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October 3, 2002

U. S. Nuclear Regulatory Commission
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ULNRC-04742

Ladies and Gentlemen:

AmerenUE

DOCKET NUMBER 50-483
UNION ELECTRIC COMPANY
CALLAWAY PLANT
REVISION TO TECHNICAL SPECIFICATION 3.1.8,
"PHYSICS TESTS EXCEPTIONS – MODE 2"

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

The proposed amendment would revise the Limiting Condition for Operation (LCO) for Technical Specification 3.1.8 to allow one power range neutron flux channel to be bypassed, rather than tripped (in accordance with LCO 3.3.1 for an inoperable channel), when that channel is used during the performance of physics testing in MODE 2. This amendment application is taken directly from NRC-approved traveler TSTF-315, without exception. NRC has also approved the implementation of this traveler on a plant-specific basis for TVA's Watts Bar Nuclear Plant, Unit 1.

AmerenUE is submitting this license amendment application in conjunction with an industry consortium of six plants as a result of a mutual agreement known as Strategic Teaming and Resource Sharing (STARS). The STARS group consists of the six plants operated by TXU Generation Company LP, AmerenUE, Wolf Creek Nuclear Operating Corporation, Pacific Gas and Electric Company, STP Nuclear Operating Company, and Arizona Public Service Company. AmerenUE's Callaway Plant is the lead plant for the proposed license amendment, and one other member of the STARS group for which this change has applicability (i.e., Wolf Creek Nuclear Operating Corporation) can also be expected to submit a license amendment request similar to this one. The Wolf Creek license amendment request will be submitted on a parallel basis, with plant-specific information presented within brackets in Attachment 1.

A001

The Callaway Plant Onsite Review Committee and the Nuclear Safety Review Board have reviewed this amendment application. Attachments 1 through 4 provide the Evaluation, Markup of Technical Specifications, Retyped Technical Specifications, and Proposed Technical Specification (TS) Bases Changes, respectively, in support of this amendment request. Attachment 4 is provided for information only. Final TS Bases changes will be processed under our program for updates per TS 5.5.14, "Technical Specifications Bases Control Program," at the time this amendment is implemented. No other commitments are contained in this amendment application.

It has been determined that this amendment application does not involve 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. The amendment will be implemented within 60 days after NRC approval. In accordance with 10CFR50.91, a copy of this amendment application is being provided to the designated Missouri State official. If you have any questions on this amendment application, please contact us.

Very truly yours,

for John D. Blosser
Manager-Regulatory Affairs

GGY/jdg

Attachments

1 – Evaluation
2 – Markup of Technical Specifications
3 – Retyped Technical Specifications
4 – Proposed Technical Specification Bases Changes (for information only)

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

David Shafer, of lawful age, being first duly sworn upon oath says that he is Superintendent Licensing, 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 David Shafer

David Shafer
Superintendent Licensing
Regulatory Affairs

SUBSCRIBED and sworn to before me this 3rd day of October, 2002.

Melissa L. Orr

MELISSA L. ORR
Notary Public - Notary Seal
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City of St. Louis
My Commission Expires: June 23, 2003

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EVALUATION

EVALUATION

1.0 DESCRIPTION

The proposed amendment would revise the Limiting Condition for Operation (LCO) for Technical Specification (TS) 3.1.8 to allow one power range neutron flux channel to be bypassed, rather than tripped (in accordance with LCO 3.3.1 for an inoperable channel), when that channel is used during the performance of physics testing in MODE 2.

