1901 Chouteau Avenue
Post Office Box 149
St. Louis, Missouri 63166
314-554-2650

UNION ELECTRIC

Donald F. Schnell
Senior Vice President
Nuclear

January 14, 1992

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Station P1-137
Washington, D.C. 20555

ULNRC-2546

Gentlemen:

DOCKET NUMBER 50-483
CALLAWAY PLANT
RELAXED AXIAL OFFSET CONTROL

References:
1. WCAP-10216-PA, "Relaxation of Constant Axial Offset Control and F_Q Surveillance Technical Specification," June 1983
2. Kansas Gas and Electric Company letter KMLNRC 86-013 dated January 20, 1986
3. NRC letter dated April 22, 1986 transmitting Amendment No. 1 to Wolf Creek Generating Station FOL No. NPF-42
4. ULNRC-2439 dated July 19, 1991
5. ULNRC-2196 dated April 12, 1990

Union Electric Company herewith transmits an application for amendment to Facility Operating License No. NPF-30 for the Callaway Plant.

This amendment application includes revisions to Technical Specification Table 2.2-1 as well as Sections 3/4.2.1, 4.2.2.2 through 4.2.2.4, and 6.9.1.9 and associated Bases in order to implement relaxed axial offset control (RAOC) for Cycle 6 at Callaway. The RAOC methodology has been previously reviewed and approved as discussed in Reference 1 above. The attached amendment application is similar to that submitted and approved for Wolf Creek Generating Station in References 2 and 3 above.

As discussed in Reference 4, the process described in WCAP-12935, "Large Break LOCA Power Distribution Methodology," will be used during each reload design to ensure that the chopped cosine power

A001
/11

2.5 <u>Heat Flux Hot Channel Factor</u> - $F_Q(Z)$
(Specification 3.2.2)

$$F_Q(Z) \le \frac{F_Q^{RTP}}{P} * K(Z) \quad \text{for } P > 0.5$$

$$F_Q(Z) \le \frac{F_Q^{RTP}}{0.5} * K(Z) \quad \text{for } P \le 0.5$$

$$\text{where: } P = \frac{\text{THERMAL POWER}}{\text{RATED THERMAL POWER}}$$

2.5.1 $F_Q^{RTP} = 2.50$

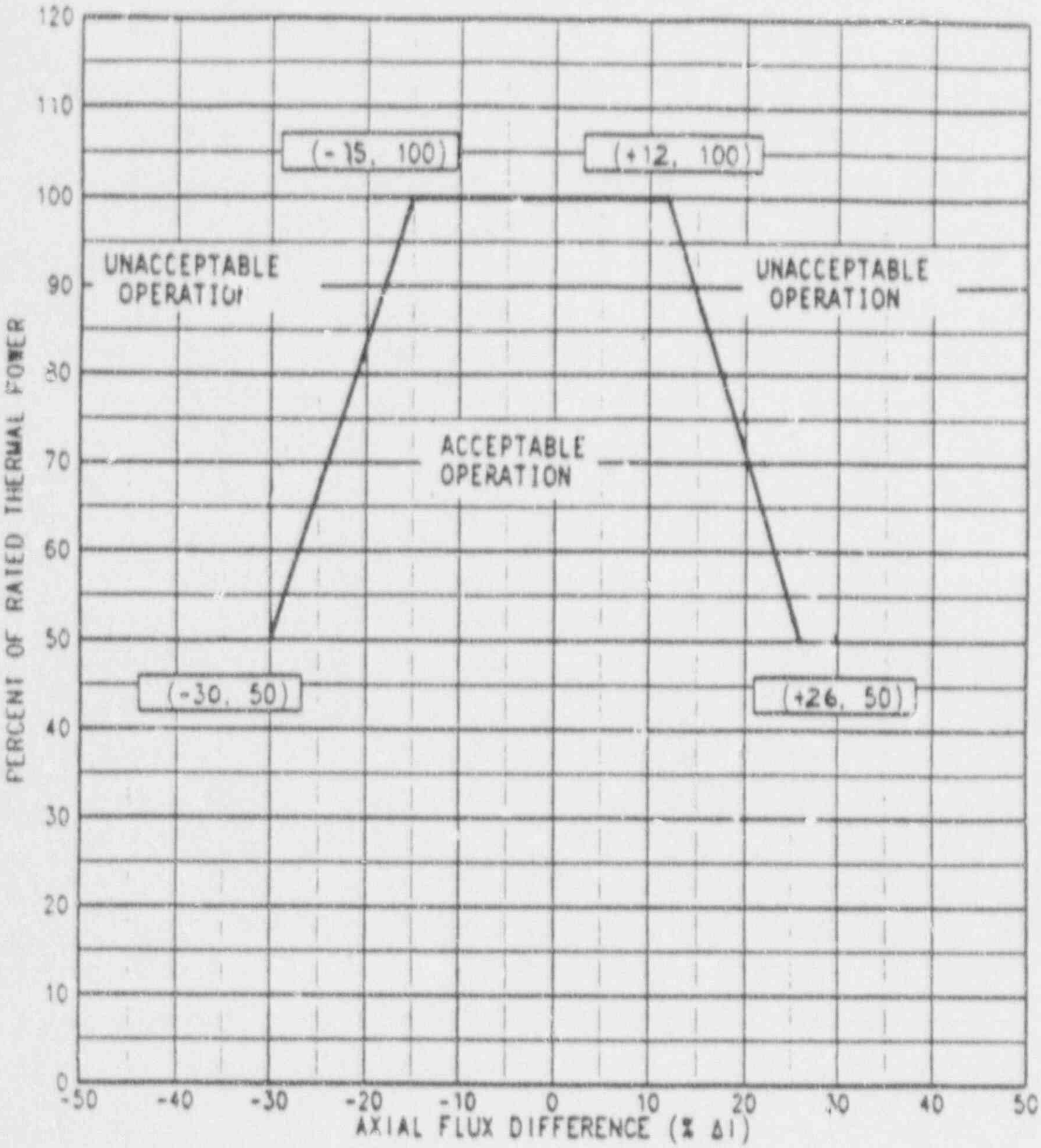
2.5.2 K(Z) is provided in Figure 4.

