May 14, 2002

Mr. J. S. Keenan
Vice President
Brunswick Steam Electric Plant
Carolina Power & Light Company
Post Office Box 10429
Southport, North Carolina 28461

SUBJECT: BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2 - ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT (TAC NOS. MB2700 AND MB2701)

Dear Mr. Keenan:

Enclosed is the Environmental Assessment and Finding of No Significant Impact related to your application for amendments dated August 9, 2001. The application was supplemented by letters dated October 17, November 1, 7, 28, and 30, December 4, 10, 17 (2 letters), and 20, 2001, January 20, February 1, 4, 13, 14, 21 (2 letters), and 25 (3 letters), March 4, 5, 7, 14, 20, 22, and 25, and April 26 and 29, 2002. The proposed amendment would allow an increase in the maximum power level at the Brunswick Steam Electric Plant, Units 1 and 2, from 2558 megawatts thermal (MWt) to 2923 MWt, representing a power increase of 14.3 percent. The total change when completed will represent an increase of approximately 20 percent above the original rated thermal power of 2436 MWt.

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

Sincerely,

/RA/

Brenda L. Mozafari, Sr. Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
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

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2

DOCKET NOS. 50-325 AND 50-324

ENVIRONMENTAL ASSESSMENT

AND FINDING OF NO SIGNIFICANT IMPACT

RELATED TO A PROPOSED LICENSE AMENDMENT TO INCREASE THE

MAXIMUM RATED THERMAL POWER LEVEL

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

ENVIRONMENTAL ASSESSMENT

Identification of the Proposed Action:

The proposed action would allow CP&L, the operator of BSEP, to increase the maximum thermal power level by approximately 15 percent, from 2558 Megawatts-thermal (MWt) to 2923 MWt. The change is considered an extended power uprate (EPU) because it would raise the reactor core power level more than 7 percent above the original licensed maximum power level. The original licensed maximum power level was 2436 MWt, and the NRC staff approved an increase in the licensed maximum power level to 2558 MWt (approximately 5 percent increase) on November 1, 1996. This increase in power was implemented at BSEP in 1997. Therefore, this proposed action would result in an increase of approximately 20 percent over the original licensed maximum power level. The amendment would allow the heat output of the reactor to increase, which would increase the flow of steam to the turbine. This would allow the turbine generator to increase the production of power and increase the amount of heat dissipated by

the condenser. Moreover, this would result in an increased temperature in the water being released into the Atlantic Ocean.

The NRC previously published a draft environmental assessment of the proposed action in the FEDERAL REGISTER (67 FR 16132, April 4, 2002) and offered an opportunity for public comment. No comments were received.

Need for the Proposed Action:

CP&L forecasts a 40-percent increase in the demand for electrical power by 2015 in its service area in North Carolina and South Carolina. CP&L can meet this projected increase in power demand by increasing the number of natural gas-fired combustion turbines or by purchasing power from other sources. The cost of adding the additional generating capacity at BSEP is roughly equivalent to the cost of constructing several small combustion turbine units, each producing approximately 50 Megawatts-electrical (MWe). The proposed EPU would increase the electrical output for BSEP Unit 1 from 841 MWe to 958 MWe and for BSEP Unit 2 from 835 MWe to 951 MWe. However, the cost of nuclear power generation is approximately one-third of the cost of natural gas power generation. Therefore, the proposed EPU would increase power production capacity at a lower economic cost than the fossil fuel alternatives, such as natural gas, and would not result in additional land disturbances or other environmental impacts that could result from new plant construction.

Environmental Impacts of the Proposed Action:

At the time of issuance of the operating licenses for BSEP, the NRC staff noted that any activity authorized by the license for each unit would be encompassed by the overall action evaluated in the Final Environmental Statement (FES) for the operation of BSEP, which was issued in January 1974. The original operating licenses allowed a maximum reactor power of 2436 MWt. CP&L was granted amendments to the BSEP licenses to increase maximum reactor power level by approximately 5 percent on November 1, 1996. The NRC staff published

an Environmental Assessment and Finding of No Significant Impact (EA) in support of this uprate in the FEDERAL REGISTER on October 28,1996 (61 FR 55673). As part of the application dated August 9, 2001, CP&L submitted a supplement to the BSEP Environmental Report supporting the proposed EPU and providing a summary of its conclusions concerning both the radiological and non-radiological environmental impacts of the proposed action. Based on the NRC staff's independent analyses and the information provided by CP&L, the NRC staff concludes that the environmental impacts of the EPU are bounded by the environmental impacts previously evaluated in the FES because the EPU would not involve extensive changes to plant systems that directly or indirectly interface with the environment. This EA summarizes the non-radiological and radiological impacts on the environment that may result from the proposed amendments.

