January 9, 1987

Docket No.: 50-382

Mr. J. G. Dewease
Senior Vice President - Nuclear Operations
Louisiana Power and Light Company
317 Baronne Street, Mail Unit 17
New Orleans, Louisiana 70160

Dear Mr. Dewease:

Subject: Issuance of Amendment No. 11 to Facility Operating License No. NPF-38 for Waterford 3

The Commission has issued the enclosed Amendment No. 11 to Facility Operating License No. NPF-38 for the Waterford Steam Electric Station, Unit 3. The amendment consists of changes to the Technical Specifications in response to your applications transmitted by letters dated August 29, and September 25, 1986, as supplemented by letters dated October 1, and October 23, 1986.

The amendment revises the Appendix A Technical Specifications by: adding a power reduction curve to be used following a full or part-length control element assembly (CEA) misalignment; revising the shutdown margin whenever all full-length CEAs are fully inserted into the core; revising the special test exceptions on shutdown margin; and allowing credit for the log power trip during physics testing.

A copy of the Safety Evaluation supporting the amendment is also enclosed.

Sincerely,

James H. Wilson, Project Manager
PWR Project Directorate No. 7
Division of PWR Licensing-B

Enclosures:
1. Amendment No. 11 to NPF-38
2. Safety Evaluation

cc: See next page

PD7 for JWilson/yt 12/3/86 | PD7 JLee 12/17/86 | OGC Shurk 12/15/86 1/5/87 | DIR:PD7 for GWKnighton 12/ /86 1/8/87 Ed L

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

LOUISIANA POWER AND LIGHT COMPANY

DOCKET NO. 50-382

WATERFORD STEAM ELECTRIC STATION, UNIT 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 11
License No. NPF-38

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

   A. The applications for amendment, dated August 29, and September 25, 1986, as supplemented by letters dated October 1, and October 23, 1986 by Louisiana Power and Light Company (licensee), comply with standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's 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 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;

   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. 11, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in this license. LP&L shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. The license amendment is effective as of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

James H. Wilson

James H. Wilson, Project Manager
PWR Project Directorate No. 7
Division of PWR Licensing-B

Attachment:
Changes to the Technical
Specifications

Date of Issuance: January 9, 1987

ATTACHMENT TO LICENSE AMENDMENT NO. 11

TO FACILITY OPERATING LICENSE NO. NPF-38

DOCKET NO. 50-382

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. Also to be replaced are the following overleaf pages to the amended pages.

Amendment Pages	Overleaf Pages
IV	III
XIX	XX
3/4 1-1	-
3/4 1-2	-
3/4 1-3	-
3/4 1-3a	-
3/4 1-9	3/4 1-10
3/4 1-11	3/4 1-12
3/4 1-18	3/4 1-17
3/4 1-19	-
3/4 1-20	-
3/4 1-20a	-
3/4 10-1	3/4 10-2
3/4 10-3	3/4 10-4
B 3/4 1-1	B 3/4 1-2

Page 3/4 1-4 is being reissued without change.

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SAFETY LIMITS AND LIMITING SAFETY SYSTEM SETTINGS

BASES

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LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

LIST OF FIGURES

LIST OF TABLES

3/4.1 REACTIVITY CONTROL SYSTEMS

3/4.1.1 BORATION CONTROL

SHUTDOWN MARGIN - ANY CEA WITHDRAWN

LIMITING CONDITION FOR OPERATION

3.1.1.1 The SHUTDOWN MARGIN shall be greater than or equal to 5.15% delta k/k when T_{avg} is greater than 200°F or 2.0% delta k/k when T_{avg} is less than or equal to 200°F.

APPLICABILITY: MODES 1, 2*, 3, 4, and 5 with any full length CEA fully or partially withdrawn.

ACTION:

With the SHUTDOWN MARGIN less than that required above, immediately initiate and continue boration at greater than or equal to 40 gpm of a solution containing greater than or equal to 1720 ppm boron or equivalent until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.1.1 With any full length CEA fully or partially withdrawn, the SHUTDOWN MARGIN shall be determined to be greater than or equal to that required above:

a. Within 1 hour after detection of an inoperable CEA(s) and at least once per 12 hours thereafter while the CEA(s) is inoperable. If the inoperable CEA is immovable or untrippable, the above required SHUTDOWN MARGIN shall be verified acceptable with an increased allowance for the withdrawn worth of the immovable or untrippable CEA(s).

b. When in MODE 1 or MODE 2 with K_{eff} greater than or equal to 1.0, at least once per 12 hours by verifying that CEA group withdrawal is within the Transient Insertion Limits of Specification 3.1.3.6.

c. When in MODE 2 with K_{eff} less than 1.0, within 4 hours prior to achieving reactor criticality by verifying that the predicted critical CEA position is within the limits of Specification 3.1.3.6.

* See Special Test Exception 3.10.1.

SURVEILLANCE REQUIREMENTS (Continued)

d. Prior to initial operation above 5% RATED THERMAL POWER after each fuel loading, by consideration of the factors of e. below, with the CEA groups at the Transient Insertion Limits of Specification 3.1.3.6.

e. When in MODE 3, 4, or 5, at least once per 24 hours by consideration of at least the following factors:

1. Reactor Coolant System boron concentration,

2. CEA position,

3. Reactor Coolant System average temperature,

4. Fuel burnup based on gross thermal energy generation,

5. Xenon concentration, and

6. Samarium concentration.

4.1.1.1.2 The overall core reactivity balance shall be compared to predicted values to demonstrate agreement within $\pm$ 1.0% delta k/k at least once per 31 Effective Full Power Days (EFPD). This comparison shall consider at least those factors stated in Specification 4.1.1.1.1e., above. The predicted reactivity values shall be adjusted (normalized) to correspond to the actual core conditions prior to exceeding a fuel burnup of 60 EFPDs after each fuel loading.

SHUTDOWN MARGIN - ALL CEAS FULLY INSERTED

LIMITING CONDITION FOR OPERATION

3.1.1.2 The SHUTDOWN MARGIN shall be greater than or equal to that shown in Figure 3.1-0.

APPLICABILITY: MODE 2*#, 3, 4 and 5 with all CEAs fully inserted.

