

October 23, 1996

Mr. W. R. Campbell
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Brunswick Steam Electric Plant
Carolina Power & Light Company
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SUBJECT: ENVIRONMENTAL ASSESSMENT RELATED TO REQUEST FOR FIVE PERCENT POWER
UPRATE - BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2, (BSEP 95-
0535) (TAC NOS. M90644 AND M90645)

Dear Mr. Campbell:

Enclosed is a copy of the Environmental Assessment and Finding of No Significant Impact related to your application for amendment dated April 2, 1996, as supplemented by an earlier submittal dated November 20, 1995, and by subsequent submittals dated July 1, 1996, July 30, 1996, August 7, 1996, September 13, 1996, September 20, 1996, October 1, 1996, October 22, 1996 (BSEP 96-0392) and October 22, 1996 (BSEP 96-0403). The proposed amendment would modify Facility Operating Licenses Nos. DPR-71 and DPR-62 and the corresponding Technical Specifications (TS) for the Brunswick Steam Electric Plant, Units 1 and 2, respectively, to authorize an increase in the maximum power level from 2436 megawatts thermal (MWt) to 2558 MWt. The amendment also includes changes to the TS to implement uprated power operation.

The assessment is being forwarded to the Office of the Federal Register for publication.

Sincerely,

(Original Signed By)

David C. Trimble, Project Manager
Project Directorate II-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket Nos. 50-325
and 50-324

Enclosure: Environmental Assessment

cc w/encl: See next page

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UNITED STATES NUCLEAR REGULATORY COMMISSION
CAROLINA POWER & LIGHT COMPANY
DOCKET NO. 50-325 AND 50-324
BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2
ENVIRONMENTAL ASSESSMENT AND FINDING OF
NO SIGNIFICANT IMPACT

The U. S. Nuclear Regulatory Commission (the Commission or NRC) is considering issuance of amendments to Facility Operating License Nos. DPR-71 and DPR-62 issued to Carolina Power & Light Company (CP&L or the licensee) for operation of the Brunswick Steam Electric Plant (BSEP), Units 1 & 2, located in Brunswick County, North Carolina.

ENVIRONMENTAL ASSESSMENT

Identification of the Proposed Action:

This Environmental Assessment addresses potential environmental issues related to Carolina Power & Light Company's (CP&L) application to amend the BSEP, Units 1 and 2, Operating Licenses. The proposed amendments would increase the licensed core thermal power from 2436 megawatts thermal (Mwt) to 2558 Mwt, which represents an increase of 5 percent over the current licensed power level. This request is in accordance with the generic boiling water reactor (BWR) power uprate program (Reference 1) established by the General Electric Company (GE) and approved by the NRC staff in a letter dated September 30, 1991 (Reference 2).

The proposed action involves NRC issuance of license amendments to uprate the authorized power level by changing the Operating Licenses,

including Appendix A (Technical Specifications). The proposed action is in accordance with the licensee's application for amendment dated April 2, 1996 (Reference 3), as supplemented by an earlier submittal dated November 20, 1995 (Reference 4), and by subsequent submittals dated July 1, 1996 (Reference 5), July 30, 1996 (Reference 6), August 7, 1996 (Reference 7), September 13, 1996 (Reference 8), September 20, 1996 (Reference 9), October 1, 1996 (Reference 10), October 22, 1996 (BSEP 96-0392) (Reference 11), and October 22, 1996 (BSEP 96-0403) (Reference 12).

The Need for the Proposed Action:

The proposed action is needed to authorize CP&L to increase the potential electrical output of the BSEP by approximately 40.5 megawatts per unit, thus providing additional electrical power to service CP&L's grid.

Environmental Impacts of the Proposed Action:

The "Final Environmental Statement" (FES) related to operation of BSEP, Units 1 and 2 (Reference 13) assumed a maximum reactor power level of 2550 MWt per unit in calculating releases of radioactivity in effluents. The licensee submitted a nonradiological environmental assessment (Enclosure 3 to Ref. 4) supporting the proposed power uprate action and provided a summary of its conclusions concerning the radiological and nonradiological environmental impacts (Enclosure 3 to Ref. 3) of the proposed action. As described in a July 1, 1996, response to NRC staff questions (Enclosure 1 to Ref. 5), evaluations performed by the licensee show no changes to the conclusions of the FES (Ref. 13) as a result of power uprate.

A summary of the nonradiological and radiological effects on the environment that may result from the proposed amendments is provided below.

Nonradiological Environmental Assessment:

As presented in the following evaluation, the proposed power uprate will not change the method of generating electricity nor the method of handling any influents from the environment or nonradiological effluents to the environment. Therefore, no new or different types of nonradiological environmental impacts are expected. The evaluation is based upon information provided by the licensee in a September 1995 GE licensing topical report supporting the BSEP power uprate (Reference 14) and in Enclosure 3 of Reference 4.

