June 6, 1988

Docket No. 50-335

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Mr. W. F. Conway
Acting Group Vice President
Nuclear Energy
Florida Power and Light Company
Post Office Box 14000
Juno Beach, Florida 33408

Dear Mr. Conway:

SUBJECT: ST. LUCIE UNIT 1 - ISSUANCE OF AMENDMENT RE: BORIC ACID MAKEUP SYSTEM (TAC NO. 67051)

The Commission has issued the enclosed Amendment No. 94 to Facility Operating License No. DPR-67 for the St. Lucie Plant, Unit No. 1. This amendment consists of changes to the Technical Specifications in response to your application dated January 22, 1988, as supplemented April 6, 1988.

This amendment changes the requirements of the boric acid makeup system such that the boric acid concentration is lowered, the water volume is increased, and heat tracing of the circuits is no longer required.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

Original signed by

E. G. Tourigny, Project Manager
Project Directorate II-2
Division of Reactor Projects-I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 94 to DPR-67
2. Safety Evaluation

cc w/enclosures:
See next page

LA:PDII-2	PM:PDII-2	D:PDII-2	OGC-WF	RSB
DMiller	ETourigny:bd	HBerkow		WHodges
04/18/88	04/20/88	06/6/88	04/29/88	04/21/88

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Mr. W. F. Conway
Florida Power & Light Company

St. Lucie Plant

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

FLORIDA POWER & LIGHT COMPANY

DOCKET NO. 50-335

ST. LUCIE PLANT UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 94
License No. DPR-67

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Florida Power & Light Company, (the licensee) dated January 22, 1988, as supplemented April 6, 1988, 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, Facility Operating License No. DPR-67 is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and by amending paragraph 2.C.(2) to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 94 , 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 90 days.

FOR THE NUCLEAR REGULATORY COMMISSION

Herbert N. Berkow

Herbert N. Berkow, Director
Project Directorate II-2
Division of Reactor Projects-I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: June 6, 1988

ATTACHMENT TO LICENSE AMENDMENT NO. 94

TO FACILITY OPERATING LICENSE NO. DPR-67

DOCKET NO. 50-335

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages. The revised pages are identified by amendment number and contain vertical lines indicating the area of change. The corresponding overleaf pages are also provided to maintain document completeness.

Remove Pages	Insert Pages
3/4 1-8	3/4 1-8
3/4 1-9	3/4 1-9
3/4 1-10	3/4 1-10
3/4 1-11	3/4 1-11
3/4 1-16	3/4 1-16
Figure 3.1-1	Figure 3.1-1
3/4 1-18	3/4 1-18
3/4 1-19	3/4 1-19
3/4 6-16a	3/4 6-16a
B3/4 1-2	B3/4 1-2
B3/4 1-3	B3/4 1-3

MINIMUM TEMPERATURE FOR CRITICALITY

LIMITING CONDITION FOR OPERATION

3.1.1.5 The Reactor Coolant System lowest operating loop temperature (T_{avg}) shall be $\geq$ 515°F when the reactor is critical.

APPLICABILITY: MODES 1 and 2#.

ACTION:

With a Reactor Coolant System operating loop temperature (T_{avg}) < 515°F, restore T_{avg} to within its limit within 15 minutes or be in HOT STANDBY within the next 15 minutes.

SURVEILLANCE REQUIREMENTS

4.1.1.5 The Reactor Coolant System temperature (T_{avg}) shall be determined to be $\geq$ 515°F.

a. Within 15 minutes prior to achieving reactor criticality, and

b. At least once per 30 minutes when the reactor is critical and the Reactor Coolant System temperature (T_{avg}) is < 525°F.

With $K_{eff} \geq 1.0$.

SURVEILLANCE REQUIREMENTS

b. At least once per 24 hours, when the Reactor Auxiliary Building air temperature is less than 55°F, by verifying that the Boric Acid Makeup Tank solution temperature is greater than 55°F, when the flowpath from the Boric Acid Makeup Tank is required to be OPERABLE.

FLOW PATHS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.2 At least two of the following three boron injection flow paths shall be OPERABLE:

a. One flow path from the boric acid makeup tank(s) with the tank meeting Specification 3.1.2.8 part a) or b), via a boric acid makeup pump through a charging pump to the Reactor Coolant System.

b. One flow path from the boric acid makeup tank(s) with the tank meeting Specification 3.1.2.8 part a) or b), via a gravity feed valve through a charging pump to the Reactor Coolant System.

c. The flow path from the refueling water storage tank via a charging pump to the Reactor Coolant System.

OR

At least two of the following three boron injection flow paths shall be OPERABLE:

a. One flow path from each boric acid makeup tank with the combined tank contents meeting Specification 3.1.2.8 c), via both boric acid makeup pumps through a charging pump to the Reactor Coolant System.

b. One flow path from each boric acid makeup tank with the combined tank contents meeting Specification 3.1.2.8 c), via both gravity feed valves through a charging pump to the Reactor Coolant System.

c. The flow path from the refueling water storage tank, via a charging pump to the Reactor Coolant System.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With only one of the above required boron injection flow paths to the Reactor Coolant System OPERABLE, restore at least two boron injection flow paths to the Reactor Coolant System to OPERABLE status within 72 hours or make the reactor subcritical within the next 2 hours and borate to a SHUTDOWN MARGIN equivalent to at least 2000 pcm at 200°F; restore at least two flow paths to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.2 At least two of the above required flow paths shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

b. At least once per 18 months during shutdown by verifying that each automatic valve in the flow path actuates to its correct position on a Safety Injection Actuation Signal.

c. At least once per 24 hours when the Reactor Auxiliary Building air temperature is below 55°F by verifying that the solution temperature of the Boric Acid Makeup Tank(s) is above 55°F.

