Mr. Charles M. Dugger
Vice President Operations
Entergy Operations, Inc.
P. O. Box B
Killona, LA 70066

December 21, 1998

SUBJECT: ISSUANCE OF AMENDMENT NO. 147 TO FACILITY OPERATING LICENSE NPF-38 - WATERFORD STEAM ELECTRIC STATION, UNIT 3 (TAC NO. MA3382)

Dear Mr. Dugger:

The Commission has issued the enclosed Amendment No. 147 to Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated August 12, 1998.

The amendment changes the Appendix A TSs by increasing the maximum boron concentration in the Safety Injection Tanks (SITs) and the Refueling Water Storage Pool (RWSP) from 2300 ppm to 2900 ppm.

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

Sincerely,

ORIGINAL SIGNED BY:

Chandu P. Patel, Project Manager
Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosures: 1. Amendment No. 147 to NPF-38
2. Safety Evaluation

cc w/encls: See next page

DISTRIBUTION:

Docket File	PUBLIC	PD4-1 r/f	CLauron,EMCB
C. Patel (2)	C. Hawes	ACRS	
OGC (15B18)	G. Hill (2)	P. Gwynn, RIV	
W. Beckner	J. Kilcrease, RIV f/r	L. Hurley, RIV	
E. Adensam (EGA1)	T. Harris (TLH3)	J. Hannon	

Document Name: G:\WATFINAL\WATA3382.AMD

OFC	PM/PD4-1	LA/PD4-1	OGC	PD/PD4-1
NAME	CPatel CPP	CHawes CMH	AYoung	JHannon
DATE	11/24/98	11/24/98	12/4/98	12/15/98
COPY	YES/NO	YES/NO	YES/NO	YES/NO

OFFICIAL RECORD COPY

9812280125 981221
PDR ADOCK 05000382
P PDR

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 21, 1998

Mr. Charles M. Dugger
Vice President Operations
Entergy Operations, Inc.
P. O. Box B
Killona, LA 70066

SUBJECT: ISSUANCE OF AMENDMENT NO. 147 TO FACILITY OPERATING LICENSE NPF-38 - WATERFORD STEAM ELECTRIC STATION, UNIT 3 (TAC NO. MA3382)

Dear Mr. Dugger:

The Commission has issued the enclosed Amendment No. 147 to Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated August 12, 1998.

The amendment changes the Appendix A TSs by increasing the maximum boron concentration in the Safety Injection Tanks (SITs) and the Refueling Water Storage Pool (RWSP) from 2300 ppm to 2900 ppm.

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

Sincerely,

Chandu P. Patel

Chandu P. Patel, Project Manager
Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosures: 1. Amendment No. 147 to NPF-38
2. Safety Evaluation

cc w/encls: See next page

cc:

Administrator
Louisiana Radiation Protection Division
Post Office Box 82135
Baton Rouge, LA 70884-2135

Vice President, Operations
Support
Entergy Operations, Inc.
P. O. Box 31995
Jackson, MS 39286

Director
Nuclear Safety & Regulatory Affairs
Entergy Operations, Inc.
P. O. Box B
Killona, LA 70066

Wise, Carter, Child & Caraway
P. O. Box 651
Jackson, MS 39205

General Manager Plant Operations
Entergy Operations, Inc.
P. O. Box B
Killona, LA 70066

Licensing Manager
Entergy Operations, Inc.
P. O. Box B
Killona, LA 70066

Winston & Strawn
1400 L Street, N.W.
Washington, DC 20005-3502

Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 1000
Arlington, TX 76011

Resident Inspector/Waterford NPS
Post Office Box 822
Killona, LA 70066

Parish President Council
St. Charles Parish
P. O. Box 302
Hahnville, LA 70057

Executive Vice-President
and Chief Operating Officer
Entergy Operations, Inc.
P. O. Box 31995
Jackson, MS 39286-1995

Chairman
Louisiana Public Service Commission
One American Place, Suite 1630
Baton Rouge, LA 70825-1697

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

ENTERGY OPERATIONS, INC.

