August 21, 2006

Mr. Charles D. Naslund
Senior Vice President and Chief Nuclear Officer
Union Electric Company
Post Office Box 620
Fulton, MO 65251

SUBJECT: CALLAWAY PLANT, UNIT 1 - ISSUANCE OF AMENDMENT RE: REACTOR COOLANT SYSTEM BORON LIMITATIONS IN MODES 3, 4, AND 5 (TAC NO. MC6897)

Dear Mr. Naslund:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 174 to Facility Operating License No. NPF-30 for the Callaway Plant, Unit 1. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated April 14, 2005 (ULNRC-05138), as supplemented by letter dated December 21, 2005 (ULNRC-05233).

The amendment adds a new TS 3.1.9, "RCS [Reactor Coolant System] Boron Limitations < 500 °F," and revises TS 3.3.1, "Reactor Trip System (RTS) Instrumentation," for the power range neutron flux - low reactor trip function.

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

Sincerely,

/RA/

Jack Donohew, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-483

Enclosures:
1. Amendment No. 174 to NPF-30
2. Safety Evaluation

cc w/encls: See next page

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UNION ELECTRIC COMPANY

CALLAWAY PLANT, UNIT 1

DOCKET NO. 50-483

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 174
License No. NPF-30

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

   A. The application for amendment by Union Electric Company (UE, the licensee) dated April 14, 2005, as supplemented by letter dated December 21, 2005, complies with the 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 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-30 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. 174 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 amendment is effective as of its date of issuance, and shall be implemented within 90 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

David Terao, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: August 21, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 174

RENEWED FACILITY OPERATING LICENSE NO. NPF-30

DOCKET NO. 50-483

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

REMOVE	INSERT
1	1
2	2
3	3
---	3.1-21
---	3.1-22
3.3-8	3.3-8
3.3-9	3.3-9
3.3-10	3.3-10
3.3-11	3.3-11
3.3-17	3.3-17

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 174 TO FACILITY OPERATING LICENSE NO. NPF-30

UNION ELECTRIC COMPANY

CALLAWAY PLANT, UNIT 1

DOCKET NO. 50-483

1.0 INTRODUCTION

By application dated April 14, 2005 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML051120189), Union Electric Company (the licensee) requested changes to Facility Operating License No. NPF-30 for the Callaway Plant, Unit 1 (Callaway). The licensee is proposing to revise the Technical Specifications (TSs) by (1) adding a new TS 3.1.9, "RCS [Reactor Coolant System] Boron Limitations < 500°F," and (2) revising TS 3.3.1, "Reactor Trip System (RTS) Instrumentation."

The licensee submitted a supplemental letter dated December 21, 2005 (ADAMS Accession No. ML060110032) that provided responses to questions on the application from the Nuclear Regulatory Commission (NRC) staff. The supplemental letter provided additional clarifying information, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination published in the *Federal Register* on May 23, 2006 (71 FR 29682).

The licensee's application and supplemental letter also identified changes that the licensee intends to make to the TS Bases because of its proposed changes to the TSs. The licensee made a regulatory commitment in Attachment 5 to its application that the changes to the TS Bases would be made during its implementation of the approved amendment.

2.0 REGULATORY EVALUATION

In Section 50.36 of Part 50, "Technical specifications," to Title 10 of the *Code of Federal Regulations* (10 CFR 50.36), the NRC issued a rule and established its regulatory requirements related to the content of TSs. In doing so, the NRC emphasized those matters related to the prevention of accidents and mitigation of consequences of such accidents. As recorded in the Statements of Consideration, Technical Specifications for Facility Licenses: Safety Analysis Reports (33 FR 18610, December 17, 1968), the NRC noted that licensees are expected to incorporate into their plant TSs those items that are directly related to maintaining the integrity of the physical barriers designed to contain radioactivity. Pursuant to 10 CFR 50.36, TSs are required to include items in five specific categories related to station operation. Specifically, those categories include: (1) safety limits, limiting safety system settings (LSSSs), and limiting

control settings; (2) limiting conditions for operation (LCOs); (3) surveillance requirements (SRs); (4) design features; and (5) administrative controls. However, the rule does not specify the particular requirements to be included in a plant's TSs. Additionally, 10 CFR 50.36(c)(2)(ii) sets forth four criteria to be used in determining whether a LCO is required to be included in the TS for a certain item. These criteria are as follows:

1. Installed instrumentation that is used to detect, and indicate in the control room, a significant abnormal degradation of the reactor coolant pressure boundary.