BORIC ACID PUMPS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.6 At least the boric acid pump(s) in the boron injection flow path(s) required OPERABLE pursuant to Specification 3.1.2.2a shall be OPERABLE if the flow path through the boric acid pump in Specification 3.1.2.2a is OPERABLE.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With one boric acid pump required for the boron injection flow path(s) pursuant to Specification 3.1.2.2a inoperable, restore the boric acid pump to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.6 The above required boric acid pump(s) shall be demonstrated OPERABLE by verifying that on recirculation flow, the pump develops a discharge pressure of $\geq$ 75 psig when tested pursuant to Specification 4.0.5.

BORATED WATER SOURCES - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.7 As a minimum, one of the following borated water sources shall be OPERABLE:

a. One boric acid makeup tank with a minimum borated water volume of 3650 gallons of 2.5 to 3.5 weight percent boric acid (4371 to 6119 ppm boron).

b. The refueling water tank with:

1. A minimum contained volume of 125,000 gallons,

2. A minimum boron concentration of 1720 ppm, and

3. A minimum solution temperature of 40°F.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no borated water sources OPERABLE, suspend all operations involving positive reactivity changes until at least one borated water source is restored to OPERABLE status.

SURVEILLANCE REQUIREMENTS

4.1.2.7 The above required borated water source shall be demonstrated OPERABLE:

a. At least once per 7 days by:

1. Verifying the boron concentration of the water,

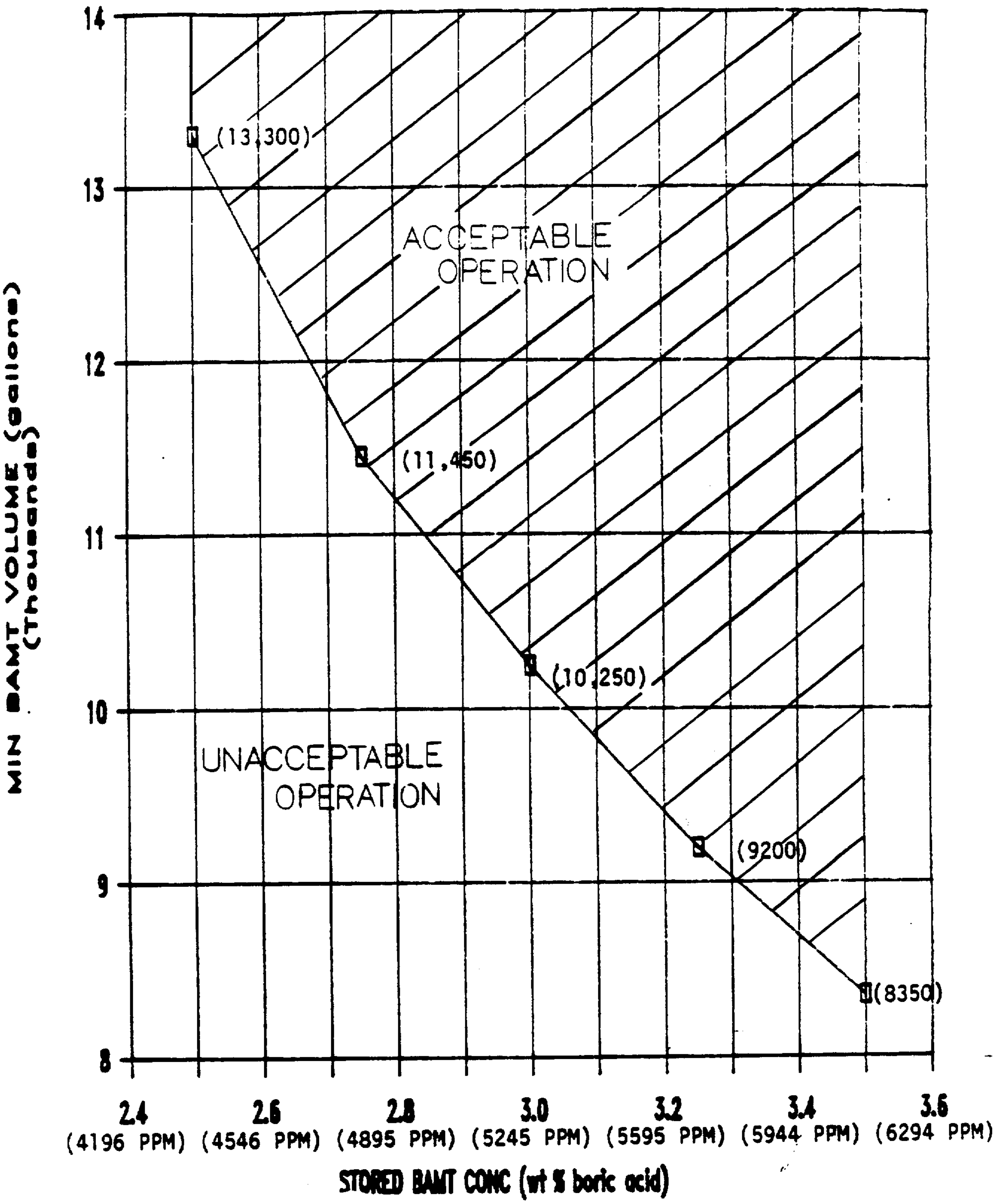
2. Verifying the water level of the tank, and

b. At least once per 24 hours by verifying the RWT temperature when it is the source of borated water and the site ambient air temperature is < 40°F.

c. At least once per 24 hours when the Reactor Auxiliary Building air temperature is less than 55°F by verifying that the Boric Acid Makeup Tank solution temperature is greater than 55°F when that Boric Acid Makeup Tank is required to be OPERABLE.

