS objective of confirmatory monitoring to detect unanticipated impacts during interim once-through operation. Acting on a recommendation by the State of North Carolina during the EPA hearing, the licensee invited participation by the State and Federal resources agencies and concerned citizens groups on a program review committee. The NRC technical staff is represented on that committee. The reporting of results and meetings of the review committee are on a calendar quarterly schedule.

National Pollutant Discharge Elimination System (NPDES) Permit No. NC0007064, issued March 23, 1977, does not include a program for biological monitoring, at present. Rather, biological monitoring is "to be developed as a result of redetermination by the Regional Administrator pursuant to 40 CFR 125.36 if closed-cycle cooling is not ultimately required" (NPDES, page 8, footnote 2).

Additionally, the NPDES permit allows for modification pursuant to Sections 316(a) and 316(b) of the FWPCA conditioned as follows:

> "This permit shall be modified upon request to allow for seasonal operation of the entire cooling system or a portion thereof in a once-through mode and without the use of cooling towers (or similar apparatus) upon demonstration to the Regional Administrator pursuant to Section 316(a) that the thermal limitations contained herein are more stringent than necessary for seasonal operation and upon a finding by the Regional Administrator that the requirements of Section 316(a) are met; and upon a finding by the Regional Administrator pursuant to Section 316(b) that the cooling water intake structures reflect the best technology available for minimizing adverse environmental impact in a seasonal mode." (NPDES, page 15, paragraph E.)

The permit recognizes the environmental monitoring requirements of the NRC and requires that copies of monitoring reports also be forwarded to the EPA (NPDES, page 15, paragraph G).

State of North Carolina, Department of Conservation and Development, Dredge or Fill Permit No. 293, issued December 29, 1971, includes as condition number 4 that:

> "Vertical traveling screens will be provided at the intake pumping structure to prevent fish from entering the plant. Provisions will be made for returning the fish to the river downstream of the canal so that they will not be recycled through the plant. When plans for the return sluice are completed, they will be made available for review by interested State agencies."

The present nekton return system, accepted by the State as satisfying their permit condition number 4, requires the transport and release of live nekton using (1) a boat designed to provide a "water bath" for protection of marine organisms during transport or (2) trucks with live wells or other means deemed suitable in the event the boat is inoperative. The State has claimed ownership of the impinged organisms and desires lesser emphasis on monitoring and greater emphasis on the return of live organisms to the estuary. Agreement has been reached with the State to allow for impingement monitoring one day each week.

Upon examination of the existing ETS requirements, the scope of the licensee's expanded program of Cape Fear Estuary studies, and provisions of the NPDES permit and the State Dredge or Fill Permit, we conclude that the following actions are appropriate:

a. Deletion of ETS Sections 4.1.3, 4.1.4, 6.2, and 6.3. The staff is assured that the licensee's expanded program, with present scope, encompasses our original ETS objective for monitoring these parameters. Implementation of the expanded program will not alter the level of anticipated impacts.

b. Retention of ETS Sections 4.1.1 and 4.1.2, as revised. The staff believes that estimates of entrainment and impingement levels for full two-unit operation are required to satisfy the original ETS objective. These estimates cannot be directly extrapolated from available data on partial plant operation. These data will be used in evaluating the short-term losses to commercial and sport fisheries and, thus, the need for reducing the impact, if found unacceptable. Additionally, these data would serve as a bases for a staff impact assessment if the EPA revises the NPDES permit allowing seasonal once-through cooling system operation.

We are, therefore, deleting the ETS sections identified in item a., above. These detailed specifications are being replaced by a general requirement for copies of the quarterly progress reports to the Cape Fear Estuary Study Program Review Committee to also be submitted to the NRC. Entrainment and impingement specifications have been revised (see item b., above) so

as to be consistent with the licensee's expanded study program, the State Dredge or Fill Permit, and our original ETS objective.