2.5.3 The W(z) functions that are to be used in Technical Specifications 4.2.2.2, 4.2.2.3, and 4.2.2.4 for F_Q surveillance are shown in Figures 5 through 8.

Because significant margin exists between the analytically determined maximum $F_Q(z)*P_{rel}$ values and their limit, Restricted Axial Flux Difference (RAFDO) oper[illegible] is not expected to be required for Cyc[illegible] [illegible] this reason, no $W(z)_{RAFDO}$ values are s[illegible] for Cycle ~~5~~ 6.

The Normal Operation W(z) values, $W(z)_{NO}$, have been determined for ~~three specific~~ multiple burnups in Cycle ~~5~~ 6. This permits determination of W(z) at any cycle burnup through the use of ~~three~~ multiple point interpolation. The $W(z)_{NO}$ values were determined assuming Cycle ~~5~~ 6 operates with ~~the CAOC strategy, and uses a +3%, -12% delta-I band about the target flux difference.~~ RAOC. Also included is a $W(z)_{NO}$ function that bounds the $W(z)_{NO}$ curve for all Cycle ~~5~~ 6 burnups. Use of the bounding $W(z)_{NO}$ curve will be conservative for any Cycle ~~5~~ 6 burnup, however additional margin may

INSERT 2



AXIAL FLUX DIFFERENCE LIMITS AS A FUNCTION OF
RATED THERMAL POWER FOR RAOC

INSERT 1

2.4.1 The Axial Flux Difference (AFD) Limits are provided in Figure 3.

2.4.2 The target band during Restricted AFD Operation is ±3%.

distribution remains limiting for large break LOCA. In this process, each power distribution calculated in the core design will be evaluated to determine whether it is more limiting than the chopped cosine power distribution. With implementation of the WCAP-12935 methodology, top-skewed axial power distributions which are potentially more limiting than the chopped cosine power distribution used in the large break LOCA analysis will be precluded from occurring by the design and/or W(z) surveillance factors. As such, it is expected that the 100°F PCT penalty discussed in Reference 4 will not apply to Cycle 6 with RAOC or to future cycles.

The Callaway Plant On-Site Review Committee and the Nuclear Safety Review Board have reviewed this amendment application. Attachments 1 through 5 provide the Safety Evaluation, Significant Hazards Evaluation, Environmental Consideration, proposed Technical Specification revisions, and preliminary Cycle 6 Core Operating Limits Report (COLR) changes, respectively, in support of this amendment request. The Callaway Cycle 6 COLR will be provided to you at a later date. It has been determined that this amendment application does not involve an unreviewed safety question as determined per 10CFR50.59 nor a significant hazard consideration as determined per 10CFR50.92. Pursuant to 10CFR51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.

Approval of this amendment application is needed by May 15, 1992 prior to startup for Cycle 6. If you have any questions on this amendment application, please contact us.

Very truly yours,

Donald F. Schnell

Donald F. Schnell

GGY/plh

Attachments:
1 - Safety Evaluation
2 - Significant Hazards Evaluation
3 - Environmental Consideration
4 - Proposed Technical Specification Revisions
5 - Preliminary Cycle 6 COLR Changes

