AmerenUE
Callaway Plant

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February 5, 2004

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
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Ladies and Gentlemen:

ULNRC-04949

DOCKET NUMBER 50-483
CALLAWAY PLANT UNIT 1
UNION ELECTRIC CO.
LICENSE AMENDMENT REQUEST OL-1251
EMERGENCY TECHNICAL SPECIFICATION CHANGE TO PERMIT ONE-TIME EXTENSION OF REQUIRED ACTION COMPLETION TIME FOR INOPERABLE TURBINE DRIVEN AUXILIARY FEEDWATER PUMP

Pursuant to 10 CFR 50.90 and 10 CFR 50.91(a)(5), Union Electric Company (AmerenUE) hereby requests an emergency amendment of the Facility Operating License for the Callaway Plant (License No. NPF-30). Specifically, AmerenUE requests revision of Technical Specification (TS) 3.7.5, "Auxiliary Feedwater (AFW) System," to incorporate a one-time provision that would extend the allowed outage time (AOT) for an inoperable turbine driven auxiliary feedwater pump (TDAFP), as specified per Required Action C.1 of the Limiting Condition for Operation (LCO) for TS 3.7.5.

The requested change is prompted by an existing condition at Callaway. Specifically, the TDAFP was declared inoperable at 0756 hours Central Standard Time on Tuesday, February 3, 2004 immediately following the occurrence of an overspeed trip. When the trip occurred, the pump had been running in the recirculation mode for several hours following an automatic start in response to a plant trip. With the plant now in Mode 3 (Hot Standby), troubleshooting is underway to determine the cause of the overspeed trip and thus proceed with repair activities. Testing of the TDAFP will then need to be completed to re-establish or confirm Operability.

The requested amendment is needed to permit the plant to remain in Mode 3 rather than proceeding to Mode 4 before the TS-specified Completion Time (of Required Action D.2) expires. Adequate steam pressure is needed to run the pump and to maintain desired thermal conditions for evaluation of the turbine condition and performance during troubleshooting. It is anticipated that several pump runs may be needed to thoroughly troubleshoot the pump. The minimum steam pressure needed to run the turbine driven pump at the required speed and to support troubleshooting can only be obtained in Mode 3 (or a higher Mode of operation, but not in Mode 4).

A001

With regard to the TS requirements for the TDAFP, declaring the TDAFP inoperable at 0756 on February 3 placed Condition C under TS 3.7.5 in effect. Entry into Condition C places Required Condition C.1 into effect, which requires restoring the inoperable AFW train to OPERABLE status within 72 hours. With this Required Action /Completion Time not met, Condition D must be entered which would place Required Actions D.1 and D.2 into effect. These Actions respectively require the plant to be in Mode 3 within 6 hours and in Mode 4 within 12 hours. Since the TDAFP was declared inoperable at 0756 on February 3 (with the plant already in Mode 3), it must be restored to OPERABLE status by 0756 on February 6 (Friday morning). Otherwise, the plant is required to be in Mode 4 (per Required Action D.2) by 1956 on that day.

To permit additional time to complete troubleshooting, repair and restoration of the TDAFP, and to allow the plant to remain in Mode 3 for completing these activities, AmerenUE requests a revision of TS 3.7.5 that would extend, on a one-time basis, the 72-hour Completion Time / AOT currently specified for an inoperable TDAFP by an additional 72 hours such that for the current situation, the plant would not be required to be in Mode 4 until 1956 on February 9, 2004. The change is requested on an emergency basis since failure to act in a timely way would result in shutdown (i.e., further shutdown) of the facility which would preclude further testing to determine the root cause. Specifically, in light of the currently required entry into Mode 4 by 1956 on February 6, and to accommodate a controlled plant shutdown to Mode 4 by that time if it is determined that the amendment cannot be granted in time, AmerenUE requests approval of the requested amendment by 1200 on February 6.

Essential information is provided in the attachments to this letter. Attachment 1 contains a description of the proposed change, the supporting technical analyses, and the significant hazards determination. Attachments 2 and 3 contain marked-up and revised TS pages, respectively. Attachment 4 contains proposed changes to the TS Bases (in marked-up form). These Bases changes are provided for information only, and will be implemented pursuant to the TS Bases Control Program, TS 5.5.14, upon approval of this license amendment.

As indicated in Attachment 1, the proposed TS changes have been evaluated pursuant to CFR 50.92, and it has been determined that this amendment application does not involve a significant hazard consideration. In addition, evaluation of the proposed changes against the requirements of 10 CFR 51.22(b) has determined that no environmental impact statement or environmental assessment needs to be prepared in connection with the issuance of a license amendment for the proposed changes. The bases for these determinations are included in Attachment 1. It should be noted that AmerenUE's evaluation of the proposed changes includes traditional engineering analyses as well as a risk-informed approach as set forth in Regulatory Guide 1.177, "An Approach for Plant-Specific, Risk-Informed Decision making: Technical Specifications."

This amendment application has been reviewed by Callaway's Onsite Review Committee and Nuclear Safety Review Board. In addition, pursuant to 10 CFR 50.91, a copy of this application, with attachments, is being provided to the designated Missouri State official. Please contact us for any questions you may have regarding this amendment application.

Very truly yours,

Keith D. Young
Manager, Regulatory Affairs

TBE/GGY/KGC/mlo

Attachments:

1 Evaluation
2 Markup of Technical Specifications
3 Retyped Technical Specifications
4 Proposed Technical Specification Bases Changes (for information only)
5 Summary of Regulatory Commitments

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ULNRC-04949
February 5, 2004

STATE OF MISSOURI)
) SS
CALLAWAY COUNTY)

Keith D. Young of lawful age, being first duly sworn upon oath says that he is Manager - Regulatory Affairs, for Union Electric Company; that he has read the foregoing document and knows the content thereof; that he has executed the same for and on behalf of said company with full power and authority to do so; and that the facts therein stated are true and correct to the best of his knowledge, information and belief.