C. Maximum Discharge Temperature, Condenser Temperature Rise and Associated Monitoring

Specification 2.1.1 limits the maximum discharge temperature to 105°F and the maximum condenser temperature rise to 18°F. The NPDES permit contains a maximum condenser temperature rise of 27°F in the summer and 32°F in winter and a mixing zone temperature increase within defined areas, but does not have a maximum discharge temperature.

Specification 3.1.1 requires hourly temperature monitoring at the pumping station at the end of the discharge canal. The NPDES permit requires continuous temperature recording at the outlets to the condensers.

The elimination of the maximum discharge temperature and increasing the ΔT to a maximum of 32°F will not have impacts greater than those evaluated in the Brunswick FES. In the Brunswick FES, organisms pumped through the power plant were predicted to suffer 100% mortality after spending five hours in the discharge canal at a ΔT of 18°F. Increasing the ΔT to 32°F may result in 100% mortality, but at the higher ΔT there is less flow through the plant and therefore fewer organisms would be withdrawn from the Cape Fear Estuary to be killed. Deleting the maximum discharge temperature will likewise not affect the FES

conclusions in that entrained organisms were presumed dead for purposes of the impact assessment. Effects at the ocean discharge will likewise be minimal as plant effluent is rapidly mixed in the ocean by the diffuser design of the discharge structure. The size and effect of the mixing zone was evaluated in the FES and this change will not increase its size. The change in the monitoring of temperature is considered acceptable in that measurements will be increased from hourly to continuously.

D. Rate of Change of Discharge Temperature and Associated Monitoring

Specification 2.1.2 limits the rate of change of discharge temperature to 4°F/hour during normal operation. The NPDES permit only limits the instantaneous change within the mixing zone.

Specification 3.1.2 requires hourly temperature monitoring for the rate of change in the discharge temperature. The NPDES has no monitoring requirement on the time rate of change for the discharge temperature.

The change in plant operation resulting from the elimination of the rate of change of discharge temperature from the technical specifications and its associated monitoring will not have a significant impact on the environment. There is no danger of entrapment of organisms into the discharge canal as a result of its design. Organisms

cannot acclimate in the discharge area as the areas of high temperatures also are areas of high water velocity. The area affected by higher temperatures in the mixing zone is small and shutdown or startup of the circulating water system is, therefore, not expected to result in mortality to organisms in the discharge area.

E. Other Chemicals and Associated Monitoring

Specification 2.2.2 Other Chemicals, requires that discharges from the auxiliary boiler water system, the RBCCW, the TBCCW and the diesel generator cooling water system shall not cause the following concentrations to be exceeded in the discharge to the canal.

Sodium Nitrite	0.1 ppm
Phosphates	0.1 ppm
Cyclohexylamine	0.1 ppm
Sulfite	0.1 ppm
Nitrite-Borate	1.0 ppm
Substituted Thiozole	0.1 ppm
Sulfuric Acid	pH range 6.5-8.5 prior to discharge
Sodium Hydroxide	pH range 6.5-8.5 prior to discharge

Specification 3.2.2 requires monitoring for the presence of the chemicals listed above.

The discharge of the chemical species controlled by this specification arise from the treatment of waters of various closed cooling systems within the plant. These discharges were described and assessed in the Brunswick FES (p. III-22, III-24). The limitations in the ETS on these

waste discharges have been examined and found to represent the conditions for which the plant treatment systems have been designed. Certain of these discharges will be monitored and controlled after July 1, 1977 under the provisions of the Low Volume Waste Sources Category of the NPDES permit. However, the NPDES permit limitations are restricted to the waste's pH, floating solids or visible foam content and the concentration of total suspended solids and oil and grease and not their potential toxicity.

The staff has reviewed the bases for inclusion of these requirements in the ETS. The FES did not predict unacceptable environmental impact as a result of these discharges. These wastes are discharged in low volumes into the circulating water system which considerably dilutes them and they are not considered toxic at low levels (Becker and Thatcher, 1973). Therefore, we conclude that the deletion of these Specifications of the ETS will not result in plant operation causing an impact that is different from or not evaluated in the staff's FES.