REPLACE WITH INSERT 2

AXIAL FLUX DIFFERENCE LIMITS AS A FUNCTION OF RATED THERMAL POWER

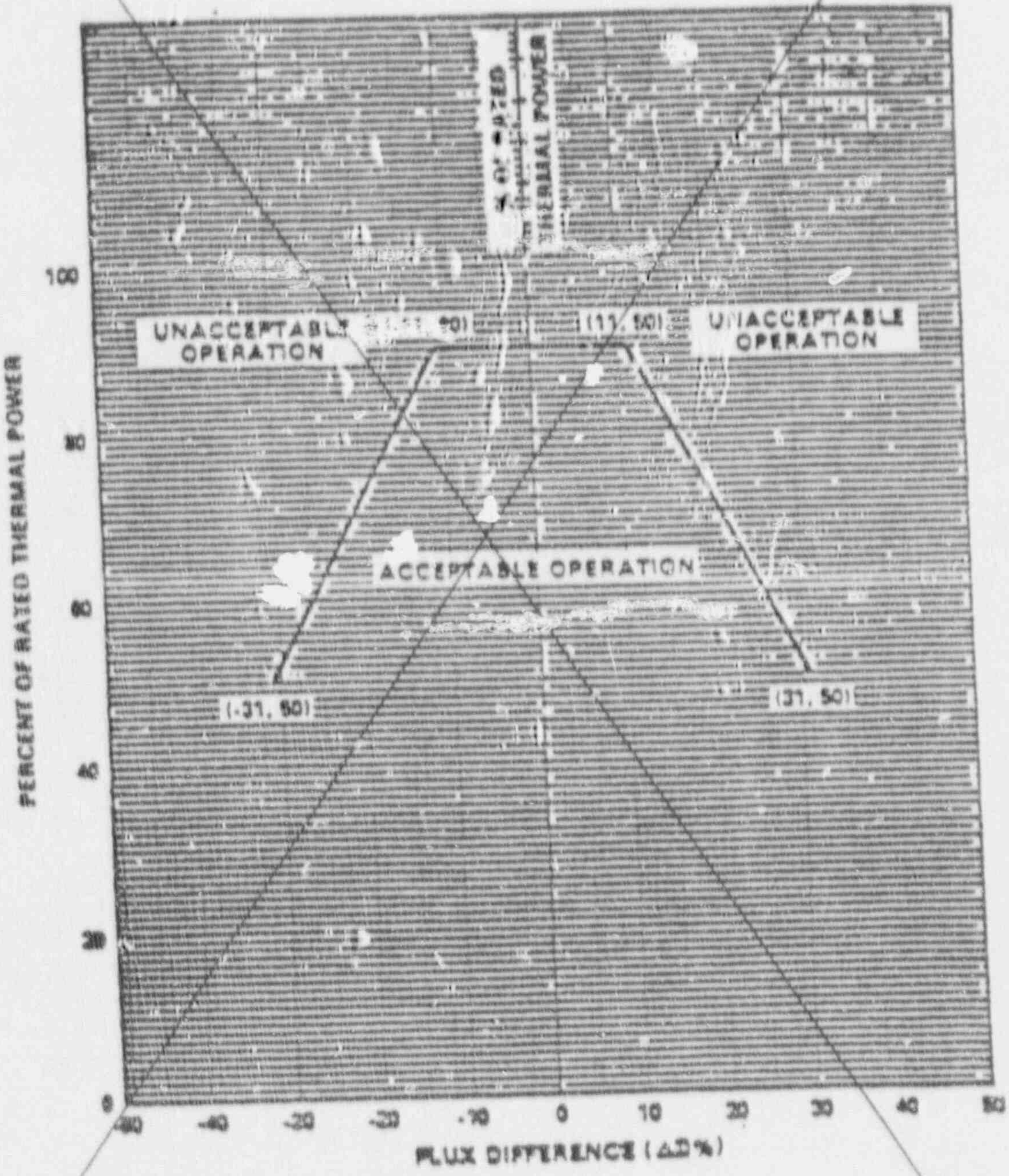


FIGURE 3

STATE OF MISSOURI)
) S S
CITY OF ST. LOUIS)

Donald F. Schnell, of lawful age, being first duly sworn upon oath says that he is Senior Vice President-Nuclear and an officer of 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 Donald F. Schnell
Donald F. Schnell
Senior Vice President
Nuclear

SUBSCRIBED and sworn to before me this 14th day of January, 1992.

Barbara J. Pfaff
Notary Public

BARBARA J. PFAFF
NOTARY PUBLIC, STATE OF MISSOURI
MY COMMISSION EXPIRES APRIL .., 1993
ST. LOUIS COUNTY

cc: T. A. Baxter, Esq.
Shaw, Pittman, Potts & Trowbridge
2300 N. Street, N.W.
Washington, D.C. 20037

Dr. J. O. Cermak
CFA, Inc.
18225-A Flower Hill Way
Gaithersburg, MD 20879-5334

R. C. Knop
Chief, Reactor Project Branch 1
U.S. Nuclear Regulatory Commission
Region III
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Bruce Bartlett
Callaway Resident Office
U.S. Nuclear Regulatory Commission
RR#1
Steedman, Missouri 65077

J. R. Hall (2)
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
1 White Flint, North, Mail Stop 13E21
11555 Rockville Pike
Rockville, MD 20852

Manager, Electric Department
Missouri Public Service Commission
P.O. Box 360
Jefferson City, MO 65102

Ron Kucera
Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102

ATTACHMENT 1

SAFETY EVALUATION FOR

RELAXED AXIAL OFFSET CONTROL (RAOC)

SAFETY EVALUATION

This amendment application includes revisions to Technical Specification Table 2.2-1 as well as Sections 3/4.2.1, 4.2.2.2 through 4.2.2.4, and 6.9.1.9 and associated Bases in order to implement Relaxed Axial Offset Control (RAOC) for Cycle 6 at Callaway Plant. Implementation of RAOC at Callaway will be in accordance with WCAP-10216-PA which has been previously reviewed and approved by the NRC.

1.0 BACKGROUND

The following discussion briefly describes the present methodology of axial power distribution control and the proposed alternative.

1.1 Constant Axial Offset Control (CAOC)

Axial power distribution control at the Callaway Plant is currently achieved by Constant Axial Offset Control (CAOC). This methodology was developed and described in WCAP-8385 (Proprietary) and WCAP-8403 (Non-proprietary). This method assures peaking factors and DNBR remain below the accident analysis limits. The CAOC strategy developed in this topical report does this by maintaining the axial flux difference (AFD or delta-I) within a band of +3%, -12% around a measured target value during normal plant operation (including power change maneuvers). By controlling the axial power distribution, the possible skewing of the axial xenon distribution is limited, thus minimizing xenon oscillations and their effects on the power distribution.

The AFD is a measure of axial power distribution skewing to the top or bottom half of the core. It is very sensitive to core-related parameters such as control bank position, core power level, axial burnup, and axial xenon distribution. The limits on AFD assure that the Heat Flux Hot Channel Factor $F_Q(Z)$ is not exceeded during either normal operation or in the event of xenon redistribution following power changes. They are used in the nuclear design process and assumed in the safety analyses as a boundary of possible initial condition axial power shapes. Operation outside these limits during Condition I operation influences the possible power shapes and results in Condition II transients. Condition II transients, assumed to begin from within the AFD limits, are used to confirm the adequacy of Overpower Delta-T (OPDT) and Overtemperature Delta-T (OTDT) trip setpoints.

