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SOUTHERN COMPANY
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May 24, 2002

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50-366

HL-6190

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Edwin I. Hatch Nuclear Plant
Request to Revise Technical Specifications:
Change to Intermediate Range Monitor
Limiting Condition for Operation

Ladies and Gentlemen:

In response to Southern Nuclear Operating Company's (SNC's) Request to Revise the Technical Specifications, dated March 9, 2001, the NRC issued Amendment No. 166 to the Edwin I. Hatch Nuclear Plant Unit 2 Technical Specifications, Appendix A to Operating License NPF-5, by letter dated April 27, 2001. The amendment, which revised the Unit 2 Technical Specifications only until the fall 2001 refueling outage, allows Mode 2 (startup) operation with two required intermediate range monitor (IRM) channels per trip system.

In accordance with the provisions of 10 CFR 50.90, as required by 10 CFR 50.59(c)(1), SNC is hereby proposing that the limited (temporary) Unit 2 Technical Specifications change granted by the NRC in Amendment No. 166, with revisions, become a permanent Technical Specifications change for Units 1 and 2. Enclosure 1 provides the basis for the change request. Enclosure 2 provides the basis for SNC's determination that the proposed change does not involve a significant hazardous consideration. Enclosure 3 provides page change instructions for incorporating the proposed change, the revised Technical Specifications and Bases pages, and the associated marked-up pages.

In accordance with the requirements of 10 CFR 50.91, a copy of this letter and all applicable enclosures will be sent to the designated State official of the Environmental Protection Division of the Georgia Department of Natural Resources.

Mr. H. L. Sumner, Jr. states he is Vice President of Southern Nuclear Operating Company and is authorized to execute this oath on behalf of Southern Nuclear Operating Company, and to the best of his knowledge and belief, the facts set forth in this letter are true.

Respectfully submitted,

Lewis Sumner

H. L. Sumner, Jr.

Sworn to and subscribed before me this 24 *day of* May 2001.

Jan C. Edge
Notary Public

Commission Expiration Date: 7/27/05

A001

OCV/sp

Enclosures:

1. Basis for Change
2. 10 CFR 50.92 No Significant Hazards Evaluation and Environmental Assessment
3. Page Change Instructions, Revised Technical Specifications and Bases Pages, and Associated Markups

cc: Southern Nuclear Operating Company
Mr. P. H. Wells, Nuclear Plant General Manager
SNC Document Management (R-Type A02.001)

U.S. Nuclear Regulatory Commission, Washington, D.C.
Mr. L. N. Olshan, Project Manager - Hatch

U.S. Nuclear Regulatory Commission, Region II
Mr. L. A. Reyes, Regional Administrator
Mr. J. T. Munday, Senior Resident Inspector - Hatch

State of Georgia
Mr. L. C. Barrett, Commissioner - Department of Natural Resources

Enclosure 1

Edwin I. Hatch Nuclear Plant
Request to Revise Technical Specifications:
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Limiting Condition for Operation

Basis for Change

A. Description of Proposed Change

Southern Nuclear Operating Company (SNC) proposes to revise the Plant Hatch Units 1 and 2 Technical Specifications Limiting Condition for Operation (LCO) for the intermediate range monitors (IRMs). Specifically, the number of required operable IRM channels per trip system specified in Technical Specifications Table 3.3.1.1-1 is reduced from 3 to 2.

B. Background for Proposed Change

By letter dated March 9, 2001, SNC requested NRC approval of a limited (temporary) Technical Specifications change to the Unit 2 IRM LCO allowing Mode 2 (startup) operation with two required IRM channels per trip system. In response to SNC's request, the NRC issued Amendment No. 166 to the Unit 2 Technical Specifications by letter dated April 27, 2001. The amendment revised the Unit 2 Technical Specifications only until the fall 2001 refueling outage.

C. Justification for Proposed Change

The function of the IRMs is discussed in Units 1 and 2 Technical Specification Bases 3.3.1.1 and the Final Safety Analysis Report (FSAR). The IRMs monitor neutron flux levels from the upper range of the source range monitors (SRMs) to the lower range of the average power range monitors (APRMs). The IRM system consists of eight incore detectors and their associated drive mechanisms and electronic circuitry (or channels). The eight IRM channels are divided into two groups of four, such that four IRM channels provide input into each reactor protection system (RPS) trip system. The Technical Specifications permit bypassing one IRM channel in each trip system, as delineated in Technical Specifications Table 3.3.1.1-1, Functions 1.a. and 1.b. The IRM is credited with mitigating the consequences of a continuous control rod withdrawal transient for an out-of-sequence rod in the startup range (ref. FSAR paragraph 15.2.6.1.3). The event scenario assumes the following:

1. The operator mistakenly selects and continuously withdraws an out-of-sequence control rod.

2. The rod worth minimizer (RWM) fails to give a "select error" and provide a rod block.

However, if the RWM is operable, a control rod cannot be moved out of sequence, because the RWM initiates a control rod block to prevent the withdrawal of the error rod. Thus, the postulated event cannot occur with the RWM operable. In addition, an in-sequence rod withdrawal error cannot occur, because the RWM will provide rod blocks at the banked-position withdrawal sequence (BPWS) specified withdrawal limits. The Technical Specifications currently require the RWM to be operable below 10% of rated reactor power, except during one startup per calendar year. In that case, the startup is currently allowed by utilizing a second operator to verify compliance with the BPWS compliant control rod pull sequence.

