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Serial: MNS-15-022

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10 CFR 50.90

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

Subject: Duke Energy Carolinas, LLC (Duke)
McGuire Nuclear Station (MNS), Units 1 and 2
Docket Numbers 50-369 and 50-370
Renewed Facility Operating License Nos. NPF-9 and NPF-17
Catawba Nuclear Station (CNS), Units 1 and 2
Docket Nos. 50-413 and 50-414
Renewed Facility Operating License Nos. NPF-35 and NPF-52
Removal of Superseded Technical Specification (TS) Requirements

References: Letter from Bruce H. Hamilton to NRC, License Amendment Request to Support Plant Modifications to the Nuclear Instrumentation System, dated July 1, 2009

Letter from Regis T. Repko to NRC, Response to Request for Additional Information Regarding License Amendment Request to Support Plant Modifications to the Nuclear Instrumentation System, dated May 20, 2010

Letter from Jon Thompson to Regis T. Repko, McGuire Nuclear Station, Units 1 and 2, Issuance of Amendments Regarding Replacement of Source Range and Intermediate Range Excore Detection Systems With Equivalent Neutron Monitoring Systems Using Fission Chamber Detectors, dated August 2, 2010

Letter from Jon Thompson to J. R. Morris, Catawba Nuclear Station, Units 1 and 2, Issuance of Amendments Regarding Replacement of Source Range and Intermediate Range Excore Detection Systems With Equivalent Neutron Monitoring Systems Using Fission Chamber Detectors, dated August 2, 2010

Pursuant to Section 50.90 of Title 10 of the Code of Federal Regulations (10 CFR), Duke Energy Carolinas, LLC (Duke Energy) herein submits a license amendment request (LAR) for the Renewed Facility Operating Licenses (FOL) and Technical Specifications (TS) for MNS and CNS Units 1 and 2 to remove superseded TS requirements.

By letter dated July 1, 2009, as supplemented by letter dated May 20, 2010, Duke Energy submitted a LAR to change TSs 3.3.1 in support of plant modifications planned for MNS and CNS. The modifications installed new nuclear instrumentation systems. The pre-existing Source Range (SR) and Intermediate Range (IR) excore detector systems utilized boron triflouride (BF_3) detectors and compensated ion chamber detectors, respectively. New nuclear instrumentation systems were installed to increase system reliability. The new instrumentation utilizes fission chamber detectors that perform both the SR and the IR monitoring functions.

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Because the modifications were implemented on a staggered basis for each of the units, temporary TS modifications were implemented to allow the applicable TS requirements to be applicable or non-applicable, depending upon implementation status of the modification. The LAR, as supplemented by a letter dated May 20, 2010, contained a commitment for Duke Energy to submit a follow-up administrative LAR to delete the superseded temporary TSs within one year following implementation of the modification on the final unit.

By separate letters dated August 2, 2010 the NRC issued license amendments regarding the TS changes requested in the July 1, 2009, LAR. Implementation of the final modification was completed during the MNS Unit 1 End-Of-Cycle 23 refueling outage (Fall 2014). This LAR satisfies the MNS and CNS commitment to delete the superseded TSs described in the July 1, 2009 LAR, as supplemented by letter dated May 20, 2010.

In accordance with Duke's administrative procedures and Quality Assurance Program, this LAR has been reviewed and approved by the MNS and CNS Plant Operations Review Committees.

Attachment 1 provides an evaluation of the changes proposed in this LAR. Attachments 2 and 4 contain marked-up versions of the affected TS pages. Attachments 3 and 5 provide the existing Bases pages marked-up to show the proposed changes These pages are provided for information only. Reprinted (clean) TS pages will be provided to the NRC prior to issuance of the approved amendments.

This LAR contains no regulatory commitments.

Implementation of this proposed LAR will not impact the MNS or CNS Updated Final Safety Analysis Reports (UFSARs).

Pursuant to 10 CFR 50.91, a copy of this LAR is being sent to the designated official of the State of North and South Carolina.

If you have any questions or require additional information, please contact Kay L. Crane at (980) 875-4306.

I declare under penalty of perjury that the foregoing is true and correct. Executed on June 23, 2015.

Sincerely,

SD Capps

Steven D. Capps

Attachments

cc:

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Attachment 1

Evaluation of the Proposed Changes

1. SUMMARY DESCRIPTION

2. DETAILED DESCRIPTION

3. TECHNICAL EVALUATION

4. REGULATORY EVALUATION

    4.1 Applicable Regulatory Requirements/Criteria

    4.2 Significant Hazards Consideration

    4.3 Conclusions

5. ENVIRONMENTAL CONSIDERATION

6. REFERENCES

1. SUMMARY DESCRIPTION

Pursuant to Section 50.90 of Title 10 of the Code of Federal Regulations (10 CFR), Duke Energy Carolinas, LLC (Duke Energy) herein submits a license amendment request (LAR) for the Renewed Facility Operating Licenses (FOLs) and Technical Specifications (TS) for McGuire Nuclear Station (MNS) and Catawba Nuclear Station (CNS) Units 1 and 2 to remove superseded TS requirements.

By letter dated July 1, 2009, Duke Energy submitted a LAR in support of plant modifications to the Nuclear Instrumentation Systems. Because the modifications were implemented on a staggered basis for each plant and unit, temporary TS modifications were implemented. This allowed the TS requirements to be either applicable or non-applicable, depending upon whether the modification had or had not been implemented, respectively. The LAR, as supplemented by a letter dated May 20, 2010, contained a commitment for Duke Energy to submit a follow-up administrative LAR to delete the superseded temporary TS(s) within one year following the implementation of the modification on the final unit.

By separate letters dated August 2, 2010, the NRC issued amendments and Safety Evaluation Report (SERs) regarding the TS changes requested in the July 1, 2009, LAR. Implementation of the final modification was completed during the MNS Unit 1 End-Of-Cycle 23 refueling outage (Fall 2014). This LAR satisfies the Duke commitment to delete the superseded temporary TSs described in the July 1, 2009, LAR, as supplemented by a letter dated May 20, 2010.

2. DETAILED DESCRIPTION

The proposed changes described below are administrative non-technical changes only. These changes are consistent with the proposed changes in Duke Energy's July 1, 2009, LAR and the subject commitment in that LAR, as supplemented by a letter dated May 20, 2010. In addition, these changes are consistent with the changes approved by the NRC in their SERs issued on August 2, 2010. The proposed changes support the commitment to the NRC to delete the superseded temporary TSs within one year following implementation of the modification on the final unit.

Proposed Changes-McGuire (reference Attachment 2):

SR 3.3.1.11, Note 3 and the associated footnote will be deleted. This note applies to Westinghouse supplied compensated ion chamber neutron detectors which have been replaced.

Table 3.3.1-1 (page 1 of 7), Intermediate Range Neutron Flux $\leq$ 30% RTP Allowable Values and the associated footnote will be deleted. This value applies to the Westinghouse supplied compensated ion chamber neutron detectors which have been replaced.

Table 3.3.1-1 (page 2 of 7), Source Range Neutron Flux Allowable Values $\leq$ 1.3 E5 cps and the associated footnote will be deleted. This value applies to the Westinghouse boron triflouride (BF_3) detectors which have been replaced.

Table 3.3.1-1 (page 4 of 7), The Intermediate Range Neutron Flux, P-6, $\geq$ 4E-11 amp

Allowable Value and the 1E-10 amp Nominal Trip Setpoint will be deleted. These values apply to the Westinghouse supplied compensated ion chamber neutron detectors which have been replaced.

The associated MNS Technical Specification Bases Pages are provided in Attachment 3 for information only.

Proposed Changes-Catawba (reference Attachment 4):

SR 3.3.1.11, Note 3 and the associated footnote will be deleted. This note applies to Westinghouse supplied compensated ion chamber neutron detectors which have been replaced.

Table 3.3.1-1 (page 2 of 8), The Intermediate Range Neutron Flux Allowable Value $\leq$ 31% RTP and the associated footnote will be deleted. This value applies to the Westinghouse supplied compensated ion chamber neutron detectors which have been replaced.

