

March 31, 1995

Mr. Donald F. Schnell  
Senior Vice President - Nuclear  
Union Electric Company  
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SUBJECT: AMENDMENT NO. 97 TO FACILITY OPERATING LICENSE NO. NPF-30 -  
CALLAWAY, UNIT 1 (TAC NO. M90477)

Dear Mr. Schnell:

The Commission has issued the enclosed Amendment No. 97 to Facility Operating License No. NPF-30 for the Callaway Plant, Unit 1. This amendment consists of changes to Technical Specifications (TS) Bases and Final Safety Analysis Report (FSAR) in response to your application dated September 8, 1994, which identified the changes as an unreviewed safety question.

The amendment revises Bases 3/4.9, "Refueling Operations" and FSAR Sections 9.1.3 "Fuel Pool Cooling and Cleanup," 9.1.4 "Fuel Handling System" and 15.4.6 "Chemical and Volume Control System Malfunction That Results in a Decrease in the Boron Concentration in the Reactor Coolant." The changes document the results of a safety evaluation that considers the effects using reactor water makeup to spray down the refueling pool during pool drain evolutions. The changes establish procedural controls to address the possibility of a different type of boron dilution event than previously considered.

The amendment is being issued pursuant to the requirements of 10 CFR 50.59(c), because the review by Union Electric Company identified the changes as an unreviewed safety question.

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

Sincerely,

Original signed by L. Raynard Wharton  
L. Raynard Wharton, Project Manager  
Project Directorate III-3  
Division of Reactor Projects III/IV  
Office of Nuclear Reactor Regulation

Docket No. 50-483

Enclosures: 1. Amendment No. 97 to  
License No. NPF-30  
2. Safety Evaluation  
cc w/encls: See next page

DOCUMENT NAME: G:\CALLAWAY\CAL90477.AMD

\* See previous concurrence

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Mr. D. F. Schnell  
Union Electric Company

Callaway Plant  
Unit No. 1

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

UNION ELECTRIC COMPANY

CALLAWAY PLANT, UNIT 1

DOCKET NO. 50-483

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 97  
License No. NPF-30

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment filed by Union Electric Company (UE, the licensee) dated September 8, 1994, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;
  - C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.
2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-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. 97 , and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto, are hereby incorporated into the license. UE shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance. The Technical Specifications are to be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



L. Raynard Wharton, Project Manager  
Project Directorate III-3  
Division of Reactor Projects - III/IV  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of issuance: March 31, 1995

ATTACHMENT TO LICENSE AMENDMENT NO. 97

OPERATING LICENSE NO. NPF-30

DOCKET NO. 50-483

Revise Appendix A Technical Specifications by removing the page identified below and inserting the enclosed page. The revised page is identified by the captioned amendment number and contains vertical lines indicating the area of change. The corresponding overleaf page, indicated by an asterisk, is also provided to maintain document completeness.

REMOVE

INSERT

B 3/4 9-1

B 3/4 9-1

B 3/4 9-2\*

B 3/4 9-2\*

## 3/4.9 REFUELING OPERATIONS

### BASES

#### 3/4.9.1 BORON CONCENTRATION

The limitations on reactivity conditions during REFUELING ensure that: (1) the reactor will remain subcritical during CORE ALTERATIONS, and (2) a uniform boron concentration is maintained for reactivity control in the water volume having direct access to the reactor vessel. The limitation on  $K_{eff}$  of no greater than 0.95 is sufficient to prevent reactor criticality during refueling operations. The locking closed of the required valves during refueling operations precludes the possibility of uncontrolled boron dilution of the filled portions of the Reactor Coolant System via the CVCS blending tee. This action prevents flow to the RCS of unborated water by closing all automatic flow paths from sources of unborated water. Administrative controls will limit the volume of unborated water which can be added to the refueling pool for decontamination activities in order to prevent diluting the refueling pool below the limits specified in the LCO. These limitations are consistent with the initial conditions assumed for the boron dilution incident in the safety analyses.

#### 3/4.9.2 INSTRUMENTATION

The OPERABILITY of the Source Range Neutron Flux Monitors ensures that redundant monitoring capability is available to detect changes in the reactivity condition of the core.

#### 3/4.9.3 DECAY TIME

The minimum requirement for reactor subcriticality prior to movement of irradiated fuel assemblies in the reactor vessel ensures that sufficient time has elapsed to allow the radioactive decay of the short-lived fission products. This decay time is consistent with the assumptions used in the fuel handling accident radiological consequence and spent fuel pool thermal-hydraulic analyses.

#### 3/4.9.4 CONTAINMENT BUILDING PENETRATIONS

The requirements on containment building penetration closure and OPERABILITY ensure that a release of radioactive material within containment will be restricted from leakage to the environment. The OPERABILITY and closure restrictions are sufficient to restrict radioactive material release from a fuel element rupture based upon the lack of containment pressurization potential while in the REFUELING MODE.