ACTION:

With the SHUTDOWN MARGIN less than that shown in Figure 3.1-0, immediately initiate and continue boration at greater than or equal to 40 gpm of a solution containing greater than or equal to 1720 ppm boron or equivalent until the required SHUTDOWN MARGIN is restored.

SURVEILLANCE REQUIREMENTS

4.1.1.2.1 With all full length CEAs fully inserted, the SHUTDOWN MARGIN shall be determined to be greater than or equal to that shown in Figure 3.1-0.

a. When in MODE 2 with k_{eff} less than 1.0, within 4 hours prior to achieving reactor criticality by verifying that the predicted critical CEA position is within the limits of Specification 3.1.3.6.

b. When in MODES 3, 4, or 5, at least once per 24 hours by consideration of the following factors:

   1. Reactor Coolant System boron concentration,
   2. CEA position,
   3. Reactor Coolant System average temperature,
   4. Fuel burnup based on gross thermal energy generation,
   5. Xenon concentration,and
   6. Samarium concentration.

4.1.1.2.2 The overall core reactivity balance shall be compared to predicted values to demonstrate agreement within ± 1.0% delta k/k at least once per 31 Effective Full Power Days (EFPD). This comparison shall consider at least those factors stated in Specification 4.1.1.2.1b, above. The predicted reactivity values shall be adjusted (normalized) to correspond to the actual core conditions prior to exceeding a fuel burnup of 60 EFPD after each fuel loading.

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*With k_{eff} less than 1.0

#See Special Test Exception 3.10.1

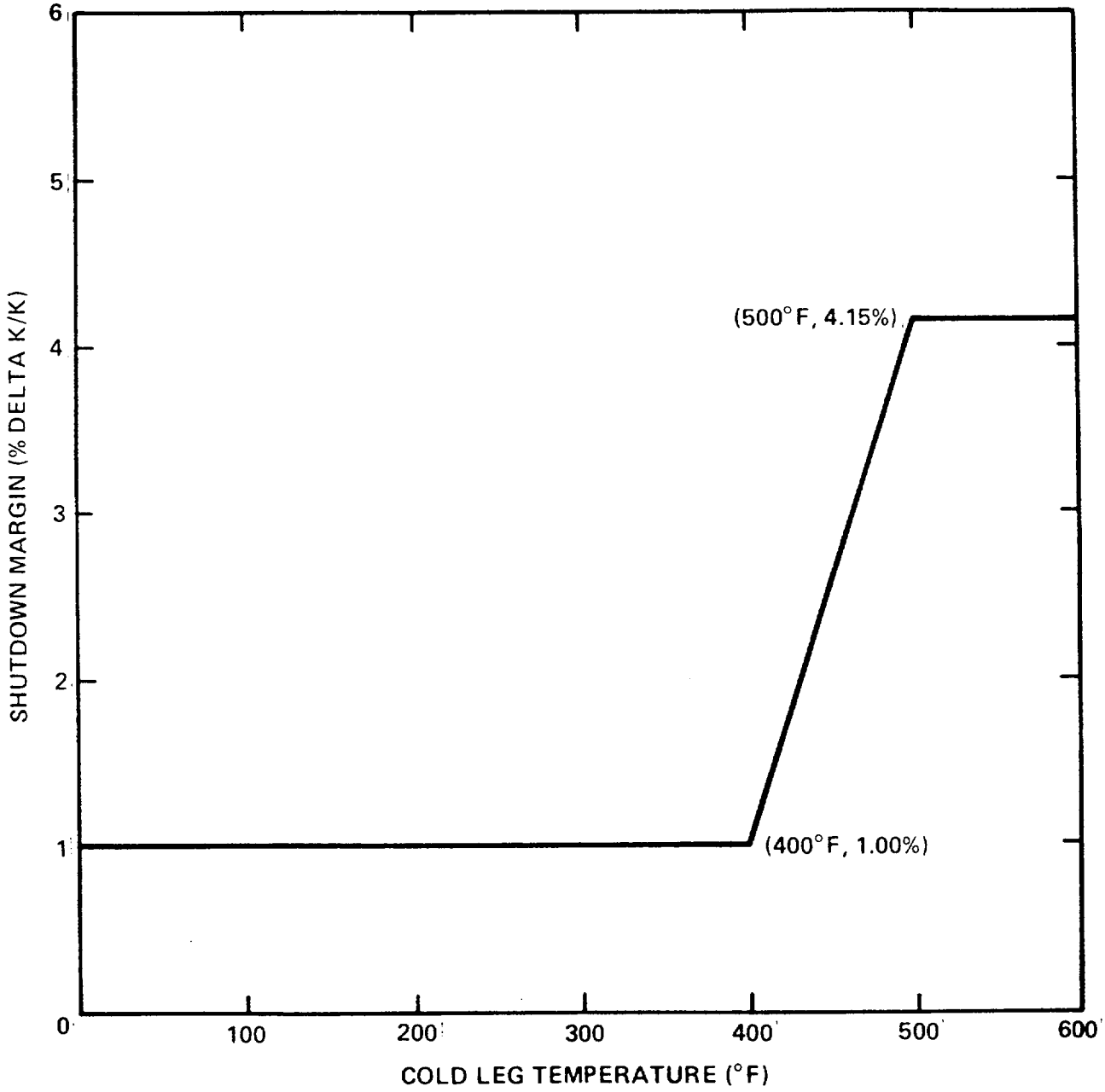


Figure 3.1-0

SHUTDOWN MARGIN AS A FUNCTION
OF COLD LEG TEMPERATURE

MODERATOR TEMPERATURE COEFFICIENT

LIMITING CONDITION FOR OPERATION

3.1.1.3 The moderator temperature coefficient (MTC) shall be:

a. Less positive than 0.2×10^{-4} delta k/k/°F whenever THERMAL POWER is $\leq$ 70% RATED THERMAL POWER, and

b. Less positive than 0.0×10^{-4} delta k/k/°F whenever THERMAL POWER is > 70% RATED THERMAL POWER, and

c. Less negative than -2.5×10^{-4} delta k/k/°F at RATED THERMAL POWER.

