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FEBRUARY 9 1979

Docket Nos. 50-325
and 50-324

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

Dear Mr. Jones:

The Commission has issued the enclosed Amendment No. 19 to Facility Operating License No. DPR-71 and Amendment No. 43 to Facility Operating License No. DPR-62 for the Brunswick Steam Electric Plant (BSEP), Unit Nos. 1 and 2, respectively. These amendments consist of changes to the Technical Specifications in response to your request dated October 16, 1978.

The revised Technical Specifications limit the annual gaseous release to the 10 CFR 50 Appendix I design objectives for BSEP during the interim period until the Augmented Offgas System is restored to an operable status. The enclosed Technical Specifications have been slightly modified from those proposed in your October 16, 1978 submittal. These changes have been discussed with and agreed to by your staff.

Copies of the Safety Evaluation and Notice of Issuance are also enclosed.

Sincerely,

Original Signed by
T. A. Ippolito

Thomas A. Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors

Enclosures:
1. Amendment No. 19 to DPR-71
2. Amendment No. 43 to DPR-62
3. Safety Evaluation
4. Notice

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cc w/enclosures: See next page

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DATE ➤	1/ /79	1/ /79	/ /79	/ /79		

NRC FORM 318 (9-76) NRCM 0240 ★ U.S. GOVERNMENT PRINTING OFFICE: 1978 - 265 - 769

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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. 19
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 October 16, 1978 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 as 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 and B, as revised through Amendment No. 19, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

7902260182

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

FOR THE NUCLEAR REGULATORY COMMISSION

Thomas A. Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors

Attachment;
Changes to the Technical
Specifications

Date of Issuance: February 9, 1979

ATTACHMENT TO LICENSE AMENDMENT NO. 19

FACILITY OPERATING LICENSE NO. DPR-71

DOCKET NO. 50-325

Replace the following pages of the Appendix "B" Technical Specifications with the enclosed pages. The revised pages are identified by Amendment number and contain vertical lines indicating the area of change.

Remove	Insert
i*	i*
ii	ii
2-8	2-8
2-9	2-9
2-10	2-10
2-11	2-11
2-12	2-12
2-13	2-13
2-14	2-14
	2-14a
2-19	2-19
2-20	2-20
2-21	2-21
2-22	2-22
2-23	2-23
	2-31
4-9	4-9
	4-9(a)

*Overleaf page provided for convenience.

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 & 2

ENVIRONMENTAL TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

LIST OF TABLES

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

2.5 RADIOACTIVE DISCHARGES

Objective: To define the limits and conditions for the controlled release of radioactive materials in liquid and gaseous effluents to the environs to ensure that these releases are as low as reasonably achievable. These releases should not result in radiation exposures in unrestricted areas greater than a few percent of natural background exposures. All effluents shall be within the limits specified in 10 CFR Part 20.

To ensure that the release of radioactive material above background to unrestricted areas will be as low as reasonably achievable as defined in Appendix I to 10 CFR Part 50, the following design objectives apply.

For liquid wastes:

a. The annual dose above background to the total body or any organ of an individual from all reactors at a site should not exceed 5 mrem in an unrestricted area.
b. The annual total quantity of radioactive materials in liquid waste, excluding tritium and dissolved and entrained fission and activation gases discharged from the site should not exceed 5 Ci per reactor.

For gaseous wastes:

a. The annual total quantity of noble gases above background discharged from the site should result in an air dose due to gamma radiation of less than 20 mrad, and an air dose due to beta radiation of less than 40 mrad, at any location near ground level which could be occupied by individuals at or beyond the boundary of the site.

3.0 SURVEILLANCE REQUIREMENTS

3.5 RADIOACTIVE DISCHARGES

Objective: The purpose of these specifications is to ensure that the releases of radioactive materials are as low as reasonably achievable and within allowable values.

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

2.5 RADIOACTIVE DISCHARGES (Cont'd)

b. The annual total quantity of I-131 and radioactive material in particulate forms with half-lives greater than 8 days above background from all reactors at a site should not result in an annual dose to any organ of an individual in an unrestricted area from all pathways of exposure in excess of 30 mrem.

2.5.1 Specifications for Liquid Waste Effluents

a. The concentration of radioactive materials released in liquid waste effluents from all reactors at the site after dilution in the discharge canal shall not exceed the values specified in 10 CFR Part 20, Appendix B, Table II, Column 2, for unrestricted areas.

b. The cumulative release of radioactive materials from the site in liquid waste effluent, excluding tritium and dissolved and entrained fission and activation gases, shall not exceed 10 Ci per reactor in a calendar quarter.

c. The cumulative release of radioactive materials from the site in liquid waste effluents excluding tritium and dissolved and entrained fission and activation gases, shall not exceed 20 Ci per reactor in any 12 consecutive months.

d. During release of radioactive wastes, the effluent control monitor shall be set to alarm and to initiate the automatic closure of each waste discharge valve prior to exceeding the limits specified in 2.5.1.a above.

e. The operability of each automatic isolation valve in the liquid radwaste discharge line shall be demonstrated quarterly.

f. The equipment installed in the liquid radioactive waste system shall be maintained and shall be operated to process radioactive liquid wastes prior to their discharge when the projected cumulative release from the site could exceed 1.25 Ci per reactor in a calendar quarter, excluding tritium and dissolved and entrained fission and activation gases.

3.0 SURVEILLANCE REQUIREMENTS

3.5 RADIOACTIVE DISCHARGES (Cont'd)

3.5.1 Specifications for Liquid Waste Sampling and Monitoring

a. Plant records shall be maintained of the radioactive concentration and volume before dilution of liquid waste discharged, and the average dilution flow and length of time over which each discharge occurred. Sample analyses results and other reports shall be submitted in accordance with Section 5.4 of these specifications. Estimates of the sampling and analytical error shall be included as stated in NRC Regulatory Guide 1.21.

b. Prior to release of each batch of liquid waste, a sample shall be taken from that batch and analyzed for each significant gamma peak in accordance with Table 3.5-1 to demonstrate compliance with Specification 2.5.1 using the flow rate of the stream into which the waste is discharged during the period of discharge.

c. Sampling and analysis of liquid radioactive waste shall be performed in accordance with Table 3.5-1. Prior to taking samples from a sample or drain tank, at least two tank volumes shall be recirculated.

d. The radioactivity in liquid wastes shall be continuously monitored and recorded during release. Whenever these monitors are inoperable for a period not to exceed 72 hours, two independent samples of each tank to be discharged shall be analyzed and two plant personnel shall independently check valving prior to the discharge. If these monitors are inoperable for a period exceeding 72 hours, no liquid waste tank shall be released and any release in progress shall be terminated.

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

2.5.1 Liquid Waste Effluents (cont'd)

g. The maximum radioactivity to be contained in any liquid radwaste tank that can be discharged directly to the environs shall not exceed 10 Ci, excluding tritium and dissolved and entrained fission and activation gases.

h. If the cumulative release of radioactive materials in liquid effluents excluding tritium and dissolved and entrained fission and activation gases, exceeds 2.5 Ci per reactor in a calendar quarter, the licensee shall make an investigation to identify the causes of such releases, define and initiate a program of action to reduce such releases to the design objective levels listed in Section 2.5, and report these actions to the Commission within 30 days from the end of the quarter during which the release occurred.