2.0 PROPOSED CHANGE

The proposed amendment would revise LCO 3.1.8 such that, in addition to allowing test exceptions from the listed LCOs, the number of required channels for LCO 3.3.1, "RTS Instrumentation," Functions 2, 3, 6, and 18.e may be reduced from 4 to 3. The specific change involves inserting the following text into LCO 3.1.8:

> "and the number of required channels for LCO 3.3.1, "RTS Instrumentation," Functions 2, 3, 6, and 18.e, may be reduced to 3 required channels"

Functions 2, 3, 6, and 18.e in TS Table 3.3.1-1 are the:

- Power Range Neutron Flux - High and Power Range Neutron Flux - Low reactor trips (Functions 2.a and 2.b);
- Power Range Neutron Flux Rate - High [Positive Rate reactor trip (Function 3)];
- Overtemperature ΔT reactor trip (for Function 6, inputs from the power range neutron flux channels are used to determine the magnitude of the f_1 (ΔI) axial power imbalance penalty discussed in Note 1 of TS Table 3.3.1-1); and
- Power Range Neutron Flux P-10 Interlock (Function 18.e).

The power range neutron flux channels are also associated with TS Table 3.3.1-1 Functions 18.b, 18.c, and 18.d; however, the Applicability for those Functions is limited to MODE 1 whereas the Applicability of LCO 3.1.8 is

MODE 2 during PHYSICS TESTS. Corresponding changes will also be made to the LCO Bases for TS 3.1.8. Attachments 2 and 3 provide the TS markups and the retyped TS for the LCO 3.1.8 revision. Attachment 4 provides an information-only copy of the associated TS Bases changes. No changes to the FSAR will be required in conjunction with this amendment application.

3.0 BACKGROUND

The following discussion covers one portion of the low power physics test program that would take advantage of the proposed amendment; however, the proposed LCO change may be applied throughout the LCO 3.1.8 Applicability.

During the performance of bank reactivity worth measurements using the Dynamic Rod Worth Measurement (DRWM) process, one power range neutron flux channel is used to provide input to the Advanced Digital Reactivity Computer (ADRC). This process is used to measure the integral worth of all the control and shutdown banks by a method of dynamic insertion. Using this process, the selected bank is fully inserted into and withdrawn from the core while measuring reactivity changes with the ADRC. The insertion and withdrawal sequence is repeated for each selected bank to obtain its worth.

When the DRWM process is currently used, the instrument power fuses associated with the power range neutron flux channel to be connected to the ADRC are removed from that power range electronics drawer. This results in the bypass of that power range channel. Since that power range channel is rendered inoperable, the control power fuses are then removed to comply with TS 3.3.1 Conditions D and E. Control power fuse removal results in the trip of that power range channel and a partial reactor trip indication on the status panel. No further Required Actions under LCO 3.3.1 Conditions D and E are necessary, i.e., the inoperable channel is in the tripped condition and THERMAL POWER complies with LCO 3.1.8 (less than or equal to 5% RTP). However, those LCO 3.3.1 Conditions are entered and can not be exited, and the inoperable channel must be maintained in the tripped condition, until the normal system configuration is restored. The cables are then disconnected from the back of that Nuclear Instrumentation System (NIS) power range drawer and connected to the ADRC NIS field connectors. With one channel tripped, this places the power range NIS trip logic in a one-out-of three coincidence status such that a spurious high signal on any of the other three channels would result in a reactor trip.

The change proposed in this amendment application would eliminate the requirement to trip the power range channel that has been disconnected from its detector and connected to the ADRC. This would place that channel in a state of bypass and place the NIS trip logic in a two-out-of-three coincidence status, precluding spurious signals on one other channel from causing a reactor trip.

This amendment application is taken directly from NRC-approved traveler TSTF-315 (Reference 1) without exception. NRC has also approved the implementation of this traveler on a plant-specific basis for TVA's Watts Bar Nuclear Plant, Unit 1 (Reference 2).

4.0 TECHNICAL ANALYSIS

As proposed herein, implementation of the requested amendment will result in one power range neutron flux channel being in a bypassed state. In this configuration, there will be three available channels with a two-out-of-three coincidence logic required to actuate the reactor trip functions associated with power range neutron flux. As required by LCO 3.1.8, physics testing will be performed while the reactor is in MODE 2 at a power level of less than or equal to 5% RATED THERMAL POWER (RTP).