By Keith D. Young
Keith D. Young
Manager, Regulatory Affairs

SUBSCRIBED and sworn to before me this 5th day of February, 2004.

TERRA E. COOK
Notary Public - Notary Seal
STATE OF MISSOURI
Callaway County
My Commission Expires May 15, 2006

Terra E. Cook

EVALUATION

EVALUATION

1.0 DESCRIPTION

The proposed amendment would revise Technical Specification (TS) 3.7.5, "Auxiliary Feedwater (AFW) System," to allow a one-time only extension of 72 hours to the Completion Time for Required Action C.1 for restoration of the inoperable turbine driven auxiliary feedwater pump (TDAFP).

2.0 PROPOSED CHANGE

The Completion Time for Required Action C.1 of TS 3.7.5 currently reads:

> "72 hours AND 10 days from discovery of failure to meet the LCO."

The proposed change would add a footnote to the 72 hour portion of the Completion Time for Required Action C.1 of TS 3.7.5 to read as follows:

> "With the exception that the Completion Time associated with the Condition C entry on 2/3/04 for the turbine driven auxiliary feedwater pump has been extended on a one-time only basis to 144 hours. At the time a formal cause of the inoperability is determined, Condition D will be entered immediately."

The second Completion Time, "10 days from discovery of failure to meet the LCO", remains unchanged.

Attachment 2 contains the TS mark-up for the above change. The Corresponding TS Bases is also revised in Attachment 4 to be consistent with the above change.

3.0 BACKGROUND

The AFW System automatically supplies feedwater to the steam generators to remove decay heat from the Reactor Coolant System upon the loss of normal feedwater supply. The AFW pumps normally take suction through a common suction line from the condensate storage tank (CST). Should the CST become unavailable, cooling water is available from the Essential Service Water (ESW) system. Each motor driven AFW pump (MDAFP) is supplied from one ESW train. The turbine driven AFW pump (TDAFP) is supplied from either ESW train. The AFW pumps discharge to the steam generator secondary side via separate and independent connections to the main feedwater (MFW) piping outside containment. The steam generators function as a heat sink for core decay heat. The heat load is dissipated by releasing steam to the atmosphere from the steam generators via the main steam safety valves (MSSVs) or atmospheric steam dump valves. If the main condenser is available, steam may be released via the Condenser Steam Dump valves and condensate recirculated to the CST.

The AFW System consists of two motor driven AFW pumps and one steam turbine driven pump configured into three trains. Each motor driven pump provides 100% of the feedwater flow required for removal of decay heat from the reactor assumed in the accident analyses. The TDAFP provides 200% of the capacity of a motor driven pump. The TDAFP receives steam from two main steam lines upstream of the main steam isolation valves and water from either the condensate storage tank or redundant ESW supply lines. Each of the steam feed lines will supply 100% of the requirements of the TDAFP. In addition, each of the ESW supply lines will supply 100% of the requirements of the TDAFP.

The AFW System is capable of supplying feedwater to the steam generators during normal unit startup, shutdown, and hot standby conditions. The TDAFP supplies a common header capable of feeding all steam generators with normally open air operated control valves. The AFW system is described in further detail in FSAR Section 10.4.9.

Surveillance Requirement (SR) 3.7.5.2, which verifies the required developed pump head, and SR 3.7.5.4, which verifies pump auto-start, are both modified by a Note. The Note indicates that these SRs may be deferred until suitable test conditions are established, i.e., the SRs are not required to be performed for the TDAFP until 24 hours after $\geq$ 900 psig in the steam generator. This deferral is required because there is insufficient steam pressure to perform the test until this test condition is satisfied.

NEED FOR CHANGE

On 2/3/04 at 0756 hours Central Standard Time, the TDAFP tripped due to mechanical overspeed. The pump was declared inoperable and TS 3.7.5 Condition C was entered. The pump was running during recovery from a reactor trip that occurred earlier the same morning. The extended Completion Time is required to maintain suitable test conditions for troubleshooting which will involve an iterative process of mechanical retests at rated flow conditions under the necessary steam pressure.

Specifically, the ongoing root cause analysis investigation and troubleshooting activities require maintaining "normal operating conditions" to the best extent possible for the TDAFP. The performance characteristics of the pump turbine and its associated control systems are heavily dependent upon main steam pressure and the corresponding thermal effects of the steam temperature (Tsat – Psat relationship). That is, the pump turbine and associated control circuits perform differently for different steam header pressures.

Because the TDAFP trip occurred approximately 3 hours and 20 minutes after the plant trip, potential thermal heating effects at the existing NOP/NOT plant conditions are critical in evaluating the cause. Important thermal effects include thermal expansion of the turbine rotor, shaft, valves, piping, and the corresponding dimensional tolerances between these components. For a plant cooldown to MODE 4, the pressures and temperatures would be significantly reduced relative to MODE 3 conditions. This in turn would reduce the thermal expansion effects of all the mechanical components as well as the force differences associated with the pressure differential. The approximate steam pressure and temperature for MODE 3 is 1050 psia and 550°F, respectively, whereas for MODE 4 a steam pressure and temperature of 135 psia and 350°F would be expected.

Upon occurrence of the trip, no immediate cause was evident. An extensive troubleshooting plan was thus developed to systematically eliminate potential faults identified from the detailed fault tree analysis. As part of the troubleshooting plan, three long pump runs (greater than 3 hours) have already been performed to simulate similar conditions as those present during the initial failure of the pump. In addition to the pump runs, there were also numerous work requests initiated for troubleshooting to eliminate potential failures of components and auxiliary systems, e.g. steam trap operation, governor stem binding, coupling integrity, etc. Some of these activities are ongoing.