2. A process variable, design feature, or operating restriction that is an initial condition of a design basis accident or transient analysis that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

3. A structure, system, or component (SSC) that is part of the primary success path and which functions or actuates to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

4. A SSC which operating experience or probabilistic risk assessment has shown to be significant to public health and safety.

As stated in 10 CFR 50.36(c)(2)(i), the LCOs "are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When a[n LCO] of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specifications ..." The remedial actions in the TSs are specified in terms of LCO conditions, required actions, and completion times (CTs) to complete the required actions. When an LCO is not being met, the CTs specified in the TSs are the time allowed in the TSs for completing the specified required actions. The conditions and required actions specified in the TSs must be acceptable remedial actions for the LCO not being met, and the CTs must be a reasonable time for completing the required actions.

The license amendment request (LAR) from the licensee involves the RCS boron concentrations and the power range neutron flux - low reactor trip. The NRC's regulatory requirements related to the power reactor reactivity control are the following General Design Criteria (GDC) in Appendix A to 10 CFR Part 50:

- GDC 13 requires that instrumentation shall be provided to monitor variables and systems over their anticipated ranges for normal operations as appropriate to assure adequate safety, including those variables and systems that can affect the fission process, the integrity of the reactor core, the reactor coolant pressure, and the containment and its associated systems.

- GDC 20 requires that the protection system(s) shall be designed (1) to initiate automatically the operation of appropriate systems including the reactivity control systems, to assure that specified acceptable fuel design limits are not exceeded as a result of anticipated operational occurrences and (2) to sense accident conditions and to initiate the operation of systems and components important to safety.

The proposed TS change would limit the maximum rate of reactivity insertion, employing the rods and RCS boron limitation, to prevent any reactivity increase from adversely affecting the reactor coolant system boundary or disrupting the core or vessel internals that could impair the effectiveness of emergency core cooling. The reactor fuel design and the reactor protection system design are not being changed by the LAR and, therefore, the GDC 10 and 21 through 26, 28, and 29 requirements on the fuel and protection system designs, respectively, are not affected by this license amendment.

3.0 NRC STAFF TECHNICAL EVALUATION

3.1 Proposed Changes to the TSs

In its application, the licensee proposed the following changes to the TSs:

1. Add a new TS 3.1.9, "RCS Boron Limitations < 500 °F," with an LCO, the reactor mode applicability, conditions and required actions when the LCO is not being met, and SRs.

2. Revise the modes of applicability for the power range neutron flux - low (PRNF-low) reactor trip function in TS Table 3.3.1-1 and add new footnotes f, h, and i to the table for the function.

3. Revise Condition V for LCO 3.3.1, "Reactor Trip System (RTS) Instrumentation," to add required actions and completion times (CTs) for one channel of the PRNF-low reactor trip function being inoperable.

4. Add new Condition Y for LCO 3.3.1 to add required actions and CTs for one channel of the PRNF-low trip function being inoperable.

5. Add new Condition Z for LCO 3.3.1 to add required actions and CTs for when Condition Y is not being met and for two channels of the PRNF-low trip function being inoperable.

3.2 Background

In its application, the licensee discussed the Nuclear Safety Advisory Letter (NSAL) -00-016 Westinghouse Advisory Letter, "Rod Withdrawal from Subcritical Protection in Lower Modes," dated December 4, 2000. The NSAL addressed the reactor trip functions assumed in the uncontrolled rod cluster control assembly (RCCA) bank withdrawal from a low power or subcritical condition event (RWFS). The primary protection for an uncontrolled RWFS event is provided by the power range neutron flux (PRNF) low (PRNF-low) reactor trip function, which is in TS Table 3.3.1-1, "Reactor Trip System Instrumentation." However, because the PRNF-low trip function is (1) not currently required to be operable in Mode 3 in TS Table 3.3.1-1 and (2) cannot detect neutron levels in the lower temperature portions of Modes 3, 4, and 5, the source range neutron flux (SRNF) reactor trip function in TS Table 3.3.1-1 is implicitly credited as the primary reactor trip function for an uncontrolled RWFS event in Modes 3, 4, or 5. But, because the SRNF reactor trip function is not time response tested at Callaway, this trip function also cannot be credited to provide protection for an uncontrolled RWSF event in Modes 3, 4, or 5.