The BSEP uses a once-through circulating water system for dissipating heat from the main turbine condensers. This cooling system withdraws water from the Cape Fear River through a 3-mile long intake canal. The heated water is discharged to the Atlantic Ocean after it travels through a 6-mile long canal. A pumping station at the end of the canal pumps the water 2000 feet off of the beach through pipes. The National Pollutant Discharge Elimination System (NPDES) permit, issued on October 1, 1996, by the State of North Carolina Department of Natural Resources and Community Development, specifies requirements applicable to nonradiological effluents released from the BSEP. No changes or other action relative to the NPDES Permit are required to implement power uprate at the Brunswick Plant.

The NPDES permit currently allows the withdrawal, from the Cape Fear River, of 922 cubic feet of water per second (cfs), per unit, from December through March; 1105 cfs, per unit, from April through November; and 1230 cfs through one unit only from July through September. No changes to the flow rate of intake circulating cooling water will occur as a result of the

proposed uprated power levels, therefore there will be no associated increase in the entrainment of planktonic organisms or impingement of fish, crabs, or shrimp. Chlorine is injected into the circulating water system to retard the growth of biofouling organisms. The NPDES permit limits the rate of chlorine injection. The chlorine injection rate is determined by the flow rate through the circulating water system. As stated above, the circulating water system flow rate will not change as a result of operation at uprated power levels; therefore, the chlorine injection rate will not change. As a result of the uprated power, the licensee has conservatively calculated an increase in the temperature of the circulating water leaving the main condensers of 1.4°F in the winter and 1.2°F in the summer (Table 6-3, Enclosure 2 to Ref. 4). These small increases at the condenser should not significantly impact the temperature of water discharged to the ocean, after traveling more than 6 miles through the discharge canal. As an example, on August 1, 1994, the ambient ocean water temperature was 83°F. With both units operating at 100% power, the water temperature at the point of ocean discharge was 91°F. At 1500 feet north and south from the point of discharge, approximately a 50-acre area, the water temperature was 83°F, i.e., ambient temperature. The NPDES permit allows a temperature increase up to 89.5°F within an area of 1,000 acres during the summer. Therefore, the ocean discharge mixing zone temperature limits, defined by the NPDES permit, should not be exceeded by operation at the uprated power.

Nonradiological effluent discharges from other systems were also reviewed by the licensee for potential effects from the proposed power uprate. Effluent limits for systems such as roof drains, yard drains, low volume waste, metal cleaning waste, and the sewage treatment plant are established in

the NPDES permit. Discharges from these systems are not changed by operation at uprated power; therefore, the impact on the environment from these systems is not changed. The licensee concluded (Enclosure 3 to Ref. 3) that the nonradiological parameters affected by power uprate will remain within the bounding conditions cited in the NPDES permit, and therefore no significant nonradiological environmental impact will result from the operation of BSEP under uprated power conditions.

Radiological Environmental Assessment:

As presented below, the licensee evaluated the radiological effects of the proposed power uprate operation during both normal and postulated accident conditions. The licensee considered the effect of the higher power level on liquid radioactive wastes (Section 8.1 of Ref. 14), gaseous radioactive wastes (Section 8.2 of Ref. 14), and radiation levels both in the plant and offsite during both normal (Sections 8.3, 8.4, 8.5) and accident conditions. Section 9.2 of Reference 14 presents the results of the calculated whole body and thyroid doses at the exclusion area boundary and the low population zone that might result from the postulated design basis radiological accidents.

Gaseous radioactive effluents are produced during both normal operation and abnormal operational occurrences. These effluents are collected, controlled, processed, stored, and disposed of by the gaseous radioactive waste management systems which include the various building ventilation systems, the off gas system, and the standby gas treatment system (SGTS). The concentration of radioactive gaseous effluents released through the building ventilation systems during normal operation is not expected to increase significantly due to the proposed power uprate since the amount of fission products released into the reactor coolant (and subsequently into the building

atmosphere) depends on the number and nature of fuel rod defects and is approximately linear with respect to core thermal power. The concentration of activation products contained in the reactor steam remains nearly constant, since the linear increase in the production of these activation products is balanced by the linear increase in steaming rate. Power uprate does not change the design basis noble gas release rates from the fuel. Therefore, based on its review of the various building ventilation systems, the licensee concluded that there will not be a significant adverse effect on airborne radioactive effluents as a result of the proposed power uprate.