DOCKET NO. 50-382

WATERFORD STEAM ELECTRIC STATION, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 147
License No. NPF-38

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

   A. The application for amendment by Entergy Operations, Inc. (the licensee) dated August 12, 1998, 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. NPF-38 is hereby amended to read as follows:

   (2) Technical Specifications and Environmental Protection Plan

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 147 , and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

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

FOR THE NUCLEAR REGULATORY COMMISSION

Chandu P. Patel

Chandu P. Patel, Project Manager
Project Directorate IV-1
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: December 21, 1998

ATTACHMENT TO LICENSE AMENDMENT NO. 147

TO FACILITY OPERATING LICENSE NO. NPF-38

DOCKET NO. 50-382

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

REMOVE PAGES	INSERT PAGES
3/4 1-13	3/4 1-13
3/4 1-14	3/4 1-14
3/4 5-1	3/4 5-1
3/4 5-9	3/4 5-9
B 3/4 5-2	B 3/4 5-2

REQUIRED STORED BORIC ACID VOLUME
AS A FUNCTION OF CONCENTRATION

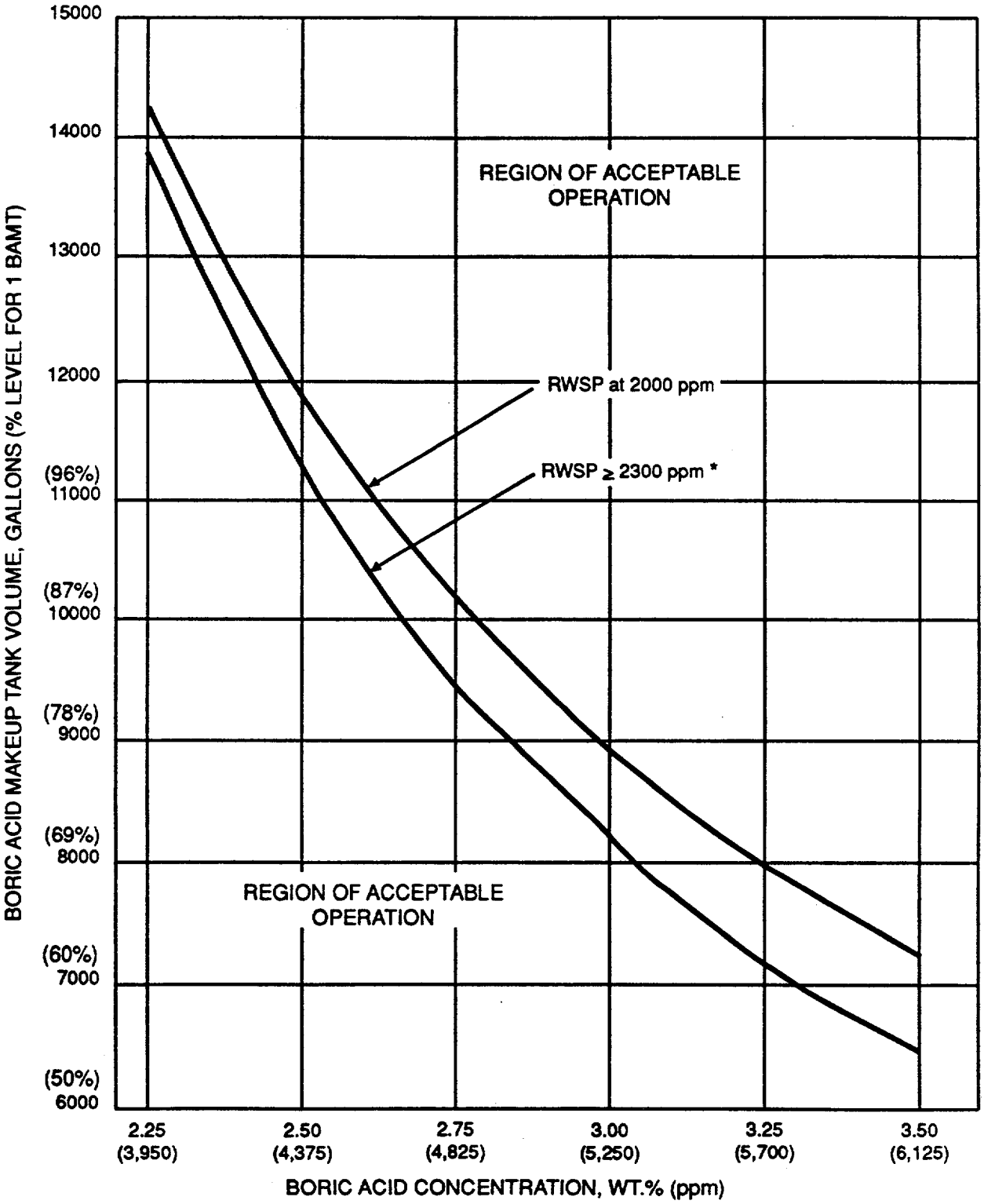

FIGURE 3.1-1

* This curve bounds RWSP concentration ranging from 2300 ppm to 2900 ppm

BORATED WATER SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.8 Each of the following borated water sources shall be OPERABLE:

a. At least one of the following sources:

1) One boric acid makeup tank, with the tank contents in accordance with Figure 3.1-1, or

2) Two boric acid makeup tanks, with the combined contents of the tanks in accordance with Figure 3.1-1, and

b. The refueling water storage pool with:

1. A minimum contained borated water volume of 475,500 gallons (83% of indicated level), and

2. A boron concentration of between 2050 and 2900 ppm of boron, and

3. A solution temperature between 55°F and 100°F.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

a. With the above required boric acid makeup tank(s) inoperable, restore the tank(s) to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and borated to a SHUTDOWN MARGIN equivalent to the requirements of Specification 3.1.1.1 or 3.1.1.2, whichever is applicable; restore the above required boric acid makeup tank(s) to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

b. With the refueling water storage pool inoperable, restore the pool to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.8 Each borated water source shall be demonstrated OPERABLE:

a. At least once per 24 hours by verifying the RWSP temperature when the Reactor Auxiliary Building air temperature is less than 55°F or greater than 100°F.

b. At least once per 24 hours by verifying the BAMT temperature is above 55°F when the Reactor Auxiliary Building air temperature is less than 55°F.

c. At least once per 7 days by:

1. Verifying the boron concentration in the water, and

2. Verifying the contained borated water volume of the water source.

3/4.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3/4.5.1 SAFETY INJECTION TANKS

LIMITING CONDITION FOR OPERATION

3.5.1 Each Reactor Coolant System safety injection tank shall be OPERABLE with:

a. The isolation valve open,

b. A contained borated water volume of between 926 (40%) and 1807 (83.8%) cubic feet,

c. Between 2050 and 2900 ppm of boron, and

d. A nitrogen cover-pressure of between 600 and 670 psig.

APPLICABILITY: MODES 1, 2, 3*, and 4*.

ACTION:

a. With one safety injection tank inoperable, except as a result of a closed isolation valve, restore the inoperable tank to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and in HOT SHUTDOWN within the following 6 hours.

b. With one safety injection tank inoperable due to the isolation valve being closed, either immediately open the isolation valve or be in at least HOT STANDBY within 1 hour and be in HOT SHUTDOWN within the next 12 hours.

SURVEILLANCE REQUIREMENTS

4.5.1 Each safety injection tank shall be demonstrated OPERABLE:

a. At least once per 12 hours by:

1. Verifying the contained borated water volume and nitrogen cover-pressure in the tanks, and

2. Verifying that each safety injection tank isolation valve is open.

*With pressurizer pressure greater than or equal to 1750 psia. When pressurizer pressure is less than 1750 psia, at least three safety injection tanks must be OPERABLE, each with a minimum pressure of 235 psig and a maximum pressure of 670 psig, and a contained borated water volume of between 1332 (61%) and 1807 (83.8%) cubic feet. With all four safety injection tanks OPERABLE, each tank shall have a minimum pressure of 235 psig and a maximum pressure of 670 psig, a boron concentration of between 2050 and 2900 ppm boron, and a contained borated water volume of between 888 (39%) and 1807 (83.8%) cubic feet. In MODE 4 with pressurizer pressure less than 392 psia (700 psia for remote shutdown from LCP-43), the safety injection tanks may be isolated.

EMERGENCY CORE COOLING SYSTEMS

3/4.5.4 REFUELING WATER STORAGE POOL

LIMITING CONDITION FOR OPERATION

3.5.4 The refueling water storage pool shall be OPERABLE with:

a. A minimum contained borated water volume of 475,500 gallons (83% indicated level),

b. Between 2050 and 2900 ppm of boron, and

c. A solution temperature of between 55°F and 100°F.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

With the refueling water storage pool inoperable, restore the pool to OPERABLE status within 1 hour or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.5.4 The RWSP shall be demonstrated OPERABLE:

a. At least once per 7 days by:

1. Verifying the contained borated water volume in the pool, and

2. Verifying the boron concentration of the water.

b. At least once per 24 hours by verifying the RWSP temperature when the RAB air temperature is less than 55°F or greater than 100°F.