NSAL-00-016 also identified that the PRNF-low trip function may not be operable at RCS temperatures significantly below hot zero power RCS average temperature (i.e., the 500 ºF in TS 3.1.9) due to calibration issues associated with shielding caused by the cold water in the downcomer region of the reactor vessel. Therefore, the PRNF-low trip function may not provide protection in Mode 3 when the RCS temperature is less than 500 ºF.

The licensee stated that the proposed TS change would address the concerns that were identified in NSAL-00-016, for RCS coolant temperatures less than 500 ºF, by requiring the boration of the RCS to greater than the all-rod-out (ARO) critical boron concentration when the RCCA banks are capable of a rod withdrawal event from a subcritical condition. The licensee stated that this requirement provides sufficient shutdown margin to prevent any undesirable consequences of an RWFS event when the RCS temperature is below 500 ºF (i.e., the core would be subcritical after the RWFS event with no credit given to the control rods in the core). At or above 500 ºF, the PRNF-low trip function provides the required reactor protection for an RWFS event. The licensee is basing the RCS temperature on the RCS cold leg temperature, the lowest temperatures in the RCS.

The RWFS event is analyzed for both a subcritical and low power plant startup condition. This event is terminated by the PRNF-low trip function in Section 15.4 of the Callaway Final Safety Analysis Report (FSAR); however, the PRNF-low trip function is only capable of providing protection for RWFS when the RCS temperature is greater than or equal to 500 ºF. Since there is no explicit RCCA bank withdrawal analysis that is performed for Modes 3, 4, and 5, when the RCS temperature is less than 500 ºF, the proposed amendment will require that the RCS is borated to greater than the ARO critical boron concentration to provide sufficient shutdown margin (SDM) if the rods are capable of being withdrawn in these modes, when the RCS temperature is less than 500 ºF.

The licensee stated that Westinghouse evaluated the operability of the PRNF-low trip function at reduced RCS temperatures and identified the minimum RCS temperature at which the trip function would still function adequately to ensure that the current FSAR accident analyses that rely on this trip function during low power or subcritical conditions would continue to be bounding. Based on plant-specific sensitivities that were run to determine the impact of reduced RCS temperatures on the PRNF instrumentation, the licensee determined that the relative response of the PRNF trip function at 500 ºF would be approximately 71 percent of the PRNF-low trip function's response at the plant's no-load temperature (557 ºF). The licensee explained that this means that under the reduced RCS temperature conditions, when the PRNF detector indicated a power of 25 percent rate thermal power (which is the nominal PRNF low setting reactor trip setpoint), the actual power could be as high as 35 percent RTP (i.e., 25/0.71). To this uncertainty, the licensee stated that Westinghouse added 10 percent margin to obtain a corresponding safety analysis PRNF-low trip function setpoint of roughly 45 percent RTP at a reduced temperature of 500 ºF and the effect of operation at a reduced temperature on core-related assumptions, such as moderator temperature coefficient, doppler feedback, axial power shape, etc., would be more than offset by the benefit from the reduced temperature for departure from nucleate boiling (DNB) considerations.

The licensee further stated that Westinghouse concluded that transients of the severity of those currently discussed in the FSAR, initiated from hot zero power (HZP) conditions that rely on the PRNF trip function for protection, would be insignificantly impacted by the increase in the PRNF

safety analysis setpoint described above. This is based on the fact that the nuclear power for these events increases so rapidly that the time of reactor trip would be insignificantly affected. As such, the resulting transient would be very similar to the results presented in the FSAR. Furthermore, operation at the reduced temperature would provide additional DNB margin if explicit DNB ratio (DNBR) and fuel temperature calculations were to be performed. Based on this, the licensee further stated that Westinghouse concluded that the PRNF-low trip function is capable of performing its safety function at RCS coolant temperatures as low as 500 ^{o}F, but not below 500 ^{o}F. Based on its review, the NRC staff agrees with this conclusion.

A reference to the rod control system is in the proposed footnotes associated with items 2 and 3 listed above in Section 3.1 of this SE, on the proposed changes to the TSs. The system is described in Section 7.7.1.2 of the Callaway FSAR. It is part of the control rod drive system (CRDS) that moves the control rods to provide for power modulation by manual or automatic control of control rod banks in a preselected sequence and for manual operation of individual banks, but is separate from the part of the CRDS that ensures a reactor trip, the reactor trip system.