The ongoing root cause analysis investigation is following a systematic process that was developed using a fault tree to identify key indications or plant conditions that could have resulted in tripping of the TDAFP. Key areas contained in the fault tree include:

- Loss of Load
  - Pump shaft failure
  - Recirculation orifice obstruction
  - Cavitation
  - Coupling failure
- TDAFP Controller Failure
  - Digital Controls failure
  - PGPL actuator and governor valve failure
- Steam Supply Fluctuations
- Human Error
- Water Ingestion
  - Steam trap or AOV failure
  - Water slug from steam supply

As a result of this troubleshooting, it appears that the momentary fault that occurred may be associated with the TDAFP controller. Although the long duration runs have not resulted in a trip of the TDAFP, one run did show a sudden increase in speed and discharge pressure on the pump. This occurrence was observed after approximately 3 hours run time on the TDAFP, which was similar to the timing observed during the initial event. Investigation of this concern continues.

4.0 TECHNICAL ANALYSIS

The change being considered in this analysis was evaluated consistent with the three-tiered approach currently defined in Regulatory Guide 1.177. The first tier addresses PRA insights and includes the risk analysis to support the one-time only Completion Time extension. The second tier addresses avoidance of risk-significant plant configurations. The third tier addresses risk-informed plant configuration control and management.

Tier 1, PRA Capability and Insights

TS 3.7.5 Condition C specifies a Completion Time of 72 hours for restoring an inoperable TDAFP to OPERABLE status during MODES 1, 2, and 3. Upon expiration of this Completion Time, the plant would have to enter Condition D of TS 3.7.5 and ultimately be taken to MODE 4 within 12 hours of Condition D entry.

A risk evaluation was performed to justify a one-time only increase of 72 hours in the Completion Time of TS 3.7.5 Required Action C.1. The evaluation assessed the impact on core damage risk due to the plant staying in MODE 3 for an additional 72 hours, with the TDAFP out of service. This evaluation credited the availability of all other risk-significant plant equipment (except for the 'C' loop Component Cooling Water Pump, which is currently out of service), the switchyard being fully reliable, not performing any work in the switchyard, and limiting personnel access to the switchyard. The incremental conditional core damage probability (ICCDP), corresponding to delaying Condition D entry by an additional 72 hours with the plant in this configuration, was determined to be 3.97E-07. The ICCDP is a unit-less value obtained by multiplying the incremental core damage frequency due to this plant configuration (4.83E-05 per year) by the incremental time this condition will exist over a one year period (72 additional hours divided by 8766 hours/year). The calculated ICCDP is below the Regulatory Guide 1.177 limit of 5E-07. In addition, since the request is for a one-time only Completion Time increase, the calculated ICCDP also represents the increase in core damage frequency (ΔCDF) attributable to this request. In effect, this would involve multiplying the unit-less ICCDP value by 1 allowed occurrence per year. The ΔCDF (i.e., 3.97E-07 per year), then, is also below the Regulatory Guide 1.174 limit of 1E-06 per year. Also note that the core damage risk value calculated is conservative, since it uses the at-power PRA model and, therefore, does not credit the reduced decay heat load that exists now, versus the decay heat load upon reactor trip.

This TS change was risk-evaluated using the metrics of incremental conditional core damage probability and increase in core damage frequency. These metrics are more limiting than the corresponding large early release metrics for this case. The change in large early release frequency (ΔLERF) and incremental conditional large early release probability (ICLERP) are provided, for information, in the table on the following page.

Plant procedures govern Callaway's PRA quality program. Attributes of these procedures, which serve to ensure that the PRA model represents the as-built, as-operated plant, include the following:

- Screening criteria, contained in the Licensing Impact Review procedure/form, are used by the entire organization for screening of plant changes for potential PRA impact. As a result of this screening, all proposed Technical Specification changes are reviewed by the PRA group for any impact on the PRA model. Those that are deemed to impact the model are tracked for inclusion in a PRA update. Proposed

plant design changes, which screen-in as having possible PRA impact, are reviewed by the PRA group, and those that would impact the PRA model are tracked for inclusion in a PRA update.

- In addition to Technical Specification and plant design changes, the following items are monitored and included, as appropriate, in PRA model updates:
  - Unavailability and functional failure data from the Callaway Maintenance Rule Program;
  - Emergency Operating Procedure changes;
  - Operating experience (both industry and Callaway-specific); and
  - Westinghouse Owners' Group, NRC and other industry studies, methodology enhancements, etc.
- All PRA model changes are documented in calculation notes and undergo review by a qualified AmerenUE reviewer and the PRA group supervisor.

There were no findings during the NRC's review of our IPE submittal that would have an impact on the conclusions of this amendment application. A Westinghouse Owners Group (WOG) PRA Peer Review was performed on the Callaway PRA in November of 2000. There were no WOG PRA Peer Review findings that would have an impact on this amendment application.

No specific sensitivity or uncertainty analyses were performed as part of the PRA analysis supporting this amendment application. However, it should be noted that the calculated ICCDP and ΔCDF values are somewhat below the applicable Regulatory Guide limits; therefore, reasonable uncertainty in the results can be accommodated.

The following table lists the risk metric acceptance criteria and the results for the requested one-time only Completion Time extension.

Risk Metric	Acceptance Criterion	Requested Change for a One-Time Only 72 Hour Completion Time Extension for TS 3.7.5 Required Action C.1
ΔCDF per year	< 1E-06 per year	3.97E-07
ICCDP	< 5E-07	3.97E-07
ΔLERF per year	< 1E-07 per year	2.53E-10
ICLERP	< 5E-08	2.53E-10

Specific PRA information that supports the above conclusions is discussed below:

1. Brief description of the Callaway containment structure

   The Callaway containment is of the large, dry design. The internal free volume is approximately 2.5 million cubic feet. The containment internal design pressure is 60 psig. A containment ultimate strength analysis, performed by Bechtel Corporation in support of the Callaway IPE, determined that the containment is actually significantly more robust than indicated by the design pressure. For example, the minimum internal pressure capability (at 95% confidence) is approximately 80 psig, and the median failure pressure, at 50% confidence, is approximately 135 psig.

