Union Electric
Callaway Plant

PO Box 620
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August 27, 2009

ULNRC-05655

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Stop P1-137
Washington, DC 20555-0001

10 CFR 50.90

Ladies and Gentlemen:

DOCKET NUMBER 50-483
CALLAWAY PLANT
UNION ELECTRIC CO.
APPLICATION FOR AMENDMENT TO
FACILITY OPERATING LICENSE NPF-30
(LDCN 09-0017)
REVISION OF TECHNICAL SPECIFICATION 3.3.9
TAC NO. ME1411

References:
1. Ameren UE Letter ULNRC-05633, "Facility Operating License NPF-30: LDCN 09-0017 – Revision of Technical Specification 3.3.9," dated June 1, 2009
2. Electronic Request for Additional Information (RAI) from NRC dated July 30, 2009

AmerenUE submitted a license amendment request via Reference 1 that proposed changes to Technical Specification (TS) 3.3.9 as contained in Facility Operating License Number NPF-30 for the Callaway Plant. Per Reference 2 the NRC staff requested additional information to complete their review. The attachment hereto provides the requested information.

It should be noted that the response to Question 1 of the NRC's RAI will require a change to the TS 3.3.9 markups that were included in Reference 1. That change will be submitted in a letter by October 1, 2009 since it requires a review by the Onsite Review Committee. Notwithstanding that change and the attached RAI responses, the conclusions of the licensing evaluations submitted in Reference 1 remain valid and unchanged. In addition, it should be noted that, similar to the original amendment request, there are no commitments contained in this letter.

AmerenUE requests NRC approval of the proposed license amendment by March 1, 2010 and that the license amendment be made effective upon NRC issuance with implementation within 90 days from the date of issuance. This approval date and implementation details remain the same as requested in Reference 1.

If you have any questions on this amendment application, please contact me at (573) 676-8528, or Mr. Scott Maglio at (573) 676-8719.

I declare under penalty of perjury that the foregoing is true and correct.

Very truly yours,

Executed on: 08/27/2009

Scott Sandbothe
Manager, Plant Support

GGY/nls

Attachment 1 – RAI Responses

cc:

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REQUEST FOR ADDITIONAL INFORMATION
CALLAWAY PLANT, UNIT 1
LICENSE AMENDMENT REQUEST
TO REVISE TECHNICAL SPECIFICATION (TS) 3.3.9
"BORON DILUTION MITIGATION SYSTEM (BDMS)" (TAC NO. ME1411)

Question

1. Please explain how the proposed Technical Specifications (TSs) will allow the BDMS function to be blocked during withdrawal of the control bank while in Mode 3.

The licensee's proposal modifies the Applicability of TS 3.3.9 to state, in part, that "The boron dilution flux multiplication signal may be blocked in MODE 3 during shutdown bank withdrawal." The submitted TS Bases state that while in Mode 3, the BDMS function may be blocked when "MODE 2 is administratively declared just prior to the commencement of control bank withdrawal even though k_{eff} should not yet be greater than or equal to 0.99 at that time." However, even if administrative controls are in place, the proposed TSs do not allow control bank withdrawal during the TS Table 1.1-1 definition of Mode 3 (i.e., $k_{eff} < 0.99$).

10 CFR 50.36(a)(1) states that "Each applicant for a license authorizing operation of a production or utilization facility shall include in its application proposed technical specifications in accordance with the requirements of this section. A summary statement of the bases or reasons for such specifications, other than those covering administrative controls, shall also be included in the application, but shall not become part of the technical specifications." As a result, the TS Bases should provide clarifying or amplifying information on the TS. The TS Bases should not contain statements that possibly conflict with the requirements of the TS.

It is unclear how the proposed TS will allow the BDMS function to be blocked during withdrawal of the control bank while in Mode 3.

Response

From Reference 1, revisions to the LCO 3.3.9 Applicability Note were proposed such that it would read as follows:

"The boron dilution flux multiplication signal may be blocked in MODE 2 (below P-6 (Intermediate Range Neutron Flux) interlock) during control bank withdrawal and in MODE 3 during shutdown bank withdrawal."