While in the proposed physics testing configuration, a postulated single failure will not prevent the power range neutron flux channels from actuating as designed and satisfying the required logic coincidence for a reactor trip.

Since this change affects only the power range neutron flux channels of the NIS, the reactor trip function of the intermediate range neutron flux channels will be unaffected and, therefore, will be available to mitigate a reactivity transient at low power levels. [In addition, the nominal trip setpoint for the power range neutron flux channels is decreased during startup of the reactor from 109% RTP to 70% RTP as discussed in the SR 3.3.1.2 Bases associated with Reference 3.]

There are two control functions which use power range channel inputs, rod control (power mismatch compensation as depicted on [FSAR Figure 7.2-1 sheet 9 and Figure 7.7-1]) and steam generator water level control (as depicted on [FSAR Figure 7.2-1 sheets 9, 13 and 14 and Figure 7.7-6]).

[At Callaway, rod control is typically in manual; rod control is always in manual at power levels of 5% RTP or less. Automatic rod withdrawal has been rendered unavailable at Callaway, under a previously implemented plant design change, such that conservative rod insertion is the only direction available when rod control is in automatic. In addition, this system uses an auctioneered power range flux input as shown on FSAR Figure 7.2-1 sheet 9, i.e., bypass of any one power range channel will not eliminate the auctioneered input from the other three power range channels for this portion of the control signal. Therefore, this control system is not adversely affected by the proposed change.] At power levels below approximately 25% RTP, steam generator water level control is provided by a system that modulates the position of the feedwater control bypass valves. This system also uses an auctioneered power range flux input as shown on [FSAR Figure 7.2-1 sheet 9], i.e., bypass of any one power range channel will not eliminate the auctioneered input from the other three power range channels for this portion of the control signal. Therefore, this control system is not adversely affected by the proposed change.

In its review of TSTF-315, the NRC staff discussed three issues with the Westinghouse Owners Group (WOG). The staff requested the WOG to provide historical data of spurious signals from excore detectors during physics testing that resulted in reactor trips, and requested information on back-up protection during MODE 2. The staff also asked whether additional analysis had been performed to cover all accident conditions during MODE 2 operation. The WOG identified four instances of trips that were caused by spurious signals. The WOG also stated that there is no specific analysis of all accidents for MODE 2 operation since accidents mitigated by the power range neutron flux channels are normally bounded by the full power condition rather than MODE 2 conditions.

During physics testing, LCO 3.1.8 requires that the reactor power level be kept at less than or equal to 5% RTP, the lowest operating reactor coolant system loop average temperature be kept at greater than or equal to 541°F, and SHUTDOWN MARGIN (SDM) be kept above the minimum value specified in the CORE OPERATING LIMITS REPORT (COLR) so that the fuel design criteria are not violated. Under the proposed change, the power range neutron flux trip would remain available and functional in a two-out-of three coincidence logic configuration. In addition, the intermediate range neutron flux trip provides back-up protection during low power operation. During physics testing the plant is held in a stable state with minimal changes in steam or feed flow. LCO 3.1.8 is applicable for physics testing that is typically performed at the beginning of the fuel cycle, with minimum fuel burnup and decay heat. The SDM is maintained above the required values and procedural controls are in place for monitoring plant parameters.

Probabilistic Risk Assessment (PRA) Evaluation

There is no adverse impact on the [Callaway] PRA since that study is concerned mainly with time-averaged equipment functionality during full power operation, not specific NIS configurations during low power physics testing. The functional performance of the power range portion of the NIS is retained in a two-out-of-three coincidence logic configuration and that functionality will continue to be demonstrated by the Surveillance Requirements of TS 3.3.1, including CHANNEL CHECKS, CHANNEL OPERATIONAL TESTS, and CHANNEL CALIBRATIONS. Since the proposed change reduces the plant susceptibility to spurious reactor trips, it would have a risk-neutral to beneficial effect on the initiating event frequency assumed in the PRA.