1.2 Relaxed Axial Offset Control (RAOC)

The implementation of Relaxed Axial Offset Control and F_Q Surveillance changes have been previously approved by the NRC in WCAP-10216-PA (Proprietary) and WCAP-11524-A (Non-proprietary). This strategy was developed to provide wider control band widths and more operator freedom than with CAOC. RAOC provides wider control bands particularly at reduced power by effectively utilizing some of the available core margin to the peaking factor limits specified in the Core Operating Limits Report (COLR). The wider operating space increases plant availability by allowing quicker plant startups and increased operating flexibility without reactor trip or reportable occurrences.

RAOC has been developed for relaxing the current constraints on axial power distribution control. This widens the allowed delta-I vs. power operating space relative to CAOC operation particularly at reduced power levels while ensuring that safety considerations are satisfied. This is achieved by examination of a wide range of possible xenon distributions and the possible range of axial power distributions associated with each xenon distribution in both normal operation and accident conditions. With the Technical Specification changes described in this submittal, Callaway will operate both safely and with enhanced flexibility during Cycle 6.

The procedure begins by constructing a xenon distribution library. Selected xenon transients are calculated and the resulting axial xenon distributions are characterized by certain parameters. These parameters are stored and the xenon distribution reconstructed from them when required. The allowed xenon distributions are limited to those for which the core delta-I values remain within tentatively chosen limits which are wider than the expected LOCA limits. Xenon libraries are prepared for beginning of life (BOL), middle of life (MOL), and end of life (EOL) burnups.

The next step in the procedure is the normal operation analysis. The only constraints employed are the rod insertion limits and the tentative delta-I limits. One dimensional calculations are performed at BOL, MOL, and EOL for a number of power levels and for xenon distributions throughout the range of the xenon library. The axial power distribution is recorded for each case.

Each power shape generated is examined to see if LOCA limits are met or exceeded. The standard Westinghouse synthesis methods for core peaking factors are used, as described in WCAP-8385. The result of this examination is a delta-I range as a function of power which meets the LOCA limits. The power shapes within this range are then examined to ascertain whether they meet the thermal-hydraulic constraints imposed by the loss of flow accident (LOFA) and the limits are revised accordingly.

The effect of the widened delta-I band on the consequences of the anticipated transients discussed in WCAP-10216-PA is next investigated. The analyses consist of choosing initial power distributions from the allowed power vs. delta-I domain, being careful to include the entire domain, and performing the transient calculation with each distribution. The axial power shapes are preserved from each "snapshot" in the event, and core peaking factors are synthesized by the standard procedure. The results are examined for violations of peak power density and DNB limits. At Callaway, the OTDT trip will be altered to provide protection by changing the f_1(delta-I) penalty function as discussed below.

2.0 LICENSING BASIS

The CAOC methodology is presently incorporated into the Callaway Technical Specification Sections 3/4.2.1 Axial Flux Difference and 3/4.2.2 Heat Flux Hot Channel Factor - $F_Q(Z)$ Surveillance Requirements. The Callaway Plant also utilizes the COLR. The use of this document is established in Technical Specification Section 6.9.1.9. Preliminary Cycle 6 COLR changes are included in Attachment 5.

FSAR Sections 4.3 and 4.4 also provide a licensing basis. The specific sections that deal with power distribution control methodologies are: 4.3.2.2.4 Axial Power Distributions; 4.3.2.2.6 Limiting Power Distributions; 4.3.2.7.6 Stability Control and Protection; and 4.4.4.3.2 Axial Heat Flux Distributions.

3.0 TECHNICAL SPECIFICATION CHANGES

Implementation of RAOC requires the alteration of the Technical Specifications, as shown in Attachment 4. The negative f_1 (delta-I) penalty in Technical Specification Table 2.2-1, Note 1 for the OTDT trip setpoint will be changed to assure the validity of the design basis analysis.

The value of this change is such that for each percent that the difference between percent Rated Thermal Power (RTP) in the top half of the core and percent RTP in the bottom half of the core, delta-I (qt-qb), is more negative than -24%, the OTDT trip setpoint shall automatically be reduced by 3.25% of its value at RTP. The rather involved CAOC specification is removed and replaced by a specification that merely requires the AFD be maintained within the allowed operations band as a function of power. The allowed operating space becomes the Technical Specification. If these limits are exceeded, the condition is alarmed and the delta-I must be returned within the limits within a 15 minute grace period or power must be reduced to less than 50% RTP. The surveillance requirements, which are similar to those for other alarmed limits, discuss the verification frequency of delta-I as a function of alarm status.

The current Technical Specification 3.2.1, per the COLR, specifies a target band of +8%, -7% for normal operation in Mode 1 above 15% RTP. This target band is applicable only for Cycle 5 EOL conditions and was changed from +3%, -12% via Revision 3 of the COLR (ULNRC-2513 dated November 13, 1991). RAOC allows an AFD operating space relaxation to -15%, +12% delta-I at 100% RTP and linearly increasing to -30%, +26% delta-I at 50% RTP, in Mode 1 above 50% RTP. The RAOC AFD limits are provided in Attachment 5. If the RAOC AFD limits are exceeded for more than 15 minutes, power must be reduced to less than 50% RTP within 30 minutes and the Power Range Neutron Flux - High Trip setpoints must be reduced to less than or equal to 55% RTP within the next 4 hours. An additional less restrictive action is included which takes credit for margin which exists in the Restricted AFD Operation (RAFDO) limits. This action does not require either a reduction to 50% RTP or a resetting of the Power Range Neutron Flux - High Trip setpoints. However, it does require a power reduction below the RAFDO power level. Two surveillances, consistent with the current Technical Specification 3.2.1, are included to assure that the AFD of the operable excore channels are updated periodically to account for indication changes due to burnup. They are included here for completeness and are consistent with past practices on plant application.