2.5.2 Specifications for Gaseous Waste Discharges

a. (1) The release rate limit of noble gases from this site shall be:

$$\sum_{i \to n} Q_{s_i}\left[4.0\overline{E}_{\gamma i} + 0.23\overline{E}_{\beta i}\right] + Q_{v_i}\left[35\overline{E}_{\gamma i} + 92\overline{E}_{\beta i}\right] \leq 1$$

where Q_s = release rate from main stack in Ci/sec (elevated release).

Q_v = release rate from vents in Ci/sec (ground release)

i = the ith individual nuclide.

n = total number of nuclides.

$\overline{E}_{\gamma i}$ = the average gamma energy per disintegration for nuclide i.

$\overline{E}_{\beta i}$ = the average beta energy per disintegration for nuclide i.

Refer to Table 3.5-5 for $\overline{E}_{\gamma i}$ and $\overline{E}_{\beta i}$ values to be used.

3.0 SURVEILLANCE REQUIREMENTS

3.5.1 Liquid Waste Effluents (cont'd)

e. The flow rate of liquid radioactive waste shall be continually measured and recorded during release.

f. All liquid effluent radiation monitors shall be calibrated at least quarterly by means of a known radioactive source which has been calibrated to a National Bureau of Standards source. Each monitor shall also have a functional test monthly and an instrument check prior to making a release.

3.5.2 Specifications for Gaseous Waste Sampling and Monitoring

a. Plant records shall be maintained and records of the sampling and analysis results shall be submitted in accordance with Section 5.4 of these Specifications. Estimates of the sampling and analytical error associated with each reported value should be included.

b. Gaseous releases to the environment from the two reactor building vents, the two turbine building vents, and the off-gas vent (stack), except as noted in Specification 3.5.2.c below, shall be continuously monitored for gross radioactivity and the flow measured and recorded. Whenever these monitors are inoperable, grab samples shall be taken and analyzed daily for gross gaseous radioactivity. If these monitors are inoperable for more than seven days, these releases shall be terminated or the plant shall be shut down

c. An isotopic analysis shall be made of a representative sample of gaseous activity, excluding tritium, at the discharge of the steam jet air ejectors and at a point prior to dilution and discharge.

(1) at least monthly,

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

2.5.2 Gaseous Waste Effluents (cont'd)

(2) The re. ase rate limit of I-131 and radioactive materials in particulate form with half-lives greater than eight days, released to the environs as part of the gaseous wastes from the site shall be:

$$\left[3.7 \times 10^4\right] Q_s + \left[5.8 \times 10^6\right] Q_v \leq 1$$

where Q_s = release rate from the main stack in Ci/sec (as elevated release)

Q_v = release rate from the vents in Ci/sec (ground release)

b. (1) the average release rate of noble gases from the site during any 12 consecutive months shall be:

$$\sum_{i \to n} \bar{E}_{\beta i} [2.8 Q_{si} + 1160 Q_{vi}] \leq 1$$

and

$$\sum_{i \to n} \bar{E}_{\gamma_i} \left[90 Q_{si} + 800 Q_{vi} \right] \leq 1$$

where Q_{si} = release rate of radioisotope i from the main stack in Ci/sec

Q_{vi} = release rate of radioisotope i from the vents of each reactor in Ci/sec.

(2) The average release rate from the site of I-131 and radioactive materials in particulate form with half-lives greater than eight days during any period of 12 consecutive months shall be:

$$(6.56 \times 10^6 Q_S) + (7.46 \times 10^7 Q_V) \leq 1$$

(If no teen, child or infant milk consumption)

The consumption of milk must be demonstrated by the Radiological Environmental Monitoring Program 4.2.7. If the Radiological Environmental Monitoring Program determines the consumption of milk by teen, child, or infant the above equation shall be modified by the appropriate coefficient (Dose Factors) of Regulatory Guide 1.109.

3.0 SURVEILLANCE REQUIREMENTS

3.5.2 Gaseous Waste Effluents (cont'd)

(2) within 1 month, following each refueling outage,

(3) within 72 hours, if the gaseous waste monitors indicate an increase of greater than 50% in the steady state fission gas release after factoring out increases due to power changes.

d. All waste gas effluent monitors shall be calibrated at least quarterly by means of a known radioactive source which has been calibrated to a National Bureau of Standards source. Each monitor shall have functional test at least monthly and an instrument check at least daily, excluding days of no discharge.

e. Sampling and analysis of radioactive material in gaseous waste, particulate form, and radioiodine shall be performed in accordance with Table 3.5-2.

Amendment No. 19

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

3.0 SURVEILLANCE REQUIREMENTS

2.5.2 Gaseous Waste Effluents (cont'd)

c. Should any of the conditions of 2.4.2.c(1), or (2) listed below exist, the licensee shall make an investigation to identify the causes of the release rates, define and initiate a program of action to reduce the release rates to design objective levels listed in Section 2.5 and report these actions to the Commission within 30 days from the end of the quarter during which the releases occurred.

(1) If the average release rate of noble gases during any calendar quarter from the site is:

$$\sum_{i \to n} \bar{E}_{\beta_i} \left[1.50 Q_{s_i} + 575 \; Q_{v_i} \right] \leq 1$$

or

$$\sum_{i \to n} \bar{E}_{\gamma_i} \left[45 Q_{s_i} + 400 \; Q_{v_i} \right] \leq 1$$

(2) If the average release rate of I-131 and radioactive materials in particulate form with half-lives greater than eight days during any calendar quarter from the site is:

$$\left[3.26 \times 10^{6} \; Q_s \right] + \left[3.74 \times 10^{7} \; Q_v \right] \leq 1$$

(if no teen, child or infant milk consumption)

The consumption of milk must be demonstrated by the Radiological Environmental Monitoring Program 4.2.7. If the Radiological Environmental Monitoring Program determines the consumption of milk by teen, child, or infant, the above equation shall be modified by the appropriate coefficients (Dose Factors) of Regulatory Guide 1.109.

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

2.5.2 Gaseous Waste Effluents (cont'd)

d. Whenever the augmented off gas (AOG) system is out of service, at least one of the condenser/air ejector off gas monitors listed in Table 3.5-4 shall be operating and set to alarm and capable to initiate the automatic closure of the waste gas discharge valve prior to excedding the limits specified in 2.5.2 above.

e. If both condenser/air ejector off gas monitors are incapable of initiating automatic closure of the waste gas discharge valves, a shutdown shall be initiated so that the reactor will be in the hot shutdown condition within 24 hours.

The augmented off gas (AOG) process monitor shall be operable whenever a release is being made from the AOG system storage tanks.