The SGTS is designed to minimize offsite and control room radiation dose rates during venting and purging of both the primary and secondary containment atmospheres under accident or abnormal conditions. This is accomplished by maintaining the secondary containment at a slightly negative pressure with respect to the outside atmosphere and discharging the secondary containment atmosphere through high-efficiency particulate air (HEPA) filters and charcoal absorbers. The capacity of the SGTS was selected to provide one secondary containment air volume change per day and thereby maintain the reactor building at a slight negative pressure. This capability is not impacted by power uprate. Although the total post-loss of coolant accident (LOCA) iodine loading of the charcoal filter beds increases slightly at uprated conditions, the total loading remains well below the original design capability of the filters.

Radiolysis of the reactor coolant causes the formation of hydrogen and oxygen, the quantities of which are expected to increase linearly with core power. These additional quantities of hydrogen and oxygen would increase the flow to the recombiners by 5 percent during uprated power conditions.

However, the operational increases in hydrogen and oxygen remain within the design capacity of the offgas system.

The design basis data for the concentration of activated corrosion products in the reactor water were assessed, and the licensee concluded that the design basis data contain sufficient conservatism and do not need to be increased for power operation. The licensee concluded that the fission product activity level in the reactor coolant will not exceed design basis data.

The largest source of liquid radioactive waste is from the backwash of the condensate demineralizers. These demineralizers remove activated corrosion products which are expected to increase proportionally with the proposed power uprate. However, the total volume of processed waste is not expected to increase significantly, since the only appreciable increase in processed waste will be due to the more frequent cleaning of these demineralizers. The floor drain collector subsystem and the waste collector subsystem both receive inputs from a variety of sources. Leakages from these systems are not expected to increase significantly due to the proposed power uprate. Based on a review of previous plant effluent reports and the slight increase in liquid radioactive waste expected due to the proposed power uprate, the licensee concluded that the slight increase in the processing of liquid radioactive wastes will not cause a significant increase in environmental impact and that requirements of 10 CFR Part 20 and 10 CFR Part 50, Appendix I, will continue to be met.

The uprated conditions may result in spent fuel with a higher burnup (and radiation levels) relative to the current levels. As indicated in Section 2.1 of Reference 14, any increase in burnup will be within the NRC

currently approved limit for BSEP fuel designs. The NRC extended the fuel burnup limit for the BSEP units to 60 gigawatt days per metric ton (GWD/MT) as part of license amendment no. 124 for Unit 1 and 153 for Unit 2 issued on February 6, 1989, and September 20, 1988, respectively. The environmental assessments associated with each of these amendments, which were published in the FEDERAL REGISTER for Unit 1 on January 31, 1989 (54 FR 4924), and Unit 2 on September 6, 1988 (53 FR 34357), considered the environmental impacts of transportation resulting from the 60 GWD/MT burnup limit with fuel enrichment up to 5%. The BSEP fuel enrichment does not exceed 5%. Both environmental assessments concluded that there were no significant radiological or nonradiological impacts associated with the amendments. Since the burnup levels for power uprate are bounded by the levels previously evaluated as acceptable and BSEP fuel enrichment does not exceed 5%, the Commission continues to conclude that there are no significant radiological or nonradiological impacts associated with this aspect of the licensee's power uprate proposal.

The licensee evaluated the effects of the power uprate on in-plant radiation levels for the Brunswick Plant during both normal operation and under post-accident conditions. The licensee's conclusions are that radiation levels during both normal operation, post-operation (plant outages), and under post-accident conditions may increase slightly (approximately proportional to the increase in power level). The increase expected in in-plant and post-operation radiation levels due to the proposed power uprate should not affect radiation zoning or shielding in the various areas of the plant, since it is offset by conservatism in the original design, source terms used, and analytical techniques. Individual worker occupational exposures will be

maintained within acceptable limits by the existing Health Physics program, which controls access to radiation areas. The increase in radiation levels due to the proposed power uprate under post-accident conditions has no significant effect on the plant, or on the habitability of the Technical Support Center or Emergency Operations Facility.

The licensee re-evaluated the effect of the power uprate on Design Basis Accident (DBA) radiological consequences and reported these results (Section 9.2 of Reference 14). The original licensing DBA source terms for Brunswick were considered. The licensee also re-evaluated the control room habitability under DBA conditions. The licensee stated that the radiological consequence analyses were performed using standard models developed by GE that have been utilized in other power uprate projects. The dose analyses were based on plant-specific parameters from the BSEP Updated Final Safety Analysis Report and were calculated at both the current power and at 102% of the proposed uprate power. The licensee's analyses indicate that the calculated offsite radiological consequences doses for all DBAs are within the dose acceptance criteria stated in the NRC's Standard Review Plan (SRP) and 10 CFR Part 100 and also comply with the dose acceptance criteria for control room operators given in General Design Criterion (GDC) 19 of Appendix A to 10 CFR Part 50. The staff performed confirmatory evaluations of radiological consequences of DBAs for the proposed power uprate. The staff found that the offsite radiological consequences and control room operator doses for all DBAs at the uprated power level of 2558 MWt will continue to meet the acceptance criteria of the SRP, 10 CFR Part 100, and GDC 19.