APPLICABILITY: MODES 1 and 2*#

ACTION:

With the moderator temperature coefficient outside any one of the above limits, be in at least HOT STANDBY within 6 hours.

SURVEILLANCE REQUIREMENTS

4.1.1.3.1 The MTC shall be determined to be within its limits by confirmatory measurements. MTC measured values shall be extrapolated and/or compensated to permit direct comparison with the above limits.

4.1.1.3.2 The MTC shall be determined at the following frequencies and THERMAL POWER conditions during each fuel cycle:

a. Prior to initial operation above 5% of RATED THERMAL POWER, after each fuel loading.

b. At greater than 15% of RATED THERMAL POWER, prior to reaching 40 EEPD core burnup.

c. At any THERMAL POWER, within 7 EFPD of reaching two-thirds of expected core burnup.

*With K_{eff} greater than or equal to 1.0.

#See Special Test Exception 3.10.2.

CHARGING PUMPS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.4 At least two independent charging pumps shall be OPERABLE.

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

ACTION:

With only one charging pump OPERABLE, restore at least two charging pumps to OPERABLE status within 72 hours or be in at least HOT STANDBY and borated to a SHUTDOWN MARGIN equivalent to the requirements of Specification 3.1.1.1 or 3.1.1.2, whichever is applicable, within the next 6 hours; restore at least two charging pumps to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.4 Each required charging pump shall be demonstrated OPERABLE at least once every 18 months by verifying that each charging pump starts in response to an SIAS test signal.

BORIC ACID MAKEUP PUMPS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.1.2.5 At least one boric acid makeup pump shall be OPERABLE and capable of being powered from an OPERABLE emergency bus if only the flow path through the boric acid pump in Specification 3.1.2.1a. is OPERABLE.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no boric acid makeup pump OPERABLE as required to complete the flow path of Specification 3.1.2.1a., suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

4.1.2.5 No additional Surveillance Requirements other than those required by Specification 4.0.5.

BORIC ACID MAKEUP PUMPS - OPERATING

LIMITING CONDITION FOR OPERATION

3.1.2.6 At least the boric acid makeup pump(s) in the boron injection flow path(s) required OPERABLE pursuant to Specification 3.1.2.2a. shall be OPERABLE and capable of being powered from an OPERABLE emergency bus if the flow path through the boric acid pump(s) in Specification 3.1.2.2a. is OPERABLE.

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

ACTION:

With one boric acid makeup pump required for the boron injection flow path(s) pursuant to Specification 3.1.2.2a. inoperable, restore the boric acid makeup pump 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 pump(s) to OPERABLE status within the next 7 days or be in COLD SHUTDOWN within the next 30 hours.

SURVEILLANCE REQUIREMENTS

4.1.2.6 Each required boric acid makeup pump shall be demonstrated OPERABLE at least once every 18 months by verifying that each boric acid makeup pump starts in response to an SIAS test signal.

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 boron concentration between 2.25 and 3.50 weight percent and a minimum borated water volume of 4150 gallons (36% indicated level).

b. The refueling water storage pool (RWSP) with:

1. A minimum contained borated water volume of 65,465 gallons (12% indicated level), and

2. A minimum boron concentration of 1720 ppm.

APPLICABILITY: MODES 5 and 6.

ACTION:

With no borated water sources OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes.

SURVEILLANCE REQUIREMENTS

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

a. At least once per 24 hours when the Reactor Auxiliary Building air temperature is less than 55°F by verifying the boric acid makeup tank solution is greater than 55°F (when it is the source of borated water).

b. At least once per 7 days by:

1. Verifying the boron concentration of the water, and

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

TABLE 3.1-1

REQUIRED MONITORING FREQUENCIES FOR BACKUP BORON DILUTION DETECTION AS A FUNCTION OF OPERATING CHARGING PUMPS AND PLANT OPERATIONAL MODES FOR K_{eff} GREATER-THAN 0.98

K_{eff} >0.98

OPERATIONAL MODE	Number of Operating Charging Pumps*			
	0	1	2	3
3	12 hours	0.75 hours	Operation not allowed**	
4	12 hours	0.75 hours	Operation not allowed**	
5 RCS filled	8 hours	0.75 hours	Operation not allowed**	
5 RCS partially drained	8 hours	Operation not allowed**		
6	Operation not allowed**			

*Charging pump OPERABILITY for any period of time shall constitute OPERABILITY for the entire monitoring frequency.

**The required charging pumps shall be verified to be inoperable by racking out their motor circuit breakers.

3/4.1.3 MOVABLE CONTROL ASSEMBLIES

CEA POSITION

LIMITING CONDITION FOR OPERATION

3.1.3.1 All full-length (shutdown and regulating) CEAs, and all part-length CEAs which are inserted in the core, shall be OPERABLE with each CEA of a given group positioned within 7 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 at least HOT STANDBY within 6 hours.

b. With more than one full-length or part-length CEA inoperable or misaligned from any other CEA in its group by more than 19 inches (indicated position), be in at least HOT STANDBY within 6 hours.

c. With one full-length or part-length CEA misaligned from any other CEA in its group by more than 19 inches, operation in MODES 1 and 2 may continue, provided that core power is reduced in accordance with Figure 3.1-1A and that within 1 hour the misaligned CEA is either:

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

   2. Declared inoperable and the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is satisfied. After declaring the CEA inoperable, operation in MODES 1 and 2 may continue pursuant to the requirements of Specification 3.1.3.6 provided:

      a) Within 1 hour the remainder of the CEAs in the group with the inoperable CEA shall be aligned to within 7 inches of the inoperable CEA while maintaining the allowable CEA sequence and insertion limits shown on Figure 3.1-2; the THERMAL POWER level shall be restricted pursuant to Specification 3.1.3.6 during subsequent operation.

      b) The SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is determined at least once per 12 hours.

   Otherwise, be in at least HOT STANDBY within 6 hours.

*See Special Test Exceptions 3.10.2 and 3.10.4.