NON-RADIOLOGICAL IMPACTS

Land Use Impacts:

The proposed EPU would not modify the current land use at the site significantly over that described in the FES. Three small mechanical draft cooling towers would be erected on the roof of the radwaste building to service the new condensate cooling system. No other expansion of buildings, roads, parking lots, equipment storage or laydown areas, or onsite transmission and distribution equipment, including power line rights-of-way, is anticipated to support this action. No new construction outside of the existing facilities would be necessary. The EPU would not significantly affect material storage, including chemicals, fuels, and other materials stored aboveground or underground.

Cooling Tower Impacts:

Each of the three new mechanical draft cooling towers, which would service the condensate cooling system, are approximately 7 meters (m) by 7 m [24 feet (ft) by 24 ft], with a height of approximately 5 m (16 ft). They will be installed on the roof of the radwaste building at

an elevation of approximately 20 m (64 ft). The cooling towers would not be readily visible offsite, so there would be no visual or aesthetic impact. The towers are modular in design and construction, and a similar kind of construction is performed onsite during almost every refueling outage without noticeable additional impacts from noise, dust, odors, vibration, traffic, or vehicle exhaust. Therefore, there would be no significant impact from construction of the cooling towers. Each cooling tower would be designed to reject a maximum of approximately 15 MWt (51 million BTU/hr). The expected level of noise from operation of a cooling tower fan would be 84 dBA at a distance of 1.5 m (5 ft); however, the towers would be located on a roof top near the middle of the protected area. Therefore, no added impact from noise is expected offsite. Existing cooling towers, similar in design to the condensate cooling towers, have been in operation for years on the roof of the turbine building at BSEP. No significant fogging, icing, or drifting plumes carrying chemicals or particulate matter have been experienced from these existing cooling towers; therefore, no significant impact would be expected from operation of the condensate cooling towers.

Transmission Facility Impacts:

The proposed EPU would not require any physical modifications to the transmission lines. Increased current would be the only change in design or operation of the transmission lines needed to support the EPU. CP&L's transmission line right-of-way maintenance practices, including the management of vegetation growth, would not be affected. No new requirements or changes to onsite transmission equipment, operating voltages, or transmission line rights-of-way would be necessary to support the EPU. The main plant transformers will be modified and replaced to support the uprate; however, replacement of the transformers would have been required before the end of plant life as part of the licensee's ongoing maintenance program; therefore, no significant environmental impact beyond that considered in the FES is expected from this kind of replacement of onsite equipment.

The increased electrical current would cause an increased electromagnetic field around the transmission lines, and the potential for chronic effects from these fields continues to be studied and no scientific consensus has been reached. However, since the increase in power level is approximately 15 percent, the impact of exposure to electromagnetic fields from the offsite transmission lines would not be expected to increase significantly over the current impact.

The transmission lines are designed and constructed in accordance with the applicable shock prevention provisions of the National Electric Safety Code. Therefore, even with the slight increase in current attributable to the EPU, adequate protection is provided against hazards from electrical shock.

Impacts on Terrestrial Biota:

The proposed EPU would not involve any land disturbance; all construction will be on the roof of the pre-existing radwaste building. Also, once construction is completed, the uprate would not increase noise levels outside the plant site or increase the size of the workforce, nor would CP&L's transmission line rights-of-way maintenance practices change. Therefore, the uprate would not disturb the habitat of any terrestrial plant or animal species. In 1998, CP&L conducted a study to update information about the potential existence of sensitive plant and animal species in the plant environs. Two endangered perennial herbs, rough-leaved loosestrife and Cooley's meadowrue, occur in the BSEP transmission line rights-of-way. The red-cockaded woodpecker, an endangered bird, occurs in the mature pine forests in Brunswick County. The uprate would not disturb the habitat of any of these species, and CP&L has instituted measures to protect and manage the two endangered herbs by agreement with the North Carolina Natural Heritage Program. Therefore, no significant impact on terrestrial biota would be expected from the uprate.