NEDO-23842, "Continuous Control Rod Withdrawal Transient in the Startup Range" (Ref. 1), provides the results of General Electric's (GE's) generic analysis addressing the control rod withdrawal error in the startup range and identifies the following key points:

1. The analysis assumes one IRM in each RPS trip system is bypassed.

2. The resultant peak fuel enthalpies due to the continuous withdrawal of an out-of-sequence control rod in the startup range are well below the licensing basis criterion of 170 cal/gm.

3. Although the scram terminates the event, Doppler feedback limits the prompt power increase that occurs when the control rod is withdrawn at its maximum rate.

4. Doppler feedback and the average power range monitor (APRM) flux scram (not the IRMs) actually terminate the limiting case that occurs at approximately 1% power. The peak fuel enthalpy reported for the limiting case is < 60 cal/gm.

NEDO-23842 further adds that at lower power levels, nonlimiting cases are terminated by a combination of Doppler feedback and a scram signal from the IRMs. However, the analysis was conservative in assigning detector locations for the analysis. That is, the detector closest to the control rod being withdrawn was bypassed on trip systems A and B, and the power level registered by the second closest detector of both trip systems had to reach the scram trip level before the scram was initiated in the analysis. The further away the scram-initiating detector is from the rod being withdrawn, the longer the duration of the transient before scram initiation. The analysis was very conservative in assuming the furthest possible distance between the control rod and a scram-initiating IRM detector. The peak fuel enthalpy reported for this scenario is < 20 cal/gm.

In the previous one-time change, SNC requested GE, the nuclear steam supply system (NSSS) vendor, to review the NEDO-23842 analysis and consider more recent analyses performed for the BWR industry to qualitatively determine whether the licensing basis criterion for this event is satisfied with only two IRMs operable per channel. For this permanent change, GE was asked to verify that the conclusions of that letter are general with respect to any cycle. They did so as discussed in reference 4. Those conclusions are based on the following:

1. The prompt power burst in the event of a control rod withdrawal error transient in the startup range is mainly terminated by Doppler feedback rather than a scram that has a slower response due to the instrument delay time.

2. The APRM system can initiate the reactor scram; therefore, the IRMs are not needed as long as the 15% APRM trip is available. (The control rod drop accident was analyzed using the methodology described in NEDE-24011-P-A-14 (Ref. 3), which credits the APRM system for initiating a reactor scram.)

3. In the past, GE performed a sensitivity analysis for a rod withdrawal transient in the startup range to determine whether the licensing basis criterion for fuel failure would be exceeded if the IRM system failed to provide a scram initiation signal. The analysis assumed the transient was terminated by a scram based upon an APRM scram setpoint of either 15% or 120% of rated power. Evaluation results indicated the peak fuel enthalpies that result from the continuous withdrawal of an out-of-sequence control rod in the startup range (assuming

failure of the IRM scram function with an APRM scram at 15% of rated power) are less than the licensing basis criterion of 170 cal/gm for control rod worths up to 2.5% Δk, which is a reasonable assumption for maximum control rod worth during a startup.

4. In the event the 15% APRM scram fails, two operable IRMs per trip channel are still available and expected to initiate a delayed scram independent of the specific detector location in the core. For the postulated low-power (nonlimiting) event scenario, the scram will occur well before the 170 cal/gm limit is reached.

At this point, presenting a summary of the defense-in-depth protection against this event is appropriate. First, either the RWM or a second operator should prevent the continuous rod withdrawal event from occurring if the operator moving the rod makes an error. Also, the limiting event is terminated by a combination of Doppler reactivity and the APRM neutron flux scram that is "set down" in the startup range (Technical Specifications Table 3.3.1.1-1, Function 2.a). For the nonlimiting event starting from low power, the IRM scram terminates the continuous rod withdrawal event. However, GE's qualitative review (Ref. 2) of the NEDO-23842 analysis concluded the licensing basis criterion will not be exceeded even if the IRM scram signal is initiated by detectors located on the opposite side of the core from the rod being withdrawn.

Furthermore, the Technical Specifications Bases state that IRMs can mitigate cold-water injection events during startup, although no credit is specifically assumed. Vessel subcooling or cold-water injection transients cause core-wide changes in reactor power. Two operable IRM channels per trip system will effectively mitigate this type of event.