Table 3.3.1-1 (page 2 of 8), The Source Range Neutron Flux Allowable Value $\leq$ 1.4 E5 cps and the associated footnote will be deleted. This value applies to the Westinghouse boron triflouride (BF_3) detectors which have been replaced.

Table 3.3.1-1 (page 5 of 8), The Intermediate Range Neutron Flux, P-6 Allowable Value and Nominal Trip Setpoint of $\geq$ 6E-11 and 1E-10 amp and the associated footnote will be deleted. These values apply to the Westinghouse supplied compensated ion chamber neutron detectors which have been replaced.

The associated CNS Technical Specification Bases Pages are provided in Attachment 5 for information only.

3. TECHNICAL EVALUATION

The proposed changes are administrative non-technical changes which remove temporary TS requirements added as part of the MNS and CNS July 1, 2009, LAR. These temporary requirements, which accommodated the staggered implementation of the modifications on both MNS and CNS Units, is no longer necessary given that the modifications have been implemented. Upon approval and implementation of the proposed changes, the MNS and CNS TSs will continue to reflect the changes justified in the Regulatory Evaluation associated with Duke Energy's July 1, 2009, LAR and approved by the NRC as part of their August 2, 2010 SERs.

The proposed changes implement an administrative non-technical editorial corrections.

Given the above, additional Technical Evaluation of the administrative non-technical changes proposed in this LAR is not necessary.

4. REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

The proposed changes in this LAR are administrative and non-technical in

nature. Upon approval and implementation of the proposed changes, the MNS and CNS TSs will continue to comply with the applicable regulatory requirements and criteria discussed in the Regulatory Evaluation associated with Duke Energy's July 1, 2009, LAR and approved by the NRC as part of their August 2, 2010 SERs. Therefore, additional discussion of the applicable regulatory requirements and criteria is not required.

4.2 Significant Hazards Consideration

The changes are administrative non-technical changes only and are consistent with the commitment in Duke Energy's July 1, 2009, LAR, as supplemented by a letter dated May 20, 2010. In addition, these changes are consistent with the changes approved by the NRC in their August 2, 2010, SERs. These changes support the commitment to the NRC to delete the superseded MNS and CNS temporary TSs within one year after implementation of the modification on the final unit.

Duke Energy has evaluated whether or not a significant hazard consideration is involved with the proposed changes by analyzing the three standards set forth in 10 CFR 50.92(c) as discussed below:

Criterion 1:

Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No.

This LAR proposes administrative non-technical changes only. These proposed changes do not adversely affect accident initiators or precursors nor alter the design assumptions, conditions, or configurations of the facility. The proposed changes do not alter or prevent the ability of structures, systems and components (SSCs) to perform their intended function to mitigate the consequences of an initiating event within the assumed acceptance limits.

Given the above discussion, it is concluded the proposed amendment does not significantly increase the probability or consequences of an accident previously evaluated.

Criterion 2:

Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No.

This LAR proposes administrative non-technical changes only. The proposed changes will not alter the design requirements of any Structure, System or Component (SSC) or its function during accident conditions. No new or different accidents result from the proposed changes. The changes do not involve a physical alteration of the plant or any changes in methods governing normal plant

operation. The changes do not alter assumptions made in the safety analysis.

Given the above discussion, it is concluded the proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated.

Criterion 3:

Does the proposed amendment involve a significant reduction in a margin of safety?

Response: No.

This LAR proposes administrative non-technical changes only. The proposed changes do not alter the manner in which safety limits, limiting safety system settings or limiting conditions for operation are determined. The safety analysis acceptance criteria are not affected by these changes. The proposed changes will not result in plant operation in a configuration outside the design basis. The proposed changes do not adversely affect systems that respond to safely shutdown the plant and to maintain the plant in a safe shutdown condition.

Given the above discussion, it is concluded the proposed amendment does not involve a significant reduction in the margin of safety.

4.3 Conclusions

Based on the above, Duke Energy concludes that the proposed amendment does not involve a 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. ENVIRONMENTAL CONSIDERATION

This LAR proposes administrative non-technical changes only. Duke Energy has determined that the proposed amendment does change requirements with respect to the installation or use of a facility component located within the restricted area, as defined by 10 CFR 20. Duke Energy has evaluated the proposed changes and has determined that they do not involve: (1) a significant hazards consideration, (2) a significant change in the types or a significant increase in the amounts of any effluents that may be released offsite, or (3) a significant increase in individual or cumulative occupational radiation exposures. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment needs to be prepared in connection with the proposed amendment.

6. REFERENCES

1. Letter from Bruce H. Hamilton to NRC, License Amendment Request to Support Plant Modifications to the Nuclear Instrumentation System, dated July 1, 2009

2. Letter from Regis T. Repko to NRC, Response to Request for Additional Information Regarding License Amendment Request to Support Plant Modifications to the Nuclear Instrumentation System, dated May 20, 2010

3. Letter from Jon Thompson to Regis T. Repko, McGuire Nuclear Station, Units 1 and 2, Issuance of Amendments Regarding Replacement of Source Range and Intermediate Range Excore Detection Systems with Equivalent Neutron Monitoring Systems Using Fission Chamber Detectors, dated August 2, 2010

4. Letter from Jon Thompson to J. R. Morris, Catawba Nuclear Station, Units 1 and 2, Issuance of Amendments Regarding Replacement of Source Range and Intermediate Range Excore Detection Systems with Equivalent Neutron Monitoring Systems Using Fission Chamber Detectors, dated August 2, 2010.

Attachment 2

MNS Marked-Up TS Pages

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.1.9	-----NOTES----- Verification of setpoint is not required. ----- Perform TADOT.	In accordance with the Surveillance Frequency Control Program
SR 3.3.1.10	-----NOTES----- This Surveillance shall include verification that the time constants are adjusted to the prescribed values. ----- Perform CHANNEL CALIBRATION.	In accordance with the Surveillance Frequency Control Program
SR 3.3.1.11	-----NOTES----- 1. Neutron detectors are excluded from CHANNEL CALIBRATION. 2. Power Range Neutron Flux high voltage detector saturation curve verification is not required to be performed prior to entry into MODE 1 or 2. ~~3. Intermediate Range Neutron Flux detector plateau voltage verification is not required to be performed prior to entry into MODE 1 or 2.*~~ ----- Perform CHANNEL CALIBRATION.	In accordance with the Surveillance Frequency Control Program
SR 3.3.1.12	Perform CHANNEL CALIBRATION.	In accordance with the Surveillance Frequency Control Program

(continued)

~~* This note applies to the Westinghouse supplied compensated ion chamber neutron detectors. The compensated ion chamber neutron detectors are being replaced with Thermo Scientific supplied fission chamber neutron detectors which do not require detector plateau voltage verification. Therefore, this note does not apply to the fission chamber neutron detectors.~~

Table 3.3.1-1 (page 1 of 7)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
1 Manual Reactor Trip	1,2	2	B	SR 3.3.1.14	NA	NA
	3[a], 4[a], 5[a]	2	C	SR 3.3.1.14	NA	NA
2. Power Range Neutron Flux						
a High	1,2	4	D	SR 3.3.1.1 SR 3.3.1.2 SR 3.3.1.7 SR 3.3.1.11 SR 3.3.1.16	≤ 110% RTP	109% RTP
b Low	1[b],2	4	E	SR 3.3.1.1 SR 3.3.1.8 SR 3.3.1.11 SR 3.3.1.16	≤ 26% RTP	25% RTP
3. Power Range Neutron Flux Rate						
High Positive Rate	1,2	4	D	SR 3.3.1.7 SR 3.3.1.11	≤ 5.5% RTP with time constant ≥ 2 sec	5% RTP with time constant ≥ 2 sec
4. Intermediate Range Neutron Flux	1[b], 2[c]	2	F,G	SR 3.3.1.1 SR 3.3.1.8[j][k] SR 3.3.1.11[j][k]	~~≤ 30% RTP*~~ ≤ 38% RTP	25% RTP
	2[d]	2	H	SR 3.3.1.1 SR 3.3.1.8[j][k] SR 3.3.1.11[j][k]	~~≤ 30% RTP*~~ ≤ 38% RTP	25% RTP

(continued)

~~* The ≤ 30% RTP Allowable Value applies to the Westinghouse-supplied compensated Ion chamber Intermediate Range neutron detectors. The compensated Ion chamber neutron detectors are being replaced with Thermo Scientific-supplied fission chamber neutron detectors. The ≤ 38% Allowable Value applies to the replacement fission chamber Intermediate Range neutron detectors.~~

(a) With Reactor Trip Breakers (RTBs) closed and Rod Control System capable of rod withdrawal.