Surveillance Requirements 4.2.2.2.b and 4.2.2.4.b are revised to require Limiting Condition for Operation (LCO) 3.2.2 to be evaluated against the measured $F_Q(Z)$ after accounting for fuel manufacturing tolerances and flux map measurement uncertainty. The intent of this change is to require use of the measured parameter to verify operation below the Technical Specification LCO limit. Increasing the monitored $F_Q(Z)$ by an additional term for expected plant maneuvers may appear to provide a more convenient form of assuring plant operation below the $F_Q(Z)$ limit. However, past practices on plant application and recent licensing reviews of the New Standard Technical Specifications

(MERITS) have demonstrated that a comparison of the safety limit and the measured $F_Q(Z)$ without adjustments for plant maneuvers is required.

The footnote for Surveillance Requirement 4.2.2.2.d.1 is modified to clarify the timing required for obtaining a power distribution map during startup at the beginning of each cycle and to state that extended operation is defined as expected operation at a power level for greater than 72 hours. The intent of this footnote is to allow the plant to escalate without undue impedance while still assuring consistency with the safety analysis values. The 72 hour limit prevents sustained operations at high power levels without verification of the $F_Q(Z)$ safety limit.

To afford additional flexibility, Surveillance Requirement 4.2.2.2.f.2.a is added. It provides the option of an AFD operating space reduction while maintaining the same surveillance power level. This revision is consistent with WCAP-10216-PA.

Specifications 4.2.2.3.a and 4.2.2.4.c are revised to define k(z) and $F_Q^M(Z)$, as done in Specification 4.2.2.2.c. For RAFDO operation, Surveillance Requirement 4.2.2.4.f.1 is added which allows a return to normal operation in the event that sufficient margin is not available to remain in RAFDO. This requirement clarifies the action necessary in the event the plant can no longer remain in RAFDO.

Specification 6.9.1.9 is revised to reflect the change to RAOC, i.e., RAFDO only target band and RAOC references. Figure B3/4.2-1 is deleted since it is not applicable to RAOC operation. The basis for AFD B3/4.2.1 is also modified to describe how RAOC and RAFDO allow operation at the maximum permissible power and AFD consistent with safety analyses. It also describes how the computer alarms function for RAOC application. The basis notes that two alarms exist. The first alarm indicates operation outside the RAOC operating space while the second indicates operation outside RAFDO.

4.0 EVALUATIONS

Both the AFD bands and the OTDT trip setpoints have been verified by the RAOC analysis and the Callaway Cycle 6 Reload Safety Analysis Checklist (RSAC), in accordance with the approved WCAP-9272-PA methodology. No other changes to the current limits are necessary for the Cycle 6 implementation of RAOC.

It has been confirmed that none of the Process Measurement Accuracy (PMA) terms nor any of the Delta-I channel terms listed in the setpoint calculations of Reference 5 will be affected by this change to RAOC. Only the positive f_1 (delta-I) OTDT penalty term, unaffected by the change to RAOC and remaining at 1.89% delta-T per percent delta-I, is used in the OTDT setpoint calculations since it is more limiting in the transient analyses. As such, there will be no change to the OTDT setpoints (i.e., trip setpoint, allowable value, total allowance, Z and S terms) in Technical Specification Table 2.2-1.

4.1 LOCA and LOCA-Related Evaluations

The change from CAOC to RAOC has been evaluated for Callaway Cycle 6 operation for impact upon the LOCA safety analyses. The LOCA and LOCA-related accident analyses remain valid for the RAOC implementation given the above parameter changes and their effect on the safety analysis limits. RAOC does not affect the normal plant operating parameters, the safeguards systems actuations, the accident mitigation capabilities important to a LOCA, the assumptions used in the LOCA-related accidents, nor create conditions more limiting than those assumed in these analyses.

4.2 Non-LOCA Related Evaluations

The effect on the non-LOCA events for a change from CAOC to RAOC is to increase the number of power shapes that must be considered when developing the OTDT and OPDT setpoint equations. The OTDT setpoint is designed to ensure plant operation within the DNB design basis and hot-leg boiling limit. The OTDT f_1 (delta-I) function is designed to ensure DNB protection from adverse axial power shapes. The OPDT setpoint is designed to ensure plant operation within the fuel temperature design basis and is unaffected by the change to RAOC.

The f_1 (delta-I) function is generated based on expected axial power shapes from various Condition I and II events. Because RAOC allows more severe power shapes, it was necessary to move the negative wing of the OTDT f_1 (delta-I) penalty to eliminate shapes which may violate the DNB criteria. Modification of the negative wing will have no effect on the FSAR transient safety analyses because they do not model the f_1 (delta-I) term in the OTDT setpoint equation. The f_1 (delta-I) term accounts for the axial power shape effects on the DNB criteria and independently lowers the OTDT setpoint to ensure a conservative reactor trip when faced with severe power shapes.