The IRMs are an important monitoring system during startup. It is necessary to verify adequate overlap exists between source range, intermediate range, and power range monitors and that the operators are always provided with the necessary feedback on core reactivity. This function can be adequately accomplished by having one IRM per quadrant operable during plant startup. (Currently, having only one operable IRM per quadrant is allowed implicitly, since one is allowed to be bypassed in each RPS trip system.) Therefore, the proposed Technical Specifications amendment request allows two IRM channels per trip system to be operable while specifying at least one IRM per quadrant is available.

The detailed discussion above supports the defense-in-depth design of reactivity controls and demonstrates SNC's proposed Technical Specifications change does not adversely affect plant safety.

References:

1. "Continuous Control Rod Withdrawal Transient in the Startup Range," GE Report NEDO-23842, April 1978.

2. GE Letter Report NSA 01-107, Nadar Sadeghi to Daryl Bouchie, "Plant Hatch IRM Technical Specification," dated March 8, 2001.

3. "General Electric Standard Application for Reactor Fuels," NEDE-24011-P-A-14 (and U.S. Supplement), June 2000, as amended.

4. GE Letter NSA 02-250, "Plant Hatch Technical Specifications," dated April 19, 2002.

Enclosure 2

Edwin I. Hatch Nuclear Plant
Request to Revise Technical Specifications:
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Limiting Condition for Operation

10 CFR 50.92 No Significant Hazards Evaluation
and
Environmental Assessment

In 10 CFR 50.92(c), the Nuclear Regulatory Commission (NRC) provides the following standards to be used in determining the existence of a significant hazards consideration:

> ...a proposed amendment to an operating license for a facility licensed under §50.21(b) or §50.22 or for a testing facility involves no significant hazards consideration, if operation of the facility in accordance with the proposed amendment would not: (1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) Involve a significant reduction in a margin of safety.

Basis for no significant hazards consideration determination:

Southern Nuclear Operating Company (SNC) reviewed the proposed license amendment request and determined its adoption does not involve a significant hazards consideration based upon the following discussion:

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

   The intermediate range monitors (IRMs) monitor neutron flux levels in the reactor core during startup. The IRM detectors are capable of generating a trip signal during a continuous rod withdrawal error in the startup range. However, the IRMs perform no function related to the probability of occurrence of a previously evaluated accident. Also, the IRM trip signal is not necessary to mitigate the limiting control rod withdrawal error. The limiting case assumes the trip signal is generated from the safety-related average power range monitor (APRM). Therefore, the consequences of this previously evaluated abnormal operating transient are not increased.

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

   The proposed change reduces the number of required operable IRM channels per trip system from three to two. However, the manner in which the actuation logic functions and the systems respond are unaffected by the proposed change. Furthermore, the IRMs will continue to perform their design function of core monitoring during startup and mitigating nonlimiting transient events postulated to occur during startup. Therefore, the proposed change cannot 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?*

   The Bases for Units 1 and 2 Technical Specifications Table 3.3.1.1-1 state the "IRMs are capable of generating trip signals that can be used to prevent fuel damage resulting from abnormal operating transients in the intermediate power [startup] range." The proposed change ensures the IRMs will still effectively mitigate these events. The most significant source of reactivity change is due to a control rod withdrawal error. With the proposed change, the IRMs will continue to provide protection against rod withdrawal errors, and peak fuel energy depositions will remain below the 170 cal/gm threshold criterion defined in the Technical Specifications Bases. Therefore, the proposed change does not reduce a margin of safety.

Environmental Assessment

10 CFR 51.22(c)(9) provides criteria for identification of licensing and regulatory actions eligible for categorical exclusion from performing an environmental assessment. A proposed amendment to an operating license for a facility requires no environmental assessment if operation of the facility in accordance with the proposed license amendment will not:

1. Involve a significant hazards consideration;

2. Result in a significant change in the types, or a significant increase in the amounts, of any effluents that may be released offsite;

3. Result in a significant increase in individual or cumulative occupational radiation exposure.

SNC has determined the proposed Technical Specifications change described in Enclosure 1 meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.229(c)(9). Accordingly, pursuant to 10 CFR 51.22, no environmental impact statement needs to be prepared in connection with the issuance of the license amendment for the proposed change. The basis for this determination using the above criteria follows:

1. As demonstrated in this enclosure, the proposed change does not involve a significant hazards consideration.

2. The proposed change does not result in a significant change to the types of effluents or in the amounts of effluents released offsite. The proposed change involves the required number of operable channels associated with instruments that monitor neutron flux during reactor startup. It does not involve changes to the radioactive waste processing systems or to radioactive waste effluent monitors. Accordingly, the proposed change does not require the radioactive waste processing systems to perform a function different from the function they are designed to perform, nor does the proposed change alter the operation or testing of any such system.

3. The proposed change does not result in a significant increase in occupational radiation exposure. Monitoring reactor neutron flux is performed by licensed reactor operators from the main control room. The number of operable channels is not related to occupational radiation exposure.