(b) Below the P-10 (Power Range Neutron Flux) interlocks

(c) Above the P-6 (Intermediate Range Neutron Flux) interlocks.

(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks

(j) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(k) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in the UFSAR

Table 3.3.1-1 (page 2 of 7)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
5. Source Range Neutron Flux	2(d)	2	I,J	SR 3.3.1.1 SR 3.3.1.8(j)(k) SR 3.3.1.11(j)(k)	~~≤ 1.3 E5 cps**~~ ≤ 1.44 E5 cps	1.0 E5 cps
	3(a), 4(a), 5(a)	2	J,K	SR 3.3.1.1 SR 3.3.1.7(j)(k) SR 3.3.1.11(j)(k)	~~≤ 1.3 E5 cps**~~ ≤ 1.44 E5 cps	1.0 E5 cps
	3(e), 4(e), 5(e)	1	L	SR 3.3.1.1 SR 3.3.1.11	N/A	N/A
6. Overtemperature ΔT	1,2	4	E	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7 SR 3.3.1.12 SR 3.3.1.16 SR 3.3.1.17	Refer to Note 1 (Page 3.3.1-18)	Refer to Note 1 (Page 3.3.1-18)
7. Overpower ΔT	1,2	4	E	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7 SR 3.3.1.12 SR 3.3.1.16 SR 3.3.1.17	Refer to Note 2 (Page 3.3.1-19)	Refer to Note 2 (Page 3.3.1-19)
8. Pressurizer Pressure						
a. Low	1(f)	4	M	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≥ 1935 psig	1945 psig
b. High	1,2	4	E	SR 3.3.1.1 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16	≤ 2395 psig	2385 psig

(continued)

~~** The ≤ 1.3 E5 cps Allowable Value applies to the Westinghouse-supplied boron triflouride (BF_3) Source Range neutron detectors. The BF_3 neutron detectors are being replaced with Thermo Scientific-supplied fission chamber neutron detectors. The ≤ 1.44 E5 cps Allowable Value applies to the replacement fission chamber Source Range neutron detectors.~~

(a) With Reactor Trip Breakers (RTBs) closed and Rod Control System capable of rod withdrawal.
(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks
(e) With the RTBs open. In this condition, source range Function does not provide reactor trip but does provide indication
(f) Above the P-7 (Low Power Reactor Trips Block) interlock.
(j) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.
(k) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the Nominal Trip Setpoint (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in the UFSAR.

Table 3.3.1-1 (page 4 of 7)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
16. Reactor Trip System Interlocks						
a. Intermediate Range Neutron Flux, P-6	2(d)	2	S	SR 3.3.1.11 SR 3.3.1.13	~~≥ 4E-11 amp***~~ ≥ 6.6E-6% RTP	~~1E-10 amp***~~ 1E-5% RTP
b. Low Power Reactor Trips Block, P-7	1	1 per train	T	SR 3.3.1.5	NA	NA
c. Power Range Neutron Flux, P-8	1	4	T	SR 3.3.1.11 SR 3.3.1.13	≤ 49% RTP	48% RTP
d. Power Range Neutron Flux, P-10	1,2	4	S	SR 3.3.1.11 SR 3.3.1.13	≥ 7% RTP and ≤ 11% RTP	10% RTP
e. Turbine Inlet Pressure, P-13	1	2	T	SR 3.3.1.12 SR 3.3.1.13	≤ 11% turbine inlet pressure equivalent	10% turbine inlet pressure equivalent
17. Reactor Trip Breakers(i)	1,2	2 trains	R, V	SR 3.3 1.4	NA	NA
	3(a), 4(a), 5(a)	2 trains	C	SR 3 3.1.4	NA	NA
18. Reactor Trip Breaker Undervoltage and Shunt Trip Mechanisms	1,2	1 each per RTB	U	SR 3.3.1.4	NA	NA
	3(a), 4(a), 5(a)	1 each per RTB	C	SR 3.3.1.4	NA	NA
19 Automatic Trip Logic	1,2	2 trains	Q, V	SR 3.3.1.5	NA	NA
	3(a), 4(a), 5(a)	2 trains	C	SR 3.3.1.5	NA	NA

~~*** The ≥ 4E-11 amp Allowable Value and the 1E-10 amp NOMINAL TRIP SETPOINT value apply to the Westinghouse-supplied compensated ion chamber Intermediate Range neutron detectors. The compensated ion chamber neutron detectors are being replaced with Thermo Scientific-supplied fission chamber neutron detectors. The ≥ 6.6E-6% RTP Allowable Value and the 1E-5% RTP NOMINAL TRIP SETPOINT value apply to the replacement fission chamber Intermediate Range neutron detectors.~~

(a) With RTBs closed and Rod Control System capable of rod withdrawal.
(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.
(i) Including any reactor trip bypass breakers that are racked in and closed for bypassing on RTP.

Attachment 3

MNS Marked-Up TS Bases Pages

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

In MODE 1 or 2, when there is a potential to add a large amount of positive reactivity from a rod ejection accident (REA), the Power Range Neutron Flux—High Positive Rate trip must be OPERABLE. In MODE 3, 4, 5, or 6, the Power Range Neutron Flux—High Positive Rate trip Function does not have to be OPERABLE because other RTS trip Functions and administrative controls will provide protection against positive reactivity additions. In MODE 6, no rods are withdrawn and the SDM is increased during refueling operations. The reactor vessel head is also removed or the closure bolts are detensioned preventing any pressure buildup. In addition, the NIS power range detectors cannot detect neutron levels present in this mode.

4A. ~~Intermediate Range Neutron Flux (Westinghouse-supplied Instrumentation)~~

~~The Westinghouse-supplied Intermediate Range excore detector systems (utilizing compensated ion chamber detectors) are being replaced with Thermo Scientific-supplied 300i neutron flux monitoring systems (utilizing fission chamber detectors). This section of the Bases applies to the Westinghouse-supplied instrumentation. The next section of the Bases applies to the Thermo Scientific-supplied instrumentation.~~

~~The Intermediate Range Neutron Flux trip Function ensures that protection is provided against an uncontrolled RCCA bank rod withdrawal accident from a subcritical condition during startup. This trip Function provides redundant protection to the Power Range Neutron Flux-Low Setpoint trip Function. The NIS intermediate range detectors are located external to the reactor vessel and measure neutrons leaking from the core. Note that this Function also provides a signal to prevent automatic and manual rod withdrawal prior to initiating a reactor trip. Limiting further rod withdrawal may terminate the transient and eliminate the need to trip the reactor.~~

~~The LCO requires two channels of Intermediate Range Neutron Flux to be OPERABLE. Two OPERABLE channels are sufficient to ensure no single random failure will disable this trip Function.~~

~~Because this trip Function is important only during startup, there is generally no need to disable channels for testing while the Function is required to be OPERABLE. Therefore, a third channel is unnecessary.~~

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

~~In MODE 1 below the P-10 setpoint, and in MODE 2, when there is a potential for an uncontrolled RCCA bank rod withdrawal accident during reactor startup, the Intermediate Range Neutron Flux trip must be OPERABLE. Above the P-10 setpoint, the Power Range Neutron Flux-High Setpoint trip and the Power Range Neutron Flux-High Positive Rate trip provide core protection for a rod withdrawal accident. In MODE 3, 4, or 5, the Intermediate Range Neutron Flux trip does not have to be OPERABLE because other RTS trip functions provide protection against positive reactivity additions. The reactor cannot be started up in this condition. The core also has the required SDM to mitigate the consequences of a positive reactivity addition accident. In MODE 6, all rods are fully inserted and the core has a required increased SDM. Also, the NIS intermediate range detectors cannot detect neutron levels present in this MODE.~~

4~~B~~. Intermediate Range Neutron Flux ~~(Thermo Scientific-supplied Instrumentation)~~

~~The Westinghouse-supplied Intermediate Range excore detector systems (utilizing compensated ion chamber detectors) are being replaced with Thermo Scientific-supplied 300i neutron flux monitoring systems (utilizing fission chamber detectors). This section of the Bases applies to the Thermo Scientific-supplied instrumentation. The previous section of the Bases applies to the Westinghouse-supplied instrumentation.~~

The Intermediate Range Neutron Flux trip Function ensures that protection is provided against an uncontrolled RCCA bank rod withdrawal accident from a subcritical condition during startup. This trip Function provides redundant protection to the Power Range Neutron Flux-Low Setpoint trip Function. The NIS intermediate range detectors are located external to the reactor vessel and measure neutrons leaking from the core. Note that this Function also provides a signal to prevent automatic and manual rod withdrawal prior to initiating a reactor trip. Limiting further rod withdrawal may terminate the transient and eliminate the need to trip the reactor.