Water Use Impacts:

BSEP uses a once-through cooling system to remove heat from the reactor coolant in the condensers. An intake canal approximately 5 kilometers (km) (3 miles) in length feeds water from the Cape Fear River to the BSEP intake structure. The water passes through tubes in the condensers removing heat from the reactor coolant. Then the water passes through a discharge canal 10 km (6 miles) in length to Caswell Beach. At Caswell Beach, the water is pumped approximately 600m (2000 ft) offshore and discharged at the bottom of the Atlantic Ocean.

The proposed EPU would not involve any increase in the rate of withdrawal of water from the intake canal or the Cape Fear River. Makeup water for the new condensate cooling system would be obtained from the Brunswick County water system; the maximum anticipated flow of makeup water would be approximately 23.7 liters per second [375 gallons per minute (gpm)]. CP&L consulted with Brunswick County water system management officials, who indicated that the additional water use would be well within the capacity of the County water system. Therefore, the uprate would not have a significant impact on water usage by BSEP and would not create a water use conflict.

Discharge Impacts:

Surface water and wastewater discharges at BSEP are regulated by the State of North Carolina via a National Pollutant Discharge Elimination System (NPDES) permit. This permit is periodically reviewed and renewed by the North Carolina Department of Environment and Natural Resources (NCDENR). The EPU would increase the temperature of the water discharged to the Atlantic Ocean. Also, the blowdown from the new cooling towers would be piped to the existing storm drain system and empty into a storm drain basin. Water from the storm drain basin is pumped into a stabilization pond; discharges from the stabilization pond flow into the BSEP intake canal.

In 2001, CP&L analyzed the effect of the proposed EPU on the water temperatures in the Atlantic Ocean in the area of the BSEP discharge. First, historical data, such as intake temperatures, discharge temperatures, plant operating conditions, and meteorological conditions, were used to develop isothermal distribution maps. Then, isothermal distribution maps were projected using the expected heat rejection rates for the uprate condition. Based on these analyses, CP&L submitted an application to the NCDENR for renewal of the BSEP NPDES permit with the following revisions to support the uprate:

1. Area of surface water temperature increase up to 7 degrees Fahrenheit (F) [3.9 degrees Celsius (C)] in the plume extending from the discharge point in the Atlantic Ocean shall not exceed 120 acres [50 hectares (ha)]. The current limit is approximately 60 acres (24 ha).
2. Area of surface water temperature increase up to 1.44 degrees F (0.8 degrees C) during June-August [3.96 degrees F (2.2 degrees C) during September-May] should not exceed 2000 acres (800 ha). The current limit is 1000 acres (400 ha).
3. Area of bottom water temperature increase up to 7 degrees F (3.9 degrees C) shall not exceed 4 acres (1.6 ha). The current limit is 2 acres (0.8 ha).
4. Bottom water temperature increase shall not exceed 7 degrees F (3.9 degrees C) beyond a distance of 1000 ft (300 m) from the discharge point. The current limit is 500 ft (150 m).

BSEP has been operating within the current limits; therefore, these limits represent an upper bound of the current impact on ocean water temperatures in the vicinity of the discharge. The proposed limits to support the uprate similarly represent the expected upper bound of the impact on ocean water temperatures if the uprate were fully implemented.

The maximum blowdown flow from all three condensate cooling towers into the storm drain system would be approximately 8.2 liters per second (130 gpm). Water treatment

chemicals would be added to the condensate cooling system - approximately 409 liters (108 gallons) per year of ChemTreat CL-216 (a biocide) and approximately 1567 liters (414 gallons) per year of ChemTreat CL-4800 (a dispersant). These chemical additions were included in the application to NCDENR for the renewed NPDES permit. The volume of the blowdown would be small compared to the volume of the storm drain basin, and it would be diluted even further in the stabilization pond and the intake canal. The blowdown from the existing cooling towers on the roof of the turbine building follows the same discharge path. Therefore, no significant additional impact would be expected from the blowdown discharged from the condensate cooling system.