Enclosure 3

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Page Change Instructions

Unit 1

Page	Instruction
3.3-7	Replace

Unit 2

Page	Instruction
3.3-7	Replace

Bases Page Change Instructions

Unit 1

Page	Instruction
B 3.3-4	Replace
B 3.3-5	Replace
B 3.3-32	Replace

Unit 2

Page	Instruction
B 3.3-4	Replace
B 3.3-5	Replace
B 3.3-32	Replace

Table 3.3.1.1-1 (page 1 of 3)
Reactor Protection System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	CONDITIONS REFERENCED FROM REQUIRED ACTION D.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Intermediate Range Monitor					
a. Neutron Flux - High	2	2(d)	G	SR 3.3.1.1.1 SR 3.3.1.1.4 SR 3.3.1.1.6 SR 3.3.1.1.7 SR 3.3.1.1.13 SR 3.3.1.1.15	≤ 120/125 divisions of full scale
	5(a)	2(d)	H	SR 3.3.1.1.1 SR 3.3.1.1.5 SR 3.3.1.1.13 SR 3.3.1.1.15	≤ 120/125 divisions of full scale
b. Inop	2	2(d)	G	SR 3.3.1.1.4 SR 3.3.1.1.15	NA
	5(a)	2(d)	H	SR 3.3.1.1.5 SR 3.3.1.1.15	NA
2. Average Power Range Monitor					
a. Neutron Flux - High (Setdown)	2	3(c)	G	SR 3.3.1.1.1 SR 3.3.1.1.7 SR 3.3.1.1.8 SR 3.3.1.1.10 SR 3.3.1.1.13	≤ 20% RTP
b. Simulated Thermal Power - High	1	3(c)	F	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.8 SR 3.3.1.1.10 SR 3.3.1.1.13	≤ 0.58 W + 58% RTP and ≤ 115.5% RTP(b)
c. Neutron Flux - High	1	3(c)	F	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.8 SR 3.3.1.1.10 SR 3.3.1.1.13	≤ 120% RTP
d. Inop	1, 2	3(c)	G	SR 3.3.1.1.10	NA

(continued)

(a) With any control rod withdrawn from a core cell containing one or more fuel assemblies.

(b) 0.58 W + 58% - 0.58 ΔW RTP when reset for single loop operation per LCO 3.4.1, "Recirculation Loops Operating."

(c) Each APRM channel provides inputs to both trip systems.

(d) One channel in each quadrant of the core must be OPERABLE whenever the IRMs are required to be OPERABLE. Both the RWM and a second licensed operator must verify compliance with the withdrawal sequence when less than three channels in any trip system are OPERABLE.

Table 3.3.1.1-1 (page 1 of 3)
Reactor Protection System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	CONDITIONS REFERENCED FROM REQUIRED ACTION D.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Intermediate Range Monitor					
a. Neutron Flux - High	2	2(d)	G	SR 3.3.1.1.1 SR 3.3.1.1.4 SR 3.3.1.1.6 SR 3.3.1.1.7 SR 3.3.1.1.13 SR 3.3.1.1.15	≤ 120/125 divisions of full scale
	5(a)	2(d)	H	SR 3.3.1.1.1 SR 3.3.1.1.5 SR 3.3.1.1.13 SR 3.3.1.1.15	≤ 120/125 divisions of full scale
b. Inop	2	2(d)	G	SR 3.3.1.1.4 SR 3.3.1.1.15	NA
	5(a)	2(d)	H	SR 3.3.1.1.5 SR 3.3.1.1.15	NA
2. Average Power Range Monitor					
a. Neutron Flux - High (Setdown)	2	3(c)	G	SR 3.3.1.1.1 SR 3.3.1.1.7 SR 3.3.1.1.8 SR 3.3.1.1.10 SR 3.3.1.1.13	≤ 20% RTP
b. Simulated Thermal Power - High	1	3(c)	F	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.8 SR 3.3.1.1.10 SR 3.3.1.1.13	≤ 0.58 W + 58% RTP and ≤ 115.5% RTP(b)
c. Neutron Flux - High	1	3(c)	F	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.8 SR 3.3.1.1.10 SR 3.3.1.1.13	≤ 120% RTP
d. Inop	1, 2	3(c)	G	SR 3.3.1.1.10	NA

(continued)

(a) With any control rod withdrawn from a core cell containing one or more fuel assemblies.

(b) 0.58 W + 58% - 0.58 ΔW RTP when reset for single loop operation per LCO 3.4.1, "Recirculation Loops Operating."

(c) Each APRM channel provides inputs to both trip systems.

(d) One channel in each quadrant of the core must be OPERABLE whenever the IRMs are required to be OPERABLE. Both the RWM and a second licensed operator must verify compliance with the withdrawal sequence when less than three channels in any trip system are OPERABLE.