It has been determined that the implementation of RAOC changes the axial offset limits which are used to develop the f_1(delta-I) penalty function in the OTDT setpoint equation. The change to the f_1(delta-I) term has no effect on the conclusions of the non-LOCA FSAR transient safety analyses. It is concluded that the implementation of RAOC does not adversely affect the results of the non-LOCA FSAR transient safety analyses and the conclusions made in the FSAR remain valid.

4.3 Containment Integrity Evaluation

The implementation of RAOC does not adversely affect the short and long term LOCA mass and energy releases and/or the main steamline break mass and energy release containment analyses. RAOC does not affect the normal plant operating parameters, system actuations, accident mitigating capabilities, or assumptions important to the containment analyses, or create conditions more limiting than those assumed in these analyses. Therefore, the conclusions presented in the FSAR remain valid with respect to the containment.

4.4 Radiological Evaluation

The transition to RAOC will not affect the radiological consequences or the post-LOCA hydrogen generation. Since the inputs to the dose analyses do not change, the accident doses are bounded by those previously reported in the FSAR. Therefore, the consequences to the public resulting from any accident previously evaluated in the FSAR have not increased.

4.5 Mechanical Component and Systems Evaluation

The implementation of RAOC does not directly or indirectly involve mechanical component hardware considerations. Direct effects as well as indirect effects on safety-related equipment have been considered. Indirect effects include activities which involve non-safety related equipment which may affect safety-related equipment. Component hardware considerations include overall component integrity, subcomponent integrity and the adequacy of component supports during all plant conditions. An evaluation has determined that RAOC implementation does not alter the design, material, construction standards, function or method of performance of any safety-related equipment.

RAOC implementation does not affect the integrity of any plant auxiliary fluid system or the ability of any system to perform its intended safety function.

5.0 DETERMINATION OF UNREVIEWED SAFETY QUESTION

The proposed change does not involve an unreviewed safety question because operation of Callaway Plant in accordance with this change would not:

(1) Involve an increase in the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the FSAR.

There are no accidents which would be more likely to occur due to the implementation of RAOC since the methodology does not change the likelihood of the event to occur and no new failure mechanisms are introduced. No new performance requirements are being imposed on any system or component and plant integrity is not degraded. The proposed parameter changes for the RAOC implementation assure that the safety analysis limits are not exceeded and therefore any mitigation capabilities are not reduced.

The implementation of RAOC will not result in a violation of the acceptance criteria for any LOCA or non-LOCA event and does not impact the mass/energy release criteria. The consequences of accidents previously evaluated in the FSAR are not increased due to RAOC. Since the inputs to the analyses do not change, the accident doses previously reported in the FSAR are unaffected. Therefore, the consequences to the public resulting from any accident or malfunction of equipment important to safety previously evaluated in the FSAR have not increased.

There are no mechanical or electrical changes to any equipment due to RAOC implementation which would increase the probability of the equipment to malfunction. No new performance requirements are being imposed on any system or component in order to support the RAOC implementation. Subsequently, there is no increase in the probability of equipment malfunctions previously evaluated.

(2) Create the possibility for an accident or malfunction of a different type than any previously evaluated in the FSAR. The proposed change does not involve any design changes or hardware modifications to safety-related equipment nor will there be a change in the method by which any safety-related plant system performs its safety function. There will be a conservative trip setpoint-reducing change to the negative f_1 (delta-I) penalty term in the OTDT setpoint equation, as well as changes to the non-safety related AFD Monitor Alarm since penalty deviation times will no longer be tracked or alarmed.

The implementation of RAOC will not create any new or different type of accident which is not already considered in the FSAR. The specific axial offset does not create the possibility that a new event could occur. No new accident scenarios, failure mechanisms or limiting single failures are introduced as a result of the RAOC implementation. The institution of RAOC will have no adverse effect and does not challenge the performance of any safety-related system. Therefore, the possibility of a new or different kind of accident is not created.

There are no changes to any equipment which would cause the malfunction of safety-related equipment, assumed to be operable in the accident analyses, as a result of the RAOC implementation. No new mode of failure has been created and no new performance requirements are imposed by the transition to RAOC. Therefore, the implementation of RAOC will not create the possibility of a new or different malfunction of safety-related equipment.

(3) Involve a reduction in the margin of safety as defined in the basis for any Technical Specification. The proposed change will not result in a decrease in the minimum DNBR given in Bases Section 2.1.1 and reported in the FSAR nor will there be an increase in the LOCA peak clad temperature (PCT) above the 2200°F ECCS Acceptance Criteria limit as defined in 10CFR50.46. The

design limits on peak local power density, F_Q, and F-delta-H will not be exceeded. The proposed change does not alter the manner in which safety limits or limiting safety system settings are determined. The axial flux difference limiting condition for operation and F_Q surveillance are revised in accordance with the approved methodology of WCAP-10216-PA.

The supporting technical specification values are defined by the accident analyses which are performed to conservatively bound the operating conditions defined by the Technical Specifications and to demonstrate meeting the regulatory acceptance limits. Performance of analyses and evaluations for the RAOC transition have confirmed that the operating envelope defined by the Technical Specifications continues to be bounded by the analytical basis, which in no case exceeds the acceptance limits. Therefore, the margin of safety provided by the analyses in accordance with the acceptance limits is maintained and not reduced.

6.0 CONCLUSION

Based on the information presented in the above evaluations, the change from CAOC to RAOC axial offset control will not affect the conclusions of the safety analyses presented in the Callaway FSAR. Therefore, the proposed change does not involve an unreviewed safety question and will not adversely affect or endanger the health or safety of the general public.