   As a consequence of the Callaway containment design, the Callaway large early release frequency (LERF) is dominated by containment bypass events. In fact, steam generator tube rupture and interfacing systems LOCA core damage events account for over 98 percent of the baseline Callaway LERF of 4.20E-07 per year.

2. Brief description of the Callaway PRA

   The Callaway PRA used to support this amendment request is an internal events model, which uses the small event tree, large fault tree approach. The Callaway PRA was originally developed for the Generic Letter 88-20 IPE requirement, and has been updated twice since the IPE. Scientech's NUPRA PRA workstation is used to store and quantify the PRA model. Core damage and large early release sequences are quantified using truncation values of 1E-10 and 1E-11, respectively.

3. Uncertainty values

   A parametric uncertainty analysis was performed on the conditional core damage frequency (CCDF) determined with the turbine driven auxiliary feedwater pump out of service. At 95 percent confidence, the CCDF is 1.48E-04 per year. At 50 percent confidence, the CCDF is 6.94E-05 per year.

4. Description of the seismic and fire evaluations

   Seismic and fire evaluations were developed for the IPEEE submittal. For seismic, a focused scope Seismic Margins Assessment (SMA) was performed, in accordance with EPRI NP-6041-SL. For fire, EPRI's Fire Induced Vulnerability Evaluation (FIVE) methodology was used. These methodologies provide an effective means to search for vulnerabilities, but do not yield quantitative risk information that can be readily used to support this amendment request.

5. Common cause failures

   Equipment common cause failure groups were identified and included in the development of the Callaway PRA. With respect to the TDAFP, there is no redundant TDAFP; therefore, there is no opposite train component that could also be failed due to common cause (i.e.,

there is no redundant component whose failure probability should be set to the common cause factor in this analysis).

In addition, we do not believe that the problem with the TDAFP represents a cross-cutting issue, which could call for an increase in the common cause failure probability used for other PRA-modeled components. The problem with the TDAFP resulted in an overspeed trip of the pump. Other pumps, such as the motor driven auxiliary feedwater pumps, do not have an overspeed trip; hence, there is no increased probability that these pumps would fail, given the observed failure of the TDAFP. Also, at present, Ameren is investigating the possibility that the trip was associated with the digital controller for the pump. Since the MDAFPs, and other modeled pumps, do not have a digital controller, they would not be susceptible to the same type of failure. There is no reason at present to believe that other PRA components have a higher failure probability, given the failure of the TDAFP.

Tier 2, Avoidance of Risk-Significant Plant Configurations

Tier 2 requires an examination of the need to impose additional restrictions when operating under the proposed Completion Times in order to avoid risk-significant equipment outage configurations.

Consistent with the need to include Tier 2 insights into the decision-making process before taking equipment out of service, the following restrictions on concurrent removal of certain equipment will be included (see also Attachment 5):

- No work will be performed in the Callaway switchyard and access to the switchyard will be restricted to reduce the likelihood of a loss of offsite power (LOOP). Reducing the LOOP frequency reduces Callaway's overall risk, and reduces the impact of events (such as station blackout) that require the TDAFP for mitigation.
- No risk-significant plant equipment modeled in the PRA will be out of service, except for the turbine driven auxiliary feedwater pump (TDAFP) and the 'C' loop Component Cooling Water pump. This matches the current plant status as reflected in the Equipment Out of Service Log (EOSL). If risk-significant plant equipment modeled in the PRA were to fail during the extended 72-hour Completion Time, the Tier 3 Configuration Risk Management Program discussed below will assess the emergent condition and direct activities to restore that emergent inoperability thereby fully implementing these Tier 2 restrictions or the plant will immediately enter Condition D of TS 3.7.5, whichever is appropriate from a risk management perspective.

Tier 3, Risk-Informed Configuration Risk Management

Tier 3 requires a proceduralized process to assess the risk associated with both planned and unplanned work activities. The objective of the third tier is to ensure that the risk impact of out-of-service equipment is evaluated prior to performing any maintenance activity. As stated in

Section 2.3 of Regulatory Guide 1.177, "a viable program would be one that is able to uncover risk-significant plant equipment outage configurations in a timely manner during normal plant operation." The third-tier requirement is an extension of the second-tier requirement, but

addresses the limitation of not being able to identify all possible risk-significant plant configurations in the second-tier evaluation. Programs and procedures are in place at Callaway which serve to address this objective.

In particular, APA-ZZ-00315, "Configuration Risk Management Program," and EDP-ZZ-01129, "Callaway Plant Risk Assessment," are an integral part of the work management process at the plant. The Configuration Risk Management Program (CRMP) ensures that configuration risk is assessed (using the PRA-based Safety Monitor, a computer-based program for assessing the impact on plant safety of out of service equipment) and managed prior to initiating any maintenance activity consistent with the requirements of 10 CFR 50.65(a)(4). The CRMP also ensures that risk is reassessed if an emergent condition results in a plant configuration that has not been previously assessed. Under the CRMP, using the associated Safety Monitor, risk thresholds were established to ensure that average baseline risk is maintained within an acceptable band. When the administrative limit (Safety Monitor in the Yellow Band) is exceeded, compensatory measures are established to reduce risk (limit unavailability time and implement a contingency plan to restore and/or mitigate the loss of a key safety function). If a risk significant configuration occurs (Safety Monitor in the Red Band), immediate actions are taken to protect redundant/diverse SSCs that are relied upon to mitigate events.

Impact on Defense-in-Depth

This amendment request does not involve any hardware changes or any changes in the method by which any safety-related plant system performs its safety function. The proposed change will not affect the normal method of plant operation. No performance or testing requirements will be affected or eliminated. The proposed change only increases the amount of time the plant may remain in MODE 3 with an inoperable TDAFP.

