

August 21, 1987

Dockets Nos. 50-259/260/296

Mr. S. A. White  
Manager of Nuclear Power  
Tennessee Valley Authority  
6N 38A Lookout Place  
1101 Market Street  
Chattanooga, Tennessee 37402-2801

Dear Mr. White:

SUBJECT: SURVEILLANCE REQUIREMENTS FOR THE STANDBY LIQUID CONTROL (SLC) SYSTEM  
TECHNICAL SPECIFICATION CHANGE #223 (TAC 64314, 64315 and 64316)

Re: Browns Ferry Nuclear Plant, Units 1, 2, and 3

The Commission has issued the enclosed Amendments Nos. 136, 132, and 107 to Facility Operating Licenses Nos. DPR-33, DPR-52 and DPR-68 for the Browns Ferry Nuclear Plant, Units 1, 2 and 3, respectively. These amendments are in response to your application dated December 23, 1986.

These amendments revise the technical specifications for the Standby Liquid Control (SLC) system to specify the use of demineralized water for testing the minimum pump flow rate and require visual verification of flow when pumping boron solution through the recirculation path.

A copy of the Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's Bi-Weekly Federal Register Notice.

Sincerely,

Original signed by John F. Stang for  
John A. Zwolinski, Assistant Director  
for Projects  
TVA Projects Division  
Office of Special Projects

Enclosures:

1. Amendment No. to License No. DPR-33
2. Amendment No. to License No. DPR-52
3. Amendment No. to License No. DPR-68
4. Safety Evaluation

cc w/enclosures:  
See next page

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August 21, 1987

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7/29/87

OSP:AD/PT  
JAZwolinski  
8/1/87



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

August 21, 1987

Dockets Nos. 50-259/260/296

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Tennessee Valley Authority  
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TVA Projects Division  
Office of Special Projects

Enclosures:

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2. Amendment No. 132 to License No. DPR-52
3. Amendment No. 107 to License No. DPR-68
4. Safety Evaluation

cc w/enclosures:  
See next page

Mr. S. A. White  
Tennessee Valley Authority

Browns Ferry Nuclear Plant  
Units 1, 2, and 3

cc:

General Counsel  
Tennessee Valley Authority  
400 West Summit Hill Drive  
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U.S. Nuclear Regulatory Commission  
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Atlanta, Georgia 30323

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Tennessee Valley Authority  
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Chattanooga, Tennessee 37402-2801

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U.S. Nuclear Regulatory Commission  
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c/o U.S. GAO  
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Knoxville, Tennessee 37919

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Browns Ferry Nuclear Plant  
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Decatur, Alabama 35602

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Tennessee Valley Authority  
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Knoxville, Tennessee 37902

Chairman, Limestone County Commission  
P.O. Box 188  
Athens, Alabama 35611

Claude Earl Fox, M.D.  
State Health Officer  
State Department of Public Health  
State Office Building  
Montgomery, Alabama 36130



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

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-259

BROWNS FERRY NUCLEAR PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 136  
License No. DPR-33

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Tennessee Valley Authority (the licensee), dated December 23, 1986, 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.

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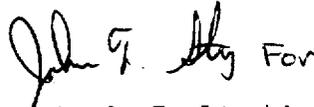
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-33 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 136, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

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

FOR THE NUCLEAR REGULATORY COMMISSION



John A. Zwolinski, Assistant Director  
for Projects  
TVA Projects Division  
Office of Special Projects

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance: August 21, 1987

ATTACHMENT TO LICENSE AMENDMENT NO. 136

FACILITY OPERATING LICENSE NO. DPR-33

DOCKET NO. 50-259

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change.

REMOVE

3.4/4.4-1  
3.4/4.4-2

INSERT

3.4/4.4-1  
3.4/4.4-2

3.4/4.4 STANDBY LIQUID CONTROL SYSTEM

LIMITING CONDITIONS FOR OPERATION

3.4 STANDBY LIQUID CONTROL SYSTEM

Applicability

Applies to the operating status of the Standby Liquid Control System.