The NRC staff finds the licensee's assessment of the radiological effects of the proposed action acceptable and concludes that the proposed

uprate will not significantly increase radiological impacts on the environment.

Alternatives to the Proposed Action:

Since the Commission has concluded there is no significant (within existing limits) environmental impact associated with the proposed action, any alternatives with equal or greater environmental impact need not be evaluated. As an alternative to the proposed action, the staff considered denial of the proposed action. Denial of the proposed action would result in no change in current environmental impacts of plant operation, but would restrict operation of BSEP to the currently licensed power level. The environmental impacts of the proposed action and the alternative action are similar.

Alternative Use of Resources:

This action does not involve the use of any resources not previously considered in the Final Environmental Statement for the BSEP.

Agencies and Persons Consulted:

In accordance with its stated policy, on October 17, 1996, the staff consulted with the North Carolina State official, Mr. J. James, of the North Carolina Department of Environment, Commerce and Natural Resources, Division of Radiation Protection, regarding the environmental impact of the proposed action. The State official had no comments.

FINDING OF NO SIGNIFICANT IMPACT:

Based upon the environmental assessment, the Commission concludes that the proposed action will not have a significant effect on the quality of the human environment. Accordingly, the Commission has determined not to prepare an environmental impact statement for the proposed action. For further

details with respect to the proposed action, see the licensee's application dated April 2, 1996, as supplemented by an earlier submittal dated November 20, 1995, and by subsequent submittals dated July 1, 1996, July 30, 1996, August 7, 1996, September 13, 1996, September 20, 1996, October 1, 1996, October 22, 1996 (BSEP 96-0392), and October 22, 1996 (BSEP 96-0403), which are available for public inspection at the Commission's Public Document Room, the Gelman Building, 2120 L Street, NW., Washington, DC, and at the local public document room located at the University of North Carolina at Wilmington, William Madison Randall Library, 601 College Road, Wilmington, North Carolina 28403-3297.

References:

1. GE Nuclear Energy, "Generic Guidelines For General Electric Boiling Water Reactor Power Uprate," Licensing Topical Report NEDO-31897, Class I (non-proprietary), February 1992; and NEDC-31897P-A, Class III (Proprietary), May 1992.
2. W. T. Russell, U.S. Nuclear Regulatory Commission, letter to P.W. Marriott, General Electric Company, "Staff Position Concerning General Electric Boiling Water Reactor Power Uprate Program," September 30, 1991.
3. W. R. Campbell, Carolina Power & Light Company, letter to U.S Nuclear Regulatory Commission, "105% Thermal Power Uprate," April 2, 1996.
4. W. R. Campbell, Carolina Power & Light Company, letter to U.S Nuclear Regulatory Commission, "Power Uprate," November 20, 1995.

5. W. R. Campbell, Carolina Power & Light Company, letter to U.S Nuclear Regulatory Commission, July 1, 1996.
6. W. R. Campbell, Carolina Power & Light Company, letter to U.S Nuclear Regulatory Commission, July 30, 1996.
7. W. R. Campbell, Carolina Power & Light Company, letter to U.S Nuclear Regulatory Commission, August 7, 1996.
8. W. R. Campbell, Carolina Power & Light Company, letter to U.S Nuclear Regulatory Commission, September 13, 1996.
9. W. R. Campbell, Carolina Power & Light Company, letter to U.S Nuclear Regulatory Commission, September 20, 1996.
10. W. R. Campbell, Carolina Power & Light Company, letter to U.S Nuclear Regulatory Commission, October 1, 1996.
11. W. R. Campbell, Carolina Power & Light Company, letter to U.S Nuclear Regulatory Commission, October 22, 1996 (BSEP 96-0392).
12. W. R. Campbell, Carolina Power & Light Company, letter to U.S Nuclear Regulatory Commission, October 22, 1996 (BSEP 96-0403).
13. "Final Environmental Statement," Brunswick Steam Electric Plant dated January 1974.

14. GE Nuclear Energy, "Power Uprate Safety Analysis Report for Brunswick Steam Electric Plant, Units 1 & 2," Licensing Topical Report NEDC-32466P, Class III (Proprietary), September 1995 (Enclosure 1 to Ref. 4); NEDO-32466, Class I (Non-proprietary) September 1995 (Enclosure 2 to Ref.4).

Dated at Rockville, Maryland, this 23rd day of October, 1996.

FOR THE NUCLEAR REGULATORY COMMISSION

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