The FSAR safety analyses were reviewed to evaluate the impact of the proposed one-time only Completion Time extension. For the proposed change, single failure considerations do not come into play since the plant is in a Condition of the Technical Specifications with a limited Completion Time. Therefore, both motor driven AFW pumps are assumed to be available and only the TDAFP is unavailable. The following events that specifically credit AFW flow were examined:

Steam Line Break
Loss of AC Power
Loss of Normal Feedwater
Feedline Break
Small Break LOCA
Station Blackout.

For Steam Line Break, two cases are considered in the FSAR. In Section 6.2, several Steam Line Break cases are evaluated for containment pressure/temperature effects. As discussed

in Sections 6.2.1.4.1.3 and 6.2.1.4.3.2, auxiliary feedwater flow is assumed to be at a maximum value in order to increase the mass/energy release to containment. The lack of flow from the TDAFP would benefit this analysis. In Section 15.1.5, analyses are presented that evaluate the effects on core reactivity and radiological consequences for a Steam Line Break. These analyses assume the loss of one ECCS train which minimizes the injection of boron and maximizes the return to power. The most limiting effects on core reactivity are produced by maximizing the reactor coolant system cooldown due to the excessive heat removal produced by a postulated Steam Line Break. The absence of flow from the TDAFP does not produce a more limiting analysis result for the Steam Line Break accident sequence. If Steam Line Break were reanalyzed with the single failure being the loss of the TDAFP, the results would not be as limiting since additional core boration would be realized and the two motor driven AFW pumps assumed available in this evaluation would provide an equivalent decay heat dissipation capability as one TDAFP. Additionally, it should be noted that the Steam Line Break radiological consequences reported in Callaway's FSAR are based on Reactor Coolant System fission product inventories representative of 100% power operation at the DEI-131 Technical Specification limit of 1 μCi/gm, and iodine spiking following the reactor trip. The plant conditions present during the period of time covered by the proposed one-time Technical Specification change would produce much lower radiological consequences. Steady-state iodine concentrations observed prior to the February 3, 2004 reactor trip were substantially lower than Technical Specification limits. Additionally, the post-trip iodine spike has already occurred, and iodine removal via letdown and decay will have occurred during the first 72 hours of subcritical operation.

For Loss of AC Power and Loss of Normal Feedwater, both analyses credit only the flow from one motor driven AFW pump (480 gpm). Since two motor driven AFW pumps are available in this evaluation, these analyses are unaffected. Additionally, it should be noted that the most limiting results for these events are obtained based on MODE 1 conditions. The plant conditions present during the period of time covered by the proposed one-time Technical Specification change would produce a much less limiting result. The decay heat loads following 72 hours of subcritical plant operation are much lower than the heat loads considered in the analyses of record for these events.

For Feedline Break, the analysis credits a total flow of 563 gpm from one motor driven AFW pump and the TDAFP due to the effects of flow control valves in the discharge lines from the motor driven AFW pumps to the steam generators. Flow from two motor driven AFW pumps assumed available in this evaluation would exceed this 563 gpm combined total for a Feedline Break. Additionally, it should be noted that the most limiting results for this event is obtained based on MODE 1 conditions. The plant conditions present during the period of time covered by the proposed one-time Technical Specification change would produce a much less limiting result. The decay heat loads following 72 hours of subcritical plant operation are much lower than the heat loads considered in the analysis of record for this event.

For Small Break LOCA, flow from just the TDAFP is assumed mainly as an analysis convenience so there is no need to consider asymmetric effects. For this evaluation, the flow from the two motor driven AFW pumps provides the same flow symmetry as the single TDAFP. Additionally, it should be noted that the most limiting results for this event is obtained based on MODE 1 conditions. The plant conditions present during the period of time covered by the proposed one-time Technical Specification change would produce a much less limiting result. The decay heat loads following 72 hours of subcritical plant operation are much lower than the heat loads considered in the analysis of record for this event.

FSAR Appendix 8.3A provides an evaluation of Callaway's capability to cope with a Station Blackout (SBO). The Condensate Storage Tank (CST) volume required by TS 3.7.6 is more than adequate to remove decay heat and cool the Reactor Coolant System during Callaway's four hour SBO coping duration requirement. During an SBO the TDAFP would provide the motive force for this CST volume. However, as discussed in FSAR Table 8.3A-1 (Callaway's assessment against NUMARC 87-00) items I.A.1, I.A.2, and I.B.2, the SBO event is not postulated to occur when the plant is in TS 3.7.5 Condition C for an inoperable TDAFP. The SBO event is postulated to occur from 100% rated thermal power with all plant equipment either operating or available from the standby state. No other design basis accidents or other events are postulated to occur immediately prior to or during the SBO.

In addition to the above evaluations, NRC guidance is provided for assessing whether proposed TS changes impact defense-in-depth principles. The guidance outlines a number of elements that may be addressed, as summarized below. Per the NRC guidance, consistency with the defense-in-depth philosophy is maintained if:

A. A reasonable balance among prevention of core damage, prevention of containment failure, and consequence mitigation is preserved, i.e., the proposed change in a TS has not significantly changed the balance among these principles of prevention and mitigation, to the extent that such balance is needed to meet the acceptance criteria of the specific design basis accidents and transients, consistent with 10 CFR 50.36. TS change requests should consider whether the anticipated operational changes associated with a TS change could introduce new accidents or transients or could increase the likelihood of an accident or transient (as is required by 10 CFR 50.92).