LIMITING CONDITION FOR OPERATION (Continued)

ACTION: (Continued)

d. With one or more full-length or part-length CEAs misaligned from any other CEAs in its group by more than 7 inches but less than or equal to 19 inches, operation in MODES 1 and 2 may continue, provided that core power is reduced in accordance with Figure 3.1-1A and that within 1 hour the misaligned CEA(s) is either:

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

2. Declared inoperable and the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is satisfied. After declaring the CEA inoperable, operation in MODES 1 and 2 may continue pursuant to the requirements of Specification 3.1.3.6 provided:

a) Within 1 hour the remainder of the CEAs in the group with the inoperable CEA shall be aligned to within 7 inches of the inoperable CEA while maintaining the allowable CEA sequence and insertion limits shown on Figure 3.1-2; the THERMAL POWER level shall be restricted pursuant to Specification 3.1.3.6 during subsequent operation.

b) The SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is determined at least once per 12 hours.

Otherwise, be in at least HOT STANDBY within 6 hours.

e. With one full-length CEA inoperable due to causes other than addressed by ACTION a., above, and inserted beyond the Long Term Steady State Insertion Limits but within its above specified alignment requirements, operation in MODES 1 and 2 may continue pursuant to the requirements of Specification 3.1.3.6.

f. 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 greater than or equal to 145 inches withdrawn or within the Long Term Steady State Insertion Limits if in full-length CEA group 6, operation in MODES 1 and 2 may continue.

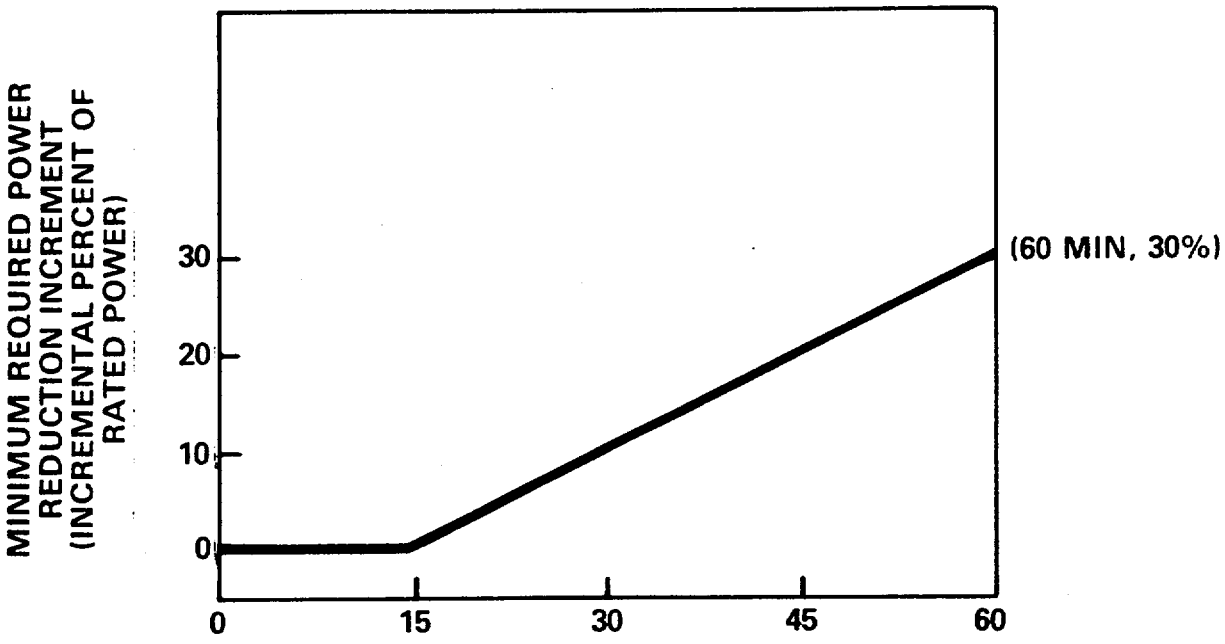
g. With one part-length CEA inoperable and inserted in the core, operation may continue provided the alignment of the inoperable part-length CEA is maintained within 7 inches (indicated position) of all other part-length CEAs in its group and the CEA is maintained pursuant to the requirements of Specification 3.1.3.7.

SURVEILLANCE REQUIREMENTS

4.1.3.1.1 The position of each full-length and part-length CEA shall be determined to be within 7 inches (indicated position) of all other CEAs in its group at least once per 12 hours except during time intervals when one CEAC is inoperable or when both CEACs are inoperable, then verify the individual CEA positions at least once per 4 hours.

4.1.3.1.2 Each full-length CEA not fully inserted and each part-length CEA which is inserted in the core below 145 inches shall be determined to be OPERABLE by movement of at least 5 inches in any one direction at least once per 31 days.

Required Power Reduction after Single CEA Deviation*



*When core power is reduced to 60% of rated power per this limit curve, further reduction is not required by this specification.

Figure 3.1 - 1A

3/4.10 SPECIAL TEST EXCEPTIONS

3/4.10.1 SHUTDOWN MARGIN

LIMITING CONDITION FOR OPERATION

3.10.1 The SHUTDOWN MARGIN requirement of Specification 3.1.1.1 or 3.1.1.2 may be suspended for measurement of CEA worth and SHUTDOWN MARGIN provided reactivity equivalent to at least the highest estimated CEA worth is available for trip insertion from OPERABLE CEA(s).

APPLICABILITY: MODES 2 AND 3*.

ACTION:

a. With any full-length CEA not fully inserted and with less than the above reactivity equivalent available for trip insertion, immediately initiate and continue boration at greater than or equal to 40 gpm of a solution containing greater than or equal to 1720 ppm boron or its equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.1 is restored.

b. With all full-length CEAs fully inserted and the reactor subcritical by less than the above reactivity equivalent, immediately initiate and continue boration at greater than or equal to 40 gpm of a solution containing greater than or equal to 1720 ppm boron or its equivalent until the SHUTDOWN MARGIN required by Specification 3.1.1.2 is restored.

SURVEILLANCE REQUIREMENTS

4.10.1.1 The position of each full-length and part-length CEA required either partially or fully withdrawn shall be determined at least once per 2 hours.