7.0 REFERENCES

7.1 WCAP-8385, (W Proprietary), September 1974.
WCAP-8403, (W Non-proprietary), September 1974.
"POWER DISTRIBUTION CONTROL AND LOAD FOLLOWING PROCEDURES-TOPICAL REPORT".

7.2 WCAP-10216-PA, Rev. 2, (W Proprietary), June 1983.
WCAP-11524-A, Rev. 2, (W Non-proprietary), March 1987.
"RELAXATION OF CONSTANT AXIAL OFFSET CONTROL AND F_Q SURVEILLANCE TECHNICAL SPECIFICATION".

7.3 WCAP-9272-PA, (W Proprietary), July 1985.
WCAP-9273-A, (W Non-proprietary), July 1985.
"WESTINGHOUSE RELOAD SAFETY EVALUATION METHODOLOGY"

ATTACHMENT TWO

SIGNIFICANT HAZARDS EVALUATION

FOR

RELAXED AXIAL OFFSET CONTROL (RAOC)

SIGNIFICANT HAZARDS EVALUATION

This amendment application includes revisions to Technical Specification Table 2.2-1 as well as Sections 3/4.2.1, 4.2.2.2 through 4.2.2.4, and 6.9.1.9 and associated Bases in order to implement Relaxed Axial Offset Control (RAOC) for Cycle 6 at Callaway Plant. Implementation of RAOC at Callaway will be in accordance with WCAP-10216-PA which has been previously reviewed and approved by the NRC.

The implementation of Relaxed Axial Offset Control and F_Q Surveillance changes have been previously approved by the NRC in WCAP-10216-PA (Proprietary) and WCAP-11524-A (Non-proprietary). This strategy was developed to provide wider control band widths and more operator freedom than with Constant Axial Offset Control (CAOC). RAOC provides wider control bands particularly at reduced power by effectively utilizing some of the available core margin to the peaking factor limits specified in the Core Operating Limits Report (COLR). The wider operating space increases plant availability by allowing quicker plant startups and increased operating flexibility without reactor trip or reportable occurrences.

Implementation of RAOC requires the alteration of the Technical Specifications. The negative f_1 (delta-I) penalty in Technical Specification Table 2.2-1, Note 1 for the Overtemperature Delta-T (OTDT) trip setpoint will be changed to assure the validity of the design basis analysis. The value of this change is such that for each percent that the difference between percent Rated Thermal Power (RTP) in the top half of the core and percent RTP in the bottom half of the core, delta-I, is more negative than -24%, the OTDT trip setpoint shall automatically be reduced by 3.25% of its value at RTP. The rather involved CAOC specification is removed and replaced by a specification that merely requires the Axial Flux Difference (delta-I or AFD) be maintained within the allowed operations band as a function of power. The allowed operating space becomes the Technical Specification. If these limits are exceeded, the condition is alarmed and the delta-I must be returned within the limits within a 15 minute grace period or power must be reduced to less than 50% RTP. The surveillance requirements, which are similar to those for other alarmed limits, discuss the verification frequency of delta-I as a function of alarm status.

The current Technical Specification 3.2.1, per the COLR specifies a target band of +8%, -7% for normal operation in Mode 1 above 15% RTP. This target band is applicable only for Cycle 5 EOL conditions and was changed from +3%, -12% via Revision 3 of the COLR (ULNRC-2513 dated November 13, 1991). RAOC allows an AFD operating space relaxation to -15%, +12% delta-I at 100% RTP and linearly increasing to -30%, +26% delta-I at 50% RTP, in Mode

1 above 50% RTP. The RAOC AFD limits are provided in Attachment 5. If the RAOC AFD limits are exceeded for more than 15 minutes, power must be reduced to less than 50% RTP within 30 minutes and the Power Range Neutron Flux - High Trip setpoints must be reduced to less than or equal to 55% RTP within the next 4 hours. An additional less restrictive action is included which takes credit for margin which exists in the Restricted AFD Operation (RAFDO) limits. This action does not require either a reduction to 50% RTP or a resetting of the Power Range Neutron Flux - High Trip setpoints. However, it does require a power reduction below the RAFDO power level. Two surveillances, consistent with the current Technical Specification 3.2.1, are included to assure that the AFD of the operable excore channels are updated periodically to account for indication changes due to burnup. They are included here for completeness and are consistent with past practices on plant application.

Surveillance Requirements 4.2.2.2.b and 4.2.2.4.b are revised to require Limiting Condition for Operation (LCO) 3.2.2 to be evaluated against the measured $F_Q(Z)$ after accounting for fuel manufacturing tolerances and flux map measurement uncertainty. The intent of this change is to require use of the measured parameter to verify operation below the Technical Specification LCO limit. Increasing the monitored $F_Q(Z)$ by an additional term for expected plant maneuvers may appear to provide a more convenient form of assuring plant operation below the $F_Q(Z)$ limit. However, past practices on plant application and recent licensing reviews of the New Standard Technical Specifications (MERITS) have demonstrated that a comparison of the safety limit and the measured $F_Q(Z)$ without adjustments for plant maneuvers is required.

The footnote for Surveillance Requirement 4.2.2.2.d.1 is modified to clarify the timing required for obtaining a power distribution map during startup at the beginning of each cycle and to state that extended operation is defined as expected operation at a power level for greater than 72 hours. The intent of this footnote is to allow the plant to escalate without undue impedance while still assuring consistency with the safety analysis values. The 72 hour limit prevents sustained operations at high power levels without verification of the $F_Q(Z)$ safety limit.