BASES

APPLICABLE SAFETY ANALYSES LCO, and APPLICABILITY (continued)

(LCO 3.3.2.1) does not allow any control rod to be withdrawn. In MODE 5, control rods withdrawn from a core cell containing no fuel assemblies do not affect the reactivity of the core and, therefore, are not required to have the capability to scram. Provided all other control rods remain inserted, no RPS Function is required. In this condition, the required SDM (LCO 3.1.1) and refuel position one-rod-out interlock (LCO 3.9.2) ensure that no event requiring RPS will occur.

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

1. Intermediate Range Monitor (IRM)

1.a. Intermediate Range Monitor Neutron Flux - High

The IRMs monitor neutron flux levels from the upper range of the source range monitor (SRM) to the lower range of the average power range monitors (APRMs). The IRMs are capable of generating trip signals that can be used to prevent fuel damage resulting from abnormal operating transients in the intermediate power range. In this power range, the most significant source of reactivity change is due to control rod withdrawal. The IRM mitigates control rod withdrawal error events and is diverse from the rod worth minimizer (RWM), which monitors and controls the movement of control rods at low power. The RWM prevents the withdrawal of an out of sequence control rod during startup that could result in an unacceptable neutron flux excursion (Ref. 5). The IRM provides mitigation of the neutron flux excursion. To demonstrate the capability of the IRM System to mitigate control rod withdrawal events, generic analyses have been performed (Ref. 6) to evaluate the consequences of control rod withdrawal events during startup that are mitigated only by the IRM. This analysis, which assumes that one IRM channel in each trip system is bypassed, demonstrates that the IRMs provide protection against local control rod withdrawal errors and results in peak fuel energy depositions below the 170 cal/gm fuel failure threshold criterion. Reference 18 provides a more recent analysis which shows that even with reduced IRM OPERABILITY requirements, the 170 cal/gm criterion is still satisfied.

The IRMs are also capable of limiting other reactivity excursions during startup, such as cold water injection events, although no credit is specifically assumed.

The IRM System is divided into two groups of IRM channels, with four IRM channels inputting to each trip system. The analysis of

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

1.a. Intermediate Range Monitor Neutron Flux - High (continued)

Reference 6 assumes that one channel in each trip system is bypassed. Therefore, six channels with three channels in each trip system are required for IRM OPERABILITY to ensure that no single instrument failure will preclude a scram from this Function on a valid signal. This trip is active in each of the 10 ranges of the IRM, which must be selected by the operator to maintain the neutron flux within the monitored level of an IRM range.

The analysis of Reference 6 has adequate conservatism to permit an IRM Allowable Value of 120 divisions of a 125 division scale.

The Intermediate Range Monitor Neutron Flux - High Function must be OPERABLE during MODE 2 when control rods may be withdrawn and the potential for criticality exists. In MODE 5, when a cell with fuel has its control rod withdrawn, the IRMs provide monitoring for and protection against unexpected reactivity excursions. In MODE 1, the APRM System and the RWM provide protection against control rod withdrawal error events and the IRMs are not required.

1.b. Intermediate Range Monitor - Inop

This trip signal provides assurance that a minimum number of IRMs are OPERABLE. Any time an IRM mode switch is moved to any position other than "Operate," the detector voltage drops below a preset level, or when a module is not plugged in, an inoperative trip signal will be received by the RPS unless the IRM is bypassed.

This Function was not specifically credited in the accident analysis but it is retained for the overall redundancy and diversity of the RPS as required by the NRC approved licensing basis.

Four channels of Intermediate Range Monitor - Inop with two channels in each trip system are required to be OPERABLE to ensure that no single instrument failure will preclude a scram from this Function on a valid signal.

Since this Function is not assumed in the safety analysis, there is no Allowable Value for this Function.

This Function is required to be OPERABLE when the Intermediate Range Monitor Neutron Flux - High Function is required.

(continued)

BASES

REFERENCES (continued)

15. NEDO-32465-A, "BWR Owners' Group Long-Term Stability Detect and Suppress Solutions Licensing Basis Methodology and Reload Applications," March 1996.

16. NEDO-32410P-A, Supplement 1, "Nuclear Measurement Analysis and Control Power Range Neutron Monitor (NUMAC PRNM) Retrofit Plus Option III Stability Trip Function," November 1997.

17. Letter, L.A. England (BWROG) to M.J. Virgilio, "BWR Owners' Group Guidelines for Stability Interim Corrective Action," June 6, 1994.

18. GE Letter NSA 02-250, "Plant Hatch IRM Technical Specifications," April 19, 2002.

BASES

APPLICABLE SAFETY ANALYSES LCO, and APPLICABILITY (continued)

(LCO 3.3.2.1) does not allow any control rod to be withdrawn. In MODE 5, control rods withdrawn from a core cell containing no fuel assemblies do not affect the reactivity of the core and, therefore, are not required to have the capability to scram. Provided all other control rods remain inserted, no RPS Function is required. In this condition, the required SDM (LCO 3.1.1) and refuel position one-rod-out interlock (LCO 3.9.2) ensure that no event requiring RPS will occur.