Impacts on Aquatic Biota:

The flow rate of water being withdrawn from the intake canal at the intake structure would not increase, and no change would be made in the design of the intake structure screens. Therefore, no increase in the entrainment of planktonic organisms or in the impingement of fish, shellfish, or sea turtles would be expected.

CP&L has conducted thermal studies in the Atlantic Ocean in the vicinity of the BSEP discharge for over 25 years; no adverse impacts on fish and shellfish have been observed. The expected increase in water temperature would be expected to be small and limited to a relatively small area in the Brunswick County coastline. The increase in water temperature would not be expected to exceed 4 degrees C (7 degrees F) beyond an area of 50 ha (120 acres) at the surface, and the increase would not be expected to exceed 2 degrees C (4 degrees F) beyond an area of 800 ha (2000 acres). The affected area would be expected to be even smaller near the bottom. There is no critical habitat in the vicinity of the ocean discharge; the ocean floor is sandy flats with no natural features that would attract fish and invertebrates. Some of the more abundant organisms (brown shrimp, white shrimp, and croaker) in the vicinity of the discharge point tolerate temperatures of up to 86 degrees F without experiencing loss of

equilibrium, and most organisms could avoid the area of higher water temperature. There is a net westward drift of the near-shore coastal waters in the vicinity of the discharge point; therefore, most larvae would enter the estuary from offshore waters to the east and would not be expected to be affected by the discharge plume. Therefore, the uprate would not be expected to significantly impact aquatic biota in the vicinity of BSEP.

CP&L's 1998 study indicated that three Federally listed aquatic species could be potentially affected by BSEP: loggerhead sea turtle (threatened), green sea turtle (threatened), and Kemp's ridley sea turtle (endangered). Of the three, the loggerhead sea turtle has been most commonly collected in the intake canal, although all three of these turtle species have been collected. CP&L employs protective measures, such as blocker panels in the diversion structure, to prevent turtles from entering the canal and patrols of the intake canal to remove turtles. The National Marine Fisheries Service (NMFS) reviewed data from BSEP on incidental takes of sea turtles and the protective measures employed at BSEP. In January 2000, NMFS concluded that BSEP operation "is not likely to jeopardize the continued existence of the loggerhead, leatherback, green, hawksbill, or Kemp's ridley sea turtles." Since the withdrawal rate of water from the intake canal would not increase due to the EPU and the sea turtles can easily swim around the small higher-temperature discharge plume, no increased impact would be expected for the sea turtles beyond that considered in the NMFS Biological Opinion of January 2000.

Social and Economic Impacts:

The NRC staff has reviewed information provided by the licensee regarding socioeconomic impacts. CP&L is a major employer in the community with approximately 750 full-time employees and 235 contract employees. CP&L is also a major contributor to the local tax base. CP&L personnel also contribute to the tax base by paying sales and property taxes. The proposed EPU would not significantly affect the size of the BSEP labor force and would

have no material effect upon the labor force required for future outages after all stages of the modifications needed to support the uprate are completed. Because the plant modifications needed to implement the uprate would be minor, any increase in sales tax and additional revenue to local and national business will be negligible relative to the large tax revenues generated by BSEP. The EPU would increase the plant's equalized assessed value, which would result in increased tax revenues for Brunswick County. It is expected that the proposed uprate will reduce incremental operating costs, enhance the value of BSEP as a power-generating asset, and lower the probability of early plant retirement. Early plant retirement would be expected to have a significant negative impact on the local economy and the community as a whole by reducing tax revenues and limiting local employment opportunities, although these effects could be mitigated by decommissioning activities in the short term.

Summary

In summary, the proposed EPU would not result in a significant change in non-radiological impacts in the areas of land use, water use, waste discharges, cooling tower operation, terrestrial and aquatic biota, transmission facility operation, or social and economic factors. No other non-radiological impacts were identified or would be expected. Table 1 summarizes the non-radiological environmental impacts of the proposed EPU at BSEP.

Table 1: Summary of Non-Radiological Environmental Impacts

Land Use: No change in land use or aesthetics; three small cooling towers on top of radwaste building.

Cooling Tower: No change in visual or aesthetic impact; no added impact on noise level; no significant impact from modular construction of the cooling towers; no significant fogging, icing, or drifting plumes.

Transmission Facilities: No physical modifications to the transmission lines and facilities; meet shock safety requirements; no changes to right-of-ways; small increase in electrical current would cause small increase in electromagnetic field around the transmission lines.