If the augmented off gas system is out of service and the air ejector off gas monitors are inoperative, a reactor shutdown shall be initiated so that the reactor will be in the hot shutdown condition within 24 hours.

f. If the release rate from the site of noble gases from the main condenser vacuum system is:

$$\sum_{i \to n} \bar{E}_{\beta_i} \left[1.5\ Q_{s_i} + 575\ Q_{v_i} \right] > 1$$

or

$$\sum_{i \to n} \bar{E}_{\gamma_i} \left[45\ Q_{s_i} + 400\ Q_{v_i} \right] > 1$$

3.0 SURVEILLANCE REQUIREMENTS

F. The operability of each automatic isolation valve in the gaseous radwaste discharge line shall be demonstrated quarterly.

2.0 ENVIRONMENTAL PROTECTION CONDITIONS | 3.0 SURVEILLANCE REQUIREMENTS

2.5.2 GASEOUS WASTE EFFLUENTS (cont'd)

for a period of greater than 48 hours, notify the Commission in writing within 10 days, identifying the causes of activity. The report should include the flow rate of the off gas from the main condenser vacuum system and the activity measured at the off gas steam jet air ejector (SJAE) monitor.

g. The drywell shall be purged through the standby gas treatment system, or released to the environment at a rate in conformance with Specification 2.5.2.c(2) based on a containment sample analysis as defined in Table 3.5-2.

h. Either the hydrogen monitor and one of the two temperature switches or both temperature switches in the off gas line downstream of the recombiners shall be operable during (AOG) operation. If the hydrogen concentration reaches set point of four percent by volume or the temperature reaches the setpoint of 900°F, the off gas flow shall be stopped by automatically closing the valves downstream of the recombiners. Whenever any two of these three devices are inoperable during (AOG) operation, grab samples shall be taken and analyzed for hydrogen concentration each shift. Calibration of the monitoring system shall be performed quarterly and checked weekly by comparison to grab-sample analysis.

2.5.3 Specifications for Solid Waste Handling and Disposal

a. Measurements shall be made to determine or estimate the total curie quantity and principal radionuclide composition of all radioactive solid waste shipped offsite.

b. Solid wastes preparatory to shipment shall be monitored and packaged to assure compliance with 10 CFR Part 20, 10 CFR Part 71, and 49 CFR Parts 171-178.

2.0 ENVIRONMENTAL PROTECTION CONDITIONS	3.0 SURVEILLANCE REQUIREMENTS
2.5.3 <u>Specifications for Solid Waste Handling and Disposal</u> (cont'd) c. Reports of the radioactive solid waste shipments, volumes, principal radionuclides, and total curie quantity, small be submitted in accordance with Section 5.4.	

GASEOUS WASTE EFFLUENTS - The release of radioactive materials in gaseous waste effluents to unrestricted areas shall not exceed the concentration limits specified in 10 CFR Part 20, and should be as low as reasonably achievable in accordance with the requirements of 10 CFR Part 50.36. These specifications provide reasonable assurance that the resulting annual air dose from this site due to gamma radiation will not exceed 20 mrad, and an annual air dose due to beta radiation will not exceed 40 mrad from noble gases, and that the annual dose to any organ of an individual from I-131 and particulates with half-lives greater than 8 days will not exceed 30 mrem.

The design objectives have been developed based on operating experience, taking into account a combination of system variables including defective fuel, primary system leakage, and the performance of the various waste treatment systems.

For Specification 2.5.2.a(1) dose calculations have been made for the critical sector. These calculations consider site meteorology, buoyancy characteristics, and radionuclide content of the effluent of each unit. Meteorological calculations for offsite locations were performed, and the most critical one was selected to set the release rate. The controlling distance is 914 meters to the south-southeast.

The gamma dose contribution was determined using the equation 7.63 in Section 7-5.2.5 of Meteorology and Atomic Energy - 1968. The releases from vents are considered to be ground level releases which could result in a beta dose from cloud submersion. The beta dose contribution was determined using Equation 7.21, as described in Section 7-4.1 of Meteorology and Atomic Energy - 1968. The beta dose contribution was determined on the basis of an infinite cloud passage with semi-infinite geometry for a ground level release (submersion dose). The beta and gamma components of the gross radioactivity in gaseous effluents were combined to determine the allowable continuous release rate. Based on these calculations, a continuous release rate of gross radioactivity in the amount specified in 2.5.2.a(1) will not result in offsite annual doses above background in excess of the limits specified in 10 CFR Part 20.

The average gamma and beta energy per disintegration used in the equation of Specification 2.5.2.a(1) will be based on the average composition of gases determined from the plant vent and ventilation exhausts.

The average energy per beta or gamma disintegration for those radio-isotopes determined to be present from the isotopic analyses are given in Table 3.5-5. Where isotopes are identified that are not listed in Table 3.5-5, the gamma energy are determined from Table of Isotopes, C. M. Lederer, J. M. Hollander, and I. Perlman, Sixth Edition, 1967 and the beta energy shall be as given in USNRDL-TR-802, II. Spectra of Individual Negatron Emitters (Beta Spectra), O. Hogan, P. E. Zigman, and J. L. Mackin.

For Specification 2.5.2.a(2), dose calculations have been made for the critical sectors and critical pathways for I-131 and radio-active material in particulate form with half-lives greater than eight days. The calculations consider site meteorology for these releases.

Specification 2.5.2.b establishes upper site levels for the releases of noble gases, iodines and particulates with half lives greater than eight days, and iodine-131 at the design objective annual quantity during any period of 12 consecutive months. Since BSEP does not have an AOG that has been demonstrated to be continuously operable, the content of these limiting conditions for operation assumes that the design objectives of 2.5a and b for gaseous wastes can be met. This specification does not limit the instantaneous gaseous radioactive release rate, but permits the licensee the flexibility of operation to assure that the public is provided a dependable source of power under unusual operating conditions which may temporarily result in higher releases than the objectives and yet remain below annual design objective releases. The equation limiting radioactivity releases was established based on on-site meteorological data and methodology of Regulatory Guides 1.109 and 1.111, and methods provided in Meteorology and Atomic Energy (1968).

For iodine-131 and radioactive material in particulate form with half-lives greater than eight days, the critical location for ground releases is the SSE sector distance of 1464 meters where χ/Q is 6.5×10^{-6} sec/m^3 for the dose due to inhalation. The critical location for elevated releases is the SSE sector at a distance of 1464 meters where the χ/Q is 3.45×10^{-8} sec/m^3 for the dose, due to inhalation. The assumptions for the grass-cow-milk-thyroid chain are listed in Table 3.5-6. The grass-cow-milk thyroid chain is controlling.

In addition to the protection conditions of Specification 2.5.2.a and 2.5.2.b, the reporting requirements of 2.5.2.c delineate that the cause be identified whenever the release of gaseous effluents exceeds one-half the objective annual quantity during any calendar quarter, and describe the proposed program of action to reduce such release rates to the design objectives.

Specifications 2.5.2.d and 2.5.2.e assure compliance with NRC general design criterion 64. The 24-hour period will allow an investigation of several hours to determine the cause of the monitor inoperability and possible repair prior to initiating the hot-shutdown.

Specification 2.5.2.f is to monitor the performance of the core. A sudden increase in the activity levels of gaseous releases may be the result of defective fuel. Since core performance is of utmost importance in the resulting doses, a report must be filed within 10 days following the specified increase in gaseous radioactive releases.