F. Hydrogen Ion (pH) Limits and Associated Monitoring

Specification 2.2.3 requires that the pH of the normalizer tanks be within the range of 6.5 to 8.5 prior to discharge from the tanks. The NPDES permit limitation for these wastes is an allowable pH range of 6.0 to 9.0, inclusive.

Specification 3.2.3 requires monitoring of the pH of the normalizer tanks prior to discharge from the tanks while the NPDES permit requires only weekly monitoring of the low volume waste-water stream which contains the discharge from the normalizer tanks. In the FES, the staff evaluated the proposed discharge of demineralizer wastes and concluded that discharge of the wastes after neutralization was acceptable.

The basis for the establishment of the specific limitation on the pH range of the discharge from the normalizer tanks of 6.5-8.5 was the EPA criterion published in Water Quality Criteria (NTAC, DOI 1968) and in the Proposed Criteria for Water Quality (EPA, 1973).

Although the proposed pH range of 6.0-9.0 is outside the 6.5-8.5 range in Specification 2.2.3, the staff does not expect significant impacts to biota in the ocean discharge area. The proposed limit applies before the low volume waste sources mix with the condenser cooling water which considerably dilutes the normalizer tank discharge. Furthermore, at the point of discharge, the saline water of the ocean has a high buffering capacity due to the presence of carbonates and bicarbonates.

We conclude that the change in the allowable pH range of the discharge from the normalizer tank of from 6.5 to 8.5 to 6.0 to 9.0 will not result in a significant environmental impact.

The pH of the wastes after mixing in the normalizer tanks can vary from batch to batch. Specification 3.2.3 now requires that the pH be monitored prior to each release. Monitoring on a weekly basis regardless of the discharge frequency of these wastes as required by the NPDES permit would not be sufficient to assure compliance with Specification 2.2.3. However, as discussed previously, the dilution of wastes in the condenser cooling water and the buffering capacity of the saline water at the ocean discharge will provide assurance that long-term effects will not occur in the discharge vicinity with the reduction in monitoring frequency. We therefore conclude that the specification can be changed to provide for weekly monitoring as allowed by EPA without significant environmental impact.

G. Heat Treatment and Monitoring of Heat Treatment

Section 2.1.3 limits the condenser water temperature rise to 54°F during heat treatment and limits the frequency of such treatment to one hour per week per condenser box. Section 3.1.3 requires that the condenser inlet and outlet water temperatures be monitored continuously and recorded every 15 minutes during heat treatment.

The Brunswick ETS provisions for heat treatment are a maximum ΔT of 54°F for one hour per week per condenser box. The recently issued NPDES permit for the Brunswick station contains provisions for heat treatment but indicates that conditions will be developed after review by the EPA Regional Administrator. When specific modification to the NPDES permit is made, we will then review the environmental impact of incorporating the permit requirements in our ETS.

3. Conclusion and Basis for Negative Declaration

On the basis of the foregoing analysis, we conclude that there will be no significant environmental impact attributable to the proposed action greater than the impacts evaluated in the Commission's FES for Brunswick Steam Electric Plant Units 1 and 2. Having made this conclusion, the Commission has further concluded that no environmental impact statement for the proposed action need be prepared and that a negative declaration to this effect is appropriate.

Date: July 25, 1977

References Cited

1. Letter from W. T. Hogarth (CP&L) to Charles Trammell (NRC), et al., RE: Carolina Power and Light Company's Brunswick Units 1 and 2, November 15, 1976.

2. Letter w/enclosures from W. T. Hogarth (CP&L) to Charles Trammell (NRC), et al., RE: Carolina Power and Light Company's Brunswick Units 1 and 2, December 3, 1976.