4.10.1.2 Each CEA not fully inserted shall be demonstrated capable of full insertion when tripped from at least the 50% withdrawn position within 7 days prior to reducing the SHUTDOWN MARGIN to less than the limits of Specification 3.1.1.1.

*Operation in MODE 3 shall be limited to 6 consecutive hours.

SPECIAL TEST EXCEPTIONS

3/4.10.2 MODERATOR TEMPERATURE COEFFICIENT, GROUP HEIGHT, INSERTION, AND POWER DISTRIBUTION LIMITS

LIMITING CONDITION FOR OPERATION

3.10.2 The moderator temperature coefficient, group height, insertion, and power distribution limits of Specifications 3.1.1.3, 3.1.3.1, 3.1.3.5, 3.1.3.6, 3.2.2, 3.2.3, 3.2.7, and the Minimum Channels OPERABLE requirement of Functional Unit 15 of Table 3.3-1 may be suspended during the performance of PHYSICS TESTS provided:

a. The THERMAL POWER is restricted to the test power plateau which shall not exceed 85% of RATED THERMAL POWER, and

b. The limits of Specification 3.2.1 are maintained and determined as specified in Specification 4.10.2.2 below.

APPLICABILITY: MODES 1 and 2.

ACTION:

With any of the limits of Specification 3.2.1 being exceeded while the requirements of Specifications 3.1.1.3, 3.1.3.1, 3.1.3.5, 3.1.3.6, 3.2.2, 3.2.3, 3.2.7, and the Minimum Channels OPERABLE requirement of Functional Unit 15 of Table 3.3-1 are suspended, either:

a. Reduce THERMAL POWER sufficiently to satisfy the requirements of Specification 3.2.1, or

b. Be in HOT STANDBY within 6 hours.

SURVEILLANCE REQUIREMENTS

4.10.2.1 The THERMAL POWER shall be determined at least once per hour during PHYSICS TESTS in which the requirements of Specifications 3.1.1.3, 3.1.3.1, 3.1.3.5, 3.1.3.6, 3.2.2, 3.2.3, 3.2.7, or the Minimum Channels OPERABLE requirement of Functional Unit 15 of Table 3.3-1 are suspended and shall be verified to be within the test power plateau.

4.10.2.2 The linear heat rate shall be determined to be within the limits of Specification 3.2.1 by monitoring it continuously with the Incore Detector Monitoring System pursuant to the requirements of Specifications 4.2.1.2 and 3.3.3.2 during PHYSICS TESTS above 5% of RATED THERMAL POWER in which the requirements of Specifications 3.1.1.3, 3.1.3.1, 3.1.3.5, 3.1.3.6, 3.2.2, 3.2.3, 3.2.7, or the Minimum Channels OPERABLE requirement of Functional Unit 15 of Table 3.3-1 are suspended.

SPECIAL TEST EXCEPTIONS

3/4.10.3 REACTOR COOLANT LOOPS

LIMITING CONDITION FOR OPERATION

3.10.3 The noted requirements of Tables 2.2-1 and 3.3-1 may be suspended during the performance of startup and PHYSICS TESTS, provided:

a. The THERMAL POWER does not exceed 5% of RATED THERMAL POWER, and either

b. The reactor trip setpoints of the OPERABLE power level channels are set at less than or equal to 20% of RATED THERMAL POWER, or

c. The core protection calculator operating bypass permissive setpoints are increased to greater than the logarithmic power-hi trip setpoint specified in Table 2.2-1 and less than 5% RATED THERMAL POWER.

APPLICABILITY: During startup and PHYSICS TESTS.

ACTION:

With the THERMAL POWER greater than 5% of RATED THERMAL POWER, immediately trip the reactor.

SURVEILLANCE REQUIREMENTS

4.10.3.1 The THERMAL POWER shall be determined to be less than or equal to 5% of RATED THERMAL POWER at least once per hour during startup and PHYSICS TESTS.

4.10.3.2 Each wide range logarithmic and power level neutron flux monitoring channel shall be subjected to a CHANNEL FUNCTIONAL TEST within 12 hours prior to initiating startup and PHYSICS TESTS.

SPECIAL TEST EXCEPTIONS

3/4.10.4 CENTER CEA MISALIGNMENT

LIMITING CONDITION FOR OPERATION

3.10.4 The requirements of Specifications 3.1.3.1 and 3.1.3.6 may be suspended during the performance of PHYSICS TESTS to determine the isothermal temperature coefficient, moderator temperature coefficient, and power coefficient provided:

a. Only the center CEA (CEA #1) is misaligned, and

b. The limits of Specification 3.2.1 are maintained and determined as specified in Specification 4.10.4.2 below.

APPLICABILITY: MODES 1 and 2.

ACTION:

With any of the limits of Specification 3.2.1 being exceeded while the requirements of Specifications 3.1.3.1 and 3.1.3.6 are suspended, either:

a. Reduce THERMAL POWER sufficiently to satisfy the requirements of Specification 3.2.1, or

b. Be in HOT STANDBY within 6 hours.

SURVEILLANCE REQUIREMENTS

4.10.4.1 The THERMAL POWER shall be determined at least once per hour during PHYSICS TESTS in which the requirements of Specifications 3.1.3.1 and/or 3.1.3.6 are suspended and shall be verified to be within the test power plateau.

4.10.4.2 The linear heat rate shall be determined to be within the limits of Specification 3.2.1 by monitoring it continuously with the Incore Detector Monitoring System pursuant to the requirements of Specifications 4.2.1.2 and 3.3.3.2 during PHYSICS TESTS above 5% of RATED THERMAL POWER in which the requirements of Specifications 3.1.3.1 and/or 3.1.3.6 are suspended.

3/4.1.1 BORATION CONTROL

3/4.1.1.1 and 3/4.1.1.2 SHUTDOWN MARGIN

SHUTDOWN MARGIN is the amount by which the core is subcritical, or would be subcritical immediately following a reactor trip, considering a single malfunction resulting in the highest worth CEA failing to insert.

The function of SHUTDOWN MARGIN is to ensure that the reactor remains subcritical following a design basis accident or anticipated operational occurrence. During operation in MODES 1 and 2, with k_{eff} greater than or equal to 1.0, the transient insertion limits of Specification 3.1.3.6 ensure that sufficient SHUTDOWN MARGIN is available.