Specification 2.5.2.g requires that the primary containment atmosphere receive treatment for the removal of gaseous iodine and particulates prior to its release.

Specification 2.5.2.h requires that hydrogen concentration in the system shall be monitored at all times during AOG operation to prevent buildup of combustible concentrations.

The sampling and monitoring requirements given under Specification 3.5.2 provide assurance that radioactive materials released in gaseous wastes are properly controlled and monitored in conformance with the requirements of Design Criteria 60 and 64. These requirements provide the data for the licensee and the Commission to evaluate the plant's performance relative to radioactive wastes released to the environment. Reports on the quantities of radioactive materials released in gaseous effluents are furnished to the Commission on the basis of Section 5.4 of these Technical Specifications and in conformance with Regulatory Guide 1.21. On the basis of such reports and any additional information the Commission may obtain from the licensee or others, the Commission may from time to time require the licensee to take such action as the Commission deems appropriate.

The points of release to the environment to be monitored in Section 3.5.2 include all the monitored release points as provided for in Table 3.5-4.

SOLID WASTE HANDLING AND DISPOSAL - The requirements for solid radioactive waste handling and disposal given under Specification 2.5.3 provide assurance that solid radioactive materials shipped offsite are properly controlled, monitored, and packaged in conformance with 10 CFR Part 20, 10 CFR Part 71, and 49 CFR Parts 171-178. These requirements provide the data for the licensee and the Commission to evaluate the handling and storage facilities for solid radwaste, and to evaluate the environmental impact of offsite shipment and storage. Reports on the quantities and amounts of the radionuclides, and volumes of the shipments, shall be furnished to the Commission according to Section 5.4 of these Technical Specifications. On the basis of such reports and any additional information the Commission may obtain from the licensee or others, the Commission may from time to time require the licensee to take such action as the Commission deems appropriate.

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TABLE 3.5-6

Assumptions for Limiting Equation for Iodine and Radioactive Particles (with Half Lives Greater than Eight Days)

Cow's Consumption Rate	50 Kg/day
Agricultural Productivity (feed grass)	.7 kg/m^2
Agricultural Productivity (stored feed)	2.0 kg/m^2
Stable Element Transfer Coefficient	6.0×10^{-3} day/l
Fraction of Activity Retained on Feed Grass	1
Transport Time from Cow to Receptor (feed grass)	2 days
Transport Time from Cow to Receptor (stored feed)	90 days
Fraction of the Year Cow is on Pasture	.7

Uptake Rate:

Adult	310 l/yr.

Thyroid Ingestion Dose Factor (I-131):

Adult	1.95×10^{-3} mrem/pCi

Meteorlogy Data (Steven's cow):

Critical Sector	SSE width 22.5°
Critical Distance	1464m
Annual Average Relative Deposition (D/Q elevated)	2.16×10^{-9} m^{-2}
Annual Average Relative Deposition (D/Q ground)	2.4×10^{-8} m^{-2}

4.2.6 Soil Sampling

Soil samples are collected from eleven locations every three years and beach sand is collected from three locations semiannually. Analysis of soil samples includes ^{90}Sr and gamma spectrometry.

4.2.7 Milk Sampling

Milk samples will be collected from either two or three locations on a weekly frequency. One sampling station is a family cow that does not produce sufficient milk for a sample every week. Within seven days of sampling, an ^{131}I analysis will be completed using an analytical procedure similar in sensitivity to the procedure outlined in Regulatory Guide 4.3. Samples of individual locations will be composited monthly and analyzed for ^{89}Sr, ^{90}Sr, and by gamma spectrometry. To determine the presence of an infant, child or teen consuming the milk from the cow(s) at sample station 35 (Steven's Farm), a survey on the usage of the milk should be conducted at least once per calendar quarter. The result of this survey should be included in the semiannual Radiation Effluent Release Report.

4.2.8 Terrestrial Vegetation

Samples of the leafy portions of natural terrestrial vegetation will be collected quarterly from four locations in the vicinity of the plant. Samples will be analyzed by gamma spectrometry.

4.2.9 Food Crops

Edible portions of food crops will be collected from two locations three times during the growing season. Samples will be analyzed by gamma spectrometry.

4.2.10 Fodder and Feed Crops

Feed crops will be collected at three locations on a monthly frequency during the growing season. Samples will be analyzed by gamma spectrometry.

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. 43
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 October 16, 1978 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 as 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) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 43 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

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

FOR THE NUCLEAR REGULATORY COMMISSION

Thomas A. Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors

Attachment:
Changes to the Technical
Specifications

Date of Issuance: February 9, 1979

ATTACHMENT TO LICENSE AMENDMENT NO. 43

FACILITY OPERATING LICENSE NO. DPR-62

DOCKET NO. 50-324

Replace the following pages of the Appendix "B" Technical Specifications with the enclosed pages. The revised pages are identified by Amendment number and contain vertical lines indicating the area of change.

Remove	Insert
i*	i*
ii	ii
2-8	2-8
2-9	2-9
2-10	2-10
2-11	2-11
2-12	2-12
2-13	2-13
2-14	2-14
	2-14a
2-19	2-19
2-20	2-20
2-21	2-21
2-22	2-22
2-23	2-23
	2-31
4-9	4-9
	4-9(a)

*Overleaf page provided for convenience.

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 & 2

ENVIRONMENTAL TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

LIST OF TABLES

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

2.5 RADIOACTIVE DISCHARGES

Objective: To define the limits and conditions for the controlled release of radioactive materials in liquid and gaseous effluents to the environs to ensure that these releases are as low as reasonably achievable. These releases should not result in radiation exposures in unrestricted areas greater than a few percent of natural background exposures. All effluents shall be within the limits specified in 10 CFR Part 20.

To ensure that the release of radioactive material above background to unrestricted areas will be as low as reasonably achievable as defined in Appendix I to 10 CFR Part 50, the following design objectives apply.

For liquid wastes:

a. The annual dose above background to the total body or any organ of an individual from all reactors at a site should not exceed 5 mrem in an unrestricted area.
b. The annual total quantity of radioactive materials in liquid waste, excluding tritium and dissolved and entrained fission and activation gases discharged from the site should not exceed 5 Ci per reactor.

For gaseous wastes:

a. The annual total quantity of noble gases above background discharged from the site should result in an air dose due to gamma radiation of less than 20 mrad, and an air dose due to beta radiation of less than 40 mrad, at any location near ground level which could be occupied by individuals at or beyond the boundary of the site.

3.0 SURVEILLANCE REQUIREMENTS

3.5 RADIOACTIVE DISCHARGES

Objective: The purpose of these specifications is to ensure that the releases of radioactive materials are as low as reasonably achievable and within allowable values.

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

2.5 RADIOACTIVE DISCHARGES (Cont'd)

b. The annual total quantity of I-131 and radioactive material in particulate forms with half-lives greater than 8 days above background from all reactors at a site should not result in an annual dose to any organ of an individual in an unrestricted area from all pathways of exposure in excess of 30 mrem.