ECCS SUBSYSTEMS (Continued)

With the RCS temperature below 350°F, one OPERABLE ECCS subsystem is acceptable without single failure consideration on the basis of the stable reactivity condition of the reactor and the limited core cooling requirements.

The trisodium phosphate dodecahydrate (TSP) stored in dissolving baskets located in the containment basement is provided to minimize the possibility of corrosion cracking of certain metal components during operation of the ECCS following a LOCA. The TSP provides this protection by dissolving in the sump water and causing its final pH to be raised to greater than or equal to 7.0. The requirement to dissolve a representative sample of TSP in a sample of water borated to be representative of post-LOCA sump conditions provides assurance that the stored TSP will dissolve in borated water at the postulated post-LOCA temperatures. A boron concentration of 3011 ppm boron is postulated to be representative of the highest post-LOCA sump boron concentration. Post-LOCA sump pH will remain between 7.0 and 8.1 for the maximum (3011 ppm) and minimum (1504 ppm) boron concentrations calculated using the maximum and minimum post-LOCA sump volumes and conservatively assumed maximum and minimum source boron concentrations.

With the exception of systems in operation, the ECCS pumps are normally in a standby, nonoperating mode. As such, flow path piping has the potential to develop voids and pockets of entrained gases. Maintaining the piping from the ECCS pumps to the RCS full of water ensures that the system will perform properly, injecting its full capacity into the RCS upon demand. This will prevent water hammer, pump cavitation, and pumping noncondensible gas (e.g., air, nitrogen, or hydrogen) into the reactor vessel following an SIAS or during SDC. The 31 day frequency takes into consideration the gradual nature of gas accumulation in the ECCS piping and the adequacy of the procedural controls governing system operation.

The Surveillance Requirements provided to ensure OPERABILITY of each component ensure that at a minimum, the assumptions used in the safety analyses are met and that subsystem OPERABILITY is maintained. Surveillance Requirements for throttle valve position stops and flow balance testing provide assurance that proper ECCS flows will be maintained in the event of a LOCA. Maintenance of proper flow resistance and pressure drop in the piping system to each injection point is necessary to: (1) prevent total pump flow from exceeding runout conditions when the system is in its minimum resistance configuration, (2) provide the proper flow split between injection points in accordance with the assumptions used in the ECCS-LOCA analyses, and (3) provide an acceptable level of total ECCS flow to all injection points equal to or above that assumed in the ECCS-LOCA analyses.

The requirement to verify the minimum pump discharge pressure on recirculation flow ensures that the pump performance curve has not degraded below that used to show that the pump exceeds the design flow condition assumed in the safety analysis and is consistent with the requirements of ASME Section XI.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 147 TO

FACILITY OPERATING LICENSE NO. NPF-38

ENTERGY OPERATIONS, INC.

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NO. 50-382

1.0 INTRODUCTION

By application dated August 12, 1998, Entergy Operations, Inc. (the licensee), submitted a request for changes to the Waterford Steam Electric Station, Unit 3 (Waterford 3), Technical Specifications (TSs). The requested changes would increase the maximum boron concentration in the Safety Injection Tanks (SITs) and the Refueling Water Storage Pool (RWSP) from 2300 ppm to 2900 ppm.

The proposed change will allow operators greater flexibility for refueling activities without challenging the minimum boron concentration necessary to ensure adequate shutdown margin in the event of an accident. The licensee has considered several factors associated with the proposed change including: corrosion and iodine retention concerns associated with a pH decrease in the sources of borated water, volume changes in the Boron Acid Makeup Tank (BAMT), pH control of recirculated water with Trisodium Phosphate Dodecahydrate (TSP), and timing limits for Emergency Core Cooling System (ECCS) injection.

2.0 EVALUATION

The licensee has requested a change to TS 3.1.2.8, 3.5.1, 3.5.4, Figure 3.1-1 and Bases 3/4.5.2. The change entails increasing the maximum boron concentration in the SITs and RWSP from 2300 ppm to 2900 ppm.