As a result of internal discussions prompted during the development of the response to this Request for Additional Information (RAI), the LCO 3.3.9 Applicability Note will be revised to read as follows:

----------NOTE----------
The boron dilution flux multiplication signal may be blocked:

1. During subcritical physics testing;

2. In MODE 2 (below P-6 (Intermediate Range Neutron Flux) interlock) and MODE 3 during control bank movement; and

3. In MODE 3 during shutdown bank movement.

The plant practice of administratively declaring MODE 2 entry upon commencement of control bank withdrawal is conservative in that certain TS 3.1 Core Reactivity LCOs are entered sooner than required by the TS Table 1.1-1 definition of MODE 2, such as TS 3.1.2, "Core Reactivity," TS 3.1.4, "Rod Group Alignment Limits," TS 3.1.5, "Shutdown Bank Insertion Limits," and TS 3.1.7, "Rod Position Indication." However, it is agreed that the plant is subcritical at the commencement of control bank withdrawal during the approach to criticality and the plant is in MODE 3 at that point in time as defined by TS Table 1.1-1. As such, the proposed LCO 3.3.9 Applicability Note will be revised to add "and MODE 3" with respect to the control bank BDMS signal blocking exception.

The addition of "during subcritical physics testing" and the change from the word "withdrawal" to "movement" in the LCO Applicability Note are explained in the response to the next RAI question.

Question

2. Please explain how the boron dilution event is mitigated with the BDMS blocked while in Mode 3 during rod withdrawal. Also, explain if the effects of a boron dilution event in Mode 3 with a blocked BDMS during rod withdrawal are bounded by the Mode 2 analysis, or more limiting.

The proposal modifies the Applicability of TS 3.3.9 to state, in part, that "The boron dilution flux multiplication signal may be blocked in MODE 3 during shutdown bank withdrawal." However, the UFSAR (Revision OL-14) credits the BDMS in Mode 3 to mitigate the effects of a boron dilution event. With the BDMS blocked in Mode 3, it is unclear how the boron dilution event will be mitigated while in that Mode (i.e. other automatic trips in place per the TS during rod withdrawal or enough time for operators to take action). The UFSAR credits the source range reactor trip (Function 6 of TS Table 3.3.1-1) and enough time for operator action to mitigate the effects of a boron dilution event during control bank withdrawal in Mode 2. However, it is unclear if the effects of a boron dilution event in Mode 3 with a blocked BDMS during shutdown or control bank withdrawal are bound by the Mode 2 analysis or are more limiting.

10 CFR 50.36(b) states, in part, that "The technical specifications will be derived from the analyses and evaluation included in the safety analysis report, and amendments thereto, submitted pursuant to § 50.34."

It is unclear how the boron dilution event will be mitigated with the BDMS blocked while in Mode 3 during rod withdrawal. It is also unclear if the effects of a boron dilution event in Mode 3 with a blocked BDMS during shutdown or control bank withdrawal are bound by the Mode 2 analysis or are more limiting. Please explain.

Response

The amendment request (ULNRC-05633 dated June 1, 2009) discusses the FSAR Chapter 15 (Section 15.4.6) analysis basis on pages 5, 8, 11, and 12 of Attachment 1. The discussion on pages 11 and 12 of Attachment 1 pertains to the essence of this question, and an excerpt from the No Significant Hazards Consideration (NSHC) in the license amendment request is repeated here:

> "The inadvertent boron dilution analysis acceptance criteria will continue to be met with the proposed change, with consideration given to the fact that the current licensing basis analyses do not assume concurrent rod withdrawal in the MODES 2 and 3 boron dilution analyses. The licensing basis analyses assume that positive reactivity insertion is being added by a single method, i.e., boron dilution. The MODE 2 licensing basis analysis of an inadvertent boron dilution event in FSAR Section 15.4.6 assumes that the shutdown banks are fully withdrawn and that the control banks are withdrawn to the 0% power rod insertion limits depicted in the COLR. The MODE 2 analysis credits operator action to swap the charging suction source after an automatic reactor trip, and corresponding rod insertion, on high source range neutron flux. The MODE 3 licensing basis analysis credits automatic mitigation by the BDMS with steady state initial conditions and static initial rod positions (all shutdown and control banks are fully inserted other than the single most reactive rod which is assumed to be fully withdrawn) at bounding RCS T-avg values at either end of MODE 3. **Neither the analysis nor the BDMS design basis assumes that the system protects against a rod withdrawal event.**" [emphasis added]

It should be noted that:

- The BDMS was not designed for, nor is it credited in the mitigation of, a positive reactivity transient associated with a rod withdrawal initiated while the reactor is subcritical. That event is discussed in FSAR Section 15.4.1. An automatic reactor trip on power range neutron flux (low setpoint) is credited for that reactivity transient. In the subcritical portion of MODE 2 and in MODE 3 when the rod control system is capable of rod withdrawal, which covers the plant status for which the revised LCO 3.3.9 Applicability Note would apply, LCO 3.1.9,

"RCS Boron Limitations < 500°F," and Function 2.b of TS Table 3.3.1-1, "RTS Instrumentation," provide requirements to protect against a rod withdrawal from subcritical (RWFS) event. These TS requirements were added pursuant to Callaway License Amendment 174 dated August 21, 2006 (TAC NO. MC6897). Since an inadvertent boron dilution event is a much slower reactivity transient than the RWFS event, those measures in LCOs 3.1.9 and 3.3.1 would also provide protection against the effects of an inadvertent boron dilution event in the upper portion of MODE 3 and in MODE 2 below P-6.

- The existing LCO 3.3.9 Applicability Note allows for blocking the BDMS in MODES 2 and 3 for which there is no supporting accident analysis in FSAR Section 15.4.6. As discussed below, the proposed amendment is a change in the conservative direction in that the undefined term in the existing Note, "during reactor startup," will be limited in its use and application.

- The BDMS has no mitigation function for rod insertion (negative reactivity) events.

The phrase "during reactor startup" could ostensibly be interpreted to cover all plant activities following the commencement of the first shutdown bank withdrawal. All plant restart and physics testing activities that follow the first shutdown bank withdrawal are associated with transitioning the plant from a subcritical state to full power operation and are, therefore, performed for "reactor startup." That phrase has different connotations depending upon context (for instance, in outage scheduling it typically refers to events after the 30% power flux map); however, it is undefined for TS 3.3.9 usage. The proposed amendment would enable (that is, unblock) the BDMS function except during subcritical physics testing activities and when rod cluster control assembly (RCCA) movement is taking place in the upper reaches of the LCO Applicability between the first shutdown bank withdrawal in MODE 3 and permissive P-6 (source range indication of 1E-10 amps, reactor still subcritical).

Under the revised LCO Applicability Note, the BDMS function would be blocked during subcritical physics testing which either directly involves rod movement or is performed at the same time as such testing, and the BDMS function would also be blocked during a rod withdrawal approach to criticality. Testing activities to be performed with the BDMS function blocked include:

- Rod drop time testing per SR 3.1.4.3

- Current traces for selected rods per Callaway's response to NRC Generic Letter 93-04 (Reference: Union Electric letter ULNRC-03131 dated January 19, 1995)

- Digital rod position indication (DRPI) testing over the full indicated range of rod travel per SR 3.1.7.1 and FSAR 16.1.3.1.1

- Subcritical Physics Testing with Subcritical Rod Worth Measurement (SWRM) which encompasses testing described in FSAR Section 4.3.2.2.8 as well as the Core Reactivity and beginning of life (BOL) upper limit Moderator Temperature Coefficient (MTC) surveillances of SR 3.1.2.1 and SR 3.1.3.1, respectively. Subcritical Physics Testing includes brief periods of static rod conditions but primarily involves testing that requires rod movement.

Under the revised LCO Applicability Note the BDMS function would be enabled during the following testing activities which do not require rod movement:

- Verification that the estimated critical position (ECP) is within the COLR limits per SR 3.1.6.1

- Shutdown margin verifications per SR 3.1.1.1

- Reactor trip breaker P-4 verification

- Verification that the RCS boron concentration is greater than all-rods-out critical concentration per SR 3.1.9.1.

Since the existing LCO Applicability Note has no accident analysis underpinning and the proposed change is generally more restrictive since additional limitations are added to when it can be applied, there should not now be a requirement for an analysis basis to support the Note. While the BDMS is blocked, operator action or a source range reactor trip would protect against a reactivity transient; however, there is no analysis which supports the existing LCO Applicability Note or the proposed change to that Note. The justification behind the proposed change is twofold – the proposed change takes an undefined term and places additional restrictions on its application, and the proposed change is consistent with several similar allowances in the TSs, as discussed on pages 9 and 10 of Attachment 1 to the amendment application, which provide exceptions to the plant's safety analysis basis.