2.5.1 Specifications for Liquid Waste Effluents

a. The concentration of radioactive materials released in liquid waste effluents from all reactors at the site after dilution in the discharge canal shall not exceed the values specified in 10 CFR Part 20, Appendix B, Table II, Column 2, for unrestricted areas.

b. The cumulative release of radioactive materials from the site in liquid waste effluent, excluding tritium and dissolved and entrained fission and activation gases, shall not exceed 10 Ci per reactor in a calendar quarter.

c. The cumulative release of radioactive materials from the site in liquid waste effluents excluding tritium and dissolved and entrained fission and activation gases, shall not exceed 20 Ci per reactor in any 12 consecutive months.

d. During release of radioactive wastes, the effluent control monitor shall be set to alarm and to initiate the automatic closure of each waste discharge valve prior to exceeding the limits specified in 2.5.1.a above.

e. The operability of each automatic isolation valve in the liquid radwaste discharge line shall be demonstrated quarterly.

f. The equipment installed in the liquid radioactive waste system shall be maintained and shall be operated to process radioactive liquid wastes prior to their discharge when the projected cumulative release from the site could exceed 1.25 Ci per reactor in a calendar quarter, excluding tritium and dissolved and entrained fission and activation gases.

3.0 SURVEILLANCE REQUIREMENTS

3.5 RADIOACTIVE DISCHARGES (Cont'd)

3.5.1 Specifications for Liquid Waste Sampling and Monitoring

a. Plant records shall be maintained of the radioactive concentration and volume before dilution of liquid waste discharged, and the average dilution flow and length of time over which each discharge occurred. Sample analyses results and other reports shall be submitted in accordance with Section 5.4 of these specifications. Estimates of the sampling and analytical error shall be included as stated in NRC Regulatory Guide 1.21.

b. Prior to release of each batch of liquid waste, a sample shall be taken from that batch and analyzed for each significant gamma peak in accordance with Table 3.5-1 to demonstrate compliance with Specification 2.5.1 using the flow rate of the stream into which the waste is discharged during the period of discharge.

c. Sampling and analysis of liquid radioactive waste shall be performed in accordance with Table 3.5-1. Prior to taking samples from a sample or drain tank, at least two tank volumes shall be recirculated.

d. The radioactivity in liquid wastes shall be continuously monitored and recorded during release. Whenever these monitors are inoperable for a period not to exceed 72 hours, two independent samples of each tank to be discharged shall be analyzed and two plant personnel shall independently check valving prior to the discharge. If these monitors are inoperable for a period exceeding 72 hours, no liquid waste tank shall be released and any release in progress shall be terminated.

2.0 ENVIRONMENTAL PROTECTION CONDITIONS	3.0 SURVEILLANCE REQUIREMENTS

2.5.1 Liquid Waste Effluents (cont'd)

g. The maximum radioactivity to be contained in any liquid radwaste tank that can be discharged directly to the environs shall not exceed 10 Ci, excluding tritium and dissolved and entrained fission and activation gases.

h. If the cumulative release of radioactive materials in liquid effluents excluding tritium and dissolved and entrained fission and activation gases, exceeds 2.5 Ci per reactor in a calendar quarter, the licensee shall make an investigation to identify the causes of such releases, define and initiate a program of action to reduce such releases to the design objective levels listed in Section 2.5, and report these actions to the Commission within 30 days from the end of the quarter during which the release occurred.

2.5.2 Specifications for Gaseous Waste Discharges

a. (1) The release rate limit of noble gases from this site shall be:

$$\sum_{i \to n} Q_{s_i}\left[4.0\bar{E}_{\gamma i} + 0.23\bar{E}_{\beta i}\right] + Q_{v_i}\left[35\bar{E}_{\gamma i} + 92\bar{E}_{\beta i}\right] \leq 1$$

where Q_s = release rate from main stack in Ci/sec (elevated release).

Q_v = release rate from vents in Ci/sec (ground release)

i = the ith individual nuclide.

n = total number of nuclides.

$\bar{E}_{\gamma i}$ = the average gamma energy per disintegration for nuclide i.

$\bar{E}_{\beta i}$ = the average beta energy per disintegration for nuclide i.

Refer to Table 3.5-5 for $\bar{E}_{\gamma i}$ and $\bar{E}_{\beta i}$ values to be used.

3.5.1 Liquid Waste Effluents (cont'd)

e. The flow rate of liquid radioactive waste shall be continually measured and recorded during release.

f. All liquid effluent radiation monitors shall be calibrated at least quarterly by means of a known radioactive source which has been calibrated to a National Bureau of Standards source. Each monitor shall also have a functional test monthly and an instrument check prior to making a release.

3.5.2 Specifications for Gaseous Waste Sampling and Monitoring

a. Plant records shall be maintained and records of the sampling and analysis results shall be submitted in accordance with Section 5.4 of these Specifications. Estimates of the sampling and analytical error associated with each reported value should be included.

b. Gaseous releases to the environment from the two reactor building vents, the two turbine building vents, and the off-gas vent (stack), except as noted in Specification 3.5.2.c below, shall be continuously monitored for gross radioactivity and the flow measured and recorded. Whenever these monitors are inoperable, grab samples shall be taken and analyzed daily for gross gaseous radioactivity. If these monitors are inoperable for more than seven days, these releases shall be terminated or the plant shall be shut down.

c. An isotopic analysis shall be made of a representative sample of gaseous activity, excluding tritium, at the discharge of the steam jet air ejectors and at a point prior to dilution and discharge.

(1) at least monthly,

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

3.0 SURVEILLANCE REQUIREMENTS

2.5.2 Gaseous Waste Effluents (cont'd)

c. Should any of the conditions of 2.4.2.c(1), or (2) listed below exist, the licensee shall make an investigation to identify the causes of the release rates, define and initiate a program of action to reduce the release rates to design objective levels listed in Section 2.5 and report these actions to the Commission within 30 days from the end of the quarter during which the releases occurred.

(1) If the average release rate of noble gases during any calendar quarter from the site is:

$$\sum_{i \to n} \overline{E}_{\beta_i} \left[1.50 Q_{s_i} + 575\ Q_{v_i} \right] \leq 1$$

or

$$\sum_{i \to n} \overline{E}_{\gamma_i} \left[45 Q_{s_i} + 400\ Q_{v_i} \right] \leq 1$$

(2) If the average release rate of I-131 and radioactive materials in particulate form with half-lives greater than eight days during any calendar quarter from the site is:

$$\left[3.26 \times 10^{6}\ Q_s \right] + \left[3.74 \times 10^{7}\ Q_v \right] \leq 1$$

(if no teen, child or infant milk consumption)

The consumption of milk must be demonstrated by the Radiological Environmental Monitoring Program 4.2.7. If the Radiological Environmental Monitoring Program determines the consumption of milk by teen, child, or infant, the above equation shall be modified by the appropriate coefficients (Dose Factors) of Regulatory Guide 1.109.