Objective

To assure the availability of a system with the capability to shut down the reactor and maintain the shutdown condition without the use of control rods.

Specification

A. Normal System Availability

1. The Standby Liquid Control System shall be operable at all times when there is fuel in the reactor vessel and the reactor is not in a shutdown condition with all operable control rods fully inserted except as specified in 3.4.B.1.

SURVEILLANCE REQUIREMENTS

4.4 STANDBY LIQUID CONTROL SYSTEM

Applicability

Applies to the surveillance requirements of the Standby Liquid Control System.

Objective

To verify the operability of the Standby Liquid Control System.

Specification

A. Normal System Availability

The operability of the Standby Liquid Control System shall be verified by the performance of the following tests:

1. At least once per month each pump loop shall be functionally tested.
2. At least once during each operating cycle:
  - a. Check that the setting of the system relief valves is  $1,425 \pm 75$  psig.
  - b. Manually initiate the system, except explosive valves. Visually verify flow by pumping boron solution through the recirculation path and back to the Standby Liquid Control Solution Tank. Verify minimum pump flow rate of 39 gpm against a system head of 1275 psig by pumping demineralized water through the

3.4/4.4 STANDBY LIQUID CONTROL SYSTEM

LIMITING CONDITIONS FOR OPERATION

SURVEILLANCE REQUIREMENTS

B. Operation with Inoperable Components

1. From and after the date that a redundant component is made or found to be inoperable, Specification 3.4.A.1 shall be considered fulfilled and continued operation permitted provided that the component is returned to an operable condition within seven days.

4.4.A Normal System Applicability

4.4.A.2.b. (Cont'd)

Standby Liquid Control Test Tank. After pumping boron solution, the system shall be flushed with demineralized water.

- c. Manually initiate one of the Standby Liquid Control System loops and pump demineralized water into the reactor vessel.

This test checks explosion of the charge associated with the tested loop, proper operation of the valves, and pump operability. Replacement charges shall be selected such that the age of charge in service shall not exceed five years from the manufacturer's assembly date.

- d. Both systems, including both explosive valves, shall be tested in the course of two operating cycles.

B. Surveillance with Inoperable Components

1. When a component is found to be inoperable, its redundant component shall be demonstrated to be operable immediately and daily thereafter until the inoperable component is repaired.



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

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-260

BROWNS FERRY NUCLEAR PLANT, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 132  
License No. DPR-52

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Tennessee Valley Authority (the licensee) dated December 23, 1986, 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.

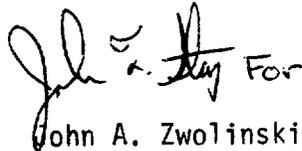
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-52 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No.132, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

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

FOR THE NUCLEAR REGULATORY COMMISSION



John A. Zwolinski, Assistant Director  
for Projects  
TVA Projects Division  
Office of Special Projects

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance: August 21, 1987

ATTACHMENT TO LICENSE AMENDMENT NO. 132

FACILITY OPERATING LICENSE NO. DPR-52

DOCKET NO. 50-260

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change.

REMOVE

3.4/4.4-1  
3.4/4.4-2

INSERT

3.4/4.4-1  
3.4/4.4-2

### 3.4/4.4 STANDBY LIQUID CONTROL SYSTEM

#### LIMITING CONDITIONS FOR OPERATION

#### 3.4 STANDBY LIQUID CONTROL SYSTEM

##### Applicability

Applies to the operating status of the Standby Liquid Control System.

##### Objective

To assure the availability of a system with the capability to shut down the reactor and maintain the shutdown condition without the use of control rods.

##### Specification

#### A. Normal System Availability

1. The Standby Liquid Control System shall be OPERABLE at all times when there is fuel in the reactor vessel and the reactor is not in a shutdown condition with all OPERABLE control rods fully inserted except as specified in 3.4.B.1.