SUMMARY OF INFORMATION AVAILABLE ON CHLORINE TOXICITY IN THE MARINE ENVIRONMENT

In studies of the toxicity of chlorine species in the aquatic environment, results reported by Brungs[1] and others,[2,3,4,5] it has been shown that the toxicity of combined residual chlorine and free available chlorine are on the same order and, therefore, that an effective measure of the toxicity of chlorinated effluent is total residual chlorine.

The recently published EPA Quality Criteria for Water[6] contains a recommended criterion of 0.01 mg/l total residual chlorine as a water quality standard for the protection of marine organisms. Additionally, this publication reports on the work of Carpenter et al., that marine phytoplankton had reduced primary production of 70% at continuous exposure to 0.10 mg/l residual chlorine and a reduction of 25% after exposure to 0.2 mg/l residual chlorine for 1.5 hours. Other studies on marine phytoplankton were also reported upon (Gentile et al.,) where 50% reduction in growth rate resulted from a 24 hour exposure period of 0.075 to 0.250 mg/l residual chlorine. Oyster sensitivity to chlorine concentrations of 0.01 mg/l to 0.05 mg/l through reduced pumping activity and inability to maintain effective pumping at a concentration of 1.0 mg/l (Galtsoff) was also reported.

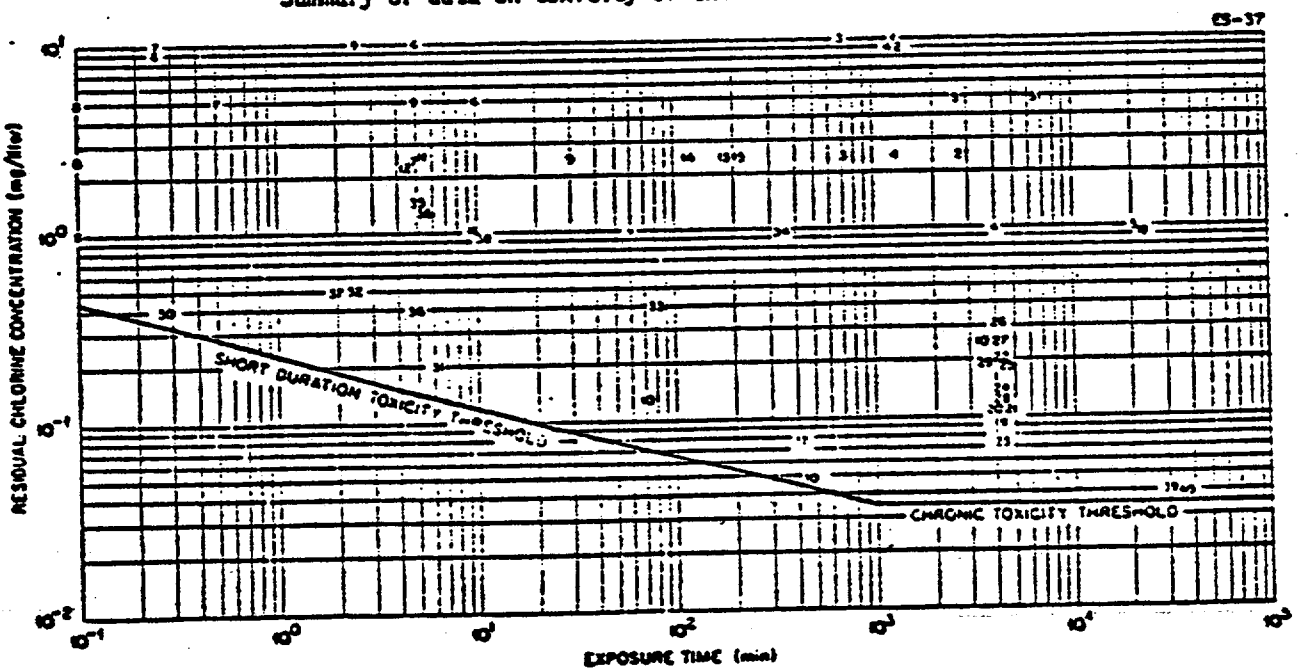
Further information is available from EPA[7] regarding effluent limits for residual chlorine. The following recommendations have been made concerning chlorine toxicity in marine waters:

CHLORINE TOXICITY - MARINE WATERS

Author	Concentration of Total Residual Chlorine	Degree of Protection and Remarks
Blue Book, 1972		Use 0.1 application factor with 96-hour LC050 data for most sensitive species.
Gentile et al.,	0.01 mg/1	Up to 2 hours in any 24-hour period.
Chlorine Task Force, 1975	0.01 mg/1	Not stated.
Bears Bluff, 1975	No detectable	Limit of detection is 0.009 mg/1, and levels below this have proven toxic.

Finally, the staff has previously presented [8] a summary of the available information on the toxicity of chlorine to marine life. This information appears on the chart and legend below.

Summary of data on toxicity of chlorine to marine life.



Point	Species name: Scientific	Species name: Common	Chlorine concentration (mg/liter)	Time	Effect	Footnote
			Plants			
	Chlorophyta					
21	Dunaliella tertiolecta		0.11	24 hr	50% stop growth	a
35	Chlamydomonas sp.		1.5	5–10 min	Time lag in growth effect recovered in 9 days	c
	Chrysophyta					
	Bacillariophyceae					
19	Skeletonema costatum		0.095	24 hr	50% stop growth	a
36	Skeletonema costatum		0.4–0.65	5 min	Adverse effect on growth	c
			1.5–2.3	5 min	Death	
23	Cyclotella nana		0.075	24 hr	50% stop growth	a
24	Chaetoceros decipiens		0.14	24 hr	50% stop growth	a
25	Thalassiosira nordenskiöldii		0.195	24 hr	50% stop growth	a
26	Thalassiosira rotula		0.33	24 hr	50% stop growth	a
27	Asterionella japonica		0.25	24 hr	50% stop growth	a
28	Chaetoceros didymum		0.125	24 hr	50% stop growth	a
29	Detonula confervacea		0.2	24 hr	50% stop growth	a
30	Asterionella japonica		0.4	16 sec	50% stop growth	a
31	Cyclotella nana		0.2	410 sec	50% stop growth	a
32	Skeletonema costatum		0.5	145 sec	50% stop growth	a
33	Detonula confervacea		0.5	5000 sec	50% stop growth	a
	Chrysophyceae					
20	Rhodomonas baltica		0.11	24 hr	50% stop growth	a
22	Monochrysis lutheri		0.2	24 hr	50% stop growth	a
	Phaeophyta					
5	Macrocystis pyrifera	giant kelp	5–10	2 days	10–15% photosynthesis reduction	b
			5–10	5–7 days	50–70% photosynthesis reduction	b
			Animals			
	Cnidaria					
	Bimeria franciscana	Hydroid	4.5	3 hr	None	d
		Sea anemone	1.0	15 days	None	e
	Mollusca					
3	Mytilus edulis	Mussel	1.0	15 days	100% mortality	e
			2.5	5 days	100% mortality	e
			10.0	5 days	100% mortality	e
	Crassostrea virginica	Oyster	0.05	?	Pumping reduced	f
			1.0	?	No pumping	f
37	Ostrea edulis larvae	Oyster	0.5	After 2 min stop swimming		g
			1.0	After 2 min stop swimming		g
			2.0	Stop swimming immediately		g
			3.0	Stop swimming immediately		g
	Arthropoda					
	Corophium sp.	Tube dwelling amphipod	2.5	410 min	0 mortality after 24 hr	h
			5.0	410 min	0 mortality after 24 hr	h
			10.0	410 min	0 mortality after 24 hr	
14	Melita nitida	Amphipod	2.5	2 hr	50% mortality. Some deaths after 5 min	i
15	Gammarus tigrinus	Amphipod	2.5	3 hr	25% mortality after 96 hr	i
7	Acartia tonsa	Copepod	1	60 min	17% mortality	
			2.5	5 min	37.5% mortality	h
			5.0	0.5 min	20% mortality	h
			10.0	0.5 min	32% mortality	h