FIGURE 3.1-1 ST.LUCIE 1 MIN BAMT VOLUME

VS STORED BAMT CONCENTRATION



BORATED WATER SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.8 At least two of the following four borated water sources shall be OPERABLE:

a. Boric Acid Makeup Tank 1A in accordance with Figure 3.1-1 and in the range of 3.2 to 3.5 weight percent boric acid (5595 to 6119 ppm boron).

b. Boric Acid Makeup Tank 1B in accordance with Figure 3.1-1 and in the range of 3.2 to 3.5 weight percent boric acid (5595 to 6119 ppm boron).

c. Boric Acid Makeup Tanks 1A and 1B with a minimum combined contained borated water volume in accordance with Figure 3.1-1.

d. The refueling water tank with:

1. A minimum contained volume of 401,800 gallons of water,
2. A minimum boron concentration of 1720 ppm,
3. A maximum solution temperature of 100°F,
4. A minimum solution temperature of 55°F when in MODES 1 and 2, and
5. A minimum solution temperature of 40°F when in MODES 3 and 4.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With only one borated water source OPERABLE, restore at least two borated water sources to OPERABLE status within 72 hours or make the reactor subcritical within the next 2 hours and borate to a SHUTDOWN MARGIN equivalent to at least 200 pcm at 200°F; restore at least two borated water sources to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.8 At least two borated water sources shall be demonstrated OPERABLE:

a. At least once per 7 days by:

1. Verifying the boron concentration in each water source,

SURVEILLANCE REQUIREMENTS (Continued)

2. Verifying the water level in each water source.

b. At least once per 24 hours by verifying the RWT temperature.

c. At least once per 24 hours by verifying that the Boric Acid Makeup Tank solution temperature is greater than 55°F when the Reactor Auxiliary Building air temperature is below 55°F.

REACTIVITY CONTROL SYSTEMS

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

FULL LENGTH CEA POSITION

LIMITING CONDITION FOR OPERATION

3.1.3.1 The CEA Block Circuit and all full length (shutdown and regulating) CEAs shall be OPERABLE with each CEA of a given group positioned within 7.5 inches (indicated position) of all other CEAs in its group.

APPLICABILITY: MODES 1* and 2*.

ACTION:

a. With one or more full length CEAs inoperable due to being immovable as a result of excessive friction or mechanical interference or known to be untrippable, determine that the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is satisfied within 1 hour and be in HOT STANDBY within 6 hours.

b. With the CEA Block Circuit inoperable, within 6 hours either:

   1. With one CEA position indicator per group inoperable, take action per Specification 3.1.3.3, or

   2. With the group overlap and/or sequencing interlocks inoperable, maintain CEAs in groups 3, 4, 5 and 6 fully withdrawn and withdraw the CEAs in group 7 to less than 5% insertion and place and maintain the CEA drive system mode switch in either the "Manual" or "Off" position, or

   3. Be in at least HOT STANDBY.

c. With one full length CEA inoperable due to causes other than addressed by Action a above, but within its above specified alignment requirements and either fully withdrawn or within the long term steady state insertion limits if in CEA group 7, operation in MODES 1 and 2 may continue.

d. With one or more full length CEAs misaligned from any other CEAs in its group by more than 7.5 inches but less than 15 inches, operation in MODES 1 and 2 may continue, provided that within one hour the misaligned CEA(s) is either:

   1. Restored to OPERABLE status within its above specified alignment requirements, or

*See Special Test Exceptions 3.10.2 and 3.10.5.

SPRAY ADDITIVE SYSTEM

LIMITING CONDITION FOR OPERATION

3.6.2.2 The spray additive system shall be OPERABLE with:

a. A spray additive tank containing a volume of between 4010 and 5000 gallons of between 28.5 and 30.5% by weight NaOH solution, and

b. Two spray additive eductors each capable of adding NaOH solution from the chemical additive tank to a containment spray system pump flow.

APPLICABILITY: MODES 1, 2 and 3.*

ACTION:

With the spray additive system inoperable, restore the system to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours; restore the spray additive system to OPERABLE status within the next 48 hours or be in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.2.2 The spray additive system shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power operated or automatic) in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

b. At least once per 6 months by:

1. Verifying the contained solution volume in the tank, and

2. Verifying the concentration of the NaOH solution by chemical analysis.

c. At least once per 18 months, during shutdown, by verifying that each automatic valve in the flow path actuates to its correct position on a CSAS test signal.

*Applicable when pressurizer pressure is $\geq$ 1750 psia.

3/4.1.1 BORATION CONTROL

3/4.1.1.1 and 3/4.1.1.2 SHUTDOWN MARGIN

A sufficient SHUTDOWN MARGIN ensures that 1) the reactor can be made subcritical from all operating conditions, 2) the reactivity transients associated with postulated accident conditions are controllable within acceptable limits, and 3) the reactor will be maintained sufficiently subcritical to preclude inadvertent criticality in the shutdown condition.

SHUTDOWN MARGIN requirements vary throughout core life as a function of fuel depletion, RCS boron concentration, and RCS T_{avg}. The most restrictive condition occurs at EOL, with T_{avg} at no load operating temperature, and is associated with a postulated steam line break accident and resulting uncontrolled RCS cooldown. In the analysis of this accident, a minimum SHUTDOWN MARGIN of 3600 pcm is required to control the reactivity transient. Accordingly, the SHUTDOWN MARGIN required by Specification 3.1.1.1 is based upon this limiting condition and is consistent with FSAR accident analysis assumptions. For earlier periods during the fuel cycle, this value is conservative. With $T_{avg} \leq 200°F$, the reactivity transient resulting from a boron dilution event with a partially drained Reactor Coolant System requires a 2000 pcm SHUTDOWN MARGIN and restrictions on charging pump operation to provide adequate protection. A 2000 pcm SHUTDOWN MARGIN is 1000 pcm conservative for Mode 5 operation with total RCS volume present, however LCO 3.1.1.2 is written conservatively for simplicity.