The licensee stated in its supplemental letter that it would de-energize all control rod drive mechanisms or open all reactor trip breakers or de-energize the motor generator sets to assure that the rod control system was not capable of rod withdrawal, and these methods have been previously accepted by the NRC staff to disable a rod control system to prevent a rod withdrawal event. This would be true if there is not a control rod fully inserted. If one or more control rods are not fully inserted, there is the chance that an RWFS event could occur, so the licensee has included this situation into item 2 for when the reactor is to be protected by the proposed new TS 3.1.9.

Based on the above, the licensee is proposing to provide reactor protection for the RWFS event in the following manner:

1. Rely on the PRNF-low trip function for primary reactor protection at or above the RCS cold leg temperature of 500 ^{o}F, and the control rod system is capable of rod withdrawal, or one or more control rods are not fully inserted, and the RCS boron concentration is less than or equal to the ARO critical boron concentration. This is Mode 1, but not above the P-10 interlock, and Modes 2 and 3.

2. Rely on the new TS 3.1.9 and borating the RCS to greater than the ARO boron concentration below the RCS temperature of 500 ^{o}F, and with the rod control system capable of rod withdrawal. This is Modes 2, 3, 4, and 5.

3. If the rod control system is not capable of rod withdrawal and the rods are fully inserted, the RWFS event is not a credible event and neither the PRNF-low trip function or the new TS 3.1.9, or any other reactor protection, is needed.

After review of the licensee's application and supplemental letter, the NRC staff concludes that the above reactor protection adequately protects the reactor during the RWFS event.

Based on this, the NRC staff further concludes that the licensee has provided the PRNF-low trip function and the RCS boration system through TS 3.1.9 to (1) provide instrumentation to

monitor variables and systems over their anticipated range to assure adequate safety including the reactor core integrity and (2) provide protection systems to sense accident conditions and to initiate the operation of systems and components important to safety for the RWFS event. Based on this, the NRC staff concludes that the PRNF-low trip function and TS 3.1.9 meet GDC 13 and 20.

3.3 Reliance in Design-Basis RWFS Event on the PRNF-Low Trip Function

Based on its application, the licensee is changing the modes of applicability where it will be relying on the PRNF-low trip function for primary reactor protection in the RWFS event. The current applicability of Mode 1 up to, but not above, the P-10 interlock, is not being changed by this amendment; however, the current Mode 2 applicability is being extended to Modes 2 and 3, where (1) the RCS cold leg temperature is at or above 500 °F and (2) the rod control system is capable of withdrawal of control rods, or one or more controls rods are not fully inserted, and the RCS boron concentration is less than or equal to the ARO critical boron concentration.

3.3.1 Proposed TS Changes for Relying on PRNF-Low Trip Function

The current requirements on the PRNF-low trip function, in the conditions for LCO 3.3.1 and TS Table 3.3.1-1, are the following:

- Mode applicability of Mode 1 (below the P-10 interlock) and Mode 2.
- Required Channels of 4 channels.
- Condition E if the trip function is inoperable.
- SRs 3.3.1.1, 3.3.1.6, 3.3.1.11, and 3.3.1.16 to demonstrate trip function operability.
- Allowable value of $\leq$ 28.3 percent of rated thermal power (RTP).

Because the licensee is extending the modes of applicability where credit would be taken for the PRNF-low trip function to provide the required reactor protection for an RWFS event, the licensee is proposing the following changes to that trip function in TS Table 3.3.1-1:

1. Revising the mode of applicability in that the current Mode 2 applicability is changed into the following three RCS boron limitation modes, which includes extending the applicable modes for the PRNF-low trip function to Mode 3:

    a. Mode 2 (with $k_{eff} \geq 1.0$)

    b. Mode 2 (with $k_{eff} < 1.0$, all RCS cold leg temperatures $\geq$ 500 °F, RCS boron concentration $\leq$ the ARO critical boron concentration, and the rod control system capable of withdrawal or one or more rods not fully inserted), and

    c. Mode 3 (with all RCS cold leg temperatures $\geq$ 500 °F, RCS boron concentration $\leq$ the ARO critical boron concentration, and the rod control system capable of withdrawal, or one or more rods not fully inserted).

2. Revising the current Condition E, which is currently for Mode 1 (below the P-10 interlock) and Mode 2, for the trip function to new Conditions V, Y, and Z for the above three modes of applicability and the unchanged applicability of Mode 1 (below the P-10 interlock):

   a. Condition V for the above mode 1.a of applicability, and the unchanged Mode 1 (below the P-10 interlock),

   b. Conditions Y and Z for the above modes 1.b and 1.c of applicability.

