

Docket Nos. 50-272
and 50-311

August 1, 1991

*Posted
Amdt. 128
to DPR-70*

Mr. Steven E. Miltenberger
Vice President and Chief Nuclear
Officer
Public Service Electric & Gas Company
Post Office Box 236
Hancocks Bridge, New Jersey 08038

Dear Mr. Miltenberger:

SUBJECT: FUEL ENRICHMENT INCREASE, SALEM NUCLEAR GENERATING STATION, UNIT
NOS. 1 AND 2 (TAC NOS. 79130 AND 79131)

The Commission has issued the enclosed Amendment Nos. 128 and 107 to Facility
Operating License Nos. DPR-70 and DPR-75 for the Salem Nuclear Generating
Station, Unit Nos. 1 and 2. These amendments consist of changes to the
Technical Specifications (TSs) in response to your application dated
November 19, 1990, as supplemented April 1, 1991, May 20, 1991 and June 14,
1991.

These amendments increase the enrichments of Westinghouse Standard and Vantage
5H fuel that can be stored in the new fuel storage racks and the spent fuel
pool and placed in the reactor core.

A copy of our safety evaluation is also enclosed. Notice of Issuance will be
included in the Commission's biweekly Federal Register notice. You are
requested to notify the NRC, in writing, when the amendments have been
implemented at Salem 1 and 2.

Sincerely,

Original signed by

James C. Stone, Senior Project Manager
Project Directorate I-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:

1. Amendment No. 128 to
License No. DPR-70
2. Amendment No. 107 to
License No. DPR-75
3. Safety Evaluation

cc w/enclosures:

See next page

DISTRIBUTION w/enclosures:

Docket File	MO'Brien(3)	Wanda Jones, 7103	OC/LFMB
NRC & Local PDR	JStone	RJones	RBlough, RGN-I
PDI-2 Reading	JRaleigh	LCunningham	JWhite, R-I
SVarga	OGC	ACRS (10)	LKopp
JCalvo	DHagan, MS-3206	GPA/PA	
WButler	GHill(8) P1-37	CGrimes	

Previously Concurred

OFC	: PDI-2/PM	: *OGC	: PDI-2/D	: *PRPB/BC	: *SRXB/BC
NAME	: JStone:tlc:APH	: WButler	: LCunningham	: RJones	
DATE	: 8/1/91	: 07/05/91	: 8/1/91	: 06/28/91	: 07/01/91

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Document Name: TACS 79130/131 SA



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

Docket Nos. 50-272
and 50-311

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Vice President and Chief Nuclear
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Public Service Electric & Gas Company
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These amendments increase the enrichments of Westinghouse Standard and Vantage 5H fuel that can be stored in the new fuel storage racks and the spent fuel pool and placed in the reactor core.

A copy of our safety evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly Federal Register notice. You are requested to notify the NRC, in writing, when the amendments have been implemented at Salem 1 and 2.

Sincerely,

A handwritten signature in black ink, reading "James C. Stone".

James C. Stone, Project Manager
Project Directorate I-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:

1. Amendment No. 128 to
License No. DPR-70
2. Amendment No. 107 to
License No. DPR-75
3. Safety Evaluation

cc w/enclosures:
See next page

Mr. Steven E. Miltenberger
Public Service Electric & Gas Company

Salem Nuclear Generating Station

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Public Service Commission of Maryland
Engineering Division
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231 E. Baltimore Street
Baltimore, MD 21202-3486



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

PUBLIC SERVICE ELECTRIC & GAS COMPANY

PHILADELPHIA ELECTRIC COMPANY

DELMARVA POWER AND LIGHT COMPANY

ATLANTIC CITY ELECTRIC COMPANY

DOCKET NO. 50-272

SALEM NUCLEAR GENERATING STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 128
License No. DPR-70

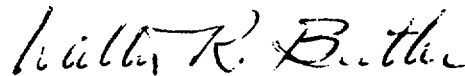
1. The Nuclear Regulatory Commission (the Commission or the NRC) has found that:
 - A. The application for amendment filed by the Public Service Electric & Gas Company, Philadelphia Electric Company, Delmarva Power and Light Company and Atlantic City Electric Company (the licensees) dated November 19, 1990, as supplemented April 1, 1991, May 20, 1991 and June 14, 1991, 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 set forth in 10 CFR Chapter I;
 - 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-70 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 128, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Walter R. Butler, Director
Project Directorate I-2
Division of Reactor Projects - I/II