The OPERABILITY of this system ensures the containment purge penetrations will be automatically isolated upon detection of high radiation levels within containment. The OPERABILITY of this system is required to restrict the release of radioactive materials from the containment atmosphere to the environment.

The restriction on the setpoint for GT-RE-22 and GT-RE-33 is based on a fuel handling accident inside the Containment Building with resulting damage to one fuel rod and subsequent release of 0.1% of the noble gas gap activity, except for 0.3% of the Kr-85 gap activity. The setpoint concentration of  $5E-3 \mu\text{Ci/cc}$  is equivalent to approximately 150 mR/hr submersion dose rate.

#### 3/4.9.5 COMMUNICATIONS

The requirement for communications capability ensures that refueling station personnel can be promptly informed of significant changes in the facility status or core reactivity conditions during CORE ALTERATIONS.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 97 TO FACILITY OPERATING LICENSE NO. NPF-30

UNION ELECTRIC COMPANY

CALLAWAY PLANT, UNIT 1

DOCKET NO. 50-483

1.0 INTRODUCTION

By letter dated September 8, 1994, Union Electric Company (UE), the licensee, requested an amendment to Operating License NPF-30, which would revise the Callaway Plant Technical Specifications (TS) Bases Section 3/4.9.1 and Final Safety Analysis Report (FSAR) procedures which deal with boron dilution during refueling. Currently FSAR section 15.4.6.2 states that administrative controls and locking dilution source manual valves preclude an inadvertent dilution of the boron concentration of the primary system. A revision to this FSAR section and the TS Bases will be made since changes are required to procedural controls as described in the FSAR associated with the use of reactor makeup water to rinse items removed from the refueling pool and to spray down the refueling pool walls during pool drain.

This amendment application involves an unreviewed safety question identified by the licensee. Callaway uses reactor makeup water to rinse items removed from the refueling pool. Reactor makeup water is also used to spray down the refueling pool walls while the fuel pool is being drained. The problem with these practices is that the current FSAR states that the closing and locking of dilution source manual valves and current administrative controls preclude the potential for an uncontrolled boron dilution of the primary system. However, the existing administrative controls do not consider the use of reactor makeup water as described above, as a potential dilution source. Therefore, without additional administrative controls, an uncontrolled dilution of the primary system could result from using reactor makeup water to facilitate the decontamination process. TS LCO 3.9.1 limits boron concentration during refueling to 2000 ppm. Since the current FSAR does not consider this dilution path, an unreviewed safety question exists. To resolve the unreviewed safety question, the licensee submitted a revision to Bases 3/4.9.1 - Boron Concentration and necessary changes to FSAR section 9.1.3.2.3.2 (Fuel Pool Cleanup System) and to the Dilution During Refueling (Mode 6) part of FSAR section 15.4.6.2 (Analysis of Effects and Consequences). The staff's review considers these proposed changes and procedural revisions which address preventing a sizable layer of diluted water from entering the primary system.

## 2.0 BACKGROUND

During the initial refueling of Callaway an inadvertent dilution of the primary system occurred during Mode 6. This dilution was caused by the use of unborated reactor makeup water to spray down the pool walls while simultaneously draining the refueling pool via the Residual Heat Removal system (RHR) flow path to the Reactor Water Storage Tank (RWST). As a result of its review of this incident, the licensee established administrative controls to limit the amount of unborated water added to the refueling pool during the rinsing of items removed from the pool. Refueling pool washdowns while simultaneously draining the pool were not performed at Callaway during refuels 2-5.

During Refuel 5, in April 1992, the licensee experienced a problem with airborne radioactivity, which resulted in some personnel contaminations and a work stoppage. This occurrence was attributed to an increase in airborne radioactivity levels from the use of a strippable decontamination coating, which was sprayed on the refueling pool walls and floor. It is believed, that as a result of the walls and floor being dry, loose surface contamination became airborne and caused the radioactivity levels to increase. After this event, the licensee determined that the then existing administrative controls which prevented rinsing of the refueling pool walls should be revised. Therefore, Callaway administrative controls were revised to allow the rinsing of refueling pool walls during the draining in order to facilitate the removal of the strippable coating and to avoid increasing airborne radioactivity. This revision included performing calculations to ensure that the amount of unborated water added would not lower the refueling pool boron concentration below 2000 ppm as required by Technical Specification LCO 3.9.1. Conservatism was added to this calculation by assuming that the rinse water was added to the RCS volume at mid-loop, neglecting the rest of the volume of the refueling pool. This practice was initiated during the Refuel 6 at Callaway. Unborated water was used to decontaminate items removed from the refueling pool and to rinse the refueling pool walls while simultaneously draining the pool to the RWST. Control of the amount of unborated water was maintained by the use of 3/4 inch line which was equipped with a flow totalizer.