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1.a. Intermediate Range Monitor Neutron Flux - High

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The IRM System is divided into two groups of IRM channels, with four IRM channels inputting to each trip system. The analysis of

(continued)

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

1.a. Intermediate Range Monitor Neutron Flux - High (continued)

Reference 6 assumes that one channel in each trip system is bypassed. Therefore, six channels with three channels in each trip system are required for IRM OPERABILITY to ensure that no single instrument failure will preclude a scram from this Function on a valid signal. This trip is active in each of the 10 ranges of the IRM, which must be selected by the operator to maintain the neutron flux within the monitored level of an IRM range.

The analysis of Reference 6 has adequate conservatism to permit an IRM Allowable Value of 120 divisions of a 125 division scale.

The Intermediate Range Monitor Neutron Flux - High Function must be OPERABLE during MODE 2 when control rods may be withdrawn and the potential for criticality exists. In MODE 5, when a cell with fuel has its control rod withdrawn, the IRMs provide monitoring for and protection against unexpected reactivity excursions. In MODE 1, the APRM System and the RWM provide protection against control rod withdrawal error events and the IRMs are not required.

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This trip signal provides assurance that a minimum number of IRMs are OPERABLE. Any time an IRM mode switch is moved to any position other than "Operate," the detector voltage drops below a preset level, or when a module is not plugged in, an inoperative trip signal will be received by the RPS unless the IRM is bypassed.

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Since this Function is not assumed in the safety analysis, there is no Allowable Value for this Function.

This Function is required to be OPERABLE when the Intermediate Range Monitor Neutron Flux - High Function is required.

(continued)

BASES

REFERENCES (continued)

9. NEDO-30851-P-A, "Technical Specification Improvement Analyses for BWR Reactor Protection System," March 1988.

10. Technical Requirements Manual.

11. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

12. NEDO-32291, "System Analyses for Elimination of Selected Response Time Testing Requirements," January 1994.

13. NEDC-32410P-A, "Nuclear Measurement Analysis and Control Power Range Neutron Monitor (NUMAC PRNM) Retrofit Plus Option III Stability Trip Function," October 1995.

14. NEDO-31960-A, "BWR Owners' Group Long-Term Stability Solutions Licensing Methodology," November 1995.

15. NEDO-31960-A, Supplement 1, "BWR Owners' Group Long-Term Stability Solutions Licensing Methodology," November 1995.

16. NEDO-32465-A, "BWR Owners' Group Long-Term Stability Detect and Suppress Solutions Licensing Basis Methodology and Reload Applications," March 1996.

17. NEDO-32410P-A, Supplement 1, "Nuclear Measurement Analysis and Control Power Range Neutron Monitor (NUMAC PRNM) Retrofit Plus Option III Stability Trip Function," November 1997.

18. Letter, L.A. England (BWROG) to M.J. Virgilio, "BWR Owners' Group Guidelines for Stability Interim Corrective Action," June 6, 1994.

19. GE Letter NSA 02-250, "Plant Hatch IRM Technical Specifications," April 19, 2002.

Table 3.3.1.1-1 (page 1 of 3)
Reactor Protection System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	CONDITIONS REFERENCED FROM REQUIRED ACTION D.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Intermediate Range Monitor					
a. Neutron Flux - High	2	~~3~~ 2(d)	G	SR 3.3.1.1.1 SR 3.3.1.1.4 SR 3.3.1.1.6 SR 3.3.1.1.7 SR 3.3.1.1.13 SR 3.3.1.1.15	≤ 120/125 divisions of full scale
	5(a)	~~3~~ 2(d)	H	SR 3.3.1.1.1 SR 3.3.1.1.5 SR 3.3.1.1.13 SR 3.3.1.1.15	≤ 120/125 divisions of full scale
b. Inop	2	~~3~~ 2(d)	G	SR 3.3.1.1.4 SR 3.3.1.1.15	NA
	5(a)	~~3~~ 2(d)	H	SR 3.3.1.1.5 SR 3.3.1.1.15	NA
2. Average Power Range Monitor					
a. Neutron Flux - High (Setdown)	2	3(c)	G	SR 3.3.1.1.1 SR 3.3.1.1.7 SR 3.3.1.1.8 SR 3.3.1.1.10 SR 3.3.1.1.13	≤ 20% RTP
b. Simulated Thermal Power - High	1	3(c)	F	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.8 SR 3.3.1.1.10 SR 3.3.1.1.13	≤ 0.58 W + 58% RTP and ≤ 115.5% RTP(b)
c. Neutron Flux - High	1	3(c)	F	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.8 SR 3.3.1.1.10 SR 3.3.1.1.13	≤ 120% RTP
d. Inop	1, 2	3(c)	G	SR 3.3.1.1.10	NA

(continued)

(a) With any control rod withdrawn from a core cell containing one or more fuel assemblies.