Attachment:
Changes to the Technical
Specifications

Date of Issuance: August 1, 1991

ATTACHMENT TO LICENSE AMENDMENT NO. 128

FACILITY OPERATING LICENSE NO. DPR-75

DOCKET NO. 50-311

Revise Appendix A as follows:

Remove Pages

5-4

5-5

5-6

Insert Pages

5-4

5-5

5-6

DESIGN FEATURES

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DESIGN PRESSURE AND TEMPERATURE

5.2.2 The reactor containment building is designed and shall be maintained for a maximum internal pressure of 47 psig and an air temperature of 271°F.

5.3 REACTOR CORE

FUEL ASSEMBLIES

5.3.1 The reactor core shall contain 193 fuel assemblies with each fuel assembly normally containing 264 fuel rods clad with Ziracloy-4 except that limited substitution of fuel rods by filler rods consisting of Ziracloy-4 or stainless steel or by vacancies may be made if justified by a cycle specific reload analysis. Each fuel rod shall have a nominal active fuel length of 143.7 inches.

CONTROL ROD ASSEMBLIES

5.3.2 The reactor core shall contain 53 full length and no part length control rod assemblies. The full length control rod assemblies shall contain a nominal 142 inches of absorber material. The nominal values of absorber material shall be 80 percent silver, 15 percent indium and 5 percent cadmium. All control rods shall be clad with stainless steel tubing.

5.4 REACTOR COOLANT SYSTEM

DESIGN FEATURE AND TEMPERATURE

5.4.1 The reactor coolant system is designed and shall be maintained:

DESIGN FEATURES

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- a. In accordance with the code requirements specified in Section 4.1 of the FSAR, with allowance for normal degradation pursuant to the applicable Surveillance Requirements,
- b. For a pressure of 2485 psig, and
- c. For a temperature of 650°F, except for the pressurizer which is 680°F.

VOLUME

5.4.2 The total water and steam volume of the reactor coolant system is 12,811 ± 100 cubic feet at a nominal Tav_g of 576.7°F.

5.5 METEOROLOGICAL TOWER LOCATION

5.5.1 The meteorological tower shall be located as shown on Figure 5.1-1.

5.6 FUEL STORAGE

CRITICALITY

5.6.1 The new and spent fuel storage racks are designed and shall be maintained with:

- a. A Keff equivalent to less than or equal to 0.95 with the storage rack filled with unborated water. This value of keff includes a conservative allowance of:
 1. 2.2% delta k/k uncertainty for all standard and V5H fuel assemblies, and
 2. An additional 0.7% delta k/k uncertainty for standard and V5H fuel assemblies containing Integral Fuel Burnable Absorber (IFBA) pins.
- b. A nominal 10.5 inch center-to-center distance between fuel assemblies placed in the spent fuel storage racks.
- c. A nominal 21.0 inch center-to-center distance between fuel assemblies placed in the new fuel storage racks.
- d. Standard or Vantage 5H fuel assemblies with maximum enrichment of 4.55 w/o U235 and a Kinf less than or equal to 1.453 in the core geometry at 68°F with no soluble boron.

DRAINAGE

5.6.2 The spent fuel storage pool is designed and shall be maintained to prevent inadvertent draining of the pool below elevation 124'8".

DESIGN FEATURES

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CAPACITY

5.6.3 The spent fuel storage pool is designed and shall be maintained with a storage capacity limited to no more than 1170 fuel assemblies.

5.7 COMPONENT CYCLIC OR TRANSIENT LIMIT

5.7.1 The components identified in Table 5.7-1 are designed and shall be maintained within the cyclic or transient limits of Table 5.7-1.