SHUTDOWN MARGIN requirements vary throughout the core life as a function of fuel depletion and reactor coolant system (RCS) cold leg temperature (T_{cold}). The most restrictive condition occurs at EOL, with (T_{cold}) at no-load operating temperature, and is associated with a postulated steam line break accident and the resulting uncontrolled RCS cooldown. In the analysis of this accident, the specified SHUTDOWN MARGIN is required to control the reactivity transient and ensure that the fuel performance and offsite dose criteria are satisfied. As (initial) T_{cold} decreases, the potential RCS cooldown and the resulting reactivity transient are less severe and, therefore, the required SHUTDOWN MARGIN also decreases. Below T_{cold} of about 200°F, the inadvertent deboration event becomes limiting with respect to the SHUTDOWN MARGIN requirements. Below 200°F, the specified SHUTDOWN MARGIN ensures that sufficient time for operator actions exists between the initial indication of the deboration and the total loss of SHUTDOWN MARGIN. Accordingly, the SHUTDOWN MARGIN requirements are based upon these limiting conditions.

Additional events considered in establishing requirements on SHUTDOWN MARGIN are single CEA withdrawal and startup of an inactive reactor coolant pump.

Other technical specifications that reference the Specifications on SHUTDOWN MARGIN are: 3/4.1.2, BORATION SYSTEMS, 3/4.1.3, MOVABLE CONTROL ASSEMBLIES, 3/4.9.1, REFUELING OPERATIONS - BORON CONCENTRATION, and 3/4.10.1, SHUTDOWN MARGIN.

3/4.1.1.3 MODERATOR TEMPERATURE COEFFICIENT

The limitations on moderator temperature coefficient (MTC) are provided to ensure that the assumptions used in the accident and transient analysis remain valid through each fuel cycle. The Surveillance Requirements for measurement of the MTC during each fuel cycle are adequate to confirm the MTC value since this coefficient changes slowly due principally to the reduction in RCS boron concentration associated with fuel burnup. The confirmation that the measured MTC value is within its limit provides assurances that the coefficient will be maintained within acceptable values throughout each fuel cycle.

3/4.1.1.4 MINIMUM TEMPERATURE FOR CRITICALITY

This specification ensures that the reactor will not be made critical with the Reactor Coolant System cold leg temperature less than 520°F. This limitation is required to ensure (1) the moderator temperature coefficient is within its analyzed temperature range, (2) the protective instrumentation is within its normal operating range, (3) the pressurizer is capable of being in an OPERABLE status with a steam bubble, (4) the reactor pressure vessel is above its minimum RT_{NDT} temperature, and (5) the ECCS analysis remains valid for the peak linear heat rate of Specification 3.2.1.

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 makeup pumps, (5) associated heat tracing systems, and (6) 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 expected operating conditions of 2.0% delta k/k after xenon decay and cooldown to 200°F. The maximum expected boration capability requirement occurs at EOL from full power equilibrium xenon conditions assuming the most reactive CEA stuck out of the core and requires boric acid solution from the boric acid makeup tanks in the allowable concentrations and volumes of Specification 3.1.2.8 plus approximately 19,000 gallons of 1720 ppm borated water from the refueling water storage pool or approximately 58,000 gallons of 1720 ppm borated water from the refueling water storage pool alone. The higher limit of 447,100 gallons is specified to be consistent with Specification 3.5.4 in order to meet the ECCS requirements.

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 changes in the event the single injection system becomes inoperable.

The boron capability required below 200°F is based upon providing a 2% delta k/k SHUTDOWN MARGIN after xenon decay and cooldown from 200°F to 140°F. This condition requires either 5,465 gallons of 1720 ppm borated water from the refueling water storage pool or boric acid solution from the boric acid makeup tanks in accordance with the requirements of Specification 3.1.2.7.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 11 TO FACILITY OPERATING LICENSE NO. NPF-38

LOUISIANA POWER AND LIGHT COMPANY

WATERFORD STEAM ELECTRIC STATION, UNIT 3

DOCKET NO. 50-382

1.0 INTRODUCTION

By applications dated August 29, and September 25, 1986, as supplemented by letters dated October 1, and October 23, 1986, Louisiana Power and Light Company (the licensee) requested changes to the Technical Specifications (Appendix A to Facility Operating License No. NPF-38) for the Waterford Steam Electric Station, Unit 3. The proposed changes would: (1) add a power reduction curve to be used following a full or part-length control element assembly (CEA) misalignment; (2) revise the shutdown margin whenever all full-length CEAs are fully inserted into the core; (3) revise the special test exceptions on shutdown margin; and (4) allow credit for the log power trip during physics testing.

2.0 DISCUSSION

The proposed changes to the technical specifications requested by the licensee are in four areas as described below.

2.1 Control Element Assembly Misalignment (NPF-38-34)

The proposed change would revise ACTION statements "c" and "d" to Technical Specification 3.1.3.1, "Moveable Control Assemblies, CEA Position". The reason for this change is to impose new requirements on power reduction during the period from 15 minutes to one hour following a full or part-length CEA misalignment. This change would reduce the inward CEA deviation penalty factors currently provided by the CEA Calculators (CEACs) to the CPCs to a value of 1.0. The reduction of these penalty factors will reduce the sensitivity of the CPCs to CEA drops and to electronic noise which can be interpreted in the logic as a major CEA deviation and will, therefore, eliminate some unnecessary reactor trips.

2.2 Shutdown Margin with CEAs Inserted (NPF-38-40)

The proposed change (NPF-38-40) would revise Technical Specifications 3.1.1.1 and 3.1.1.2, "Boration Control, Shutdown Margin;" 3.1.2.4, "Boration Systems, Charging Pumps-Operating;" 3.1.2.6, "Boration Systems, Boric Acid Makeup Pumps-Operating;" 3.10.1, "Special Test Exceptions, Shutdown Margin;" and the associated Bases. These changes revise the requirements for shutdown margin and, consequently, for boration of the reactor coolant system (RCS) whenever all full-length control element assemblies (CEAs) are fully inserted into the core during Cycle 2.