Terrestrial Biota: No additional impact on endangered herbs and birds or other terrestrial biota.

Water Use: No increase in the rate of withdrawal of water from the Cape Fear River; up to an additional 23.7 liters per second (375 gpm) of water from Brunswick County supply system, approved by County.

Discharge: Increase in area of plume in Atlantic Ocean with increased water temperature from 400 to 800 ha (from 1000 to 2000 acres) [area of 0.8 degrees C (1.44 degrees F) isotherm in Summer]; up to an additional 8.2 liters per second (130 gpm) of blowdown water discharged to storm drain system with small amount of biocide and dispersant chemicals; application for revised NPDES permit under review by State of North Carolina.

Aquatic Biota: No expected increased impact on endangered sea turtles or other aquatic biota.

Social and Economic: No significant change in size of BSEP workforce.

RADIOLOGICAL IMPACTS

Radioactive Waste Stream Impacts

BSEP uses waste treatment systems designed to collect, process, and dispose of gaseous, liquid, and solid wastes that might contain radioactive material in a safe and controlled manner such that discharges are in accordance with the requirements of 10 CFR Part 20, “STANDARDS FOR PROTECTION AGAINST RADIATION,” and 10 CFR Part 50, “DOMESTIC LICENSING OF PRODUCTION AND UTILIZATION FACILITIES,” Appendix I. These radioactive waste streams are discussed in the FES. The proposed EPU would not result in changes in the operation or design of equipment in the gaseous, liquid, or solid waste systems. The uprate would not introduce new or different radiological release pathways and does not increase the probability of an operator error or equipment malfunction that would result in an uncontrolled release of radioactive material. The uprate will not affect the environmental monitoring of any of these waste streams or the radiological monitoring requirements contained in licensing basis documents.

Gaseous Radioactive Waste and Offsite Doses:

During normal operation, the gaseous effluent treatment systems process and control the release of gaseous radioactive effluents to the environs, including small quantities of noble gases, halogens, particulates, and tritium, such that the doses to individuals offsite are maintained within the limits of 10 CFR Part 20 and the dose design objectives of Appendix I to 10 CFR Part 50 (10 CFR Part 20 includes the requirements of the U.S. Environmental Protection Agency (EPA) regulation 40 CFR Part 190, “ENVIRONMENTAL RADIATION PROTECTION STANDARDS FOR NUCLEAR POWER OPERATIONS”). The gaseous waste management systems include the offgas system and various building ventilation systems. CP&L estimates that the resulting increase in gaseous radioactive effluents would be bounded in direct proportion to the increase in power - 15 percent. CP&L indicated that a 15-percent increase in the amount of gaseous radioactive material released annually from BSEP in the last several years would still be well below the estimates presented in the FES. The NRC staff has

independently reviewed the information presented by the licensee and confirmed the licensee's conclusion.

CP&L also calculated the potential increase in the maximum radiation dose to a member of the public in the environs offsite at BSEP from the proposed EPU. A 15-percent increase applied to the release data for the worst year in the 5-year timeframe from 1996 to 2000 would still result in doses below 1 percent of the dose design objectives of Appendix I to 10 CFR Part 50. Therefore, the increased impact of the uprate on offsite doses from gaseous effluents would not be significant.

Liquid Radioactive Waste and Offsite Dose:

During normal operation, the liquid effluent treatment systems process and control the release of liquid radioactive effluents to the environs, such that the doses to individuals offsite are maintained within the limits of 10 CFR Part 20 and the dose design objectives of Appendix I to 10 CFR Part 50. The liquid radioactive waste systems are designed to cleanup and recycle as much water as practicable; the liquid effluents that are released are continuously monitored and discharges terminated if effluents exceed preset levels of radioactive material. CP&L estimates that the amount of radioactive material released in liquid effluents would not increase significantly. CP&L indicated that the amounts of liquid radioactive material that have been released from BSEP in the last several years are well below the estimates presented in the FES. CP&L expects little or no increase in the quantity of radioactive material released in liquid effluents as a result of the uprate. The NRC staff has independently reviewed the information presented by the licensee and confirmed the licensee's conclusions. In addition, the calculated doses to members of the public offsite associated with these levels of release of radioactive liquid are below 1 percent of the dose design objectives of Appendix I to 10 CFR Part 50. Therefore, the increased impact of the uprate on offsite doses from liquid effluents would not be significant.