(b) 0.58 W + 58% - 0.58 ΔW RTP when reset for single loop operation per LCO 3.4.1, "Recirculation Loops Operating."

(c) Each APRM channel provides inputs to both trip systems.

(d) add note from attached page

One channel in each quadrant of the core must be operable whenever the IRMS are required to be operable. Both the RWM and a second licensed operator must verify compliance with the withdrawal sequence when less than three channels in any trip system are operable.

Table 3.3.1.1-1 (page 1 of 3)
Reactor Protection System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER TRIP SYSTEM	CONDITIONS REFERENCED FROM REQUIRED ACTION D.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Intermediate Range Monitor					
a. Neutron Flux - High	2	~~3~~(d) 2	G	SR 3.3.1.1.1 SR 3.3.1.1.4 SR 3.3.1.1.6 SR 3.3.1.1.7 SR 3.3.1.1.13 SR 3.3.1.1.15	≤ 120/125 divisions of full scale
	5(a)	~~3~~(d) 2	H	SR 3.3.1.1.1 SR 3.3.1.1.5 SR 3.3.1.1.13 SR 3.3.1.1.15	≤ 120/125 divisions of full scale
b. Inop	2	~~3~~(d) 2	G	SR 3.3.1.1.4 SR 3.3.1.1.15	NA
	5(a)	~~3~~(d) 2	H	SR 3.3.1.1.5 SR 3.3.1.1.15	NA
2. Average Power Range Monitor					
a. Neutron Flux - High (Setdown)	2	3(c)	G	SR 3.3.1.1.1 SR 3.3.1.1.7 SR 3.3.1.1.8 SR 3.3.1.1.10 SR 3.3.1.1.13	≤ 20% RTP
b. Simulated Thermal Power - High	1	3(c)	F	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.8 SR 3.3.1.1.10 SR 3.3.1.1.13	≤ 0.58 W + 58% RTP and ≤ 115.5% RTP(b)
c. Neutron Flux - High	1	3(c)	F	SR 3.3.1.1.1 SR 3.3.1.1.2 SR 3.3.1.1.8 SR 3.3.1.1.10 SR 3.3.1.1.13	≤ 120% RTP
d. Inop	1, 2	3(c)	G	SR 3.3.1.1.10	NA

(continued)

(a) With any control rod withdrawn from a core cell containing one or more fuel assemblies.

(b) 0.58 W + 58% - 0.58 ΔW RTP when reset for single loop operation per LCO 3.4.1, "Recirculation Loops Operating."

(c) Each APRM channel provides inputs to both trip systems.

(d) ~~Only two channels required per trip system until the Fall 2001 refueling outage, provided one channel is operable in each quadrant of the core and both the RWM and a second licensed operator verify compliance with the withdrawal sequence.~~

add note from attached page

One channel in each quadrant of the core must be operable whenever the IRMS are required to be operable. Both the RWM and a second licensed operator must verify compliance with the withdrawal sequence when less than three channels in any trip system are operable.

BASES

APPLICABLE SAFETY ANALYSES LCO, and APPLICABILITY (continued)

(LCO 3.3.2.1) does not allow any control rod to be withdrawn. In MODE 5, control rods withdrawn from a core cell containing no fuel assemblies do not affect the reactivity of the core and, therefore, are not required to have the capability to scram. Provided all other control rods remain inserted, no RPS Function is required. In this condition, the required SDM (LCO 3.1.1) and refuel position one-rod-out interlock (LCO 3.9.2) ensure that no event requiring RPS will occur.

The specific Applicable Safety Analyses, LCO, and Applicability discussions are listed below on a Function by Function basis.

1. Intermediate Range Monitor (IRM)

1.a. Intermediate Range Monitor Neutron Flux - High

The IRMs monitor neutron flux levels from the upper range of the source range monitor (SRM) to the lower range of the average power range monitors (APRMs). The IRMs are capable of generating trip signals that can be used to prevent fuel damage resulting from abnormal operating transients in the intermediate power range. In this power range, the most significant source of reactivity change is due to control rod withdrawal. The IRM mitigates control rod withdrawal error events and is diverse from the rod worth minimizer (RWM), which monitors and controls the movement of control rods at low power. The RWM prevents the withdrawal of an out of sequence control rod during startup that could result in an unacceptable neutron flux excursion (Ref. 5). The IRM provides mitigation of the neutron flux excursion. To demonstrate the capability of the IRM System to mitigate control rod withdrawal events, generic analyses have been performed (Ref. 6) to evaluate the consequences of control rod withdrawal events during startup that are mitigated only by the IRM. This analysis, which assumes that one IRM channel in each trip system is bypassed, demonstrates that the IRMs provide protection against local control rod withdrawal errors and results in peak fuel energy depositions below the 170 cal/gm fuel failure threshold criterion.

add sentence from next page

The IRMs are also capable of limiting other reactivity excursions during startup, such as cold water injection events, although no credit is specifically assumed.