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

2.5.2 Gaseous Waste Effluents (cont'd)

(2) The release rate limit of I-131 and radioactive materials in particulate form with half-lives greater than eight days, released to the environs as part of the gaseous wastes from the site shall be:

$$\left[3.7 \times 10^{4}\right] Q_s + \left[5.8 \times 10^{6}\right] Q_v \leq 1$$

where Q_s = release rate from the main stack in Ci/sec (as elevated release)

Q_v = release rate from the vents in Ci/sec (ground release)

b. (1) the average release rate of noble gases from the site during any 12 consecutive months shall be:

$$\sum_{i \to n} \bar{E}_{\beta i} \left[2.8 Q_{si} + 1160 Q_{vi}\right] \leq 1$$

and

$$\sum_{i \to n} \bar{E}_{\gamma_i} \left[90 Q_{si} + 800 Q_{vi}\right] \leq 1$$

where Q_{si} = release rate of radioisotope i from the main stack in Ci/sec

Q_{vi} = release rate of radioisotope i from the vents of each reactor in Ci/sec.

(2) The average release rate from the site of I-131 and radioactive materials in particulate form with half-lives greater than eight days during any period of 12 consecutive months shall be:

$$(6.56 \times 10^{6} Q_S) + (7.46 \times 10^{7} Q_V) \leq 1$$

(If no teen, child or infant milk consumption)

The consumption of milk must be demonstrated by the Radiological Environmental Monitoring Program 4.2.7. If the Radiological Environmental Monitoring Program determines the consumption of milk by teen, child, or infant the above equation shall be modified by the appropriate coefficient (Dose Factors) of Regulatory Guide 1.109.

3.0 SURVEILLANCE REQUIREMENTS

3.5.2 Gaseous Waste Effluents (cont'd)

(2) within 1 month, following each refueling outage,

(3) within 72 hours, if the gaseous waste monitors indicate an increase of greater than 50% in the steady state fission gas release after factoring out increases due to power changes.

d. All waste gas effluent monitors shall be calibrated at least quarterly by means of a known radioactive source which has been calibrated to a National Bureau of Standards source. Each monitor shall have functional test at least monthly ~~and an instrument~~ check at least daily, excluding days of no discharge.

e. Sampling and analysis of radioactive material in gaseous waste, particulate form, and radioiodine shall be performed in accordance with Table 3.5-2.

Amendment No. 43

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

2.5.2 Gaseous Waste Effluents (cont'd)

d. Whenever the augmented off gas (AOG) system is out of service, at least one of the condenser/air ejector off gas monitors listed in Table 3.5-4 shall be operating and set to alarm and capable to initiate the automatic closure of the waste gas discharge valve prior to exceeding the limits specified in 2.5.2 above.

e. If both condenser/air ejector off gas monitors are incapable of initiating automatic closure of the waste gas discharge valves, a shutdown shall be initiated so that the reactor will be in the hot shutdown condition within 24 hours.

The augmented off gas (AOG) process monitor shall be operable whenever a release is being made from the AOG system storage tanks.

If the augmented off gas system is out of service and the air ejector off gas monitors are inoperative, a reactor shutdown shall be initiated so that the reactor will be in the hot shutdown condition within 24 hours.

f. If the release rate from the site of noble gases from the main condenser vacuum system is:

$$\sum_{i \to n} \bar{E}_{\beta_i} \left[1.5\, Q_{s_i} + 575\, Q_{v_i} \right] > 1$$

or

$$\sum_{i \to n} \bar{E}_{\gamma_i} \left[45\, Q_{s_i} + 400\, Q_{v_i} \right] > 1$$

3.0 SURVEILLANCE REQUIREMENTS

F. The operability of each automatic isolation valve in the gaseous radwaste discharge line shall be demonstrated quarterly.

2.0 ENVIRONMENTAL PROTECTION CONDITIONS | 3.0 SURVEILLANCE REQUIREMENTS

2.5.2 GASEOUS WASTE EFFLUENTS (cont'd)

for a period of greater than 48 hours, notify the Commission in writing within 10 days, identifying the causes of activity. The report should include the flow rate of the off gas from the main condenser vacuum system and the activity measured at the off gas steam jet air ejector (SJAE) monitor.

g. The drywell shall be purged through the standby gas treatment system, or released to the environment at a rate in conformance with Specification 2.5.2.c(2) based on a containment sample analysis as defined in Table 3.5-2.

h. Either the hydrogen monitor and one of the two temperature switches or both temperature switches in the off gas line downstream of the recombiners shall be operable during (AOG) operation. If the hydrogen concentration reaches set point of four percent by volume or the temperature reaches the setpoint of 900°F, the off gas flow shall be stopped by automatically closing the valves downstream of the recombiners. Whenever any two of these three devices are inoperable during (AOG) operation, grab samples shall be taken and analyzed for hydrogen concentration each shift. Calibration of the monitoring system shall be performed quarterly and checked weekly by comparison to grab-sample analysis.

2.5.3 Specifications for Solid Waste Handling and Disposal

a. Measurements shall be made to determine or estimate the total curie quantity and principal radionuclide composition of all radioactive solid waste shipped offsite.

b. Solid wastes preparatory to shipment shall be monitored and packaged to assure compliance with 10 CFR Part 20, 10 CFR Part 71, and 49 CFR Parts 171-178.

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

3.0 SURVEILLANCE REQUIREMENTS

2.5.3 Specifications for Solid Waste Handling and Disposal (cont'd)

c. Reports of the radioactive solid waste shipments, volumes, principal radionuclides, and total curie quantity, small be submitted in accordance with Section 5.4.

GASEOUS WASTE EFFLUENTS - The release of radioactive materials in gaseous waste effluents to unrestricted areas shall not exceed the concentration limits specified in 10 CFR Part 20, and should be as low as reasonably achievable in accordance with the requirements of 10 CFR Part 50.36. These specifications provide reasonable assurance that the resulting annual air dose from this site due to gamma radiation will not exceed 20 mrad, and an annual air dose due to beta radiation will not exceed 40 mrad from noble gases, and that the annual dose to any organ of an individual from I-131 and particulates with half-lives greater than 8 days will not exceed 30 mrem.

The design objectives have been developed based on operating experience, taking into account a combination of system variables including defective fuel, primary system leakage, and the performance of the various waste treatment systems.

For Specification 2.5.2.a(1) dose calculations have been made for the critical sector. These calculations consider site meteorology, buoyancy characteristics, and radionuclide content of the effluent of each unit. Meteorological calculations for offsite locations were performed, and the most critical one was selected to set the release rate. The controlling distance is 914 meters to the south-southeast.

The gamma dose contribution was determined using the equation 7.63 in Section 7-5.2.5 of Meteorology and Atomic Energy - 1968. The releases from vents are considered to be ground level releases which could result in a beta dose from cloud submersion. The beta dose contribution was determined using Equation 7.21, as described in Section 7-4.1 of Meteorology and Atomic Energy - 1968. The beta dose contribution was determined on the basis of an infinite cloud passage with semi-infinite geometry for a ground level release (submersion dose). The beta and gamma components of the gross radioactivity in gaseous effluents were combined to determine the allowable continuous release rate. Based on these calculations, a continuous release rate of gross radioactivity in the amount specified in 2.5.2.a(1) will not result in offsite annual doses above background in excess of the limits specified in 10 CFR Part 20.

The average gamma and beta energy per disintegration used in the equation of Specification 2.5.2.a(1) will be based on the average composition of gases determined from the plant vent and ventilation exhausts.