Solid Radioactive Wastes:

The solid radioactive waste system collects, processes, packages, and temporarily stores radioactive dry and wet solid wastes prior to shipment offsite and permanent disposal. The largest volume of solid radioactive waste at BSEP is low-level radioactive waste; sources of this low-level waste include spent resins, filters, charcoal, sludges from water processing, oil, and dry active waste, which is essentially contaminated trash. During the last several years, CP&L has implemented waste handling procedures to reduce the volume of low-level waste generated at BSEP. The volume of low-level radioactive waste generated in 2000 was approximately 389 cubic meters (13,877 cubic ft). The proposed EPU would increase the volume of spent resins, filters, and sludges because the uprate would produce more radioactive material that would have to be removed by processing systems such as the demineralizers in the condensate system. The licensee estimates that the volume of such wastes could increase by as much as 15 percent, consistent with the EPU. Even with such an increase, the expected volume of low-level radioactive waste would be well below the value in the FES. No significant increase would be expected in the production of the other types of low-level waste.

In addition to the low-level wastes, the proposed EPU would result in replacement of 135 control rod blades at each unit. This replacement would occur in stages during the next several refueling outages. The removed control rod blades would be stored in the spent fuel pool, as is commonly done with irradiated reactor components, until they can be prepared for shipping and disposal offsite. These control rod blades would not contribute significantly to the overall volume of solid radioactive waste handled at BSEP.

The proposed EPU would also result in a greater percentage of the fuel assemblies being removed from the reactor core and replaced with new fuel assemblies during each refueling outage. Currently, 212 fuel assemblies (approximately 39 percent) are replaced during each refueling; 256 fuel assemblies (approximately 47 percent) would be replaced each refueling to

support the uprated power level. Since CP&L limits the amount of spent fuel stored at BSEP and stores the rest of the spent fuel from BSEP in the spent fuel storage pools at CP&L's Shearon Harris Nuclear Power Plant (SHNPP), no increased volume of spent fuel would be expected to be stored at BSEP as a result of the uprate. By letter dated December 21, 2000, the NRC granted CP&L an amendment to the operating license for SHNPP to allow storage of spent fuel in all four spent fuel storage pools at SHNPP. CP&L has stated that the pools at SHNPP have sufficient storage capacity to handle the additional spent fuel assemblies that would be generated as a result of the proposed EPU at BSEP. An EA was published in the FEDERAL REGISTER on December 21, 1999 (64 FR 71514), to address the environmental impact of fully utilizing the storage capacity of all four spent fuel pools at SHNPP. The NRC staff concludes that the 1999 EA bounds the impact of storage of the additional spent fuel assemblies that would be generated by the BSEP uprate in the SHNPP spent fuel pools.

In-plant Radiation Doses:

The proposed EPU would result in the production of more radioactive material and higher radiation dose rates in some areas at BSEP. Potentially, the increase could be as much as 15 percent, consistent with the proposed 15-percent increase in reactor power. However, CP&L expects that the BSEP radiation protection staff will be able to minimize the resultant increase in radiation doses to the plant staff to a level well below the 15-percent upper-bound estimate by using commonly known methods, such as installation of additional shielding or more effective systems to remove more radioactive material from process streams such as the condensate system. BSEP has reduced the amount of radiation dose received by the plant workers over the last several years. The collective occupational dose for year 2000 at BSEP (including both units) was approximately 3.22 person-Sieverts (Sv) (322 person-rem); the average dose for a boiling-water reactor unit in the U.S. in year 2000 was 1.74 person-Sv (174 person-rem). The FES did not discuss occupational dose; however, other FESs published

shortly after the BSEP FES estimated the environmental impact from occupational dose to be 500 person-rem (Sievert unit did not exist at that time) of collective occupational dose per year per reactor unit. Therefore, the collective dose at BSEP would not be expected to increase significantly as a result of the uprate and would be well within the impact commonly estimated in FESs in the 1970s.