Summary/Conclusion

The discussions presented above assess the potential impact of this change which will reduce the plant susceptibility to spurious reactor trips during low power physics testing. On the basis of similar discussions, NRC approved TSTF-315 on a generic basis and for Watts Bar, Unit 1, on a plant-specific basis. There are no unique aspects to this amendment application that would preclude approval of this same change for [Callaway]. The above discussions demonstrate that the proposed change will not adversely affect the design basis or the safe operation of the plant.

5.0 REGULATORY SAFETY ANALYSIS

This section addresses the standards of 10CFR50.92 as well as the applicable regulatory requirements and acceptance criteria.

5.1 NO SIGNIFICANT HAZARDS CONSIDERATION (NSHC)

The proposed amendment would revise the LCO for Technical Specification (TS) 3.1.8 to allow one power range neutron flux channel to be bypassed, rather than tripped (in accordance with LCO 3.3.1 for an inoperable channel), when that channel is used during the performance of physics testing in MODE 2. The proposed change does not involve a significant hazards consideration for [Callaway Plant] based on the three standards set forth in 10CFR50.92(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 there are no permanent hardware changes. The design of the RTS instrumentation will be unaffected; only the manner in which the system is connected for short duration physics testing is being changed to allow the temporary bypass of one power range channel. The reactor protection system will continue to function in a manner consistent with the plant design basis since a sufficient number of power range channels will remain OPERABLE to assure the capability of protective functions, even with a postulated single failure. All design, material, and construction standards that were applicable prior to the request are maintained.

The proposed change will allow the temporary bypass of one power range neutron flux channel during the performance of low power physics testing in MODE 2. This results in a temporary change to the coincidence logic from one-out-of-three under the current TS (with a trip imposed on the channel used for physics testing) to two-out-of-three under the proposed TS (the channel used for physics testing would be in a bypassed state). However, this two-out-of-three coincidence logic still supports required protection and control system applications, while reducing plant susceptibility to a spurious reactor trip.

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.

Therefore, the proposed change does not involve a significant increase in 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 permanent hardware changes nor are there any changes in the method by which any safety-related plant system performs its safety function. This change will not affect the normal method of power operation or change any operating parameters. No performance requirements will be affected.

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

The proposed amendment does not alter the design or performance of the 7300 Process Protection System, Nuclear Instrumentation System (other than as discussed above), or Solid State Protection System used in the plant protection systems.

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

There will be no effect on the manner in which safety limits or limiting safety system settings 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, departure from nucleate boiling ratio (DNBR) limits, heat flux hot channel factor (F_Q), nuclear enthalpy rise hot channel factor ($F\Delta H$), loss of coolant accident peak cladding temperature (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 proposed change does not eliminate any RTS surveillances or alter the Frequency of surveillances required by the Technical Specifications. The nominal RTS and Engineered Safety Features Actuation System (ESFAS) trip setpoints

(TS Bases Tables B 3.3.1-1 and B 3.3.2-1), RTS and ESFAS allowable values (TS Tables 3.3.1-1 and 3.3.2-1), and the safety analysis limits assumed in the transient and accident analyses [(FSAR Table 15.0-4)] are unchanged. None of the acceptance criteria for any accident analysis is changed. The potential reduction in the frequency of spurious reactor trips would effectively increase the margin of safety or, at a minimum, be risk-neutral.

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

Conclusion:

Based on the above, [AmerenUE] concludes 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 systems discussed in this amendment application include:

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

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

GDC-21 requires that the protection system(s) shall be designed for high functional reliability and testability.

GDC-22 through GDC-25 and GDC-29 require various design attributes for the protection system(s), including independence, safe failure modes, separation from control systems, requirements for reactivity control malfunctions, and protection against anticipated operational occurrences.

Regulatory Guide 1.22 discusses an acceptable method of satisfying GDC-20 and GDC-21 regarding the periodic testing of protection system actuation functions. These periodic tests should duplicate, as closely as practicable, the performance that is required of the actuation devices in the event of an accident.