The average energy per beta or gamma disintegration for those radioisotopes determined to be present from the isotopic analyses are given in Table 3.5-5. Where isotopes are identified that are not listed in Table 3.5-5, the gamma energy are determined from Table of Isotopes, C. M. Lederer, J. M. Hollander, and I. Perlman, Sixth Edition, 1967 and the beta energy shall be as given in USNRDL-TR-802, II. Spectra of Individual Negatron Emitters (Beta Spectra), O. Hogan, P. E. Zigman, and J. L. Mackin.

For Specification 2.5.2.a(2), dose calculations have been made for the critical sectors and critical pathways for I-131 and radioactive material in particulate form with half-lives greater than eight days. The calculations consider site meteorology for these releases.

Specification 2.5.2.b establishes upper site levels for the releases of noble gases, iodines and particulates with half lives greater than eight days, and iodine-131 at the design objective annual quantity during any period of 12 consecutive months. Since BSEP does not have an AOG that has been demonstrated to be continuously operable, the content of these limiting conditions for operation assumes that the design objectives of 2.5a and b for gaseous wastes can be met. This specification does not limit the instantaneous gaseous radioactive release rate, but permits the licensee the flexibility of operation to assure that the public is provided a dependable source of power under unusual operating conditions which may temporarily result in higher releases than the objectives and yet remain below annual design objective releases. The equation limiting radioactivity releases was established based on on-site meteorological data and methodology of Regulatory Guides 1.109 and 1.111, and methods provided in Meteorology and Atomic Energy (1968).

For iodine-131 and radioactive material in particulate form with half-lives greater than eight days, the critical location for ground releases is the SSE sector distance of 1464 meters where χ/Q is 6.5×10^{-6} sec/m^3 for the dose due to inhalation. The critical location for elevated releases is the SSE sector at a distance of 1464 meters where the χ/Q is 3.45×10^{-8} sec/m^3 for the dose, due to inhalation. The assumptions for the grass-cow-milk-thyroid chain are listed in Table 3.5-6. The grass-cow-milk thyroid chain is controlling.

In addition to the protection conditions of Specifications 2.5.2.a and 2.5.2.b, the reporting requirements of 2.5.2.c delineate that the cause be identified whenever the release of gaseous effluents exceeds one-half the objective annual quantity during any calendar quarter, and describe the proposed program of action to reduce such release rates to the design objectives.

Specifications 2.5.2.d and 2.5.2.e assure compliance with NRC general design criterion 64. The 24-hour period will allow an investigation of several hours to determine the cause of the monitor inoperability and possible repair prior to initiating the hot-shutdown.

Specification 2.5.2.f is to monitor the performance of the core. A sudden increase in the activity levels of gaseous releases may be the result of defective fuel. Since core performance is of utmost importance in the resulting doses, a report must be filed within 10 days following the specified increase in gaseous radioactive releases.

Specification 2.5.2.g requires that the primary containment atmosphere receive treatment for the removal of gaseous iodine and particulates prior to its release.

Specification 2.5.2.h requires that hydrogen concentration in the system shall be monitored at all times during AOG operation to prevent buildup of combustible concentrations.

The sampling and monitoring requirements given under Specification 3.5.2 provide assurance that radioactive materials released in gaseous wastes are properly controlled and monitored in conformance with the requirements of Design Criteria 60 and 64. These requirements provide the data for the licensee and the Commission to evaluate the plant's performance relative to radioactive wastes released to the environment. Reports on the quantities of radioactive materials released in gaseous effluents are furnished to the Commission on the basis of Section 5.4 of these Technical Specifications and in conformance with Regulatory Guide 1.21. On the basis of such reports and any additional information the Commission may obtain from the licensee or others, the Commission may from time to time require the licensee to take such action as the Commission deems appropriate.

The points of release to the environment to be monitored in Section 3.5.2 include all the monitored release points as provided for in Table 3.5-4.

SOLID WASTE HANDLING AND DISPOSAL - The requirements for solid radioactive waste handling and disposal given under Specification 2.5.3 provide assurance that solid radioactive materials shipped offsite are properly controlled, monitored, and packaged in conformance with 10 CFR Part 20, 10 CFR Part 71, and 49 CFR Parts 171-178. These requirements provide the data for the licensee and the Commission to evaluate the handling and storage facilities for solid radwaste, and to evaluate the environmental impact of offsite shipment and storage. Reports on the quantities and amounts of the radionuclides, and volumes of the shipments, shall be furnished to the Commission according to Section 5.4 of these Technical Specifications. On the basis of such reports and any additional information the Commission may obtain from the licensee or others, the Commission may from time to time require the licensee to take such action as the Commission deems appropriate.

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TABLE 3.5-6

Assumptions for Limiting Equation for Iodine and Radioactive Particles (with Half Lives Greater than Eight Days)

Cow's Consumption Rate	50 Kg/day
Agricultural Productivity (feed grass)	.7 kg/m^2
Agricultural Productivity (stored feed)	2.0 kg/m^2
Stable Element Transfer Coefficient	6.0×10^{-3} day/l
Fraction of Activity Retained on Feed Grass	1
Transport Time from Cow to Receptor (feed grass)	2 days
Transport Time from Cow to Receptor (stored feed)	90 days
Fraction of the Year Cow is on Pasture	.7

Uptake Rate:

Adult	310 l/yr.

Thyroid Ingestion Dose Factor (I-131):

Adult	1.95×10^{-3} mrem/ρCi

Meteorlogy Data (Steven's cow):

Critical Sector	SSE width 22.5°
Critical Distance	1464m
Annual Average Relative Deposition (D/Q elevated)	2.16×10^{-9} m^{-2}
Annual Average Relative Deposition (D/Q ground)	2.4×10^{-8} m^{-2}

4.2.6 Soil Sampling

Soil samples are collected from eleven locations every three years and beach sand is collected from three locations semiannually. Analysis of soil samples includes ^{90}Sr and gamma spectrometry.

4.2.7 Milk Sampling

Milk samples will be collected from either two or three locations on a weekly frequency. One sampling station is a family cow that does not produce sufficient milk for a sample every week. Within seven days of sampling, an ^{131}I analysis will be completed using an analytical procedure similar in sensitivity to the procedure outlined in Regulatory Guide 4.3. Samples of individual locations will be composited monthly and analyzed for ^{89}Sr, ^{90}Sr, and by gamma spectrometry. To determine the presence of an infant, child or teen consuming the milk from the cow(s) at sample station 35 (Steven's Farm), a survey on the usage of the milk should be conducted at least once per calendar quarter. The result of this survey should be included in the semiannual Radiation Effluent Release Report.

4.2.8 Terrestrial Vegetation

Samples of the leafy portions of natural terrestrial vegetation will be collected quarterly from four locations in the vicinity of the plant. Samples will be analyzed by gamma spectrometry.