The LCO requires two channels of Intermediate Range Neutron Flux to be OPERABLE. Two OPERABLE channels are sufficient to ensure no single random failure will disable this trip Function.

Because this trip Function is important only during startup, there is generally no need to disable channels for testing while the Function

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

is required to be OPERABLE. Therefore, a third channel is unnecessary.

In MODE 1 below the P-10 setpoint, and in MODE 2, when there is a potential for an uncontrolled RCCA bank rod withdrawal accident during reactor startup, the Intermediate Range Neutron Flux trip must be OPERABLE. Above the P-10 setpoint, the Power Range Neutron Flux-High Setpoint trip and the Power Range Neutron Flux-High Positive Rate trip provide core protection for a rod withdrawal accident. In MODE 3, 4, or 5, the Intermediate Range Neutron Flux trip does not have to be OPERABLE because other RTS trip functions provide protection against positive reactivity additions. The reactor cannot be started up in this condition. The core also has the required SDM to mitigate the consequences of a positive reactivity addition accident. In MODE 6, all rods are fully inserted and the core has a required increased SDM.

~~5A. Source Range Neutron Flux (Westinghouse-supplied Instrumentation)~~

~~The Westinghouse-supplied Source Range excore detector systems (utilizing boron triflouride detectors) are being replaced with Thermo Scientific-supplied 300i neutron flux monitoring systems (utilizing fission chamber detectors). This section of the Bases applies to the Westinghouse-supplied instrumentation. The next section of the Bases applies to the Thermo Scientific-supplied instrumentation.~~

~~The LCO requirement for the Source Range Neutron Flux trip Function ensures that protection is provided against an uncontrolled RCCA bank rod withdrawal accident from a subcritical condition during startup. This trip Function provides redundant protection to the Power Range Neutron Flux-Low Setpoint and Intermediate Range Neutron Flux trip Functions. In MODES 3, 4, and 5, administrative controls also prevent the uncontrolled withdrawal of rods. The NIS source range detectors are located external to the reactor vessel and measure neutrons leaking from the core. The NIS source range detectors do not provide any inputs to control systems. The source range trip is the only RTS automatic protection function required in MODES 3, 4, and 5 with the CRD System capable of rod withdrawal. Therefore, the functional capability at the specified Trip Setpoint is assumed to be available.~~

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The LCO requires two channels of Source Range Neutron Flux to be OPERABLE. Two OPERABLE channels are sufficient to ensure no single random failure will disable this trip Function. The LCO also requires one channel of the Source Range Neutron Flux to be OPERABLE in MODE 3, 4, or 5 with RTBs open. In this case, the source range Function is to provide control room indication. The outputs of the Function to RTS logic are not required OPERABLE when the RTBs are open.

The Source Range Neutron Flux Function provides protection for control rod withdrawal from subcritical, boron dilution, and control rod ejection events. The Function also provides visual neutron flux indication in the control room.

In MODE 2 when below the P-6 setpoint during a reactor startup, the Source Range Neutron Flux trip must be OPERABLE. Above the P-6 setpoint, the Intermediate Range Neutron Flux trip and the Power Range Neutron Flux—Low Setpoint trip will provide core protection for reactivity accidents. Above the P-6 setpoint, the NIS source range detectors are de-energized and inoperable.

In MODE 3, 4, or 5 with the reactor shut down, the Source Range Neutron Flux trip Function must also be OPERABLE. If the CRD System is capable of rod withdrawal, the Source Range Neutron Flux trip must be OPERABLE to provide core protection against a rod withdrawal accident. If the unit is to be in MODE 3 with the RTBs closed for > 4 hours the Surveillance requirement SR 3.3.1.7 must be completed within 4 hours after entry into MODE 3. The surveillance shall include verification of the high flux at shutdown alarm setpoint of less than or equal to five times background of the average CPS Neutron Level Reading (the average CPS Reading is the most consistent value between highest and lowest CPS Neutron Level Reading).

If the CRD System is not capable of rod withdrawal, the source range detectors are not required to trip the reactor. However, their monitoring Function must be OPERABLE to monitor core neutron levels and provide indication of reactivity changes that may occur as a result of events like a boron dilution.

The neutron detector's high flux at shutdown alarm setpoint of less than or equal to five times background, in Mode 3, 4, or 5, shall be verified. Once the High Flux at Shutdown Alarm setpoints are set at five times background above steady state neutron count rate the re-verification/re-adjustment of the high flux at shutdown is not required. The neutron count rate will decrease as Mode changes

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

~~are made from 3 to 4 to 5 as the system temperature decreases. Any subsequent changes in the count rate are an indication of gamma flux (due to movement of irradiated particles in the system) which may cause the source range response to vary. Upon increase in the neutron count rate due to activities that add positive reactivity to the core, the presence of gamma flux will cease to be a factor in detector count rate.~~

~~A CHANNEL CHECK provides a comparison of the parameter indicated on one channel to a similar parameter on other channels. This is based on the assumption that the two indicating channels should be consistent. Significant differences between the indicating source range channels can occur due to core geometry, decreasing neutron count rate as temperature is decreasing in the system, the location of the Source Assemblies (distance from the Source Detectors), and large amounts of gamma. Each channel should be consistent with its local condition.~~

~~The requirements for the NIS source range detectors in MODE 6 are addressed in LCO 3.9.3, "Nuclear Instrumentation."~~

5~~B~~. Source Range Neutron Flux ~~(Thermo Scientific-supplied Instrumentation)~~

~~The Westinghouse-supplied Source Range excore detector systems (utilizing boron triflouride detectors) are being replaced with Thermo Scientific-supplied 300i neutron flux monitoring systems (utilizing fission chamber detectors). This section of the Bases applies to the Thermo Scientific-supplied instrumentation. The previous section of the Bases applies to the Westinghouse-supplied instrumentation.~~

The LCO requirement for the Source Range Neutron Flux trip Function ensures that protection is provided against an uncontrolled RCCA bank rod withdrawal accident from a subcritical condition during startup. This trip Function provides redundant protection to the Power Range Neutron Flux-Low Setpoint and Intermediate Range Neutron Flux trip Functions. In MODES 3, 4, and 5, administrative controls also prevent the uncontrolled withdrawal of rods. The NIS source range detectors are located external to the reactor vessel and measure neutrons leaking from the core. The NIS source range detectors do not provide any inputs to control systems. The source range trip is the only RTS automatic protection function required in MODES 3, 4, and 5 with the CRD System capable of rod withdrawal. Therefore, the

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

functional capability at the specified Trip Setpoint is assumed to be available.

The LCO requires two channels of Source Range Neutron Flux to be OPERABLE. Two OPERABLE channels are sufficient to ensure no single random failure will disable this trip Function. The LCO also requires one channel of the Source Range Neutron Flux to be OPERABLE in MODE 3, 4, or 5 with RTBs open. In this case, the source range Function is to provide control room indication. The outputs of the Function to RTS logic are not required OPERABLE when the RTBs are open.