2.3 Test Exception - CEA Insertability (NPF-38-41)

The proposed change would modify Technical Specification 3/4.10.1, "Special Test Exceptions, Shutdown Margin". This specification currently allows shutdown margin to be reduced to less than the normal operating shutdown margin requirements during low power physics testing provided that certain conditions are met. One of these conditions (Surveillance Requirement 4.10.1.2) requires that all control element assemblies (CEAs) not fully inserted into the core be shown to be capable of full insertion when tripped from at least the 50% withdrawn position within 24 hours prior to reducing shutdown margin to less than the normal operating requirements. The requested revision would allow this surveillance to be performed within seven days prior to margin reduction instead of within the prior 24 hours.

2.4 Test Exception - Reactor Coolant Loops (NPF-38-42)

The proposed change would revise Technical Specification 3/4.10.3, "Special Test Exceptions, Reactor Coolant Loops," by allowing credit for the log power trip for protection against power transients initiated at low power levels instead of relying solely on reduced reactor trip setpoints in the linear power channels.

3.0 EVALUATION

The proposed changes to the Technical Specifications requested by the licensee and described in four areas above, are evaluated below.

3.1 Control Element Assembly Misalignment (NPF-38-34)

Currently, if a single full-length or part-length CEA is inserted beyond the other CEAs in its group by a specified distance (inward CEA deviation event), the core protection calculator (CPC) algorithm applies two penalty factors to the departure from nucleate boiling ratio (DNBR) and linear heat rate (LHR) calculations. The first is a static penalty factor which is applied upon detection of the CEA deviation. The second is a xenon redistribution penalty which is applied linearly as a function of time over a one hour period following the detection of the deviation. The maximum inward CEA deviation event is the drop of a full-length CEA from its normal position. For this limiting event, the imposition of the DNBR and LHR penalty factors previously resulted in a reactor trip to assure that the DNBR and fuel centerline melt specified acceptable fuel design limits (SAFDLs) would not be violated.

As a consequence of the core protection calculator (CPC) improvement program, which has been reviewed and approved by the staff, an inward CEA deviation event would not be accompanied by the application of the CEA deviation penalty factors. Instead, the expected margin degradation for the event is accounted for by reserving sufficient margin in the DNBR limiting condition for operation (LCO) based on the most limiting inward CEA deviation event, the CEA drop. For Cycle 2, the limiting CEA drop was found to cause a radial peaking increase of 9.0%. Xenon redistribution during the first 15 minutes following the drop caused an additional increase of 4.3%, resulting in a total peaking distortion of 1.137 (1.09 x 1.043). The LCOs will be set to maintain at least this much margin to the SAFDLs for Cycle 2. The licensee has also determined that the additional distortion due to xenon redistribution during the period from 15 minutes to one hour after the drop is less than 1.2. The power penalty due to this peaking is less than the power penalty imposed by the proposed Technical Specification Figure 3.1-1A. If the combination of the static and xenon redistribution penalties exceeds the reserved required overpower margin, a power reduction in accordance with this figure is required.

The staff has reviewed the reanlaysis of the single full-length CEA drop event presented by the licensee for Cycle 2 and finds the results are acceptable since they meet the required NRC criteria regarding SAFDLs. Since this event requires the maximum initial margin to be maintained by the LCOs, the staff finds the proposed changes acceptable. For other than single CEA deviation events, such as CEA subgroup drops, the CEA position-related penalty factors for downward deviations are still used by the CPCs as in the Reference Cycle (Cycle 1) to provide a trip when necessary.

3.2 Shutdown Margin with CEAs Inserted (NPF-38-40)

The most significant change due to the proposed amendment is the reduction in required shutdown margin during Modes 2 through 5 when all full-length CEAs are fully inserted into the core. The shutdown margin requirements vary throughout the fuel cycle as a function of fuel depletion and RCS temperature. The most restrictive condition occurs at end of cycle and is associated with a postulated steam line break accident at no-load operating temperature and the resulting uncontrolled RCS cooldown. As the RCS temperature decreases, the potential RCS cooldown and the resulting reactivity transient are less severe and, therefore, the required shutdown margin also decreases. The licensee has proposed a new Figure 3.1-0 which shows the required shutdown margin as a function of cold leg temperature when all CEAs are fully inserted. These shutdown margin requirements vary from 1% at low temperatures to 4.15% for cold leg temperatures above 500°F. The shutdown margin requirements when any CEA is not fully inserted remain the same as current values in Technical Specification 3.1.1.1.

Two diverse, independent CEA position indication systems are available at Waterford 3 to provide CEA position information to the operator; the pulse counting CEA position indication system and the reed switch CEA position indication system. In addition, a light display is provided on the reactor turbine generator board in the main control room to indicate the fully inserted position of each CEA. Therefore, the staff finds that the operator has sufficient indication when all CEAs are fully inserted.

By definition, the shutdown margin assumes that the CEA of highest worth is always fully withdrawn (stuck out). When the actual shutdown margin is calculated at Waterford 3, the highest worth CEA is assumed to be stuck out to be consistent with the definition. However, in the safety analyses supporting this Technical Specification change request, the licensee has taken credit for the situations when all CEAs are fully inserted. If, for example, the stuck CEA were worth 1%, then a shutdown margin of 1% would mean that the core is actually subcritical by 2% (i.e., 1% shutdown margin plus the worth of the stuck CEA) since all CEAs have been verified to be fully inserted. The safety analyses used by the licensee to support this change were initiated with the core subcritical by 2% since all CEAs were assumed to be inserted.

The anticipated operational occurrences (AOOs) and accidents that have the potential for being impacted by the proposed change are the steam line break, CEA withdrawal, CEA ejection, inadvertent boron dilution, and the startup of an inactive reactor coolant pump. The licensee has reevaluated these events for Cycle 2. The staff agrees that these are the appropriate events to be evaluated and finds the results of these evaluations meet the appropriate NRC acceptance criteria as stated in the Standard Review Plan. The proposed changes to Specification 3.1.1.1 and 3.1.1.2, therefore, are acceptable.