3/4.1.1.3 BORON DILUTION AND ADDITION

A minimum flow rate of at least 3000 GPM provides adequate mixing, prevents stratification and ensures that reactivity changes will be gradual during boron concentration changes in the Reactor Coolant System. A flow rate of at least 3000 GPM will circulate an equivalent Reactor Coolant System volume of 11,400 cubic feet in approximately 26 minutes. The reactivity change rate associated with boron concentration changes will be within the capability for operator recognition and control.

3/4.1.1.4 MODERATOR TEMPERATURE COEFFICIENT (MTC)

The limiting values assumed for the MTC used in the accident and transient analyses were +7 pcm/°F for THERMAL POWER levels $\leq$ 70% of RATED THERMAL POWER, +2 pcm/°F for THERMAL POWER levels > 70% of RATED THERMAL and -28 pcm/°F at RATED THERMAL POWER. Therefore, these limiting values are included in this specification. Determination of MTC at the specified conditions ensures that the maximum positive and/or negative values of the MTC will not exceed the limiting values.

3/4.1.1.5 MINIMUM TEMPERATURE FOR CRITICALITY

The MTC is expected to be slightly negative at operating conditions. However, at the beginning of the fuel cycle, the MTC may be slightly positive at operating conditions and since it will become more positive at lower temperatures, this specification is provided to restrict reactor operation when T_{avg} is significantly below the normal operating temperature.

3/4.1.2 BORATION SYSTEMS

The boron injection system ensures that negative reactivity control is available during each mode of facility operation. The components required to perform this function include 1) borated water sources, 2) charging pumps, 3) separate flow paths, 4) boric acid pumps, and 5) an emergency power supply from OPERABLE diesel generators.

With the RCS average temperature above 200°F, a minimum of two separate and redundant boron injection systems are provided to ensure single functional capability in the event an assumed failure renders one of the systems inoperable. Allowable out-of-service periods ensure that minor component repair or corrective action may be completed without undue risk to overall facility safety from injection system failures during the repair period.

The boration capability of either system is sufficient to provide a SHUTDOWN MARGIN from all operating conditions of 2000 pcm after xenon decay and cooldown to 200°F. The maximum boration capability requirement occurs at EOL from full power equilibrium xenon conditions. This requirement can be met for a range of boric acid concentrations in the Boric Acid Makeup Tanks (BAMTs) and Refueling Water Tank (RWT). This range is bounded by 8350 gallons of 3.5 weight percent (6119 ppm boron) boric acid from the BAMTs and 14,000 gallons of 1720 ppm borated water from the RWT to 13,300 gallons of 2.5 weight percent (4371 ppm boron) boric acid from the BAMTs and 9,000 gallons of 1720 ppm borated water from the RWT. A minimum of 45,000 gallons of 1720 ppm boron is required from the RWT if it is to be used to borate the RCS alone.

The requirements for a minimum contained volume of 401,800 gallons of borated water in the refueling water tank ensures the capability for borating the RCS to the desired level. The specified quantity of borated water is consistent with the ECCS requirements of Specification 3.5.4. Therefore, the larger volume of borated water is specified here too.

With the RCS temperature below 200°F, one injection system is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the additional restrictions prohibiting CORE ALTERATIONS and positive reactivity change in the event the single injection system becomes inoperable.

3/4.1.2 BORATION SYSTEMS (Continued)

The boron addition capability after the plant has been placed in MODES 5 and 6 requires either 3650 gallons of 2.5 to 3.5 weight percent boric acid solution (4371 to 6119 ppm boron) from the boric acid tanks or 11,900 gallons of 1720 ppm borated water from the refueling water tank to makeup for contraction of the primary coolant that could occur if the temperature is lowered from 200°F to 140°F.

The restrictions associated with the establishing of the flow path from the RWT to the RCS via a single HPSI pump provide assurance that Appendix G pressure/temperature limits will not be exceeded in the case of any inadvertent pressure transient due to a mass addition to the RCS.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

The specifications of this section ensure that (1) acceptable power distribution limits are maintained, (2) the minimum SHUTDOWN MARGIN is maintained, and (3) the potential effects of a CEA ejection accident are limited to acceptable levels.

The ACTION statements which permit limited variations from the basic requirements are accompanied by additional restrictions which ensure that the original criteria are met.

The ACTION statements applicable to an immovable or untrippable CEA and to a large misalignment (≥ 15 inches) of two or more CEAs, require a prompt shutdown of the reactor since either of these conditions may be indicative of a possible loss of mechanical functional capability of the CEAs and in the event of a stuck or untrippable CEA, the loss of SHUTDOWN MARGIN.

For small misalignments (< 15 inches) of the CEAs, there is 1) a small degradation in the peaking factors relative to those assumed in generating LCOs and LSSS setpoints for DNBR and linear heat rate, 2) a small effect on the time dependent long term power distributions relative to those used in generating LCOs and LSSS setpoints for DNBR and linear heat rate, 3) a small effect on the available SHUTDOWN MARGIN, and 4) a small effect on the ejected CEA worth used in the safety analysis. Therefore, the ACTION statement associated with the small misalignment of a CEA permits a one hour time interval during which attempts may be made to restore the CEA to within its alignment requirements prior to initiating a reduction in THERMAL POWER. The one hour time limit is sufficient to (1) identify causes of a misaligned CEA, (2) take appropriate corrective action to realign the CEAs, and (3) minimize the effects of xenon redistribution.