The Source Range Neutron Flux Function provides protection for control rod withdrawal from subcritical, boron dilution, and control rod ejection events. The Function also provides visual neutron flux indication in the control room.

In MODE 2 when below the P-6 setpoint during a reactor startup, the Source Range Neutron Flux trip must be OPERABLE. Above the P-6 setpoint, the Intermediate Range Neutron Flux trip and the Power Range Neutron Flux—Low Setpoint trip will provide core protection for reactivity accidents. Above the P-6 setpoint, the Source Range Neutron Flux trip is blocked.

In MODE 3, 4, or 5 with the reactor shut down, the Source Range Neutron Flux trip Function must also be OPERABLE. If the CRD System is capable of rod withdrawal, the Source Range Neutron Flux trip must be OPERABLE to provide core protection against a rod withdrawal accident. If the unit is to be in MODE 3 with the RTBs closed for > 4 hours the Surveillance requirement SR 3.3.1.7 must be completed within 4 hours after entry into MODE 3.

If the CRD System is not capable of rod withdrawal, the source range detectors are not required to trip the reactor. However, their monitoring Function must be OPERABLE to monitor core neutron levels and provide indication of reactivity changes that may occur as a result of events like a boron dilution.

A CHANNEL CHECK provides a comparison of the parameter indicated on one channel to a similar parameter on other channels. This is based on the assumption that the two indicating channels should be consistent. Significant differences between the indicating source range channels can occur due to core geometry, decreasing neutron count rate as temperature is decreasing in the system, the location of the Source Assemblies (distance from the Source

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

Detectors), and large amounts of gamma. Each channel should be consistent with its local condition.

The requirements for the NIS source range detectors in MODE 6 are addressed in LCO 3.9.3, "Nuclear Instrumentation."

6. Overtemperature ΔT

The Overtemperature ΔT trip Function is provided to ensure that the design limit DNBR is met. This trip Function also limits the range over which the Overpower ΔT trip Function must provide protection. The inputs to the Overtemperature ΔT trip include pressurizer pressure, coolant temperature, axial power distribution, and reactor power as indicated by loop ΔT assuming full reactor coolant flow. Protection from violating the DNBR limit is assured for those transients that are slow with respect to delays from the core to the measurement system. The Function monitors both variation in power and flow since a decrease in flow has the same effect on ΔT as a power increase. The Overtemperature ΔT trip Function uses each loop's ΔT as a measure of reactor power and is compared with a setpoint that is automatically varied with the following parameters:

- reactor coolant average temperature-the Trip Setpoint is varied to correct for changes in coolant density and specific heat capacity with changes in coolant temperature;
- pressurizer pressure—the Trip Setpoint is varied to correct for changes in system pressure; and
- axial power distribution—f(ΔI), the Trip Setpoint is varied to account for imbalances in the axial power distribution as detected by the NIS upper and lower power range detectors. If axial peaks are greater than the design limit, as indicated by the difference between the upper and lower NIS power range detectors, the Trip Setpoint is reduced in accordance with Note 1 of Table 3.3.1-1.

Dynamic compensation is included for system piping delays from the core to the temperature measurement system.

The Overtemperature ΔT trip Function is calculated for each loop as described in Note 1 of Table 3.3.1-1. Trip occurs if Overtemperature ΔT is indicated in two loops. The pressure and temperature signals are used for other control functions, therefore, the actuation logic must be able to withstand an input failure to the

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

A reactor trip is initiated every time an SI signal is present. Therefore, this trip Function must be OPERABLE in MODE 1 or 2, when the reactor is critical, and must be shut down in the event of an accident. In MODE 3, 4, 5, or 6, the reactor is not critical, and this trip Function does not need to be OPERABLE.

16. Reactor Trip System Interlocks

Reactor protection interlocks are provided to ensure reactor trips are in the correct configuration for the current unit status. They back up operator actions to ensure protection system Functions are not bypassed during unit conditions under which the safety analysis assumes the Functions are not bypassed. Therefore, the interlock Functions do not need to be OPERABLE when the associated reactor trip functions are outside the applicable MODES. These are:

~~a1. Intermediate Range Neutron Flux, P-6 (Westinghouse-supplied Instrumentation)~~

~~The Westinghouse-supplied Intermediate Range excore detector systems (utilizing compensated ion chamber detectors) are being replaced with Thermo Scientific-supplied 300i neutron flux monitoring systems (utilizing fission chamber detectors). This section of the Bases applies to the Westinghouse-supplied instrumentation. The next section of the Bases applies to the Thermo Scientific-supplied instrumentation.~~

~~The Intermediate Range Neutron Flux, P-6 interlock is actuated when any NIS intermediate range channel goes approximately one decade above the minimum channel reading. If both channels drop below the setpoint, the permissive will automatically be defeated. The LCO requirement for the P-6 interlock ensures that the following Functions are performed:~~

- ~~on increasing power, the P-6 interlock allows the manual block of the NIS Source Range, Neutron Flux reactor trip. This prevents a premature block of the source range trip and allows the operator to ensure that the intermediate range is OPERABLE prior to leaving the source range. When the source range trip is blocked, the high voltage to the detectors is also removed; and~~

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

- ~~on decreasing power, the P-6 interlock automatically energizes the NIS source range detectors and enables the NIS Source Range Neutron Flux reactor trip.~~

~~The LCO requires two channels of Intermediate Range Neutron Flux, P-6 interlock to be OPERABLE in MODE 2 when below the P-6 interlock setpoint.~~

~~Above the P-6 interlock setpoint, the NIS Source Range Neutron Flux reactor trip will be blocked, and this Function will no longer be necessary.~~

~~In MODE 3, 4, 5, or 6, the P-6 interlock does not have to be OPERABLE because the NIS Source Range is providing core protection.~~

a~~2~~. Intermediate Range Neutron Flux, P-6 ~~(Thermo Scientific-supplied Instrumentation)~~

~~The Westinghouse-supplied Intermediate Range excore detector systems (utilizing compensated ion chamber detectors) are being replaced with Thermo Scientific-supplied 300i neutron flux monitoring systems (utilizing fission chamber detectors). This section of the Bases applies to the Thermo Scientific-supplied instrumentation. The previous section of the Bases applies to the Westinghouse-supplied instrumentation.~~

The Intermediate Range Neutron Flux, P-6 interlock is actuated when any NIS intermediate range channel goes approximately three decades above the minimum channel reading. If both channels drop below the setpoint, the permissive will automatically be defeated. The LCO requirement for the P-6 interlock ensures that the following Functions are performed:

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.9

SR 3.3.1.9 is the performance of a TADOT. The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

The SR is modified by a Note that excludes verification of setpoints from the TADOT. Since this SR applies to RCP undervoltage and underfrequency relays, setpoint verification is accomplished during the CHANNEL CALIBRATION.

SR 3.3.1.10

The CHANNEL CALIBRATION may be performed at power or during refueling based on testing capability. Channel unavailability evaluations in References 10 and 11 have conservatively assumed that the CHANNEL CALIBRAITON is performed at power with the channel in bypass.

CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to a measured parameter within the necessary range and accuracy.

CHANNEL CALIBRATIONS must be performed consistent with the assumptions of the setpoint methodology.

The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

SR 3.3.1.10 is modified by a Note stating that this test shall include verification that the time constants are adjusted to the prescribed values where applicable. The applicable time constants are shown in Table 3.3.1-1.

SR 3.3.1.11

SR 3.3.1.11 is the performance of a CHANNEL CALIBRATION, as described in SR 3.3.1.10. Two notes modify this SR. Note 1 states that neutron detectors are excluded from the CHANNEL CALIBRATION. The CHANNEL CALIBRATION for the power range neutron detectors consists of a normalization of the detectors based on a power calorimetric and flux map performed above 15% RTP. ~~The high~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

voltage detector saturation curve is evaluated and compared to the manufacturer's data. The Westinghouse-supplied boron-triflouride (BF_3) source range neutron detectors and compensated ion chamber intermediate range neutron detectors are being replaced with Thermo Scientific-supplied fission chamber source and intermediate range neutron detectors. The CHANNEL CALIBRATION for the BF_3 source range neutron detectors consists of two methods. Method 1 consists of obtaining the discriminator curves for source range, evaluating those curves, and comparing the curves to the manufacturer's data (adjustments to the discriminator voltage are performed as required). Method 2 consists of performing waveform analysis. This analysis process monitors the actual number and amplitude of the Neutron/Gamma pulses being generated by the SR detector. The high voltage is adjusted to optimize the amplitude of the pulses while maintaining as low as possible high voltage value in order to prolong the detector life. The discriminator voltage is then adjusted, as required, to reasonably ensure that the neutron pulses are being counted by the source range instrumentation and the unwanted gamma pulses are not being counted as neutron pulses.