The proposed changes to Specifications 3.1.2.4, 3.1.2.6, and 3.10.1 are required in order to refer to the appropriate shutdown margin specification depending on whether or not all CEAs are fully inserted. These changes are editorial in nature and are required for consistency. They are, therefore, acceptable.

3.3 Test Exception - CEA Insertability (NPF-38-41)

This proposed change would enable low power physics tests to be accomplished without an additional trip to verify CEA insertability. The startup test program includes a CEA trip test before criticality in order to measure CEA drop times and demonstrated CEA insertability. Criticality is then achieved and low power physics tests are performed. Measurements of CEA worths are made later and may involve the reduction of shutdown margin as permitted by Technical Specification 3.10.1. Since these CEA worth measurements are performed several days after the CEA insertability tests are performed, the reactor would have to be tripped again to demonstrate CEA insertion capability and satisfy the current 24-hour

criterion. The requested revision would, therefore, eliminate the necessity for an additional trip during physics tests by requiring CEA insertability to be verified within seven days prior to reducing shutdown margin instead of within 24 hours.

The primary concern in extending the surveillance time period of verifying CEA insertability is whether or not there could be an increase in the probability of a stuck CEA over a seven-day period of time as compared to the present 24-hour time period. Consideration of the configuration of the components that are used in CEA insertion indicate that there is nothing which could cause a significant increase in the probability of a CEA to become untrippable since there is no significant change in the geometry of these components over the seven day period of low power physics testing. The components considered include the fuel assembly (including foreign material buildup in the gap between the CEA and the guide tube), the CEA, the CEA extension shaft, the control element drive mechanism, and the upper guide structure. Surveillance requirements necessitate the CEA drop time of full-length CEAs be demonstrated through measurement prior to reactor criticality for specifically affected individual CEAs following any maintenance on or modification to the CEA drive system which could affect the drop time of those specific CEAs. Therefore, if any modifications were made which could affect CEA drop times and hence, trippability, following the previous verification of CEA tripability, a reverification is required. Also, since the CEAs will insert by gravity upon loss of power, the probability of a stuck CEA is not increased due to an electrical malfunction, if one were to occur during physics testing.

The staff concludes that the proposed change continues to provide assurance that all CEAs are trippable during low power physics testing and does not affect the amount by which shutdown margin may be reduced during this period. It is similar to a change previously approved for Arkansas Nuclear One, Unit 2. The proposed change is, therefore, acceptable.

The staff has reviewed the proposed surveillance requirement change to the Waterford 3 Technical Specification associated with the shutdown margin special test exception. This change would allow a time duration of seven days following verification of CEA trippability during which time shutdown margin may be reduced to accommodate physics testing. The staff concludes that the proposed change is acceptable since it continues to provide assurance that all CEAs are trippable during low power physics testing and does not affect the amount by which shutdown margin may be reduced during the testing period.

3.4 Test Exception - Reactor Coolant Loops (NPF-38-42)

In order to perform certain physics tests at low thermal power levels, it is necessary to bypass the core protection calculators (CPCs). The

measurement of control element assembly (CEA) worths, for example, requires inserting and withdrawing CEAs outside of the normally prescribed sequence. If the CPCs were not bypassed, they would generate out-of-sequence penalty factors that would result in a reactor trip. Currently, Technical Specification 3.10.3.b requires that the linear power level-high trip setpoint be decreased to less than or equal to 20% of rated thermal power when the CPCs are bypassed during physics tests. The addition of Technical Specification 3.10.3.c is being proposed to allow credit for either the reduced reactor trip setpoints in the linear power channels (Technical Specification 3.10.3.b) or the log power trip (proposed Technical Specification 3.10.3.c) for protection against power transients during CPC bypass periods. Both the high log power trip and the high linear power level trip use the neutron flux power from the excore neutron flux monitoring system as input. The high log power trip is provided to trip the reactor when the indicated neutron flux power reaches 0.257% of full power and has been found acceptable by the staff in assuring the integrity of the fuel cladding and the reactor coolant system boundary in the event of an unplanned power transient from subcritical or low power conditions. Therefore, the high log trip is an acceptable alternative to the high linear power level trip when the CPCs are bypassed during physics tests.

The CPC operating bypass permissive bistable must be increased to a value above the power level where physics testing is performed in order to bypass all four CPC channels without generating a reactor trip. Since this same bistable also serves as the threshhold value for bypassing the log power trip (i.e., it is the minimum thermal power below which the log power trip cannot be bypassed), setting it above the log power trip setpoint of 0.257% power removes the possibility of bypassing the log power trip. Thus, by bypassing all four CPCs as described in the proposed change, a type of electrical interlock is created that precludes the log power trip from being bypassed. Therefore, the log power trip will provide the necessary protection in the event of an unplanned power excursion during physics testing precluding the need to change the high linear power setpoint. Also increasing the CPC operating bypass permissive bistable setpoint above the log power trip setpoint does not preclude the CPCs from performing a protective function. That is, if the thermal power were to exceed the bistable setpoint (without causing a log power trip), the CPCs would automatically come out of bypass and, as necessary, trip the reactor. The staff, therefore, finds the proposed change acceptable.

4.0 CONTACT WITH STATE OFFICIAL

The NRC staff has advised the Administrator, Nuclear Energy Division, Department of Environmental Quality, State of Louisiana of the proposed determination of no significant hazards consideration. No comments were received.

5.0 ENVIRONMENTAL CONSIDERATION

This amendment involves changes in the installation or use of facility components located within the restricted area. The staff has determined that the amendment

involves no significant increase in the amounts 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 proposed findings that the amendment involves no significant hazards consideration, and there has been no public comment on such findings. 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 this amendment.

6.0 CONCLUSION

Based upon our evaluation of the proposed changes to the Waterford 3 Technical Specifications, we have concluded that: there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and 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. We, therefore, conclude that the proposed changes are acceptable, and are hereby incorporated into the Waterford 3 Technical Specifications.

Dated: January 9, 1987

Principal Contributor: L. Kopp

JAN 9 1987

ISSUANCE OF AMENDMENT NO. 11 TO FACILITY OPERATING
LICENSE NP. NPF-38 FOR WATERFORD 3

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