Response: The proposed change increases the Completion Time (allowed outage time) specified in the Technical Specifications for the inoperable TDAFP. The allowed outage time is a TS provision which, as noted in the TS Bases, "is reasonable, based on redundant capabilities afforded by the AFW system, the time needed for repairs, and the low probability of a LOCA occurring during the time period." In general, the Technical Specifications permit Limiting Conditions for Operation and thus the normally required full complement of redundant components and trains to not be met for short periods of time on this basis. These provisions, as noted in the Technical Specifications themselves, have been determined to be reasonable based on engineering judgment, while still preserving the intent of maintaining adequate system/component availability for those systems and components assumed to function in accordance with the assumptions of the accident analyses. The extended AOT has been quantitatively evaluated for risk and was established on the basis that the risk is acceptable, as already discussed.

With regard to the potential for the introduction of any new accidents or transients or increase in the likelihood of an accident or transient, these concerns are addressed in the Basis for No Significant Hazards Consideration in Section 5.1.

B. Over-reliance on programmatic activities to compensate for weaknesses in plant design is avoided, e.g., use of high reliability estimates that are primarily based on optimistic program assumptions.

Response: The Technical Specification requirements for Callaway are based on the plant design and the associated safety analyses that demonstrate the adequacy of the design in preventing and mitigating postulated accidents and transients (design-basis events). The proposed Completion Time (AOT) extension does not constitute an over-reliance on a programmatic activity, given that the intent is to utilize an existing Technical Specification provision (albeit a longer-than-normal provision) and only on a one-time basis. Although the AOT provision of TS Required Action C.1 is being extended, it is justified with respect to plant risk.

C. System redundancy, independence, and diversity are maintained commensurate with the expected frequency and consequences of challenges to the system, e.g., there are no risk outliers. The following items should be considered:

· *Whether there are appropriate restrictions in place to preclude simultaneous equipment outages that would erode the principles of redundancy and diversity,*

Response: Restrictions are in place to preclude simultaneous equipment outages that would erode the principles of redundancy and diversity. These restrictions include:

- the Technical Specifications, which serve to assure that defense-in-depth is maintained,
- the Tier 2 restrictions identified within this request, which help to assure redundancy and diversity, and minimize the likelihood of challenges to the system, and
- Restrictions from entering plant configurations that Callaway's 10CFR50.65(a)(4) (i.e., Tier 3) program determines to be of high risk.

· *Whether compensatory actions to be taken when entering the modified AOT for pre-planned maintenance are identified,*

Response: Such compensatory actions have been identified and constitute the Tier 2 restrictions identified within this request.

· *Whether voluntary removal of equipment from service during plant operation should not be scheduled when adverse weather conditions are predicted or at times when the plant may be subjected to other abnormal conditions, and*

Response: Callaway's 10CFR50.65(a)(4) program would assess and manage the risk associated with the prediction or occurrence of adverse weather or other, abnormal conditions occurring coincident with the extended TDAFP Completion Time.

· *Whether the impact of the TS change on the safety function should be taken into consideration. For example, what is the impact of a change in the AOT for the low-pressure safety injection system on the overall availability and reliability of the low-pressure injection function?*

Response: The impact of the Completion Time extension on AFW system availability/reliability is an integral part of the PRA calculations performed to support the Tier 1 evaluation. The Tier 1 evaluation confirmed that the Completion Time extension is acceptable based on applicable Regulatory Guide limits.

D. Defenses against potential common cause failures are maintained and the potential for introduction of new common cause failure mechanisms is assessed, e.g., TS change requests should consider whether the anticipated operational changes associated with a change in an AOT or STI could introduce any new common cause failure modes not previously considered.

Response: Potential common cause failures were discussed previously, in the section titled "Tier 1, PRA Capability and Insights." The proposed AOT increase allows for troubleshooting and testing of the TDAFP. The work performed on the TDAFP is unique. No other components or trains will be impacted by this work. Therefore the one-time increase in the AOT proposed by this TS change request will not introduce any new common cause failure modes or impact any defenses against potential common cause failures.

E. Independence of physical barriers is not degraded, e.g., TS change requests should address a means of ensuring that the independence of barriers has not been degraded by the TS change (e.g., when changing TS for containment systems).

Response: The independence of physical barriers is not degraded by the proposed AOT increase. The three barriers to fission product release (i.e., fuel cladding, RCS pressure boundary, and containment) are not impacted by the one-time increase in the AOT proposed by this TS change request.

F. Defenses against human errors are maintained, e.g., TS change requests should consider whether the anticipated operation changes associated with a change in an AOT or STI could change the expected operator response or introduce any new human errors not previously considered, such as the change from performing maintenance during shutdown to performing maintenance at power when different personnel and different activities may be involved.

Response: The proposed AOT increase allows for troubleshooting and testing of the TDAFP. The work and testing on the TDAFP is performed by the same qualified personnel who would perform this work for planned maintenance of the TDAFP. Callaway personnel are trained in the use of human error prevention tools. Therefore the one-time increase in the AOT proposed by this TS change request will not introduce any new human errors or impact any defenses against human errors.

G. The intent of the General Design Criteria in Appendix A to 10 CFR Part 50 is maintained.

Response: Applicable General Design Criteria and continued compliance with those criteria are addressed in Section 5.2,"Applicable Regulatory Requirements/Criteria."

Conclusion

Traditional engineering considerations have been discussed in this section. The fundamental safety principles upon which the plant design is based are not compromised by the proposed amendment application.

5.0 REGULATORY ANALYSIS

This section addresses the standards of 10 CFR 50.92 as well as the applicable regulatory requirements and acceptance criteria.

5.1 NO SIGNIFICANT HAZARDS CONSIDERATION (NSHC)

The proposed amendment would revise Technical Specification (TS) 3.7.5, "Auxiliary Feedwater (AFW) System," to allow a one-time only extension of 72 hours to the Completion Time for Required Action C.1 for restoration of the inoperable turbine driven auxiliary feedwater pump (TDAFP). The proposed change does not involve a significant hazards consideration based on the three standards set forth in 10 CFR 50.92(c) as discussed below:

(1) Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No

Overall protection system performance will remain within the bounds of the previously performed accident analyses since no hardware changes are proposed. The protection systems (RTS and ESFAS) will continue to function in a manner consistent with the plant design basis. This change to the Technical Specifications does not result in a condition where the design, material, and construction standards that were applicable prior to the change are altered. The proposed change will not modify any system interface. The proposed change will not affect the probability of any event initiators. There will be no change to normal plant operating parameters or accident mitigation performance. The proposed change will not alter any assumptions or change any mitigation actions in the radiological consequence evaluations in the FSAR.