The CHANNEL CALIBRATION for the compensated ion chamber intermediate range neutron detectors consists of the high voltage detector plateau for intermediate range, evaluating those curves, and comparing the curves to the manufacturer's data. The CHANNEL CALIBRATION for the fission chamber source and intermediate range neutron detectors consists of verifying that the channels respond correctly to test inputs with the necessary range and accuracy.

Note 2 states that this Surveillance is not required for the NIS power range detectors for entry into MODE 2 or 1. Note 3 applies to the compensated ion chamber intermediate range neutron detectors, and states that this Surveillance is not required to be performed for entry into MODE 2 or 1. Notes 2 and 3 are required because the unit must be in at least MODE 2 to perform the test for the compensated ion chamber intermediate range detectors and MODE 1 for the power range detectors. **Note 2 is required because the unit must be in MODE 1 to perform the test for the power range detectors.** The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

For Functions for which TSTF-493, "Clarify Application of Setpoint Methodology for LSSS Functions" (Reference 12) has been implemented, this SR is modified by two Notes as identified in Table 3.3.1-1. The first Note requires evaluation of channel performance for the condition where

BASES

the as-found setting for the channel setpoint is outside its as-found tolerance but conservative with respect to the Allowable Value.

SURVEILLANCE REQUIREMENTS (continued)

Evaluation of channel performance will verify that the channel will continue to behave in accordance with safety analysis assumptions and the channel performance assumptions in the setpoint methodology. The purpose of the assessment is to ensure confidence in the channel performance prior to returning the channel to service. The performance of these channels will be evaluated under the station's Corrective Action Program. Entry into the Corrective Action Program will ensure required review and documentation of the condition for continued OPERABILITY. The second Note requires that the as-left setting for the channel be returned to within the as-left tolerance of the Nominal Trip Setpoint (NTSP). Where a setpoint more conservative than the NTSP is used in the plant surveillance procedures (field setting), the as-left and as-found tolerances, as applicable, will be applied to the surveillance procedure setpoint. This will ensure that sufficient margin to the Safety Limit and/or Analytical Limit is maintained. If the as-left channel setting cannot be returned to a setting within the as-left tolerance of the NTSP, then the channel shall be declared inoperable. The second Note also requires that the methodologies for calculating the as-left and the as-found tolerances be in the UFSAR. The NOMINAL TRIP SETPOINT definition includes a provision that would allow the as-left setting for the channel to be outside the tolerance band, provided the setting is conservative with respect to the NTSP. This provision is not applicable to Functions for which the second NOTE applies.

<u>SR 3.3.1.12</u>

SR 3.3.1.12 is the performance of a CHANNEL CALIBRATION, as described in SR 3.3.1.10. Calibration of the ΔT channels is required at the beginning of each cycle upon completion of the precision heat balance. RCS loop ΔT values shall be determined by precision heat balance measurements at the beginning of each cycle.

The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

<u>SR 3.3.1.13</u>

SR 3.3.1.13 is the performance of a COT of RTS interlocks.

The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

B 3.9 REFUELING OPERATIONS

B 3.9.3 Nuclear Instrumentation

BASES

BACKGROUND

The source range neutron flux monitors are used during refueling operations to monitor the core reactivity condition. The installed source range neutron flux monitors are part of the Nuclear Instrumentation System (NIS) while the Wide Range Neutron Flux Monitoring System (Gamma-Metrics) are not. Source range indication is provided via the NIS source range channels and the Gamma-Metrics shutdown monitors using detectors located external to the reactor vessel. These detectors monitor neutrons leaking from the core. Neutron flux indication for these monitors are provided in counts per second.

~~The Westinghouse-supplied boron triflouride (BF_3) detectors used for the NIS Source Range Channels are being replaced with Thermo Scientific-supplied fission chamber detectors. The Westinghouse NIS Source Range Channels utilizing BF_3 detectors have a range of 1 to 1E6 cps. The replacement Thermo Scientific~~ The NIS Source Range Channels ~~utilizing fission chamber detectors~~ have a range of 0.1 to 1E6 cps. The Wide Range (Gamma-Metrics) channels are fission chambers with a range of 0.1 to 1E5 cps (in the startup range). The NIS source range channels and the Gamma-Metrics shutdown monitors provide continuous visible count rate indication in the control room and a high flux control room alarm to alert operators to any unexpected positive reactivity additions. Since TS 3.9.2 requires isolation of unborated water sources, the shutdown monitors (Gamma-Metrics) audible alarm, NIS source range audible indication and audible alarm are not required for OPERABILITY in Mode 6.

The NIS source range detectors and the Gamma-Metrics are designed in accordance with the criteria presented in Reference 1.

APPLICABLE SAFETY ANALYSES

Two OPERABLE source range neutron flux monitors (any combination of the two NIS source range monitors and the two Gamma-Metrics wide range monitors) are required to provide an indication to alert the operator to unexpected changes in core reactivity such as with a boron dilution accident (Ref. 2) or an improperly loaded fuel assembly.

The source range neutron flux monitors satisfy Criterion 3 of 10 CFR 50.36 (Ref. 3).

Attachment 4

CNS Marked-Up TS Pages

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.1.9	-----NOTE----- Verification of setpoint is not required. -----	
	Perform TADOT.	In accordance with the Surveillance Frequency Control Program
SR 3.3.1.10	-----NOTE----- This Surveillance shall include verification that the time constants are adjusted to the prescribed values. -----	
	Perform CHANNEL CALIBRATION.	In accordance with the Surveillance Frequency Control Program
SR 3.3.1.11	-----NOTE----- 1. Neutron detectors are excluded from CHANNEL CALIBRATION. 2. Power Range Neutron Flux high voltage detector saturation curve verification is not required to be performed prior to entry into MODE 1 or 2. ~~3. Intermediate Range Neutron Flux detector plateau voltage verification is not required to be performed prior to entry into MODE 1 or 2.*~~ -----	
	Perform CHANNEL CALIBRATION.	In accordance with the Surveillance Frequency Control Program

(continued)

~~* This Note applies to the Westinghouse-supplied compensated ion chamber neutron detectors. The compensated ion chamber neutron detectors are being replaced with Thermo Scientific-supplied fission chamber neutron detectors which do not require detector plateau voltage verification. Therefore, this Note does not apply to the fission chamber neutron detectors.~~

Table 3.3.1-1 (page 2 of 8)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
4. Intermediate Range Neutron Flux	1(b), 2(c)	2	F,G	SR 3.3.1.1 SR 3.3.1.8(l)(m) SR 3.3.1.11(l)(m)	≤ 31% RTP* ≤ 38% RTP	25% RTP
	2(d)	2	H	SR 3.3.1.1 SR 3.3.1.8(l)(m) SR 3.3.1.11(l)(m)	≤ 31% RTP* ≤ 38% RTP	25% RTP
5. Source Range Neutron Flux	2(d)	2	I,J	SR 3.3.1.1 SR 3.3.1.8(l)(m) SR 3.3.1.11(l)(m)	≤ 1.4 E5 cps** ≤ 1.44 E5 cps	1.0 E5 cps
	3(a), 4(a), 5(a)	2	J,K	SR 3.3.1.1 SR 3.3.1.7(l)(m) SR 3.3.1.11(l)(m)	≤ 1.4 E5 cps** ≤ 1.44 E5 cps	1.0 E5 cps
6. Overtemperature ΔT	1,2	4	E	SR 3.3.1.1 SR 3.3.1.3 SR 3.3.1.6 SR 3.3.1.7 SR 3.3.1.10 SR 3.3.1.16 SR 3.3.1.17	Refer to Note 1 (Page 3.3.1-19)	Refer to Note 1 (Page 3.3.1-19)

(continued)

~~* The ≤ 31% RTP Allowable Value applies to the Westinghouse-supplied compensated ion chamber Intermediate Range neutron detectors. The compensated ion chamber neutron detectors are being replaced with Thermo Scientific-supplied fission chamber neutron detectors. The ≤ 38% RTP Allowable Value applies to the replacement fission chamber Intermediate Range neutron detectors.~~

~~** The ≤ 1.4 E5 cps Allowable Value applies to the Westinghouse-supplied boron trifluoride (BF_3) Source Range neutron detectors. The BF_3 neutron detectors are being replaced with Thermo Scientific-supplied fission chamber neutron detectors. The ≤ 1.44 E5 cps Allowable Value applies to the replacement fission chamber Source Range neutron detectors.~~

(a) With Reactor Trip Breakers (RTBs) closed and Rod Control System capable of rod withdrawal.