The number of required channels, the SRs and surveillance test interval to demonstrate trip function operability, and the allowable value for the trip function are not being changed by this amendment. As stated above, requiring the PRNF-low trip function to be operable in Mode 1 (below the P-10 trip interlock) is not being changed by this amendment.

3.3.2 Revising Mode 2 Applicability and Extending Applicability to Mode 3

The licensee is revising the Mode 2 applicability and extending the modes of applicability to Mode 3 by proposing the following new footnotes to be added to the applicable modes for the PRNF-low trip function in TS Table 3.3.1-1:

- Footnote f for Mode 2 stating "With $k_{eff} \geq 1.0$."

- Footnote h for Mode 2 stating "With $k_{eff} < 1.0$, and all RCS cold leg temperatures > 500 °F, and RCS boron concentration $\leq$ the ARO critical boron concentration, and the rod control system capable of withdrawal or one or more rods not fully inserted."

- Footnote i for Mode 3 stating "With all RCS cold leg temperatures $\geq$ 500 °F, RCS boron concentration $\leq$ the ARO critical boron concentration, and the rod control system capable of withdrawal or one or more rods not fully inserted."

The footnotes define the three modes 1.a, 1.b, and 1.c of applicability in Section 3.3.1 of this safety evaluation (SE).

The licensee is proposing to take credit for the PRNF-low trip function for RCS temperatures at or above 500 °F where the rod control system is capable of rod withdrawal. Because the RCS temperatures for Modes 4 and 5 are $\leq$ 500 °F, the PRNF only needs to be operable in the current Mode 1 (less than P-10 interlock), Mode 2, and Mode 3 (at or above 500 °F). The licensee has proposed to divide Mode 2 into the two modes 1.a and 1.b of applicability (defined in SE Section 3.3.1, and to add the mode 1.c of applicability (also defined in SE Section 3.3.1). For crediting the PRNF-low trip function for RCS temperatures at or above 500 °F, which includes Mode 3, these three modes of applicability cover all the applicable conditions from Mode 3 up to Mode 1. Based on this, the NRC staff concludes that the three footnotes to TS Table 3.3.1-1, which define the three modes of applicability for the PRNF-low trip function, are consistent with the mode of applicability where the licensee is taking credit for the trip function in the accident analyses, meet 10 CFR 50.36 and are, therefore, acceptable.

The licensee is proposing to have the SRs 3.3.1.1 (channel check), 3.3.1.8 (channel operational test), 3.3.1.11 (channel calibration), and 3.3.1.16 (channel response time test) that demonstrate the operability of the PNRF-low trip function in Modes 1 and 2 to be the SRs for demonstrating the operability of the trip function in Mode 3. The licensee stated in its application that these SRs have been added to demonstrate operability of the trip function in the revised mode applicability, which extends the mode applicability to Mode 3. The NRC staff agrees with the licensee and concludes that the four SRs are sufficient to demonstrate the operability of the PRNF-low trip function in Mode 3 and, therefore, these four SRs meet 10 CFR 50.36. Based on this, the NRC staff concludes that having these four SRs listed in Table 3.3.1-1 for the PRNF-low trip function for Mode 3 is acceptable.

The licensee is proposing to have the allowable value for the PNRF-low trip function in Modes 1 and 2 to be the allowable value for the trip function in Mode 3. This was addressed in the licensee's supplemental letter where it stated that a conclusion in the Westinghouse evaluation was that a safety analysis setpoint limit as high as 45 percent RTP in Mode 3 at a reduced RCS temperature of 500 ^{o}F would be more than offset by the margins inherent at the reduced temperature. Based on this, the NRC staff concludes that the allowable value for the PRNF-low trip function at Modes 1 and 2 is an acceptable allowable value in Mode 3 and, therefore, meets 10 CFR 50.36. Based on this, the NRC staff further concludes that this TS change is acceptable.