#### SURVEILLANCE REQUIREMENTS

#### 4.4 STANDBY LIQUID CONTROL SYSTEM

##### Applicability

Applies to the surveillance requirements of the Standby Liquid Control System.

##### Objective

To verify the operability of the Standby Liquid Control System.

##### Specification

#### A. Normal System Availability

The operability of the Standby Liquid Control System shall be verified by the performance of the following tests:

1. At least once per month each pump loop shall be functionally tested.
2. At least once during each operating cycle:
  - a. Check that the setting of the system relief valves is  $1,425 \pm 75$  psig.
  - b. Manually initiate the system, except explosive valves. Visually verify flow by pumping boron solution through the recirculation path and back to the Standby Liquid Control Solution Tank. Verify minimum flow rate of 39 gpm against a system head of 1275 psig by pumping demineralized water through the

### 3.4/4.4 STANDBY LIQUID CONTROL SYSTEM

#### LIMITING CONDITIONS FOR OPERATION

#### SURVEILLANCE REQUIREMENTS

##### B. Operation with INOPERABLE Components

1. From and after the date that a redundant component is made or found to be INOPERABLE, Specification 3.4.A.1 shall be considered fulfilled and continued operation permitted provided that the component is returned to an OPERABLE condition within seven days.

##### 4.4.A Normal System Applicability

##### 4.4.A.2.b. (Cont'd)

Standby Liquid Control Test Tank. After pumping boron solution, the system shall be flushed with demineralized water.

- c. Manually initiate one of the Standby Liquid Control System loops and pump demineralized water into the reactor vessel.

This test checks explosion of the charge associated with the tested loop, proper operation of the valves, and pump operability. Replacement charges shall be selected such that the age of charge in service shall not exceed five years from the manufacturer's assembly date.

- d. Both systems, including both explosive valves, shall be tested in the course of two operating cycles.

##### B. Surveillance with INOPERABLE Components

1. When a component is found to be INOPERABLE, its redundant component shall be demonstrated to be OPERABLE immediately and daily thereafter until the INOPERABLE component is repaired.



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

TENNESSEE VALLEY AUTHORITY

DOCKET NO. 50-296

BROWNS FERRY NUCLEAR PLANT, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 107  
License No. DPR-68

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Tennessee Valley Authority (the licensee) dated December 23, 1986, 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.

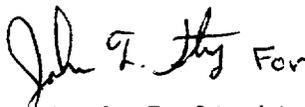
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of Facility Operating License No. DPR-68 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 107, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

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

FOR THE NUCLEAR REGULATORY COMMISSION



John A. Zwolinski, Assistant Director  
for Projects  
TVA Projects Division  
Office of Special Projects

Attachment:  
Changes to the Technical  
Specifications

Date of Issuance: August 21, 1987

ATTACHMENT TO LICENSE AMENDMENT NO. 107

FACILITY OPERATING LICENSE NO. DPR-68

DOCKET NO. 50-296

Revise the Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by the captioned amendment number and contain marginal lines indicating the area of change.

REMOVE

3.4/4.4-1  
3.4/4.4-2

INSERT

3.4/4.4-1  
3.4/4.4-2

### 3.4/4.4 STANDBY LIQUID CONTROL SYSTEM

#### LIMITING CONDITIONS FOR OPERATION

#### 3.4 STANDBY LIQUID CONTROL SYSTEM

##### Applicability

Applies to the operating status of the Standby Liquid Control System.

##### Objective

To assure the availability of a system with the capability to shut down the reactor and maintain the Shutdown Condition without the use of control rods.

##### Specification

##### A. Normal System Availability

1. The Standby Liquid Control System shall be OPERABLE at all times when there is fuel in the reactor vessel and the reactor is not in a Shutdown Condition with all OPERABLE control rods fully inserted except as specified in 3.4.B.1.