To afford additional flexibility, Surveillance Requirement 4.2.2.2.f.2.a is added. It provides the option of an AFD operating space reduction while maintaining the same surveillance power level. This revision is consistent with WCAP-10216-PA.

Specifications 4.2.2.3.a and 4.2.2.4.c are revised to define k(z) and $F_Q^M(Z)$, as done in Specification 4.2.2.2.c. For RAFDO operation, Surveillance Requirement 4.2.2.4.f.1 is added which allows a return to normal operation in the event that sufficient margin is not available to remain in RAFDO. This requirement clarifies the action necessary in the event the plant can no longer remain in RAFDO.

Specification 6.9.1.9 is revised to reflect the change to RAOC, i.e., RAFDO only target band and RAOC references. Figure B3/4.2-1 is deleted since it is not applicable to RAOC operation. The basis for AFD B3/4.2.1 is also modified to describe how RAOC and RAFDO allow operation at the maximum permissible power and AFD consistent with safety analyses. It also describes how the computer alarms function for RAOC application. The basis notes that two alarms exist. The first alarm indicates operation outside the RAOC operating space while the second indicates operation outside RAFDO.

The proposed change does not involve a significant hazards consideration because operation of Callaway Plant in accordance with this change would not:

(1) Involve a significant increase in the probability or consequences of an accident previously evaluated. The RAOC-related technical specification changes do not significantly increase the probability or consequences of any accident previously evaluated in the FSAR. No new performance requirements are being imposed on any system or component in order to support the RAOC implementation. Subsequently, overall plant integrity is not reduced. Furthermore, the parameter changes associated with RAOC assure that the limiting safety analysis inputs (i.e. F_Q, AFD and F-delta-H) are not exceeded. Mitigators to assumed accident scenarios, such as the f_1(delta-I) penalty term in the OTDT setpoint, are not accident initiators. Therefore, the probability of an accident has not increased.

The consequences of any accident previously evaluated in the FSAR are not increased due to the RAOC-related Technical Specification changes. Since the results of the LOCA and non-LOCA analyses remain applicable, the inputs to the dose analyses do not change. Therefore, the consequences to the public resulting from any accident previously evaluated in the FSAR has not increased.

(2) Create the possibility of a new or different kind of accident from any previously evaluated. The proposed change does not involve any design changes or hardware modifications to safety-related equipment nor will there be a change in the method by which any safety-related plant system performs its safety function. There will be a conservative trip setpoint-reducing change to the negative f_1(delta-I) penalty term in the OTDT setpoint equation, as well as changes to the non-safety related AFD Monitor Alarm since penalty deviation times will be no longer be tracked or alarmed.

The RAOC-related Technical Specification changes do not create the possibility of a new or different kind of accident than any already evaluated in the FSAR. No new accident scenarios, failure mechanisms or limiting single failures are introduced as a result of the RAOC implementation. The institution of RAOC will have no adverse effect and does not challenge the performance of any safety-related system. Therefore, the possibility of a new or different kind of accident is not created.

(3) Involve a significant reduction in a margin of safety. The proposed change will not result in a decrease in the minimum DNBR given in Bases Section 2.1.1 and reported in the FSAR nor will there be an increase in the peak clad temperature (PCT) above the 2200°F ECCS Acceptance Criteria limit as defined in 10CFR50.46. The design limits on peak local power density, F_Q, and F-delta-H will not be exceeded. The proposed change does not alter the manner in which safety limits or limiting safety system settings are determined. The axial flux difference limiting condition for operation and F_Q surveillance are revised in accordance with the approved methodology of WCAP-10216-PA.

The supporting Technical Specification values are defined by the accident analyses which are performed to conservatively bound the operating conditions defined by the Technical Specifications and to demonstrate meeting the regulatory acceptance limits. Performance of analyses and evaluations for the RAOC transition have confirmed that the operating envelope defined by the Technical Specifications continues to be bounded by the analytical basis, which in no case exceeds the acceptance limits. Therefore, the margin of safety provided by the analyses in accordance with the acceptance limits is maintained and not reduced.

Based upon the preceding information, it has been determined that the proposed changes to the Technical Specifications do not involve an increase in the probability or consequences of an accident previously evaluated, create the possibility of a new or different kind of accident from any accident previously evaluated, or involve a significant reduction in a margin of safety. Therefore, it is concluded that the proposed change meets the requirements of 10 CFR 50.92 (c) and does not involve a significant hazards consideration.

ATTACHMENT THREE

ENVIRONMENTAL CONSIDERATION FOR

RELAXED AXIAL OFFSET CONTROL

ENVIRONMENTAL CONSIDERATION

This amendment application includes revisions to Technical Specification Table 2.2-1 as well as Sections 3/4.2.1, 4.2.2.2 through 4.2.2.4, and 6.9.1.9 and associated Bases in order to implement Relaxed Axial Offset Control (RAOC) for Cycle 6 at Callaway Plant. Implementation of RAOC at Callaway will be in accordance with WCAP-10216-PA which has been previously reviewed and approved by the NRC.

The proposed amendment involves changes with respect to the use of facility components within the restricted area, as defined in 10CFR20, and changes surveillance requirements. Union Electric has determined that the proposed amendment does not involve:

(1) A significant hazard consideration, as discussed in Attachment 2 of this amendment application;

(2) A significant change in the types or significant increase in the amounts of any effluents that may be released offsite;

(3) A significant increase in individual or cumulative occupational radiation exposure.

Accordingly, the proposed amendment meets the eligibility criteria for categorical exclusion set forth in 10CFR51.22(c)(9). Pursuant to 10CFR51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of this amendment.