Overpower margin is provided to protect the core in the event of a large misalignment (≥ 15 inches) of a CEA. However, this misalignment would cause distortion of the core power distribution. This distribution may, in turn, have a significant effect on (1) the available SHUTDOWN MARGIN, (2) the time-dependent long-term power distributions relative to those used in generating LCOs and LSSS setpoints, and (3) the ejected CEA worth used in the safety analysis. Therefore, the ACTION statement associated with the large misalignment of the CEA requires a prompt realignment of the misaligned CEA.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES (Continued)

The ACTION statements applicable to misaligned or inoperable CEAs include requirements to align the OPERABLE CEAs in a given group with the inoperable CEA. Conformance with these alignment requirements brings the core, within a short period of time, to a configuration consistent with that assumed in generating LCO and LSSS setpoints. However, extended operation with CEAs significantly inserted in the core may lead to perturbations in 1) local burnup, 2) peaking factors, and 3) available shutdown margin which are more adverse than the conditions assumed to exist in the safety analyses and LCO and LSSS setpoints determination. Therefore, time limits have been imposed on operation with inoperable CEAs to preclude such adverse conditions from developing.

The requirement to reduce power in certain time limits, depending upon the previous F_r^t, is to eliminate a potential nonconservatism for situations when a CEA has been declared inoperable. A worst case analysis has shown that a DNBR SAFDL violation may occur during the second hour after the CEA misalignment if this requirement is not met. This potential DNBR SAFDL violation is eliminated by limiting the time operation is permitted at FULL POWER before power reductions are required. These reductions will be necessary once the deviated CEA has been declared inoperable. The time allowed to continue operation at a reduced power level can be permitted for the following reasons:

1. The margin calculations that support the Technical Specifications are based on a steady-state radial peak of $F^t > 1.70$.
2. When the actual $F_r^t \leq 1.70$, significant additional margin exists.
3. This additional margin can be credited to offset the increase in F_r^t with time that can occur following a CEA misalignment.
4. This increase in F_r^t is caused by xenon redistribution.
5. The present analysis can support allowing a misalignment to exist for up to 60 minutes without correction, if the initial $F_r^t \leq 1.67$.

Operability of the CEA position indicators (Specification 3.1.3.3) is required to determine CEA positions and thereby ensure compliance with the CEA alignment and insertion limits and ensures proper operation of the rod block circuit. The CEA "Full In" and "Full Out" limits provide an additional independent means for determining the CEA positions when the CEAs are at either their fully inserted or fully withdrawn positions. Therefore, the ACTION statements applicable to inoperable CEA position indicators permit continued operations when the positions of CEAs with inoperable position indicators can be verified by the "Full In" or "Full Out" limits.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO.94

TO FACILITY OPERATING LICENSE NO. DPR-67

FLORIDA POWER & LIGHT COMPANY

ST. LUCIE PLANT, UNIT NO. 1

DOCKET NO. 50-335

1.0 INTRODUCTION

By letter dated January 22, 1988, the Florida Power and Light Company (FP&L, the licensee) requested Technical Specification changes for the St. Lucie Plant, Unit No. 1. The proposed changes would revise the requirements of the boric acid makeup system such that the boric acid concentration would be lowered, the water volume would be increased, and heat tracing of the circuits would no longer be required. A minor decrease in sodium hydroxide concentration for the spray additive system was also proposed due to the above changes. The decrease is necessary to ensure proper pH range of solutions under loss of coolant accident conditions. The licensee also submitted Combustion Engineering report number CEN-353(F) entitled "Boric Acid Concentration Reduction Effort, Technical Bases and Operational Analysis," to serve as the technical basis for the proposed changes. The licensee provided additional information by letter dated April 6, 1988. The additional information did not, in any way, alter the staff's proposed no significant hazards consideration determination.

2.0 DISCUSSION

The proposed changes would modify the requirements for the boric acid makeup (BAMU) system, which is used to provide an adequate volume of borated water in the reactor coolant system (RCS) to assure that the shutdown margin is met in all modes of reactor operation. The boron contained in the BAMU system is not taken credit for inreactivity control during transients and accidents. Thus, the plant's accident analysis basis is not changed as a result of the proposed changes to the requirements of the BAMU system.

Presently, the minimum required boric acid concentration in water is 8 percent. This requires the minimum water temperature to be approximately 105°F. In practice, the boric acid concentration has operational range, i.e., 8 to 12 weight percent in this case. Twelve weight percent boric acid concentration requires a water temperature of approximately 135°F. If the minimum water temperature is not maintained for a given boric acid concentration, the boron in the boric acid will precipitate out of solution and solidify at the bottom of tanks and piping. If the boron starts to precipitate, the BAMU system cannot be called upon to meet shutdown margin requirements. Thus, the water temperature in the BAMU system is continually being maintained by electrical means called heat tracing. The boric acid concentration can be lowered to an extent that heat tracing is not necessary, but other compensatory measures would also have to be taken.

The licensee proposed to delete the heat tracing requirement for the BAMU system. In order to do so, the licensee proposed to decrease the required boric acid concentration and increase the required borated water volume to offset the reduced concentration. The range of boric acid concentration is proposed to be reduced from 8.0 to 12.0 weight percent to 2.5 to 3.5 weight percent. This reduction in boric acid concentration will prevent boron precipitation at ambient temperatures in the auxiliary building after the heat tracing is removed. For example, the minimum water temperature necessary to keep the boron in solution is only 50°F. The range of borated water volume in a boric acid makeup tank is proposed to be increased from the approximate range of 6,600 - 7,900 gallons to the range of 8,350 - 13,300 gallons for Modes 1 through 4, and at least 3,650 gallons (assumes 2.5 weight percent concentration) for Modes 5 and 6. The following Technical Specifications would be changed to effect the above described changes: TS 3/4.1.2.1, Boration Systems - Flow Paths - Shutdown; TS 3/4.1.2.2, Boration System - Flow Paths - Operation; TS 3/4.1.2.7, Borated Water Sources - Shutdown; and TS 3/4 1.2.8, Borated Water Sources - Operating.