10CFR50.55a(h) requires that the protection systems meet IEEE 279-1971. Section 4.2 of IEEE 279-1971 discusses the general functional requirement for protection systems to assure they satisfy the single failure criterion.

There will be no changes to the RTS instrumentation design such that compliance with any of the regulatory requirements and guidance documents above would come into question. The evaluations performed by [AmerenUE] confirm that [Callaway 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 10CFR20, 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 10CFR51.22 (c)(9). Therefore, pursuant to 10CFR51.22 (b), an environmental assessment of the proposed amendment is not required.

7.0 REFERENCES

1. Industry/TSTF Standard Technical Specification Change Traveler, TSTF-315, approved by letter from William D. Beckner (NRC) to James Davis (NEI) dated June 19, 1999.

2. Amendment Number 28 to Facility Operating License No. NPF-90 for Watts Bar Nuclear Plant, Unit 1, TAC No. MA9519, dated September 13, 2000.

[3. Amendment Number 148 to Facility Operating License No. NPF-30 for Callaway Plant, Unit 1, TAC No. MB3385, dated February 5, 2002.]

ATTACHMENT TWO

MARKUP OF TECHNICAL SPECIFICATIONS

3.1 REACTIVITY CONTROL SYSTEMS

3.1.8 PHYSICS TESTS Exceptions - MODE 2

LCO 3.1.8 During the performance of PHYSICS TESTS, the requirements of

LCO 3.1.3, "Moderator Temperature Coefficient (MTC)";
LCO 3.1.4, "Rod Group Alignment Limits";
LCO 3.1.5, "Shutdown Bank Insertion Limits";
LCO 3.1.6, "Control Bank Insertion Limits"; and
LCO 3.4.2, "RCS Minimum Temperature for Criticality"

may be suspended, *and the number of required channels for LCO 3.3.1, "RTS Instrumentation," Functions 2, 3, 6, and 18.e, may be reduced to 3 required channels* provided:

a. RCS lowest operating loop average temperature is ≥ 541°F;

b. SDM is within the limits specified in the COLR; and

c. THERMAL POWER is ≤ 5% RTP.

APPLICABILITY: MODE 2 during PHYSICS TESTS.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SDM not within limit.	A.1 Initiate boration to restore SDM to within limit. <u>AND</u> A.2 Suspend PHYSICS TESTS exceptions.	15 minutes 1 hour
B. THERMAL POWER not within limit.	B.1 Open reactor trip breakers.	Immediately

(continued)

ATTACHMENT THREE

RETYPED TECHNICAL SPECIFICATIONS

3.1 REACTIVITY CONTROL SYSTEMS

3.1.8 PHYSICS TESTS Exceptions - MODE 2

LCO 3.1.8 During the performance of PHYSICS TESTS, the requirements of

LCO 3.1.3, "Moderator Temperature Coefficient (MTC)";
LCO 3.1.4, "Rod Group Alignment Limits";
LCO 3.1.5, "Shutdown Bank Insertion Limits";
LCO 3.1.6, "Control Bank Insertion Limits"; and
LCO 3.4.2, "RCS Minimum Temperature for Criticality"

may be suspended, and the number of required channels for LCO 3.3.1, "RTS Instrumentation," Functions 2, 3, 6, and 18.e, may be reduced to 3 required channels provided:

a. RCS lowest operating loop average temperature is ≥ 541°F;

b. SDM is within the limits specified in the COLR; and

c. THERMAL POWER is ≤ 5% RTP.

APPLICABILITY: MODE 2 during PHYSICS TESTS.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. SDM not within limit.	A.1 Initiate boration to restore SDM to within limit.	15 minutes
	AND	
	A.2 Suspend PHYSICS TESTS exceptions.	1 hour
B. THERMAL POWER not within limit.	B.1 Open reactor trip breakers.	Immediately

(continued)

ATTACHMENT FOUR

PROPOSED TECHNICAL SPECIFICATION BASES CHANGES
(for information only)

B 3.1 REACTIVITY CONTROL SYSTEMS

B 3.1.8 PHYSICS TESTS Exceptions - MODE 2

BASES

BACKGROUND

The primary purpose of the MODE 2 PHYSICS TESTS exceptions is to permit relaxations of existing LCOs to allow certain PHYSICS TESTS to be performed.