Direct Radiation Doses Offsite:

Direct radiation from radionuclides (mainly nitrogen-16) in the main steam system components in the turbine building is scattered by the air above the site and provides another offsite public dose pathway (skyshine) from an operating boiling-water reactor. CP&L has routinely monitored the whole body dose rate offsite using thermoluminescent dosimeters; the licensee has also performed surveys offsite with pressurized ion chambers. Data from these monitoring methods indicated that the highest annual offsite dose from skyshine at the site boundary from 1999 to 2001 was 7 millirem (mrem) (.07 mSv). Nitrogen-16 production is increased by routine hydrogen gas injection into the reactor feedwater (hydrogen water chemistry) in an effort to prevent intergranular stress corrosion cracking of reactor internals. The annual whole body dose equivalent to a real member of the public (beyond the site boundary) is limited to 25 mrem (0.25 mSv) by 40 CFR Part 190. Assuming a 15-percent increase in the doses from skyshine (consistent with a 15-percent EPU), the expected annual dose would be expected to increase to approximately 8 mrem (.08 mSv), still well below the annual dose limit of 40 CFR Part 190. The licensee will continue to perform surveys as the proposed EPU is implemented to assess the combined impact of hydrogen water chemistry with the uprate to ensure continued compliance with the requirements of 40 CFR Part 190. Therefore, the increased impact of the uprate on offsite doses from direct radiation sources would not be significant.

Postulated Accident Doses:

The NRC staff has reviewed the licensee's analyses and performed confirmatory calculations to verify the acceptability of the licensee's calculated doses under accident conditions. As a result of implementation of the proposed EPU, there could be an increase in the source term used in the evaluation of some of the postulated accidents in the FES. The inventory of radionuclides in the reactor core is dependent on power level; therefore, the core inventory of radionuclides could increase by as much as 15 percent. The concentration of radionuclides in the reactor coolant may also increase by as much as 15 percent; however, this concentration is limited by the BSEP Technical Specifications and is more dependent on the degree of leakage occurring through the fuel cladding. The overall quality of fuel cladding has improved since the mid-1970s when the FES was published, and BSEP has been experiencing very little fuel cladding leakage in recent years. Therefore, the reactor coolant concentration of radionuclides would not be expected to increase significantly. This coolant concentration is part of the source term considered in some of the postulated accident analyses. Finally, as previously discussed above, some of the radwaste streams and storage systems evaluated for postulated accidents may contain slightly higher quantities of radionuclides. For those postulated accidents where the source term increased, the calculated potential radiation dose to individuals at the site boundary (the exclusion area) and in the low population zone would be increased over the values presented in the FES. Any such increase in calculated accident doses would not be expected to be more than 15 percent higher, and the calculated doses would still be below the acceptance criteria of 10 CFR Part 100, "REACTOR SITE CRITERIA," and the Standard Review Plan (NUREG-0800). Also, no modifications in the plant design or operation would be made that would significantly increase the probability of an accident. Therefore, the NRC staff concludes that the uprate would not significantly increase the probability or consequences of accidents and would not result in a significant increase in the radiological environmental impact of BSEP under accident conditions.

After many years of reactor experience and research, the NRC approved an alternative radiological source term methodology for power reactors. The alternative source term is codified in 10 CFR 50.67 and described in Regulatory Guide 1.183, “Alternative Radiological Source Term for Evaluating Design Basis Accidents at Nuclear Power Reactors,” which was published in July 2000. This methodology also uses the Total Effective Dose Equivalent methodology, which is recommended by the International Commission on Radiation Protection and the National Council on Radiation Protection and Measurements. CP&L submitted a proposal to the NRC to implement the alternative source term for the BSEP accident analyses; therefore, the application for the proposed EPU assessed the postulated accidents discussed in the FES using the new methodology. CP&L concluded that the new calculated doses for the uprate met all the applicable acceptance criteria of 10 CFR 50.67 and Regulatory Guide 1.183. The results of the NRC staff’s calculations will be presented in the safety evaluation to be issued with the license amendments.