3.3.3 Revise Conditions for Inoperable PRNF-Low Trip Function

3.3.3.1 Plant in Mode 1 (below the P-10 interlock) or Mode 2 (with $k_{eff} \geq 1.0$)

For Mode 1 (below the P-10 interlock) or Mode 2 (with $k_{eff} \geq 1.0$), the licensee has proposed to change the current Condition E to proposed Condition V. Current Condition E that one channel is inoperable required the channel to be placed in trip within 72 hours or the plant shall be in Mode 3 in 78 hours. The proposed Condition V, which will replace the current Condition V that is not being used, has the following required actions:

1. Place channel in trip within 72 hours, or

2. Place plant in Mode 2 with $k_{eff} < 1.0$, and

    a. Initiate action to fully insert rods and then place the rod control system in a condition where it is incapable of rod withdrawal within 78 hours, or

    b. Initiate action to borate the RCS to greater than the ARO critical boron concentration within 78 hours.

The proposed Condition V also has a note stating that "The inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels." This note is the same as the note in the existing Condition E for the trip function. Therefore, the proposed Condition V retains the note.

The proposed required action 1 above is the same as that in Required Action E.1 in the existing Condition E with the same CT of 72 hours. Therefore, the licensee has not proposed a change to this requirement.

The Required Action E.2 in the existing Condition E is to put the plant in a condition where the trip function is not required to perform its safety function. For the new Condition V, the licensee has proposed to change the second required action in the existing Condition E to either the required action 2.a or 2.b above, either of which puts the plant in a condition where the trip function is not needed to protect the core from the RWFS event. This is to say that either (1) having all control rods in and the rod control and placing the rod control system in a condition where it is not capable of rod withdrawal or (2) borating the RCS to greater than the ARO critical boron concentration will protect the core from the RWFS event. Based on this, the NRC staff concludes that the proposed Condition V for an inoperable PRNF-low trip function is sufficient to protect the reactor core in Mode 1 (below the P-10 interlock) and Mode 2 (with $k_{eff} \geq 1.0$) and is, therefore, acceptable. The proposed completion time is the same as that for Required Action E.2; therefore, the licensee is not changing this requirement.

3.3.3.2 Plant in Mode 2 (with $k_{eff} < 1.0$) or Mode 3

In Mode 2 (with $k_{eff} < 1.0$) or Mode 3, the PRNF-low trip function is needed to perform its safety function at or above the RCS temperature of 500 ^{o}F when the rod control system is capable of rod withdrawal. As addressed in Section 3.3.2 of this SE, these are the modes of applicability in Footnotes h and i for when the trip function is required to be operable. If the trip function is inoperable in these modes of applicability, the licensee proposed the new Conditions Y and Z to address the inoperable trip function channel.

The proposed Condition Y is for one channel being inoperable and requires the channel to be placed in trip in 72 hours. This is the same as required Action E.1 in existing Condition E with the same completion time. Therefore, the licensee has not proposed a change to this requirement.

The proposed Condition Z is (1) for one channel inoperable where the required action and associated CT of Condition Y is not met and (2) for two or more channels inoperable. For the first case, which is for an inoperable channel and the channel has not been placed in trip in 72 hours, the proposed required actions are to immediately initiate action to (a) fully insert all rods and initiate action to place the rod control system in a condition incapable of rod withdrawal or (b) borate the RCS to greater than the ARO critical boron concentration. These proposed required actions for Condition Z are the same as for the required actions 2.a and 2.b for the proposed Condition V, where the channel was not placed in trip in 72 hours, that are discussed in the previous SE section. For the same reasons given in that SE section whereby the NRC staff concluded that these required actions place the reactor in a protected condition and are, therefore, acceptable for Condition V, the NRC staff concludes that the proposed required actions for Condition Z, for an inoperable channel where the channel has not been placed in trip within 72 hours, are acceptable.

For the second case of proposed Condition Z, where two PRNF-low trip channels are inoperable, the licensee has also proposed to immediately initiate action to (a) fully insert all rods and initiate action to place the rod control system in a condition incapable of rod

withdrawal or (b) borate the RCS to greater than the ARO critical boron concentration. These proposed required actions for Condition Z are the same as for the required actions 2.a and 2.b for the proposed Condition V, where the channel was not placed in trip in 72 hours, that are discussed in the previous SE section. For the same reasons given in that SE section whereby the NRC staff concluded that these required actions place the reactor in a protected condition and are, therefore, acceptable for Condition V, the NRC staff concludes that the proposed required actions for Condition Z, for more than one inoperable channel, are acceptable.

The proposed CT of acting immediately in the required actions for Condition Z, as defined in the TSs, is to have the licensee pursue the required action without delay and in a controlled manner. Because the proposed CT requires that the required action is done without delay to place the reactor in a protected condition, the NRC staff concludes that the proposed CT for Condition Z is acceptable.