After Refuel 6 (September 1994), UE Quality Assurance personnel raised concerns that these refuel pool washdown and decontamination practices constituted an unreviewed safety question. It was determined that a dilution path different than any discussed in FSAR Section 15.4.6.2. had been created. Based on internal review, the licensee determined that a revision to its FSAR and TS Bases was necessary and submitted the subject amendment application pursuant to 10 CFR 50.59(c)(2).

## 3.0 EVALUATION

The first change proposed by the licensee was to revise the Bases 3/4.9.1, "Boron Concentration." The current Bases state that the locking-closed of required valves precludes the possibility of an uncontrolled boron dilution. Since these valves do not preclude an uncontrolled dilution



from reactor makeup water, the licensee revised this Bases to state that locking-closed of the required valves prevents all automatic paths from sources of unborated water. In addition, it is stated that administrative controls will be used to limit the volume of unborated water which can be added to the refueling pool for decontamination activities in order to prevent diluting the refueling pool below the limits specified in the LCO. We have reviewed the change made to Bases 3/4.9.1, as proposed by the licensee, and find that it accurately achieves the licensee's objectives, as described above, and is acceptable to the staff.

The next major area of staff review concerns changes made by the licensee to the Callaway FSAR. A number of changes were made to section 9.1.3.2.3.2 (Fuel Pool Cleanup System). These changes are descriptive in nature and are intended to specifically identify that items removed from the refueling pool are sprayed-down using reactor makeup water and that this is performed to facilitate the decontamination of those items. Statements were also added to recognize that administrative controls have been established to prevent diluting the pool below acceptable boron concentration limits. Revisions of particular importance were made to FSAR section 15.4.6.2 (Analysis of Effects and Consequences). These revisions make it clear that inadvertent boron dilution events resulting from automatic flow paths are precluded by valve closure and that administrative controls will limit the volume of unborated water which can be added to the refueling pool for decontamination activities. The staff reviewed all of these changes. We found these changes to be consistent with those changes made to the Bases as previously described, and we believe that these changes accurately reflect Callaway Plant procedures as described in the licensee's submittal. Therefore, the FSAR changes as proposed by the licensee are acceptable to the staff.

Another major area of staff review concerns the potential for a diluted layer of water entering the primary system. The licensee states that this problem will be minimized by using the following procedures during refueling:

1. The water level will be drained to approximately one foot above the reactor cavity seal/shield ring. The refueling pool will then be drained via the reactor coolant drain tank (RCDT) pumps or other available means (excluding the RHR system), until the level is below the cavity seal/shield ring. This will direct the potentially diluted layer of water at the top of the pool away from the reactor vessel and core.
2. After the level has been lowered to below the cavity seal/shield ring, further draining of the area enclosed by the inside diameter of the ring will be performed via the RHR connection to the CVCS letdown.

The staff has reviewed these procedures and based on our knowledge and review of the Callaway Plant, we find that they will indeed preclude the possibility for a diluted layer of water from reaching the reactor core. Therefore, the procedures are acceptable to the staff.

The initial review by the staff resulted in two open issues.

1. The submittal did not provide a detailed description or diagram of exactly where the reactor makeup water was being sprayed. The staff was concerned about the potential paths that existed for this unborated water.
2. The submittal did not provide detailed calculations showing the magnitude of unborated water that was being added to the refueling pool and the subsequent reduction in primary system boron concentration that could result from potential additions of unborated water.

The staff raised these concerns in a meeting held at NRC headquarters with UE management on January 11, 1995. Based on the licensee's description of the spray activities and on the staff's knowledge of the Callaway Plant, the staff concluded that the licensee is aware of the potential paths for unborated water entering the reactor core area. The licensee also stated they had performed the calculations for determining the amount of boron dilution that occurs as a result of using unborated water for decontamination purposes and that these calculations agree with the staff's estimation that the reduction in ppm boron concentration is minor. Based on this information, and the fact that the actual boron concentrations each cycle will be based on using one-half the Reactor Coolant System Volume at mid-loop, the staff determined that further generic analysis of boron concentrations by the licensee would not be required.

The proposed changes do not involve any design changes, nor are there any changes in the method by which any safety systems perform their function. The changes are required since the administrative controls described in the FSAR and Technical Specifications do not address the possibility for a boron dilution event directly from the reactor makeup water (RMW) system, as could occur when RMW is used to rinse the refueling pool walls. This amendment establishes administrative controls for controlling the amount of unborated water added to the RCS from this source.

Union Electric has proposed revising plant procedures which will enhance plant safety by reducing the potential for RCS boron dilution. The procedural changes have been reviewed by the staff, and have been found to achieve this goal in a conservative manner. The proposed changes to the FSAR and Technical Specifications are acceptable to the staff.

### 3.0 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.

#### 4.0 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. The 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 this amendment involves no significant hazards consideration and there has been no public comment on such finding (60 FR 11151). Accordingly, this amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

#### 5.0 CONCLUSION

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

Principal Contributor: G. Schwenk

Date: March 31, 1995