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

PUBLIC SERVICE ELECTRIC & GAS COMPANY

PHILADELPHIA ELECTRIC COMPANY

DELMARVA POWER AND LIGHT COMPANY

ATLANTIC CITY ELECTRIC COMPANY

DOCKET NO. 50-311

SALEM NUCLEAR GENERATING STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 107
License No. DPR-75

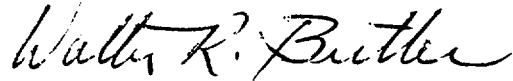
1. The Nuclear Regulatory Commission (the Commission or the NRC) has found that:
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 - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, 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-75 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

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3. This license amendment is effective as of its date of issuance and shall be implemented within 60 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Walter R. Butler, Director
Project Directorate I-2
Division of Reactor Projects - I/II

Attachment:
Changes to the Technical
Specifications

Date of Issuance: August 1, 1991

ATTACHMENT TO LICENSE AMENDMENT NO. 107

FACILITY OPERATING LICENSE NO. DPR-75

DOCKET NO. 50-311

Revise Appendix A as follows:

Remove Pages

5-4

5-5

Insert Pages

5-4

5-5

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATING TO AMENDMENT NOS. 128 AND 107 TO FACILITY OPERATING

LICENSE NOS. DPR-70 AND DPR-75

PUBLIC SERVICE ELECTRIC & GAS COMPANY

PHILADELPHIA ELECTRIC COMPANY

DELMARVA POWER AND LIGHT COMPANY

ATLANTIC CITY ELECTRIC COMPANY

SALEM NUCLEAR GENERATING STATION UNIT NOS. 1 AND 2

DOCKET NO. 50-272 AND 50-311

1.0 INTRODUCTION

By letter dated November 19, 1990, as supplemented April 1, 1991 May 20, 1991, and June 14, 1991, Public Service Electric & Gas Company, Philadelphia Electric Company, Delmarva Power and Light Company and Atlantic City Electric Company (the licensee) submitted a request for changes to the Salem Nuclear Generating Station, Unit Nos. 1 and 2, Technical Specifications (TS). The requested changes would revise TS 5.3.1 and 5.6.3 by removing the current maximum U-235 enrichment limit. TS 5.6.3 would be revised to allow storage of Westinghouse Standard or Vantage 5H fuel with maximum enrichment of 4.55 weight percent (w/o) U-235 provided that the reference infinite multiplication factor (k -infinity) for the fuel assemblies be less than or equal to 1.453 in unborated water at 68° F in core geometry. TS 5.6.1 would also be revised to reflect the reactivity uncertainty associated with the use of integral fuel burnable absorber pins.

2.0 EVALUATION

The Salem Units 1 and 2 spent fuel pools were previously analyzed for the storage of Westinghouse 17x17 Standard fuel assemblies with enrichments up to 4.05 weight percent (w/o) U-235. The current analysis considers the storage of Westinghouse Vantage 5H (V5H) fuel containing integral fuel burnable absorbers (IFBAs) with enrichments up to 4.55 w/o U-235. The fuel assembly consists of a thin boron coating on the outside of the fuel pellet, thus making it an integral part of the fuel assembly. The primary mechanical difference between the Standard and V5H fuel is that the V5H design employs zircaloy rather than inconel spacer grids. However, since the fuel storage criticality analyses are performed by replacing the grid volume with water volume, the results are applicable to both fuel types.

The neutron cross sections were generated with the PSCPM code, which is a depletable, two-dimensional, multigroup, transport theory code based on the EPRI code CPM-2. The reactivity calculations were performed with the PDQ7 code, a depletable, few-group, diffusion theory code. The analytical methods and models used in the reactivity analysis have been benchmarked against experimental data and industry standard codes and have been found to adequately reproduce the critical values. The staff finds these methods and models to be acceptable.

The design basis for preventing criticality outside the reactor is that, including uncertainties, there is a 95 percent probability at a 95 percent confidence level (95/95 probability/confidence) that the effective multiplication factor (k -eff) of the fuel assembly array will be no greater than 0.95. Two analytical techniques are used to ensure the criticality criterion for the storage of IFBA fuel in the Salem storage racks. The first method uses reactivity equivalencing to establish the poison material loading required to meet the criticality limits. The second method uses the fuel assembly infinite multiplication factor (k -infinity) to establish a reference reactivity.