The licensee has not proposed a new LCO 3.3.1 condition for the case where the required actions and associated CTs in Condition Z are not being met (i.e., that Condition Z is not being met). The required actions in Condition Z are to (1) fully insert the controls rod and place the rod control system in a condition where it is not capable of rod withdrawal or (2) borate the RCS to greater than the ARO critical boron concentration. As discussed in Section 3.2 of this SE, doing either 1 or 2 would put the reactor in a condition where it is protected from the RWFS event either by (1) the event is not credible or (2) the effect of the event does not have unacceptable consequences. Based on this, the NRC staff concludes that there does not have to be a condition for LCO 3.3.1 where Condition Z is not being met.

The note, that the inoperable channel may be bypassed for up to 12 hours for surveillance testing of other channels, in the current Condition E for Modes 1 and 2, is included in the proposed Condition V for Modes 1 and 2, and Condition Y for Modes 2 and 3. Having the note in Condition V for Modes 1 and 2 and Condition Y for Mode 2 is not a change to the current TSs because Condition E is for Modes 1 and 2. However, including the note in Condition Y is a change because Condition Y is for Mode 3 and Condition E is only for Modes 1 and 2. In the identified TS Bases changes for TS 3.3.1 in Attachment 4 to its application, the licensee stated, for Conditions V and Y, that the 12-hour limit is justified in Topical Report WCAP-15376-P-A, "Risk-Informed Assessment of the RTS and ESFAS Surveillance Test Intervals and Reactor Trip Breaker Test and Completion Times," dated March 2003. This topical report was implemented at Callaway in Amendment No. 165 dated January 31, 2005. In that amendment, the bypass time of 4 hours was extended to 12 hours for surveillance testing of other channels for the PRNF-low trip function. By the identified changes to TS 3.3.1 Bases in (1) the application dated April 14, 2005, for this proposed amendment and (2) the application dated December 17, 2003, for Amendment No. 165, the NRC staff concludes that the note also applies to Mode 3 and, therefore, the note in Conditions V and Y is acceptable.

3.3.4 Conclusion Related to PRNF-Low Trip Function

Based on the evaluation in the above Sections 3.3.2 and 3.3.3 of this SE, the NRC staff concludes that the proposed changes to the conditions, required actions, completion times, and footnotes for LCO 3.3.1 and TS Table 3.3.1-1 for the PRNF-low trip function meet 10 CFR 50.36, and are, therefore, acceptable.

3.4 Proposed New TS 3.1.9 on RCS Boron Concentration

The licensee is relying on the proposed TS 3.1.9 and borating the RCS to greater than the ARO boron concentration, when the RCS temperature is less than 500 °F and the rod control system capable of rod withdrawal, to protect the reactor from a RWFS event.

The proposed TS change will add a new LCO for limitations on boron in the RCS at coolant temperatures less than 500 °F. The new LCO 3.1.9 will require that the RCS boron concentration shall be greater than the ARO critical boron concentration for the following reactor modes of operation:

3. In Mode 2 with k_{eff} less than 1.0 with any RCS cold leg temperature less than 500 °F and the rod control system capable of rod withdrawal,

4. In Mode 3 with any RCS cold leg temperature less than 500 °F and with the rod control system capable of rod withdrawal, and

5. In Modes 4 and 5 with the rod control system capable of rod withdrawal.

If the RCS boron concentration limit in LCO 3.1.9 is not met (i.e., proposed Condition A) when the plant is operating within the above modes of applicability, the licensee has proposed the following required actions and CTs for the plant to follow:

1. Initiate boration of restore RCS boron concentration to the limit (and thereby meet the LCO) immediately, or

2. Initiate action to place the rod control system in a condition incapable of control rod withdrawal immediately, or

3. Initiate action to increase the RCS cold leg temperature to greater than or equal to 500 °F immediately.

The licensee has proposed SR 3.1.9.1 to verify the RCS boron concentration is greater than the LCO-specified limit every 24 hours.

The licensee has proposed the new TS 3.1.9 to mitigate the consequences of the design-basis RWFS event. Based on this, the NRC staff concludes that TS 3.1.9 meets Criterion 3 in Section 2.0 of this SE. Given that the proposed TS 3.1.9 meets Criterion 3, then it should be in the TSs and should have an appropriate LCO, modes of applicability, condition(s) when the LCO is not met, required actions and CTs for the condition(s), and SRs. These are addressed below.