Section XI of 10 CFR 50, Appendix B (Ref. 1), requires that a test program be established to ensure that structures, systems, and components will perform satisfactorily in service. All functions necessary to ensure that the specified design conditions are not exceeded during normal operation and anticipated operational occurrences must be tested. This testing is an integral part of the design, construction, and operation of the plant. Requirements for notification of the NRC, for the purpose of conducting tests and experiments, are specified in 10 CFR 50.59 (Ref. 2).

The key objectives of a test program are to (Ref. 3):

a. Ensure that the facility has been adequately designed;

b. Validate the analytical models used in the design and analysis;

c. Verify the assumptions used to predict unit response;

d. Ensure that installation of equipment in the facility has been accomplished in accordance with the design; and

e. Verify that the operating and emergency procedures are adequate.

To accomplish these objectives, testing is performed prior to initial criticality, during startup, during low power operations, during power ascension, at high power, and after each refueling. The PHYSICS TESTS requirements for reload fuel cycles ensure that the operating characteristics of the core are consistent with the design predictions and that the core can be operated as designed ~~(Ref. 4)~~.

PHYSICS TESTS procedures are written and approved in accordance with established formats. The procedures include all information necessary to permit a detailed execution of the testing required to ensure that the design intent is met. PHYSICS TESTS are performed in accordance with these procedures and test results are approved prior to continued power escalation and long term power operation.

(continued)

BASES

BACKGROUND (continued)

The PHYSICS TESTS typically required for reload fuel cycles ~~(Ref. 4)~~ in MODE 2 include:

a. Critical Boron Concentration - Control Rods Withdrawn;

b. Critical Boron Concentration - Control Rods Inserted;

c. Control Rod Worth; and

d. Isothermal Temperature Coefficient (ITC).

These and other supplementary tests may be required to calibrate the nuclear instrumentation or to diagnose operational problems. These tests may cause the operating controls and process variables to deviate from their LCO requirements during their performance.

a. The Critical Boron Concentration - Control Rods Withdrawn Test measures the critical boron concentration at hot zero power (HZP). With all rods out, the lead control bank is at or near its fully withdrawn position. HZP is where the core is critical ($k_{eff} = 1.0$), and the Reactor Coolant System (RCS) is at design temperature and pressure for zero power. Performance of this test should not violate any of the referenced LCOs.

b. The Critical Boron Concentration - Control Rods Inserted Test measures the critical boron concentration at HZP, with a bank having a worth of at least 1% $\Delta k/k$ at or near its fully inserted position in the core. With the core at HZP and all banks fully withdrawn, the boron concentration of the reactor coolant is gradually lowered in a continuous manner. The selected bank is then inserted to make up for the decreasing boron concentration. The boron concentration is then measured with the selected bank at or near its fully inserted position. This test may be performed concurrently with the Control Rod Worth Test described below. Performance of this test could violate LCO 3.1.4, "Rod Group Alignment Limits"; LCO 3.1.5, "Shutdown Bank Insertion Limits"; or LCO 3.1.6, "Control Bank Insertion Limits."

c. The Control Rod Worth Test is used to measure the reactivity worth of selected banks. This test is performed at HZP and has four alternative methods of performance. The first method, the Boron Exchange Method, varies the reactor coolant boron concentration and moves the selected bank in response to the changing boron concentration. The reactivity changes are measured with a reactivity computer. This sequence is continued

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

Westinghouse Reload Safety Evaluation Methodology Report (Ref. 5). The above mentioned PHYSICS TESTS, and other tests that may be required to calibrate nuclear instrumentation or to diagnose operational problems, may require the operating control or process variables to deviate from their LCO limitations.