The licensee has analyzed the increase of boron concentration for the possibility of corrosion and iodine retention concerns during a loss of coolant accident (LOCA). In the event of an accident, the reactor coolant system (RCS) will experience a decrease in pH due to the injection of a higher concentration of boric acid into the system from the SITs. However, the increased acidity in the RCS is short-lived. As the borated water flows through the core and out into containment through the pipeline break, it mixes with the TSP contained in open baskets located on the containment floor. During the ECCS recirculation phase, the borated water is pumped through the core at a pH above 7.0 due to the TSP addition. By maintaining the borated water at a pH greater than 7.0, the chances of dissolved radioactive iodine escaping into the containment and subsequently released into the environment are minimized.

The failures due to corrosion are a long term process and therefore, the carbon steel components in containment will not be affected by the brevity of this decreased pH of borated water. The boric acid in the SITs and RWSP is a relatively weak acid due to the low temperatures and pressures present in these systems. In addition, these systems are lined with austenitic stainless steel such that an increase in boron concentration will not result in an increase of corrosion problems.

Figure 3.1-1, "Required Stored Boric Acid Volume as a Function of Concentration," defines the acceptable regions of operation for the available volume in the BAMT as a function of the boric acid concentration. As indicated in the figure for the RWSP concentration of 2300 ppm, the volume needed in the BAMT to ensure adequate shutdown margin increases with decreasing boric acid concentration. The plot for an RWSP concentration of 2900 ppm will lie below the plot for a boric acid concentration of 2300 ppm indicating that, for each boric acid concentration in the BAMT, less volume from the BAMT is needed to ensure adequate shutdown margin due to the increased availability of boron. The licensee proposes to use the plot of the RWSP boric acid concentration of 2300 ppm as the limit for boric acid concentrations greater than and equal to 2300 ppm. This change conservatively bounds the proposed increase of boric acid concentration of 2900 ppm in the RWSP.

The licensee's analysis assumes an average sump boron concentration of 3011 ppm for maximum volumes from each of the following water sources: RWSP, SITs, RCS and BAMT. The RWSP and SITs are assumed to each have a boron concentration of 2949 ppm, the RCS of 2500 ppm, and the BAMT of 6125 ppm. Based on these assumptions, the amount of TSP currently available in the sump bounds the proposed boron concentration change of 2900 ppm to ensure that a minimum borated water pH of 7.0 is still attainable in the event of an accident.

The precipitation of boron out of solution during ECCS is a concern since the deposition of the material on fuel cladding can cause cooling channels to be blocked. The blockage of the cooling channels will lead to a reduction in heat transferred from the fuel and increase the likelihood of radioactive material release to the environment. The licensee's previous analysis assumed the following boron concentrations: RWSP, SITs, and RCS each at 3000 ppm and the BAMT at 6125 ppm. Based on these assumptions, the solubility limit was set at 27.6 wt% corresponding to an RCS pressure of 14.7 psia at RCS saturation temperature. The minimum precipitation time with no flushing flow was determined to be 7.87 hours. The effective flushing flow was calculated at 1.4 hours but conservatively set at 2 hours. The effective flushing flow time assures that the hot leg steam velocity drops below the critical gas velocity for the onset of entrainment. The maximum start time for simultaneous injection is conservatively set at four hours, which is prior to the time when the assumed HPSI flow to one side of the core exceeds the core boil off rate. The minimum required HPSI flow to either side of the core to avoid precipitation was determined to be 275 gpm or a total of 550 gpm (assuming a 50% flow split between hot and cold sides). The HPSI flow currently available is 777 gpm at 0 psia. Based on the analysis presented, the increased concentration of boron to 2900 ppm in the SITs and RWSP will not lead to boron precipitation during a LOCA.

Based on its evaluation, the staff finds that the licensee has adequately addressed the following consequences to changes in the boron concentration in the SITs and RWSP: corrosion and iodine retention concerns associated with a pH decrease in the sources of borated water, volume changes in the BAMT, pH control of recirculated water with TSP, and timing limits for the ECCS injection. These concerns have been addressed and analyzed with results

indicating that the capability to ensure adequate shutdown margin in the event of a LOCA is not challenged. The staff concludes, therefore, that the increased concentration of boron in the SITs and RWSP from 2300 ppm to 2900 ppm is acceptable. The corresponding changes in Bases are also acceptable.

3.0 STATE CONSULTATION

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

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes 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 surveillance requirements. The Nuclear Regulatory Commission 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 issued a proposed finding that the amendment involves no significant hazards consideration and there has been no public comment on such finding (63 FR 56249). 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.

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

Principal Contributor: C. Lauron, EMCB/DE

Date: December 21, 1998