4.2.9 Food Crops

Edible portions of food crops will be collected from two locations three times during the growing season. Samples will be analyzed by gamma spectrometry.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 19 TO LICENSE NO. DPR-71 AND AMENDMENT NO. 43 TO LICENSE NO. DPR-62

CAROLINA POWER AND LIGHT COMPANY

BRUNSWICK STEAM ELECTRIC PLANT, UNITS NOS. 1 AND 2

DOCKET NOS. 50-325 AND 50-324

Introduction

On October 16, 1978, Carolina Power and Light Company (the licensee) submitted a request for an amendment to the Technical Specifications of Brunswick Steam Electric Plant (BSEP), Units 1 and 2. These changes to the BSEP Technical Specifications provide revised limiting conditions of operation on the radioactivity releases in airborne effluents.

Discussion

On July 12, 1975, the licensee submitted information, in accordance with 10 CFR Part 50, Appendix I, Section VB.1, necessary for the NRC staff to evaluate the means employed for keeping levels of radioactivity in effluents "As Low As Reasonably Achievable" (ALARA) and within the design objectives of Appendix I. In that submittal, the licensee committed to the operation of the Augmented Offgas System (AOG) as part of the gaseous radwaste effluent treatment system to maintain radioactivity in effluents ALARA. The AOG, however, has never been in continuous operation because of engineering difficulties.

In response to the NRC staff's concern about the inoperable status of the AOG, the licensee stated, in a letter dated May 18, 1978, that because of continuing technical problems (including offgas detonations) with the installed AOG, a major system modification would be necessary. In view of the necessary system modifications, the NRC staff requested, in a September 12, 1978 letter, that the licensee (1) prepare a schedule for restoring the AOG to operable status and (2) submit an amendment to the BSEP Technical Specifications with limiting conditions of operation (LCO) to provide assurance that 10 CFR Part 50, Appendix I, dose objectives will be met in the interim. The proposed amendment this safety evaluation appraises was submitted by the licensee in response to the second of the above NRC requests.

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4.2.10 Fodder and Feed Crops

Feed crops will be collected at three locations on a monthly frequency during the growing season. Samples will be analyzed by gamma spectrometry.

Evaluation

Technical Specification 2.5.2.a limits the instantaneous radioactivity in gaseous effluents to provide assurance that airborne radioactivity concentrations in unrestricted areas are below the limits specified in 10 CFR Part 20 and those LCOs remain unchanged by the amendment. Amended Technical Specifications 2.5.2.b(1) and (2) do not limit the instantaneous radioactive gaseous release rate, but limit the annual release to below the design objective dose levels of Appendix I.

Technical Specification 2.5.2.b(1) is the LCO on the release of noble gases from BSEP during any 12 consecutive months. This specification limits the annual gamma and beta air dose from the two BSEP units to the unrestricted areas to less than 20 mrad and 40 mrad, respectively. Meteorological calculations for most critical offsite location was used to set the release rate limits. The controlling distance is 914 meters to the south-southeast of BSEP, the same location identified in the Final Environmental Statement for BSEP issued in 1976.

Technical Specification 2.5.2.b(2) is the LCO on the airborne release of Iodine-131 and radioactive materials in particulate form with half lives greater than eight days from BSEP during any 12 consecutive months. This specification limits the airborne release of Iodine-131 and radioactive particulates with half-lives greater than eight days such that the estimated resultant annual dose for any individual in an unrestricted area from all pathways of exposure is less than 30 mrems to any organ. The critical location for the controlling dose pathway is in the south-southeast sector at a distance of 1464 meters. The controlling dose pathway is the grass-cow-milk-thyroid chain to an adult consuming the milk. The consumption of milk by adults only is measured by the Radiological Environmental Monitoring Program of Technical Specification 4.2.7.

Actual doses due to airborne releases from BSEP Unit Nos. 1 and 2 have been within the limits of amended Technical Specifications 2.5.2.b(1) and (2), as shown by Table 1 which compares the releases in airborne effluents from BSEP during 1977 and the first-half of 1978 with the amended Technical Specification limits. The higher release levels during 1977 were, in part, due to excessive air-inleakage at the Unit 2 main condenser. A comprehensive leak detection and repair program was begun in 1978 to reduce the Unit 2 main condenser air-inleakage. The repair work was completed in September 1978 after reducing the offgas flow rate of Unit 2 from about 300 scfm to 50 scfm. The reduced flow rate accounts for the decrease in releases because the lower flow increases the gas decay time such that more decay of the radioactive gases occurs prior to release.

In addition to the LCO of Technical Specifications 2.5.2.a and 2.5.2.b, the reporting requirements of 2.5.2.c delineate that the cause(s) be identified whenever the release of airborne effluents exceeds one-half of the objective annual quantity during any calendar quarter, and describe the proposed program of action to reduce such release rates to the design objectives.

Based on the above discussion, we conclude the following: (1) Technical Specifications on limiting instantaneous radioactivity release in gaseous effluents remain unchanged to provide assurance that airborne radioactivity concentrations in unrestricted areas are below the limits of 10 CFR Part 20. The amended Technical Specifications will limit the annual release of airborne effluents to below the dose design objectives of BSEP. (2) The actual annual release of airborne radioactive effluents, since the commercial operation of BSEP, have been within the dose design objectives of Appendix I without the operation of the AOG. (If fuel failures were to occur, however, the facility might not be able to operate within Appendix I guidelines without the AOG.) This provides reasonable assurance that during the interim period before the AOG becomes operational, the operation of BSEP within the amended Technical Specifications is feasible.

Environmental Considerations

We have determined that the amendments do not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendments involve an action which is insignificant from the standpoint of environmental impact and, pursuant to 10 CFR §51.5(d)(4), that an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of the amendments.

Conclusion

We have concluded, based on the considerations discussed above, that: (1) because the amendments do not involve a significant increase in the probability or consequences of accidents previously considered and do not involve a significant decrease in a safety margin, the amendments do not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Dated: February 9, 1979

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

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment Nos. 19 and 43 to Facility Operating License Nos. DPR-71 and DPR-62 issued to Carolina Power & Light Company (the licensee) for operation of the Brunswick Steam Electric Plant, Unit Nos. 1 and 2 (the facility), located in Brunswick County, North Carolina. The amendments are effective as of their date of issuance.

The amendments revise the Technical Specifications to limit the annual gaseous release to the 10 CFR 50 Appendix I design objectives for BSEP during the interim period until the Augmented Offgas System is restored to an operable status. The enclosed Technical Specifications have been slightly modified from those proposed in your October 16, 1978 submittal. These changes have been discussed with and agreed to by your staff.

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.

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The Commission has determined that the issuance of the amendments will not result in any significant environmental impact and that pursuant to 10 CFR §51.5(d)(4) an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with issuance of the amendments.

For further details with respect to this action, see (1) the application for amendments dated October 16, 1978, (2) Amendment Nos. 19 and 43 to License Nos. DPR-71 and DPR-62, and (3) the Commission's related Safety Evaluation. These items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N. W., Washington, D. C. 20555, and at the Southport-Brunswick County Library, 109 West Moore Street, Southport, North Carolina 28461. A copy of items (2) and (3) 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 9th day of February 1979.

FOR THE NUCLEAR REGULATORY COMMISSION

T. Ippolito

Thomas A. Ippolito, Chief
Operating Reactors Branch #3
Division of Operating Reactors