The FSAR defines requirements for initial testing of the facility, including PHYSICS TESTS. Section 14.2 summarizes the zero, low power, and power tests. Reload fuel cycle PHYSICS TESTS are performed in accordance with Technical Specification requirements, fuel vendor guidelines, and established industry practices. Although these PHYSICS TESTS are generally accomplished within the limits for all LCOs, conditions may occur when one or more LCOs must be suspended to make completion of PHYSICS TESTS possible or practical. This is acceptable as long as the fuel design criteria are not violated. When one or more of the requirements specified in LCO 3.1.3, "Moderator Temperature Coefficient (MTC)," LCO 3.1.4, LCO 3.1.5, LCO 3.1.6, and LCO 3.4.2 are suspended for PHYSICS TESTS, the fuel design criteria are preserved as long as the power level is limited to ≤ 5% RTP, the reactor coolant lowest operating loop temperature is kept ≥ 541°F, and SDM is within the limits specified in the COLR.

The PHYSICS TESTS include measurement of core nuclear parameters or the exercise of control components that affect process variables. Among the process variables involved are MTC and RCS Average Temperature, which represent initial conditions of the unit safety analyses. Also involved are the movable control components (control and shutdown rods), which are required to shut down the reactor. The limits for these variables are specified for each fuel cycle in the COLR. PHYSICS TESTS meet the criteria for inclusion in the Technical Specifications, since the components and process variable LCOs suspended during PHYSICS TESTS meet Criteria 1, 2, and 3 of 10CFR50.36(c)(2)(ii).

Reference 6 allows special test exceptions (STEs) to be included as part of the LCO that they affect. It was decided, however, to retain this STE as a separate LCO because it was less cumbersome and provided additional clarity.

LCO

This LCO allows the reactor parameters of MTC and minimum temperature for criticality to be outside their specified limits. In addition, it allows selected control and shutdown rods to be positioned outside of their specified alignment and insertion limits. *One Power Range Neutron Flux channel may be bypassed, reducing the number of required channels from 4 to 3.* Operation beyond specified limits is permitted for the purpose of performing PHYSICS TESTS and poses no threat to fuel integrity, provided the SRs are met.

BASES

LCO (continued)

The requirements of LCO 3.1.3, LCO 3.1.4, LCO 3.1.5, LCO 3.1.6, and LCO 3.4.2 may be suspended *and the number of required channels for LCO 3.3.1, "RTS Instrumentation," Functions 2, 3, 6, and 18.e, may be reduced to 3 required channels* during the performance of PHYSICS TESTS provided:

a. RCS lowest operating loop average temperature is ≥ 541°F;

b. SDM is within the limits specified in the COLR; and

c. THERMAL POWER is ≤ 5% RTP.

APPLICABILITY

This LCO is applicable in MODE 2 when performing low power PHYSICS TESTS. The applicable PHYSICS TESTS are performed in MODE 2 at HZP.

ACTIONS

A.1 and A.2

If the SDM requirement is not met, boration must be initiated promptly. A Completion Time of 15 minutes is adequate for an operator to correctly align and start the required systems and components. The operator should begin boration with the best source available for the plant conditions. Boration will be continued until SDM is within limit.

Suspension of PHYSICS TESTS exceptions requires restoration of each of the applicable LCOs to within specification.

B.1

When THERMAL POWER is > 5% RTP, the only acceptable action is to open the reactor trip breakers (RTBs) to prevent operation of the reactor beyond its design limits. Immediately opening the RTBs will shut down the reactor and prevent operation of the reactor outside of its design limits.

C.1

When the RCS lowest operating loop T_{avg} is < 541°F, the appropriate action is to restore T_{avg} to within its specified limit. The allowed Completion Time of 15 minutes provides time for restoring T_{avg} to within limits without allowing the plant to remain in an unacceptable condition for an extended period of time. Operation with the reactor critical and with an operating loop's temperature below 541°F could violate the assumptions for accidents analyzed in the safety analyses.