The IRM System is divided into two groups of IRM channels, with four IRM channels inputting to each trip system. The analysis of Reference 6 assumes that one channel in each trip system is bypassed. Therefore, six channels with three channels in each trip

(continued)

Reference 18 provides more recent analysis which shows that even with reduced IRM operability requirements, the 170 cal/gm criteria is still satisfied.

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

1.a. Intermediate Range Monitor Neutron Flux - High (continued)

system are required for IRM OPERABILITY to ensure that no single instrument failure will preclude a scram from this Function on a valid signal. This trip is active in each of the 10 ranges of the IRM, which must be selected by the operator to maintain the neutron flux within the monitored level of an IRM range.

The analysis of Reference 6 has adequate conservatism to permit an IRM Allowable Value of 120 divisions of a 125 division scale.

The Intermediate Range Monitor Neutron Flux - High Function must be OPERABLE during MODE 2 when control rods may be withdrawn and the potential for criticality exists. In MODE 5, when a cell with fuel has its control rod withdrawn, the IRMs provide monitoring for and protection against unexpected reactivity excursions. In MODE 1, the APRM System and the RWM provide protection against control rod withdrawal error events and the IRMs are not required.

1.b. Intermediate Range Monitor - Inop

This trip signal provides assurance that a minimum number of IRMs are OPERABLE. Any time an IRM mode switch is moved to any position other than "Operate," the detector voltage drops below a preset level, or when a module is not plugged in, an inoperative trip signal will be received by the RPS unless the IRM is bypassed. ~~Since only one IRM in each trip system may be bypassed, only one IRM in each RPS trip system may be inoperable without resulting in an RPS trip signal.~~

This Function was not specifically credited in the accident analysis but it is retained for the overall redundancy and diversity of the RPS as required by the NRC approved licensing basis.

Four ~~Six~~ channels of Intermediate Range Monitor - Inop with ~~three~~ two channels in each trip system are required to be OPERABLE to ensure that no single instrument failure will preclude a scram from this Function on a valid signal.

Since this Function is not assumed in the safety analysis, there is no Allowable Value for this Function.

This Function is required to be OPERABLE when the Intermediate Range Monitor Neutron Flux - High Function is required.

(continued)

BASES

REFERENCES (continued)

15. NEDO-32465-A, "BWR Owners' Group Long-Term Stability Detect and Suppress Solutions Licensing Basis Methodology and Reload Applications," March 1996.

16. NEDO-32410P-A, Supplement 1, "Nuclear Measurement Analysis and Control Power Range Neutron Monitor (NUMAC PRNM) Retrofit Plus Option III Stability Trip Function," November 1997.

17. Letter, L.A. England (BWROG) to M.J. Virgilio, "BWR Owners' Group Guidelines for Stability Interim Corrective Action," June 6, 1994.

18. SE Letter NSA 02-250, "Plant Hatch IRM Technical Specifications," April 19, 2002.

BASES

APPLICABLE SAFETY ANALYSES LCO, and APPLICABILITY (continued)

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(continued)

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BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY

1.a. Intermediate Range Monitor Neutron Flux - High (continued)

system are required for IRM OPERABILITY to ensure that no single instrument failure will preclude a scram from this Function on a valid signal. This trip is active in each of the 10 ranges of the IRM, which must be selected by the operator to maintain the neutron flux within the monitored level of an IRM range.

The analysis of Reference 6 has adequate conservatism to permit an IRM Allowable Value of 120 divisions of a 125 division scale.

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This trip signal provides assurance that a minimum number of IRMs are OPERABLE. Any time an IRM mode switch is moved to any position other than "Operate," the detector voltage drops below a preset level, or when a module is not plugged in, an inoperative trip signal will be received by the RPS unless the IRM is bypassed. ~~Since only one IRM in each trip system may be bypassed, only one IRM in each RPS trip system may be inoperable without resulting in an RPS trip signal.~~

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Since this Function is not assumed in the safety analysis, there is no Allowable Value for this Function.

This Function is required to be OPERABLE when the Intermediate Range Monitor Neutron Flux - High Function is required.

(continued)

BASES

REFERENCES (continued)

9. NEDO-30851-P-A, "Technical Specification Improvement Analyses for BWR Reactor Protection System," March 1988.

10. Technical Requirements Manual.

11. NRC No. 93-102, "Final Policy Statement on Technical Specification Improvements," July 23, 1993.

12. NEDO-32291, "System Analyses for Elimination of Selected Response Time Testing Requirements," January 1994.

13. NEDC-32410P-A, "Nuclear Measurement Analysis and Control Power Range Neutron Monitor (NUMAC PRNM) Retrofit Plus Option III Stability Trip Function," October 1995.

14. NEDO-31960-A, "BWR Owners' Group Long-Term Stability Solutions Licensing Methodology," November 1995.

15. NEDO-31960-A, Supplement 1, "BWR Owners' Group Long-Term Stability Solutions Licensing Methodology," November 1995.

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