#### SURVEILLANCE REQUIREMENTS

#### 4.4 STANDBY LIQUID CONTROL SYSTEM

##### Applicability

Applies to the surveillance requirements of the Standby Liquid Control System.

##### Objective

To verify the operability of the Standby Liquid Control System.

##### Specification

##### A. Normal System Availability

The operability of the Standby Liquid Control System shall be verified by the performance of the following tests:

1. At least once per month each pump loop shall be functionally tested.
2. At least once during each operating cycle:
  - a. Check that the setting of the system relief valves is  $1,425 \pm 75$  psig.
  - b. Manually initiate the system, except explosion valves. Visually verify flow by pumping boron solution through the recirculation path and back to the Standby Liquid Control Solution Tank. Verify minimum pump flow rate of 39 gpm against a system head of 1275 psig by pumping demineralized water through the

3.4/4.4 STANDBY LIQUID CONTROL SYSTEM

LIMITING CONDITIONS FOR OPERATION

SURVEILLANCE REQUIREMENTS

B. Operation with Inoperable Components

1. From and after the date that a redundant component is made or found to be INOPERABLE, Specification 3.4.A.1 shall be considered fulfilled and continued operation permitted provided that the component is returned to an OPERABLE condition within seven days.

4.4.A Normal System Applicability

Standby Liquid Control Test Tank. After pumping boron solution, the system shall be flushed with demineralized water.

- c. Manually initiate one of the Standby Liquid Control System loops and pump demineralized water into the reactor vessel.

This test checks explosion of the charge associated with the tested loop, proper operation of the valves, and pump operability. Replacement charges shall be selected such that the age of charge in service shall not exceed five years from the manufacturer's assembly date.

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

SAFETY EVALUATION BY THE OFFICE OF SPECIAL PROJECTS

SUPPORTING AMENDMENT NO. 136 TO FACILITY OPERATING LICENSE NO. DPR-33

AMENDMENT NO. 132 TO FACILITY OPERATING LICENSE NO. DPR-52

AMENDMENT NO. 107 TO FACILITY OPERATING LICENSE NO. DPR-68

TENNESSEE VALLEY AUTHORITY

BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2 AND 3

DOCKETS NOS. 50-259, 50-260 AND 50-296

1.0 INTRODUCTION

By letter dated December 23, 1986, Tennessee Valley Authority, the licensee for Browns Ferry Nuclear (BFN) Plant, Units 1, 2 and 3, proposed changes to plant Technical Specification Surveillance Requirement (SR) 4.4.A.2.b and provided justification for the same. The SR deals with testing requirements for ensuring the operability of the Standby Liquid Control System (SLCS) for the BFN units. Specifically, the proposed SR changes the requirement that at least once per each operating cycle, the system be verified operable by (1) visually verifying the flow by pumping boron solution through the recirculation path and back to the SLCS solution tank and (2) verifying a minimum pump flow rate of 39 gpm against the system head of 1275 psig by pumping demineralized water through the SLCS test tank. The above changes have been proposed in lieu of the existing SR which do not spell out (1) visual verification of the flow during recirculation of the boron solution and (2) the test method for verifying the minimum pump flow rate. The staff's evaluation of the proposed SR changes is given below.

2.0 EVALUATION

The SLCS is intended to provide the capability for bringing the reactor from full power to a cold, xenon-free shutdown condition, assuming that none of the withdrawn control rods can be inserted. The system accomplishes this purpose by injecting sufficient quantity of borated water of proper concentration into the reactor vessel in less than 125 minutes. The system consists of a boron solution tank, a test tank containing demineralized water, two positive-displacement pumps, two explosive-actuated valves, other associated valves and controls. The operability of the system is ensured by a number of periodic surveillance tests listed in the plant Technical Specifications for the three BFN units. The licensee has proposed changes to two of these tests which have been identified above (See Section 1.0). In the description of the first change, the licensee stated that when the boron solution is pumped from solution tank via a recirculation path back to the solution tank the flow can be visually verified by observing the turbulence through a sample opening in the top of the solution tank. Regarding the second change, i.e., method of verifying minimum pump flow rate, the test requires aligning the pump with the demineralizer water test tank such that demineralized water may be recirculated into and from

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the tank. For a brief period (a couple of minutes) the discharge from the pump is routed to a floor drain, and the change in water level in the test tank is measured. The valves are then returned to the recirculation flow mode, and the pump is kept running for the remainder of the test period.