Implementation of the proposed change will result in an insignificant risk impact. The proposed one-time only change to the TS 3.7.5 Required Action C.1 Completion Time does not, of itself, increase the probability of any accident previously evaluated. However, the proposed change will result in an insignificant increase in the risk of plant operation. This is demonstrated by showing that the impact on plant safety as measured by the increase in core damage frequency (ΔCDF) is less than 1.0E-06 per year and the increase in large early release frequency (ΔLERF) is less than 1.0E-07 per year. In addition, the incremental conditional core damage probability (ICCDP) and incremental conditional large early release probability (ICLERP) are less than 5.0E-07 and 5.0E-08, respectively. These changes meet

the acceptance criteria in Regulatory Guides 1.174 and 1.177. The AFW system design and testing provisions are not being changed, and the AFW system will continue to perform its required safety function. Since the increase in risk as measured by the risk metrics is within the acceptance criteria of existing regulatory guidance, there will not be a significant increase in the consequences of any accidents.

The proposed change does not adversely affect accident initiators or precursors nor alter the design assumptions or the manner in which the plant is normally operated and maintained. The proposed change does not affect the source term, containment isolation, or radiological release assumptions used in evaluating the radiological consequences of an accident previously evaluated. The proposed change is consistent with safety analysis assumptions which apply when the plant is operating in compliance with LCO requirements.

Therefore, this change does not increase the probability or consequences of an accident previously evaluated.

(2) Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

There are no hardware changes nor are there any changes in the method by which any safety-related plant system performs its safety function. The proposed changes will not affect the normal method of plant operation. There will be no setpoint changes. There will be no changes to accident analysis assumptions; however, those assumptions fully apply only in the absence of a Technical Specification Condition entry. The Technical Specification LCOs are intentionally structured such that the initial condition assumption in the accident analyses is that LCO compliance is in place. The accident analyses make their applicable single failure assumptions and the LCO Completion Time limitations provide assurance that the single failure susceptibility is appropriately limited.

No new accident scenarios, transient precursors, failure mechanisms, or limiting single failures are introduced as a result of this change. There will be no adverse effect or challenges imposed on any safety-related system as a result of this change.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

(3) Does the proposed change involve a significant reduction in a margin of safety?

Response: No

The proposed change does not affect the acceptance criteria for any analyzed event nor is there a change to any Safety Analysis Limit (SAL). There will be no effect on the manner in which safety limits, limiting safety system settings, or limiting conditions for operation are determined nor will there be any effect on those plant systems necessary to assure the accomplishment of protection functions. There will be no impact on the overpower limit, DNBR limits, F_Q, $F\Delta H$, LOCA PCT, peak local power density, or any other margin of safety. The radiological dose consequence acceptance criteria listed in the Standard Review Plan will continue to be met.

The calculated impact on risk is insignificant and meets the acceptance criteria contained in Regulatory Guides 1.174 and 1.177.

Therefore, the proposed change does not involve a significant reduction in the margin of safety.

Conclusion

Based on the above, it is concluded that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c) and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 APPLICABLE REGULATORY REQUIREMENTS/CRITERIA

The regulatory bases and guidance documents associated with the AFW system discussed in this amendment application include:

GDC 2 requires that structures, systems, and components important to safety be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without the loss of the capability to perform their safety functions.

GDC 4 requires that structures, systems, and components important to safety be designed to accommodate the effects of, and to be compatible with, the environmental conditions associated with the normal operation, maintenance, testing, and postulated accidents, including loss-of-coolant accidents. These structures, systems, and components shall be appropriately protected against dynamic effects, including the effects of missiles, pipe whipping, discharging fluids that may result from equipment failures, and from events and conditions outside the nuclear power unit.

GDC 34 establishes requirements associated with those systems designed for residual heat removal to transfer fission product decay heat and other residual heat from the reactor core at a rate such that specified acceptable fuel design limits and the design conditions of the reactor coolant pressure boundary are not exceeded. Suitable redundancy in components and features, and suitable interconnections, leak detection, and isolation capabilities shall be provided to assure that for onsite electric power system operation (assuming offsite power is not available) and for offsite electric power system operation (assuming onsite power is not available) the system safety function can be accomplished. In MODE 3 above 350°F the AFW system provides this function.

There will be no changes to the AFW system design such that compliance with any of the above regulatory requirements would come into question. The plant will continue to comply with all applicable regulatory requirements.

In conclusion, based on the considerations discussed above, (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) issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

6.0 ENVIRONMENTAL CONSIDERATION

AmerenUE has determined that the proposed amendment would change requirements with respect to the installation or use of a facility component located within the restricted area, as defined in 10 CFR 20, or would change an inspection or surveillance requirement. However, AmerenUE has evaluated the proposed amendment and has determined that the amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amount of effluent that may be released offsite, or (iii) a significant increase in the individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22 (c)(9). Therefore, pursuant to 10 CFR 51.22 (b), an environmental assessment of the proposed amendment is not required.

ATTACHMENT 2

MARKUP OF TECHNICAL SPECIFICATIONS

INSERT 1

With the exception that the Completion Time associated with the Condition C entry on 2/3/04 for the turbine driven auxiliary feedwater pump has been extended on a one-time only basis to 144 hours. At the time a formal cause of the inoperability is determined, Condition D will be entered immediately.