The proposed TS 3.1.9 has the proposed LCO that the boron concentration of the RCS shall be greater than the ARO critical boron concentration for the following modes of applicability:

- Mode 2 with $k_{eff} < 1.0$, with any RCS cold leg temperature < 500 °F and with the rod control system capable of rod withdrawal.

- Mode 3 (which is $k_{eff} < 1.0$) with any RCS cold leg temperature < 500 °F and with the rod control system capable of rod withdrawal.

- Modes 4 and 5 with the rod control system capable of rod withdrawal.

In its submittals, the licensee stated that at or above the RCS temperature of 500 °F the PRNF-low trip function protected the reactor from the RWFS event and, below 500 °F, the proposed TS 3.1.9 will protect the reactor in that borating the RCS to greater than the ARO critical boron concentration when the RCCA are capable of being withdrawn provides sufficient SDM in a RWFS event. If the rod control system is not capable of rod withdrawal, the RWFS event is not credible and does not have to be protected against the TSs.

The proposed modes of applicability conform to when the licensee needs to have the RCS boron concentration be the ARO critical concentration to protect the reactor. Based on this, the NRC staff concludes that the proposed modes of applicability meet 10 CFR 50.36 and are, therefore, acceptable.

The required actions for the proposed LCO condition, when the LCO is not being met, are to immediately do the following:

1. Initiate boration of the RCS to restore the RCS boron concentration to within limits, or

2. initiate action to place the rod control system in condition incapable of rod withdrawal, or

3. initiate action to increase all the RCS cold leg temperatures to $\geq$ 500 °F.

The proposed condition is consistent with the LCO not being met and each of the three required actions will place the reactor in a condition where the LCO is either being met (items 1 and 3 above) or the RWFS event is not credible (item 2 above). The proposed CT of acting immediately would have the licensee perform any of the three required actions without delay and in a controlled manner. Because of this and the proposed CT requires that the required action is done without delay, the NRC staff concludes that the proposed condition, required actions, and CTs meet 10 CFR 50.36 and are, therefore, acceptable.

The licensee also proposed SR 3.1.9.1 to verify the RCS boron concentration is greater than the ARO critical boron concentration with a surveillance test interval (STI) of 24 hours. This SR is sufficient to determine whether the LCO is being met or not, and therefore, no additional SR is needed. The proposed STI is the same 24 hours for verifying that the SDM (which involves the RCS boron concentration) is within limits in TS 3.1.1 and less than the 72 hours for verifying the RCS boron concentration in TS 3.9.1. Based on this, the NRC staff concludes that the proposed STI of 24 hours for SR 3.9.1.1 for verifying the boron concentration is reasonable and, therefore, meets 10 CFR 50.36. Based on this, the NRC staff further concludes that the proposed 24 hours is acceptable.

Based on the above evaluation, the NRC staff concludes that the proposed TS 3.1.9 ensures that the RCS boron concentration is greater than the ARO critical boron concentration when this

boron concentration is needed to protect the reactor against the RWFS event and meets 10 CFR 50.36. Based on this, the NRC staff further concludes that TS 3.1.9 is acceptable.

In adding the new TS 3.1.9 to the TSs, the licensee also proposed to add TS 3.1.9 to page i of the table of contents. This TS change to the table of contents is administrative in nature to identify where TS 3.1.9 is located in the TSs, and does not add or change any requirements in the TSs. Based on this, the NRC staff also concludes that the addition of TS 3.1.9 to the table of contents meets 10 CFR 50.36 and is, therefore, acceptable.

3.5 Proposed Amendment Conclusion

Based on the above evaluation, the NRC staff concludes that the proposed amendment in the form of a new TS 3.1.9 and a revised PRNF-low trip function in TS Table 3.3.1-1, will provide the necessary reactor protection for the RWFS event, meets 10 CFR 50.36, and meets GDC 13 and 20. Based on this, the NRC staff also concludes that the amendment is acceptable.

In Attachment 4 to its application, the licensee identified changes to TS bases that are associated with the licensee's proposed amendment. The NRC staff reviewed these changes and does not disagree with these changes. Changes to the TS bases are made by the licensee in accordance to TS 5.5.14, "Technical Specifications (TS) Bases Control Program."

4.0 STATE CONSULTATION

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

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and changes SRs. The NRC 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 on May 23, 2006 (71 FR 29682). 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.

6.0 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.

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