continuation of legend

Point	Species name: Scientific	Species name: Common	Chlorine concentration (mg/liter)	Time	Effect	Footnote
11	Acartia tonsa	Copepod	2.5	5 min	90% mortality measured after 3 hr	*i*
	Pseudodiaptomus coronatus	Copepod	1.0	24 hr	No deaths	*h*
			2.5	30 min	19% mortality	*h*
			5.0	5 min	6% mortality	*h*
			10.0	2.5 min	24% mortality	*h*
34	Eurytemora affinis	Copepod	1.0	360 min	51% mortality	*h*
	Elminius modestus	Barnacle	0.5	10 min	Little effect	*g*
		Nauplii	1.0	10 min	Heavy losses. No growth	*g*
12	Balanus improvisus	Barnacle	2.5	5 min	80% mortality after 3 hr	*f*
18		Barnacles	1.0	15 days	Most dead	*e*
6	Crangon septemspinosus larvae	Sand shrimp	5	10 min	37% mortality	*h*
			10	5 min	55% mortality	*h*
13	Palaemonetes pugio	Grass shrimp	2.5	3 hr	98% mortality after 96 hr	*i*
	Ectoprocta					
2	Bugula sp.		2.5	48 hr	100% mortality	*e*
			10.0	24 hr	100% mortality	*e*
	Chordata					
	Ascidiacia					
4	Molgula sp.		1.0	3 days	100% mortality	*e*
			2.5	1 day	100% mortality	*e*
			10.0	1 day	100% mortality	*e*
	Tunicata					
1	Botryllus sp.		10	24 hr	100% mortality	*e*
	Pisces					
8	Pseudopleuronectes americanus	Winter flounder	1	0.1 min	9% mortality	*h*
			2.5	0.1 min	6% mortality	*h*
			5.0	0.1 min	15% mortality	*h*
			10.0	0.25 min	32% mortality	*h*
	Pseudopleuronectes americanus eggs	Winter flounder	10.0	0.33 min	0% mortality	*h*
10	Pleuronectes platessa larvae	Plaice	0.05	460 min	50% mortality	*h*
	Pleuronectes platessa larvae	Plaice	0.13	70 min	50% mortality	*i*
	Pleuronectes platessa eggs		0.25	3 days	Critical level	*j*
17	Oncorhynchus kitsutch	Coho salmon	0.1	3 days	Critical level	*k*
39	Oncorhynchus tshawytscha	Chinook	0.05	23 days	Critical level	*k*
40	Oncorhynchus gorbuscha		0.05	23 days	Critical level	
	Marine fish		1.0		Slight irritant response	*l*

[a] C. S. Hegre, "Toxicity to Marine Organisms of Free Chlorine and Chlorinated Compounds in Sea Water," Environmental Protection Agency, National Marine Quality Lab. Progress Report, 1971.

[b] J. E. McKee and H. W. Wolf, "Water Quality Criteria," Publication No. 3-2, California Water Quality Control Board, 1963.

[c] K. Hirayama and R. Hirano, "Influences of High Temperature and Residual Chlorine on Marine Phytoplankton," *Mar. Biol.* 7: 205–213 (1970).

[d] R. L. McLean, "Chlorine Tolerance of the Colonial Hydroid," Bowerbankia franciscana *Chesapeake Sci.* 13: 229–230 (1972).

[e] H. J. Turner, D. M. Reynolds, and A. C. Redfield, "Chlorine and Sodium Pentachlorophenate as Fouling Preventatives in Sea Water Conduits," *Ind. Eng. Chem.* 40: 450–453 (1948).