The concept of reactivity equivalencing is predicated upon the reactivity decrease associated with the addition of IFBA fuel rods. A series of reactivity calculations are performed to generate a set of IFBA rod number versus enrichment ordered pairs which all yield the same k -eff when the fuel is stored in the spent fuel racks. The results show that the rack reactivity of fuel with 60 IFBA rods with an initial enrichment of 4.55 w/o U-235 is equivalent to the rack reactivity of fresh (unirradiated) fuel having an initial U-235 enrichment of 4.05 w/o U-235 and containing no IFBA rods. This equivalence relationship assures the maximum k -eff will be calculated since depletion calculations performed by the licensee have shown that the maximum reactivity of the Westinghouse fuel assemblies occurs at zero burnup for any number of IFBA rods per assembly. This method of reactivity equivalencing has been used by other licensees for fuel storage analyses and has been accepted by the staff.

The resulting k -eff for the Salem spent fuel storage racks was less than 0.95 and included all appropriate biases and uncertainties at a 95/95 probability/confidence level. This meets the NRC acceptance criterion and is, therefore, acceptable.

In order to simplify verification of acceptability for storage of fuel in the spent fuel racks, a k -infinity for a fresh 4.05 w/o U-235 fuel assembly was determined. As mentioned earlier, this is equivalent to the reactivity of a 4.55 w/o U-235 fuel assembly with 60 IFBA rods. When k -infinity is used as a reference reactivity point, the need to specify an acceptable enrichment versus number of IFBA rods correlation is eliminated. Calculation of k -infinity for a fuel array of 4.05 w/o fuel in the Salem reactor core geometry resulted in a reference value of 1.453. The licensee has shown that Westinghouse Standard or V5H fuel with a maximum U-235 enrichment of 4.55 w/o and a reference k -infinity of 1.453 results in a maximum k -eff of less than 0.95 when stored in the Salem spent fuel storage racks. Therefore, the only requirement needed to ensure that the fuel racks are maintained at a k -eff below 0.95 for these fuel types

is to verify that for each assembly the k-infinity is no greater than 1.453 at 68° F in the core geometry and the maximum enrichment is no greater than 4.55 w/o U-235.

It is possible to postulate events which could lead to an increase in storage rack reactivity. However, these criticality accidents for 4.05 w/o U-235 fuel have been analyzed previously and the consequences have been found to be acceptable. These conclusions likewise apply to 4.55 w/o U-235 fuel with a sufficient number of IFBA rods to maintain an unborated reference fuel assembly k-infinity less than or equal to 1.453 at 68° F in core geometry as explained above.

Reanalysis of the spent fuel pool heat loads and radiological consequences of potential fuel handling accidents were not required to be performed as part of this submittal. These are issues which are affected by extended fuel burnups and operational history. Although it is possible to achieve extended cycle burnups using assemblies with increased enrichment, actual assembly burnups will depend on core reload designs and integrated power history. Therefore, the impact of extended burnups will be addressed as a separate issue, and any required safety analysis and FSAR updates will be performed as necessary. Prior to this, reload cycle designs and reactor operation will ensure that the design bases of the spent fuel pool will be maintained.

Based on the above evaluation, the staff concludes that the storage racks in the Salem 1 and 2 spent fuel pools can accommodate Westinghouse Standard or V5H fuel assemblies with maximum enrichments of 4.55 w/o U-235 provided that the fuel with enrichment greater than 4.05 w/o U-235 contains sufficient IFBAs such that the maximum core geometry k-infinity of these assemblies is no greater than 1.453 at 68° F. Since the analyses were performed for fuel with enrichment up to 4.55 w/o U-235, this enrichment will be included in the TS to indicate that any higher enriched fuel will require an evaluation to determine if the k-infinity criterion remains valid.

Although the Salem TS have been modified to specify acceptable reload fuel for storage, evaluations of reload core designs (using any enrichment) will, of course, be performed on a cycle by cycle basis as part of the reload safety evaluation process. Each reload design is evaluated to confirm that the cycle core design adheres to the limits that exist in the accident analyses and TS to ensure that reactor operation is acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New Jersey State official was notified of the proposed issuance of the amendments. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

Pursuant to 10 CFR 51.21, 51.32 and 51.35, an environmental assessment and finding of no significant impact has been prepared and published in the

Federal Register (56 FR 33045) dated July 18, 1991. Accordingly, based upon the environmental assessment, the Commission has determined that the issuance of the amendments will not have a significant effect on the quality of the human environment.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors:

L. Kopp
J. Stone

Date: August 1, 1991