(b) Below the P-10 (Power Range Neutron Flux) interlocks.

(c) Above the P-6 (Intermediate Range Neutron Flux) interlocks.

(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks.

(l) If the as-found channel setpoint is outside its predefined as-found tolerance, then the channel shall be evaluated to verify that it is functioning as required before returning the channel to service.

(m) The instrument channel setpoint shall be reset to a value that is within the as-left tolerance around the NOMINAL TRIP SETPOINT (NTSP) at the completion of the surveillance; otherwise, the channel shall be declared inoperable. Setpoints more conservative than the NTSP are acceptable provided that the as-found and as-left tolerances apply to the actual setpoint implemented in the Surveillance procedures (field setting) to confirm channel performance. The methodologies used to determine the as-found and the as-left tolerances are specified in the UFSAR.

Table 3.3.1-1 (page 5 of 8)
Reactor Trip System Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE	NOMINAL TRIP SETPOINT
16. Reactor Trip System Interlocks						
a. Intermediate Range Neutron Flux, P-6	2(d)	2	R	SR 3.3.1.11 SR 3.3.1.13	~~≥ 6E-11 amp***~~ ≥ 6.6E-6% RTP	~~1E-10 amp***~~ 1E-5% RTP
b. Low Power Reactor Trips Block, P-7	1	1 per train	S	SR 3.3.1.5	NA	NA
c. Power Range Neutron Flux, P-8	1	4	S	SR 3.3.1.11 SR 3.3.1.13	≤ 50.2% RTP	48% RTP
d. Power Range Neutron Flux, P-9	1	4	S	SR 3.3.1.11 SR 3.3.1.13	≤ 70% RTP	69% RTP
e. Power Range Neutron Flux, P-10	1,2	4	R	SR 3.3.1.11 SR 3.3.1.13	≥ 7.8% RTP and ≤ 12.2% RTP	10% RTP
f. Turbine Impulse Pressure, P-13	1	2	S	SR 3.3.1.12 SR 3.3.1.13	≤ 12.2% RTP turbine impulse pressure equivalent	10% RTP turbine impulse pressure equivalent
17. Reactor Trip Breakers(k)	1,2	2 trains	Q,U	SR 3.3.1.4	NA	NA
	3(a), 4(a), 5(a)	2 trains	C	SR 3.3.1.4	NA	NA
18. Reactor Trip Breaker Undervoltage and Shunt Trip Mechanisms	1,2	1 each per RTB	T	SR 3.3.1.4	NA	NA
	3(a), 4(a), 5(a)	1 each per RTB	C	SR 3.3.1.4	NA	NA
19. Automatic Trip Logic	1,2	2 trains	P,U	SR 3.3.1.5	NA	NA
	3(a), 4(a), 5(a)	2 trains	C	SR 3.3.1.5	NA	NA

(continued)

*** ~~The ≥ 6E-11 amp Allowable Value and the 1E-10 amp NOMINAL TRIP SETPOINT value apply to the Westinghouse-supplied compensated ion chamber Intermediate Range neutron detectors. The compensated ion chamber neutron detectors are being replaced with Thermo Scientific-supplied fission chamber neutron detectors. The ≥ 6.6E-6% RTP Allowable Value and the 1E-5% RTP NOMINAL TRIP SETPOINT value apply to the replacement fission chamber Intermediate Range neutron detectors.~~

(a) With RTBs closed and Rod Control System capable of rod withdrawal.

(d) Below the P-6 (Intermediate Range Neutron Flux) interlocks

(k) Including any reactor trip bypass breakers that are racked in and closed for bypassing an RTB.

Attachment 5

CNS Marked-Up TS Bases Pages

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

Range Neutron Flux-Low Setpoint trip Function. The NIS intermediate range detectors are located external to the reactor vessel and measure neutrons leaking from the core. Note that this Function also provides a signal to prevent automatic and manual rod withdrawal prior to initiating a reactor trip. Limiting further rod withdrawal may terminate the transient and eliminate the need to trip the reactor.

The LCO requires two channels of Intermediate Range Neutron Flux to be OPERABLE. Two OPERABLE channels are sufficient to ensure no single random failure will disable this trip Function.

Because this trip Function is important only during startup, there is generally no need to disable channels for testing while the Function is required to be OPERABLE. Therefore, a third channel is unnecessary.

In MODE 1 below the P-10 setpoint, and in MODE 2, when there is a potential for an uncontrolled RCCA bank rod withdrawal accident during reactor startup, the Intermediate Range Neutron Flux trip must be OPERABLE. Above the P-10 setpoint, the Power Range Neutron Flux-High Setpoint trip and the Power Range Neutron Flux-High Positive Rate trip provide core protection for a rod withdrawal accident. In MODE 3, 4, or 5, the Intermediate Range Neutron Flux trip does not have to be OPERABLE because other RTS trip functions provide protection against positive reactivity additions. The reactor cannot be started up in this condition. The core also has the required SDM to mitigate the consequences of a positive reactivity addition accident. In MODE 6, all rods are fully inserted and the core has a required increased SDM. ~~Also, the NIS intermediate range detectors (Westinghouse-supplied only) cannot detect neutron levels present in this MODE.~~

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

5. Source Range Neutron Flux

The LCO requirement for the Source Range Neutron Flux trip Function ensures that protection is provided against an uncontrolled RCCA bank rod withdrawal accident from a subcritical condition during startup.

This trip Function provides redundant protection to the Power Range Neutron Flux-Low Setpoint and Intermediate Range Neutron Flux trip Functions. In MODES 3, 4, and 5, administrative controls also prevent the uncontrolled withdrawal of rods. The NIS source range detectors are located external to the reactor vessel and measure neutrons leaking from the core. The NIS source range detectors do not provide any inputs to control systems. The source range trip is the only RTS automatic protection function required in MODES 3, 4, and 5. Therefore, the functional capability at the specified Trip Setpoint is assumed to be available.

The LCO requires two channels of Source Range Neutron Flux to be OPERABLE. Two OPERABLE channels are sufficient to ensure no single random failure will disable this trip Function.

The Source Range Neutron Flux Function provides protection for control rod withdrawal from subcritical and control rod ejection events. The Function also provides visual neutron flux indication in the control room.

In MODE 2 when below the P-6 setpoint during a reactor startup, the Source Range Neutron Flux trip must be OPERABLE. Above the P-6 setpoint, the Intermediate Range Neutron Flux trip and the Power Range Neutron Flux-Low Setpoint trip will provide core protection for reactivity accidents. ~~Above the P-6 setpoint, the NIS source range detectors are de-energized and inoperable (Westinghouse supplied only).~~ Above the P-6 setpoint, the Source Range Neutron Flux trip is blocked ~~(Thermo Scientific supplied only)~~.

In MODE 3, 4, or 5 with the reactor shut down, the Source Range Neutron Flux trip Function must also be OPERABLE. If the CRD System is capable of rod withdrawal, the Source Range Neutron Flux trip must be OPERABLE to provide core protection against a rod withdrawal accident. If the CRD System is not capable of rod withdrawal, the source range detectors are not required to trip the reactor.