[f] S. Galtsoff, "Reaction of Oysters to Chlorination," U.S. Fish and Wildlife Service, Dept. of Interior, Res. Repr. No. 11, 28 pp., 1946.

[g] G. D. Waugh, "Observations on the Effects of Chlorine on the Larvae of Oysters (*Ostrea edulis* L.) and Barnacles (*Elminnium modestus* Darwin)," *Ann. Appl. Biol.* 54: 423–440 (1964).

[h] J. H. Gentile, Unpublished Data, Environmental Protection Agency, National Marine Water Quality Laboratory, West Kingston, R.I., 1972.

[i] R. L. McLean, "Chlorine and Temperature Stress on Estuarine Invertebrates," *J. Water Pollut. Contr. Fed.* 45: 837–841 (1973).

[j] R. Ahlstrom, "Effects of Low Concentrations of Free Chlorine on Eggs and Larvae of Plaice, *Pleuronectes platessa* L.," pp. 312–315 in *Marine Pollution and Sea Life*, ed. by M. Ruivo, FAO, Fishing News (Books, Ltd.), Surrey, England, 1973.

[k] G. A. Holland, J. E. Lasater, E. D. Neumann, and W. E. Eldridge, "Toxic Effects of Organic and Inorganic Pollutants on Young Salmon and Trout," Wash. Dept. Fish., Res. Bull. No. 5, 264 pp., 1960.

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In recent reports of investigations by Macalady, et al.[9,10] the ability to adequately predict environmental impacts of chlorination of salt water with the existing state-of-the-art is questioned. This assertion is made as a result of the formation, via sunlight conversion, of chlorine-biomide reaction products to bromate ion, which is persistent and has an unknown toxicity. McKee and Wolf[11] report that "marine fish" exhibited a "violent irritant response" upon exposure to a 10 mg/l concentration of bromine but no irritant response at an exposure level of 1 mg/l. Additionally, the above mentioned studies[9,10] indicate that current methods for detection of the presence of residual oxidants may yield erroneous results and, therefore, such procedures are judged as inadequate.

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UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKET NOS. 50-325 AND 50-324

CAROLINA POWER & LIGHT COMPANY

NOTICE OF ISSUANCE OF AMENDMENTS TO FACILITY OPERATING LICENSES

AND NEGATIVE DECLARATION

The U.S. Nuclear Regulatory Commission (the Commission) has issued Amendments Nos. 7 and 29 to Facility Operating License Nos. DPR-71 and DPR-62, issued to Carolina Power & Light Company, which revised Technical Specifications for operation of the Brunswick Steam Electric Plant, Unit Nos. 1 and 2 (the facilities) located in Brunswick County, North Carolina. The amendments are effective as of the date of their issuance.

The amendments revise numerous provisions in the Environmental Technical Specifications relating to limitations and monitoring requirements for non-radiological liquid effluents.

The application for the amendments complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendments. Prior public notice of the amendments was not required since the amendments do not involve a significant hazards consideration.

The Commission has prepared an environmental impact appraisal for the revised Technical Specifications and has concluded that an environmental impact statement for this particular action is not warranted because there will be no environmental impact attributable to the action greater than that which has already been predicted and described in the Commission's Final Environmental Statement for the facilities dated January 1974.

For further details with respect to this action, see (1) the application for amendments dated January 11, 1977, (2) Amendment No. 7 to License No. DPR-71, (3) Amendment No. 29 to License No. DPR-62, and (4) the Commission's related Environmental Impact Appraisal. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N. W., Washington, D. C. and at the Southport Brunswick County Library, 109 W. Moore Street, Southport, North Carolina 28461. A copy of items (2), (3) and (4) may be obtained upon request addressed to the U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Director, Division of Operating Reactors.

Dated at Bethesda, Maryland, this 25th day of July 1977.

FOR THE NUCLEAR REGULATORY COMMISSION

A. Schwencer

A. Schwencer, Chief
Operating Reactors Branch #1
Division of Operating Reactors