The licensee also proposed to make a minor change to the sodium hydroxide (NAOH) concentration in the chemical storage tank, associated with the spray additive system. The spray additive system is used during a large-break loss of coolant accident to maintain the pH range of post-accident solutions. A lowering of the BAMU system boric acid concentration will change the pH of the solutions. The licensee proposed to change the range from 30-32% to 28.5-30.5% by weight NAOH solution. The applicable Technical Specification is TS 3.6.2.2.a - Spray Additive System.

3.0 EVALUATION

The proposed changes to the requirements for the BAMU system, the associated Technical Specifications changes, and the calculated results associated with the Combustion Engineering report are evaluated below. The NAOH concentration change is also addressed.

3.1 Boration Capacity

The methodology and analytical results to support the request for the Technical Specifications changes are documented in Combustion Engineering report number CEN-353(F), and include two distinct series of calculations for the required and available boron concentration in the RCS to maintain a safe shutdown margin. Both are employed at each time of interest in the plant cooldown conditions.

3.1.1 Evaluation of Analysis for Required Boron Concentration

According to the licensee, the analysis for the required boron concentration is based on the shutdown requirements of Branch Technical Position 5.1, entitled "Design Requirements for the Residual Heat Removal System" (SRP Section 5.4.7). Specifically, the shutdown margin requirements are consistent with those specified in Technical Specifications 3.1.1.1 and 3.1.1.2 for operating Modes 1 through 4, and 5 through 6, respectively. Reasonable core physics parameters were used to calculate the boron concentration required to be present in the RCS for the shutdown margins required by the Technical Specifications.

In the analysis, the analytical and measurement uncertainties were included to ensure that the upper bound boron requirements were predicted. The uncertainties include -10% in scram worth, ±10% in moderator temperature feedback, ±5% in Doppler reactivity feedback, and the time constant of 26 hours for xenon decay to maximize the xenon poison effect.

The staff has reviewed the licensee's analysis for required boron concentration and finds the analysis acceptable.

3.1.2 Evaluation of Analysis for Available Boron Concentration

The licensee specified that the calculated method to determine the available boron concentration is based on a steady-state mass balance for boron in the entire RCS. It is assumed that the borated water added to the RCS is equal to the fluid volume contraction due to the cooldown while the pressurizer water level is maintained constant. In the analysis (CEN-353(F)), various core conditions were considered to minimize the available boron reactivity effect. The limiting core conditions identified and used in the analysis were (1) end-of-cycle conditions with initial RCS concentrations at zero ppm boron, (2) the core with the most reactive control rod fully stuck out, (3) plant power at 100% with 100% equilibrium xenon prior to initiation of plant shutdown, (4) a slow plant cooldown rate of 12.5°F/hr., (5) end-of-cycle moderator cooldown effects, and (6) beginning-of-cycle boron reactivity worths.

These assumptions are conservative with respect to minimizing the boron reactivity effects since assumptions (1) and (2) minimize the existing boron within the core and available scram worth, assumptions (3) and (4) maximize the xenon poison effect, and assumptions (5) and (6) maximize the boration requirements due to moderator cooldown effects.

The use of a cooldown rate of 12.5°F/hr. is consistent with the plant test procedures for the boron mixing test performed during a natural circulation test at another Combustion Engineering plant. Included in CEN-353(F) is an analysis that demonstrates that the boration requirements for the fastest cooldown rate of 100°F/hr., as allowed by Technical Specifications, is bounded by the case when the cooldown rate was limited to 12.5°F/hr.

The report (CEN-353(F)) uses a conservative method to calculate the required boron concentration necessary to maintain the shutdown margin required by Technical Specifications 3.1.1.1 and 3.1.1.2 during a safe shutdown scenario. A conservative RCS makeup scenario was used to demonstrate that the proposed boron concentration and volume requirements for the BAMU tanks will maintain the safe shutdown margins required by the Technical Specifications.

The staff agrees with the above licensee analysis, showing that the available boron meets the required boron concentration requirements, and finds it acceptable.

3.2 Transient and Accidents

The licensee addressed off-normal operations as follows. As stated in Section 2.6 of CEN-353(F), credit is not taken for boron addition to the RCS from the boric acid makeup tanks for the purpose of reactivity control in the accidents analyzed in Chapter 15 of the plant's Final Safety Analysis Report. The response of an operator, therefore, to such events as steam line break, overcooling, boron dilution, etc., will not be affected by a reduction in boric acid makeup tank (BAMT) concentration. In particular, the action statements associated with Technical Specification 3.1.1.2 require that boration be commenced at greater than 40 gallons per minute using a solution of at least 1720 ppm boron in the event that shutdown margin is lost. Such statements are conservatively based upon the refueling water tank concentration and are therefore independent of the amount of boron in the BAMTs. It should be noted that even after reducing the boron concentration in the BAMT, the minimum boron concentration in these tanks is higher than 1720 ppm.