Fuel Cycle and Transportation Impacts

The environmental impacts of the fuel cycle and transportation of fuels and wastes are described in Tables S-3 and S-4 of 10 CFR 51.51 and 10 CFR 51.52, respectively. An additional NRC generic EA (53 FR 30355, dated August 11, 1988, as corrected by 53 FR 32322, dated August 24, 1988) evaluated the applicability of Tables S-3 and S-4 to higher burnup cycle and concluded that there is no significant change in environmental impact from the parameters evaluated in Tables S-3 and S-4 for fuel cycles with uranium enrichments up to 5 weight percent uranium-235 and burnups less than 60,000 megawatt (thermal)-days per metric ton of uranium-235 (MWd/MTU). CP&L has concluded that the fuel enrichment at BSEP will increase to approximately 4.4 percent as a result of the proposed EPU with burnup remaining at approximately 45,000 MWd/MTU. Because the fuel enrichment for the uprate will not exceed 5 weight percent uranium-235 and the rod average discharge burnup for the uprate

will not exceed 60,000 MWd/MTU, the environmental impacts of the uprate will remain bounded by the conclusions in Tables S-3 and S-4 and are not significant.

Summary

The proposed EPU would not significantly increase the probability or consequences of accidents, would not introduce any new radiological release pathways, would not result in a significant increase in occupational or public radiation exposure, and would not result in significant additional fuel cycle environmental impacts. Accordingly, the Commission concludes that there are no significant radiological environmental impacts associated with the proposed action. Table 2 summarizes the radiological environmental impacts of the proposed EPU at BSEP.

Alternatives to Proposed Action:

As an alternative to the proposed action, the NRC staff considered denial of the proposed EPU (i.e., the “no-action alternative”). Denial of the application would result in no change in the current environmental impacts; however, other fossil-fueled generating facilities would be built in CP&L’s service area in North Carolina and South Carolina in order to maintain sufficient power-generating capacity. Construction and operation of a fossil-fueled plant would create impacts in air quality, land use, and waste management. Implementation of the proposed EPU would have less impact on the environment than the construction and operation of a new fossil-fueled generating facility and does not involve environmental impacts that are significantly different from those presented in the 1974 FES and the 1996 EA for BSEP.

Alternative Use of Resources:

This action does not involve the use of any resources not previously considered in the 1974 FES and the 1996 EA for BSEP.

Table 2: Summary of Radiological Environmental Impacts

Gaseous Effluents & Doses:	Up to 15-percent increase in amount of radioactive material in gaseous effluents; within FES estimate; offsite doses would continue to be well within NRC criteria.
Liquid Effluents & Doses:	No significant increase in amount of radioactive material in liquid effluents; within FES estimate; offsite doses would continue to be well within NRC criteria.
Solid Radioactive Waste:	Up to 15-percent increase in volume of low-level solid radwaste; increases in amount of spent control rod blades and spent fuel assemblies.
In-plant Dose:	No significant increase in collective occupational dose expected.
Direct Radiation Dose:	Up to 15-percent increase in dose rate offsite from skyshine; expected annual dose continues to meet NRC/EPA criteria.
Postulated Accidents:	Up to 15-percent increase in calculated doses from some postulated accidents; calculated doses within NRC criteria.
Fuel Cycle & Transportation:	Fuel enrichment and burnup would continue to be within bounding assumptions for Tables S-3 and S-4 in 10 CFR Part 51, “ENVIRONMENTAL PROTECTION REGULATIONS FOR DOMESTIC LICENSING AND RELATED REGULATORY FUNCTIONS”; conclusions of tables regarding impact would remain valid.

Agencies and Persons Consulted:

In accordance with the its stated policy, on March 29, 2002, the NRC 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

On the basis of the EA, 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 August 9, 2001, as supplemented October 17, November 1, 7, 28, and 30, December 4, 10, 17 (2 letters), and 20, 2001, January 20, February 1, 4, 13, 14, 21 (2 letters), and 25 (3 letters), March 4, 5, 7, 14, 20, 22, and 25, and April 26 and 29, 2002. Documents may be examined and/or copied for a fee at the NRC's Public Document Room (PDR), at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland. Publicly available records will be accessible electronically from the ADAMS Public Library component on the NRC Web site, http://www.nrc.gov (the Electronic Reading Room). If you do not have access to ADAMS or if there are problems in accessing the documents located in ADAMS, contact the NRC PDR Reference staff at (800) 397-4209, or (301) 415-4737, or by e-mail at pdr@nrc.gov.

Dated at Rockville, Maryland, this 14th day of May 2002.

FOR THE NUCLEAR REGULATORY COMMISSION

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