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

However, other transients and accidents take credit or varying levels of ESF performance and rely upon rod insertion, except for the most reactive rod that is assumed to be fully withdrawn, to ensure reactor shutdown. Therefore, a reactor trip is initiated every time an SI signal is present.

Trip Setpoint and Allowable Values are not applicable to this Function. The SI Input is provided by a manual switch or by the automatic actuation logic. Therefore, there is no measurement signal with which to associate an LSSS.

The LCO requires two trains of SI Input from ESFAS to be OPERABLE in MODE 1 or 2.

A reactor trip is initiated every time an SI signal is present. Therefore, this trip Function must be OPERABLE in MODE 1 or 2, when the reactor is critical, and must be shut down in the event of an accident. In MODE 3, 4, 5, or 6, the reactor is not critical, and this trip Function does not need to be OPERABLE.

16. Reactor Trip System Interlocks

Reactor protection interlocks are provided to ensure reactor trips are in the correct configuration for the current unit status. They back up operator actions to ensure protection system Functions are not bypassed during unit conditions under which the safety analysis assumes the Functions are not bypassed. Therefore, the interlock Functions do not need to be OPERABLE when the associated reactor trip functions are outside the applicable MODES. These are:

a. Intermediate Range Neutron Flux, P-6

The Intermediate Range Neutron Flux, P-6 interlock is actuated when any NIS intermediate range channel goes approximately ~~one decade (Westinghouse supplied only) or~~ three decades ~~(Thermo Scientific supplied only)~~ above the minimum channel reading. If both channels drop below the setpoint, the permissive will automatically be defeated. The LCO requirement for the P-6 interlock ensures that the following Functions are performed:

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

- on increasing power, the P-6 interlock allows the manual block of the NIS Source Range, Neutron Flux reactor trip. This prevents a premature block of the source range trip and allows the operator to ensure that the intermediate range is OPERABLE prior to leaving the source range. ~~When the source range trip is blocked, the high voltage to the detectors is also removed (Westinghouse-supplied only); and~~

- on decreasing power, the P-6 interlock automatically ~~energizes the NIS source range detectors (Westinghouse-supplied only) and~~ enables the NIS Source Range Neutron Flux reactor trip.

The LCO requires two channels of Intermediate Range Neutron Flux, P-6 interlock to be OPERABLE in MODE 2 when below the P-6 interlock setpoint.

Above the P-6 interlock setpoint, the NIS Source Range Neutron Flux reactor trip will be blocked, and this Function will no longer be necessary.

In MODE 3, 4, 5, or 6, the P-6 interlock does not have to be OPERABLE because the NIS Source Range is providing core protection.

b. <u>Low Power Reactor Trips Block, P-7</u>

The Low Power Reactor Trips Block, P-7 interlock is actuated by input from either the Power Range Neutron Flux, P-10, or the Turbine Impulse Pressure, P-13 interlock. The LCO requirement for the P-7 interlock ensures that the following Functions are performed:

(1) on increasing power, the P-7 interlock automatically enables reactor trips on the following Functions:

- Pressurizer Pressure-Low;

- Pressurizer Water Level-High;

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The LCO requires four channels of Power Range Neutron Flux, P-9 interlock to be OPERABLE in MODE 1.

In MODE 1, a turbine trip could cause a load rejection beyond the capacity of the Steam Dump System, so the Power Range Neutron Flux interlock must be OPERABLE. In MODE 2, 3, 4, 5, or 6, this Function does not have to be OPERABLE because the reactor is not at a power level sufficient to have a load rejection beyond the capacity of the Steam Dump System.

e. Power Range Neutron Flux, P-10

The Power Range Neutron Flux, P-10 interlock is actuated at approximately 10% power, as determined by two-out-of-four NIS power range detectors. If power level falls below 10% RTP on 3 of 4 channels, the nuclear instrument trips will be automatically unblocked. The LCO requirement for the P-10 interlock ensures that the following Functions are performed:

- on increasing power, the P-10 interlock allows the operator to manually block the Intermediate Range Neutron Flux reactor trip. Note that blocking the reactor trip also blocks the signal to prevent automatic and manual rod withdrawal;
- on increasing power, the P-10 interlock allows the operator to manually block the Power Range Neutron Flux-Low reactor trip;
- on increasing power, the P-10 interlock automatically provides a backup signal to block the Source Range Neutron Flux reactor trip~~, and also to de-energize the (Westinghouse-supplied only) NIS source range detectors;~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.11

SR 3.3.1.11 is the performance of a CHANNEL CALIBRATION, as described in SR 3.3.1.10. ~~Three~~ Two Notes modify this SR. Note 1 states that neutron detectors are excluded from the CHANNEL CALIBRATION. The CHANNEL CALIBRATION for the power range neutron detectors consists of a normalization of the detectors based on a power calorimetric and flux map performed above 15% RTP. ~~The high voltage detector saturation curve is evaluated and compared to the manufacturer's data. The Westinghouse-supplied boron triflouride (BF_3) source range neutron detectors and compensated ion chamber intermediate range neutron detectors are being replaced with Thermo Scientific-supplied fission chamber source and intermediate range neutron detectors. The CHANNEL CALIBRATION for the BF_3 source range and compensated ion chamber intermediate range neutron detectors consists of obtaining the high voltage detector plateau and discriminator curves for source range, and the high voltage detector plateau for intermediate range, evaluating those curves, and comparing the curves to the manufacturer's data.~~ The CHANNEL CALIBRATION for the fission chamber source and intermediate range neutron detectors consists of verifying that the channels respond correctly to test inputs with the necessary range and accuracy. Note 2 states that this Surveillance is not required for the NIS power range detectors for entry into MODE 2 or 1. ~~Note 3 applies to the compensated ion chamber intermediate range neutron detectors, and states that this Surveillance is not required to be performed for entry into MODE 2 or 1. Notes 2 and 3 are required because the unit must be in at least MODE 2 to perform the test for the compensated ion chamber intermediate range detectors and MODE 1 for the power range detectors.~~ Note 2 is required because the unit must be in MODE 1 to perform the test for the power range detectors. The Surveillance Frequency is based on operating experience, equipment reliability, and plant risk and is controlled under the Surveillance Frequency Control Program.

B 3.9 REFUELING OPERATIONS

B 3.9.2 Nuclear Instrumentation

BASES

BACKGROUND

The neutron flux monitors are used during refueling operations to monitor the core reactivity condition. The installed neutron flux monitors are part of the Nuclear Instrumentation System (NIS) and the Wide Range Neutron Flux Monitoring System (Gamma-Metrics). Source range indication is provided via the NIS source range channels and the Gamma-Metrics shutdown monitors using detectors located external to the reactor vessel. These detectors monitor neutrons leaking from the core. Neutron flux indication is provided in counts per second. ~~The Westinghouse-supplied BF_3 detectors used for the NIS source range channels are being replaced with Thermo Scientific-supplied fission chamber detectors. The Westinghouse NIS source range channels utilizing BF_3 detectors have a range of 1 to 1E6 cps. The replacement Thermo Scientific~~ The NIS source range channels ~~utilizing fission chamber detectors~~ have a range of 0.1 to 1E6 cps. The wide range channels have a range of 0.1 to 1E5 cps (in the startup range). The NIS source range channels and the Gamma-Metrics shutdown monitors provide continuous visible count rate indication in the control room. The NIS is designed in accordance with the criteria presented in Reference 1.

The shutdown monitors (Gamma-Metrics) automatic actuations and alarm are not required for OPERABILITY during refueling operations. The NIS source range audible indication and audible alarm are not required for OPERABILITY during refueling operations.

APPLICABLE SAFETY ANALYSES

Two OPERABLE neutron flux monitors are required to provide an indication to alert the operator to unexpected changes in core reactivity such as with a boron dilution accident (Ref. 2) or an improperly loaded fuel assembly.

The neutron flux monitors satisfy Criterion 3 of 10 CFR 50.36 (Ref. 3).

LCO

This LCO requires that two neutron flux monitors be OPERABLE to ensure that redundant monitoring capability is available to detect changes in core reactivity. To be OPERABLE, each monitor must provide visual indication.