Similar to the Technical Specification action steps in the event of a loss of shutdown margin, the operator guidance in Combustion Engineering's Emergency Procedure Guidelines (EPGs), CEN-152, Rev. 2, are also independent of specific boron concentration within the boric acid makeup tanks. Specifically, the acceptance criteria developed for the reactivity control section of the Functional Recovery Guidelines of CEN-152 are based upon a boron addition rate from the chemical and volume control system of 40 gallons per minute without reference to a particular boration concentration. Therefore, the reduction in boron concentration within the boric acid makeup tanks has no impact on, and does not change, the guidance contained in the EPGs.

The staff agrees with the above licensee analysis and finds it acceptable.

3.3 Sodium Hydroxide

The licensee proposed changing the concentration of sodium hydroxide in the chemical storage tank from a concentration range of 30%-32% to 28.5%-30.5% by weight. This change is necessary because of a reduction of the boric acid concentration in the boric acid makeup tanks. The staff did not audit the licensee's calculations to confirm the 1½% concentration reduction, nor did the staff perform independent calculations to confirm the reduction. The staff agrees that a slight reduction is in order. The licensee's discussion of this matter in the April 6, 1988 submittal is appropriate and the proposed 1½% reduction appears reasonable. On this basis, the change is acceptable.

3.4 Technical Specification Changes

The Technical Specification changes and the reasons for their acceptability are provided blow.

Technical Specification 3/4.1.2.1 Boration Systems Flow Paths - Shutdown

The proposed change to the Technical Specifications eliminates the requirements for heat tracing of the BAMU system. The design purpose of heat tracing of the BAMU system is to maintain the temperature of fluid in the BAMU tanks and the boration flowpaths high enough to prevent the boric acid from precipitating. The proposed changes to TS 3/4.1.2.7 and TS 3/4.1.2.8 (explained later) reduce the concentration in the BAMU tanks to a maximum concentration of 3.5 weight percent boric acid, which will not precipitate at a borated water temperature higher than 55°F. Chemical analyses have shown that a 3.5 weight percent solution of boric acid will remain dissolved (i.e., will not precipitate or "plate out") at solution temperatures above 50°F. The proposed changes also include a surveillance requirement to ensure that the borated water source is operable by verifying that the temperature in the BAMU is above 55°F whenever the auxiliary building temperature is below 55°F. The 55°F requirement provides a 5°F margin, since the boron will remain in solution down to 50°F. Consistent with the new surveillance requirement above, the old surveillance requirement to verify the flow path temperature above the temperature limit line on Figure 3.1-1 will be deleted.

The licensee specified that the auxiliary building temperature will be monitored at the Boric Acid Makeup Station. Therefore, the Technical Specification change is acceptable.

Technical Specification 3/4.1.2.2 Flow Paths - Operating

Currently, the Technical Specifications require two out of the following three flow paths for boron injection into the RCS: (1) a BAMU tank gravity feed path and associated heat tracing, (2) a BAMU tank path via a boric acid makeup pump and associated heat tracing, or (3) flow path from the refueling water tank.

The proposed change requires a flow path from any credited source of water (refueling water storage tank and/or BAMU tank (or tanks)) to be operable. These changes are consistent with the assumptions used in CEN-353(F).

The proposed change to the Technical Specifications eliminates the requirement for heat tracing of the BAMU system. As in Technical Specification 3/4.1.2.1, deletion of the requirement to heat trace the BAMU system is consistent with the ability of the boric acid to remain in solution at temperatures above 50°F. The proposed change includes a surveillance requirement to assure that the borated water source is operable by verifying that the temperature in the BAMU is above 55°F whenever the auxiliary building temperature is below 55°F. As in Technical Specification 3/4.1.2.1, the old surveillance requirement for temperature verification of the flow path from the boric acid makeup tanks has been deleted. The Technical Specification change is acceptable.

Technical Specification 3/4.1.2.7 Borated Water Sources - Shutdown

The existing Technical Specification requires that one of the two BAMU tanks and its associated heat tracing be operable with the tank containing 8 weight percent boron and a minimum content of 1660 gallons. The proposed changes will delete the heat tracing operability requirement, lower the boric acid concentration to a range of 2.5 to 3.5 weight percent, change the minimum BAMT content to 3650 gallons (assumes a minimum of 2.5 weight percent boric acid concentration), and modify the surveillance requirement to verify that the BAMU tank temperature is above 55°F whenever the auxiliary building temperature is below 55°F. As in Technical Specification 3/4.1.2.1, the old surveillance requirement to verify the temperature of the flow path from the boric acid makeup tanks has been deleted. These changes are consistent with the analysis presented in CEN-353(F), which demonstrates adequate boration capability at the lower boric acid concentrations and the ability for boric acid to remain in solution at these concentrations at temperatures above 50°F. Therefore, the Technical Specification changes are acceptable.

Figure 3.1-1 (for Operating Modes 1 through 4)

The existing figure specifies the minimum required BAMU water volume and temperature as a function of stored boric acid concentration for the various plant operating modes. The existing figure is applicable to any one of the two BAMU tanks, each having a maximum capacity of 9700 gallons (only 9450 gallons assumed to be useable). The revised figure specifies the minimum required water volume (contained in one or both BAMU tanks) as a function of boric acid concentration in the BAMU tank. This curve was generated in report CEN-353(F) for a minimum refueling water tank boron concentration of 1720 ppm boron. This curve conservatively bounds BAMU tank minimum required water volumes for conditions when the refueling water tank boron concentration is greater than 1720 ppm (a Technical Specification requirement). The range of boron concentration in the BAMU tank will be reduced from 8.0 to 12.0 weight percent boric acid to 2.5 to 3.5 weight percent. The upper range of the required borated water volume will increase from 7,900 gallons (8 weight percent) to 13,300 gallons (2.5 weight percent). The lower range of the required borated water volume will increase from 6,600 gallons (12 weight percent) to 8,350 gallons (3.5 weight percent). The revised Figure 3.1-1 is consistent with the analytical results of CEN-353(F) for plant conditions at Operating Modes 1 through 4 to maintain the required safe shutdown margin. The temperature versus BAMT concentration curve has been removed from the Technical Specifications since it is no longer required. The revised figure is acceptable.