ATTACHMENT 3

RETYPED TECHNICAL SPECIFICATIONS

ATTACHMENT 4

PROPOSED TECHNICAL SPECIFICATION BASES CHANGES
(for information only)

INSERT 2

License Amendment 158 approves a one-time only Completion Time extension to 144 hours for the Condition C entry on 2/3/04 for the turbine driven auxiliary feedwater pump. Condition C was entered at 0756 hours Central Standard Time on 2/3/04 when the turbine driven auxiliary feedwater pump was declared inoperable. This one-time Completion Time extension for Required Action C.1 expires at 0756 hours Central Standard Time on 2/9/04, after which Condition D must be entered. At the time a formal cause of the inoperability is determined, Condition D will be entered immediately.

ATTACHMENT 5

SUMMARY OF REGULATORY COMMITMENTS

SUMMARY OF REGULATORY COMMITMENTS

The following table identifies those actions committed to by AmerenUE in this document. Any other statements in this submittal are provided for information purposes and are not considered to be commitments. Please direct questions regarding these commitments to Mr. Dave E. Shafer, Superintendent Licensing, (314) 554-3104.

COMMITMENT	Due Date/Event
The proposed changes to the Callaway Technical Specifications and Bases will be implemented immediately upon NRC approval.	Immediately upon NRC approval.
Administrative controls shall be put in place to ensure the Tier 2 restrictions are assured during the extended TS 3.7.5 Required Action C.1 Completion Time: No work will be performed in the Callaway switchyard and access to the switchyard be restricted. No risk-significant plant equipment modeled in the PRA will be out of service, except for the turbine driven auxiliary feedwater pump and the 'C' loop Component Cooling Water pump. If risk-significant plant equipment modeled in the PRA were to fail during the extended 72-hour Completion Time, the Tier 3 Configuration Risk Management Program will assess the emergent condition and direct activities to restore that emergent inoperability thereby fully implementing these Tier 2 restrictions or the plant will immediately enter Condition D of TS 3.7.5, whichever is appropriate from a risk management perspective.	At the time the amendment is implemented.

3.7 PLANT SYSTEMS

3.7.5 Auxiliary Feedwater (AFW) System

LCO 3.7.5 Three AFW trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One steam supply to turbine driven AFW pump inoperable.	A.1 Restore steam supply to OPERABLE status.	7 days AND 10 days from discovery of failure to meet the LCO
B. One ESW supply to turbine driven AFW pump inoperable	B.1 Restore ESW supply to OPERABLE status.	72 hours AND 10 days from discovery of failure to meet the LCO
C. One AFW train inoperable for reasons other than Condition A or B.	C.1 Restore AFW train to OPERABLE status.	72 hours* AND 10 days from discovery of failure to meet the LCO

(continued)

*With the exception that the Completion Time associated with the Condition C entry on 2/3/04 for the turbine driven auxiliary feedwater pump has been extended on a one-time only basis to 144 hours. At the time a formal cause of the inoperability is determined, Condition D will be entered immediately.

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B. One ESW supply to turbine driven AFW pump inoperable	B.1 Restore ESW supply to OPERABLE status.	72 hours AND 10 days from discovery of failure to meet the LCO
C. One AFW train inoperable for reasons other than Condition A or B.	C.1 Restore AFW train to OPERABLE status.	72 hours* AND 10 days from discovery of failure to meet the LCO

(continued)

* INSERT 1

INSERT 1

With the exception that the Completion Time associated with the Condition C entry on 2/3/04 for the turbine driven auxiliary feedwater pump has been extended on a one-time only basis to 144 hours. At the time a formal cause of the inoperability is determined, Condition D will be entered immediately.

ATTACHMENT 4

PROPOSED TECHNICAL SPECIFICATION BASES CHANGES
(for information only)

BASES

ACTIONS

B.1 (continued)

c. The availability of at least one OPERABLE motor driven AFW pump. When an ESW train inoperability renders a TDAFP supply line inoperable and a motor driven AFW pump supply line inoperable, then one motor driven AFW pump is OPERABLE and the second motor driven AFW pump is available with water supplied from the nonsafety grade Condensate Storage Tank;

d. The low probability of an event occurring that will require the inoperable Essential Service Water supply line to the turbine driven AFW pump; and

e. The 72 hour Completion Time is consistent with the allowed Completion Time for one train of ESW inoperable.

The second Completion Time for Required Action B.1 establishes a limit on the maximum time allowed for any combination of Conditions to be inoperable during any continuous failure to meet this LCO.

The 10 day Completion Time provides a limitation time allowed in this specified Condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which multiple Conditions are entered concurrently. The AND connector between 72 hours and 10 days dictates that both Completion Times apply simultaneously, and the more restrictive must be met.

C.1

With one of the required AFW trains (pump or flow path) inoperable for reasons other than Condition A or Condition B, action must be taken to restore OPERABLE status within 72 hours. This Condition includes the loss of two steam supply lines or two ESW supply lines to the turbine driven AFW pump. The 72 hour Completion Time is reasonable, based on redundant capabilities afforded by the AFW System, time needed for repairs, and the low probability of a DBA occurring during this time period. INSERT 2

The second Completion Time for Required Action C.1 establishes a limit on the maximum time allowed for any combination of Conditions to be inoperable during any continuous failure to meet this LCO.

The 10 day Completion Time provides a limitation time allowed in this specified Condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which multiple Conditions are entered concurrently. The AND connector between 72 hours and 10 days

(continued)

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License Amendment 158 approves a one-time only Completion Time extension to 144 hours for the Condition C entry on 2/3/04 for the turbine driven auxiliary feedwater pump. Condition C was entered at 0757 hours Central Standard Time on 2/3/04 when the turbine driven auxiliary feedwater pump was declared inoperable. This one-time Completion Time extension for Required Action C.1 expires at 0757 hours Central Standard Time on 2/9/04, after which Condition D must be entered. At the time a formal cause of the inoperability is determined, Condition D will be entered immediately.