In the justification, the licensee stated that the purpose of the pump flow rate test is to monitor the pump performance and that it could be achieved by either pumping the borated water using the solution tank as the source of water or by pumping demineralized water using the test tank as the source of water. The licensee stated that the proposed utilization of the demineralized water and the test tank as the water source for performing the pump flow rate test is the same as what is being currently followed at the BFN units. The licensee added that the above clarification of the flow rate test contained in the proposed SR change conforms with the current practice and is further required since the SR as currently worded implies that the pump flow rate is determined during boron solution recirculation back to the SLCS solution tank. The licensee further stated that the proposed flow rate determination test method is consistent with Standard Technical Specifications and ASME Section XI. During its discussions with the staff, the licensee further stated that the test procedures require verification of at least 48 gpm pump flow rate for the S. R. 4.4.A.1 operability test.

Based on the above, the staff finds the proposed technical specifications changes are acceptable. The bases for staff's acceptance are listed below:

- (1) The operational testing of the system specified in the proposed SR changes, along with the other tests specified under SR for the system in the existing plant Technical Specifications, will demonstrate the availability of a flow path from the SLC system solution tank to the reactor vessel. These changes will further limit the utilization of borated water for testing purposes and consequently reduce the potential for blocking the piping between the solution tank and the reactor vessel.
- (2) The proposed visual verification of the flow path when the boron solution is pumped from the solution tank through a recirculation path back to the tank will demonstrate that sufficient Net Positive Suction Head (NPSH) is available at the solution tank.
- (3) The proposed utilization of the test tank and demineralized water for testing purposes is consistent with NRC's General Electric Standard Technical Specifications (NUREG-0123) for the SLC system.
- (4) The proposed SR changes along with the other SR in the existing plant Technical Specifications, the test procedures which require verifying that at least a minimum of 48 gpm pump flow rate is available, and the use of a positive displacement pump, provide reasonable assurance that the pump can inject borated water from the SLC system solution tank at a flow rate of at least 39 gpm against a system head of 1275 psig, when required.

(5) The technical specifications include the SR to flush the system with demineralized water after borated water recirculation test. Additionally, as indicated in the BFN Final Safety Analysis Report (FSAR), an electric immersion coil is provided for the solution tank, and heating coils are wrapped around the pipe lines from the tank to the pump suction. These measures maintain the solution temperature in the range 80°F-85°F. The above assure that the piping between the solution tank and the vessel will remain unblocked.

(6) As indicated in the FSAR, after the functional tests, the valves to and from the solution tank and the valves to and from the test tank will be returned to their normal positions. This will ensure that there is no misalignment of the valves after the tests are completed.

Based on the above, the staff has determined that the proposed SR changes in conjunction with other surveillance tests identified in the existing plant Technical Specifications for the BFN units, ensure the operability of the SLC system and thus satisfy the applicable requirements of General Design Criterion 27, "Combined Reactivity Control System Capability" of 10 CFR Part 50, Appendix A.

### 3.0 ENVIRONMENTAL CONSIDERATIONS

The amendments involve a change to a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes to the surveillance requirements. The staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that these amendments involve no significant hazards consideration and there has been no public comment on such finding. Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement nor environmental assessment need be prepared in connection with the issuance of these amendments.

### 4.0 CONCLUSION

The staff 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, and (2) 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 nor to the health and safety of the public.

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Dated: August 21, 1987