Technical Specification 3.1.2.8 Borated Water - Operating

The current Technical Specification requires that at least one BAMU tank and its associated heat tracing be operable with the contents of boric acid in the tank to be consistent with the existing Figure 3.1-1.

The existing Figure 3.1-1 specifies the volume of boric acid of 7,900 gallons at a minimum concentration of 8.0 weight percent to be maintained in the BAMU tank. The proposed changes are to provide a new range of boric acid concentration of 2.5 to 3.5 weight percent for one or both of the BAMU tanks. The revised volumes of Figure 3.1-1 raise the minimum water volume to 8,350 gallons. Deletion of the requirement to heat trace the BAMU system is consistent with the ability to maintain 2.5 to 3.5 weight percent boric acid in solution at temperatures above 50°F. The revised surveillance requirements delete verifying the BAMU tank temperature unless the auxiliary building temperature is below 55°F. For conservatism, this verification of temperature is done more frequently (24 hours versus 7 days) and the old surveillance requirement has been deleted.

Since the borated water source can be made up of one BAMU tank (1A or 1B) per the proposed Technical Specifications, and considering that one tank has a maximum capacity of 9700 gallons, a minimum concentration of boric acid needs to be specified. The minimum weight percent boric acid is specified as 3.2 weight percent under these conditions. The proposed Technical Specification changes are acceptable.

Bases - 3/4 1.2 Boration Systems

The Technical Specifications define the required components for the boron injection system, which ensures that negative reactivity is available during each mode of operation, and define the boric acid concentration and volume requirements for the BAMU tank and refueling water tank (RWT).

Since heat tracing will no longer be required, the deletion of the heat tracing system, as part of the boron injection system components, will be deleted from the bases statements. This change is acceptable.

The permissible range of boric acid concentration and associated water volumes needs to be changed in the bases statements. The bases statement for Modes 1 through 4 will now read, "This range is bounded by 8,350 gallons of 3.5 weight percent (6119 ppm boron) boric acid from the BAMTs and 14,000 gallons of 1720 ppm borated water from the RWT to 13,300 gallons of 2.5 weight percent (4371 ppm boron) boric acid from the BAMTs and 9,000 gallons of 1720 ppm borated water from the RWT." The Combustion Engineering report, Table 2-34, page 2-66, specified 7,317.1 gallons of 3.5 weight percent boric acid and 12,271.2 gallons of 2.5 weight percent boric acid for Modes 1 through 4.

The relationship between these values and the Technical Specification values is explained on page 2-21 of the Combustion Engineering report. Each value was rounded up to the nearest 50 gallons and 1,000 gallons was added to provide water for auxiliary spray for RCS depressurization purposes. For example, 12,271.2 gallons was rounded to 12,300 gallons, and adding an additional 1,000 gallons yields 13,300 gallons. Therefore, the proposed changes are acceptable.

The bases statement for Modes 5 and 6 specifies 3,650 gallons of 2.5 to 3.5 weight percent boric acid solution. The 3,650 gallon calculation in the Combustion Engineering report assumed 2.5 weight percent boric acid solution. Thus, any concentration greater than 2.5 weight percent, up to and including 3.5 weight percent, is conservative. In addition, the 3,650 gallon value is made up of the following components. The Combustion Engineering report on page 2-11 specifies that 3,114.8 gallons of 2.5 weight percent boric acid solution is the required value per analysis. An additional 500 gallons was added to this figure for conservatism. Finally, the 3,614.8 gallon number was rounded up to the nearest 50 gallon value of 3,650 gallons. Therefore, the proposed changes are acceptable.

Technical Specification 3.6.2.2 Spray Additive System

The current Technical Specification requires a sodium hydroxide (NAOH) concentration range of 30-32% by weight in the spray additive tank. Because of the boric acid concentration reduction, the new NAOH concentration range is 28.5-30.5% by weight. The licensee's discussion supports this new range. It should be noted that the chemical storage tank discussed in the above evaluation is the same as the spray additive tank discussed in the Technical Specification. Thus, the proposed change is acceptable.

3.5 SUMMARY

The staff has reviewed the proposed changes to the St. Lucie Plant, Unit No. 1 Technical Specifications involving reduction in boric acid concentration and volume requirements for the BAMU system, and deletion of the requirement for heat tracing in the BAMU system. The staff concludes that the proposed changes are acceptable since the changes of boric acid requirements for the BAMU system do not reduce shutdown margin below the required values specified in Technical Specifications 3.1.1.1 and 3.1.1.2. Because the concentration of boric acid in the BAMU system has been reduced to a value which will not cause precipitation at ambient temperatures for the BAMU system, heat tracing in the BAMU system is not required. The proposed Technical Specifications are acceptable since they are consistent with the proposed changes to requirements for the BAMU system and are supported by the analytical results.

The staff has also reviewed the proposed Technical Specification change in sodium hydroxide concentration range for the chemical storage tank. The new range is reasonable and is acceptable.

ENVIRONMENTAL CONSIDERATION

This amendment involves a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 or a change to a surveillance requirement. The staff has determined that the amendment involves 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 published a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, the amendment meets 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 or environmental assessment need be prepared in connection with the issuance of the amendment.

CONCLUSION

We have 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 amendment will not be inimical to the common defense and security or to the health and safety of the public.

Date: June 6, 1988

Principal Contributor:

E. Tourigny