Industry/TSTF Standard Technical Specification Change Traveler

Surveillance Test Interval Extensions for Components of the Reactor Protection System (WCAP-15376-P)

NUREGs Affected: ☐ 1430 ☑ 1431 ☐ 1432 ☐ 1433 ☐ 1434

Classification: 1) Technical Change Recommended for CLIIP?: Yes

Priority: 1)High

Simple or Complex Change: Complex

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Letter OG-00-112, dated November 8, 2000, transmitted WCAP-15376-P, Rev. 0 (Proprietary) and WCAP-15377-NP, Rev. 0 (Non-Proprietary), both entitled "Risk-Informed Assessment of the RTS and ESFAS Surveillance Test Intervals and Reactor Trip Breaker Test and Completion Times" to the NRC for review and approval. WCAP-15376-P provides the technical justification for the following RTS Instrumentation (3.3.1), ESFAS Instrumentation (3.3.2), Containment Purge and Exhaust Isolation Instrumentation (3.3.6), CREFS Actuation Instrumentation (3.3.7), and BDPS (3.3.9) Technical Specification changes:

Summary of RPS STI and CT Changes - Solid State Protection System

Component	Surveillance Test Intervals	Completion Times and Bypass Times
Logic Cabinet	2 months to 6 months	No changes
Master Relays	2 months to 6 months	No changes
Analog Channels	3 months to 6 months	No changes
Reactor Trip Breakers	2 months to 4 months	AOT: 1 hour to 24 hours Bypass Time: 2 hours to 4 hours

Summary of RPS STI and CT Changes - Relay Protection System

Component	Surveillance Test Intervals	Completion Times and Bypass Times
Logic Cabinet	1 month to 6 months	No changes
Master Relays	No change	No changes
Analog Channels	3 months to 6 months	No changes
Reactor Trip Breakers	2 months to 4 months	AOT: 1 hour to 24 hours Bypass Time: 2 hours to 4 hours

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BACKGROUND

WCAP-15376-P, Rev. 0, "Risk-Informed Assessment of the RTS and ESFAS Surveillance Test Intervals and Reactor Trip Breaker Test and Completion Times," provides the justification for the following changes to the Improved Standard Technical Specifications for the Reactor Trip System (RTS) Instrumentation (3.3.1) and Engineered Safety Features Actuation System (ESFAS) Instrumentation (3.3.2):,

1. Increase the Completion Time and the bypass test time for the reactor trip breakers.

2. Increase the Surveillance Test Intervals (STI) for the reactor trip breakers, master relays, logic cabinets, and analog channels.

This evaluation considers both the Solid State Protection System and the Relay Protection System.

Depending on the plant protection system design, some of the actuation logic and master relays associated with the Containment Purge and Exhaust Isolation Instrumentation (3.3.6) and CREFS Actuation Instrumentation (3.3.7) Technical Specifications may be processed through the Relay or Solid State Protection System. Since the STIs for the actuation logic and master relays of the ESFAS Instrumentation were justified to be relaxed in this report, these STI relaxations are also applicable to the actuation logic and master relays for all signals processed through the Relay or Solid State Protection System.

The STI for the source range neutron flux CHANNEL OPERATIONAL TEST (COT) in the RTS Instrumentation (3.3.1) Technical Specification was justified to be relaxed in this report. Since this source range neutron flux channel is also used for the Boron Dilution Protection System (BDPS) in Technical Specification 3.3.9, the STI relaxation is also applicable to that STI.

NEED FOR CHANGE

The STI changes will reduce the required testing on the reactor protection system components without significantly impacting its reliability, and reduce the potential for reactor trips and actuation of engineered safety features associated with the testing of these components. The Completion Time extensions for the reactor trip breakers will provide the utilities additional time to complete test and maintenance activities while at power, potentially reducing the number of forced outages related to compliance with reactor trip breaker Completion Times, and provide consistency with the Completion Times for the logic cabinets.

PROPOSED CHANGE

The proposed changes to the Improved Standard Technical Specifications (ISTS) will revise Technical Specifications 3.3.1, 3.3.2, 3.3.6, 3.3.7, and 3.3.9. Specifically, the Reactor Trip Breaker bypass test time is relaxed from 2 hours to 4 hours, the Completion Time from 1 hour to 24 hours, and the Surveillance Frequency from 2 months to 4 months in Technical Specification 3.3.1. The Surveillance Frequencies for the Logic Cabinet are relaxed from 2 months to 6 months for SSPS plants and 1 month to 6 months for Relay Protection System plants, the Master Relays are relaxed from 2 months to 6 months for SSPS plants, and the Analog Channels from 3 months to 6 months in Technical Specifications 3.3.1, 3.3.2, 3.3.6, 3.3.7, and 3.3.9.

In the 3.3.1 Bases, the appropriate annotation of References 10 and 11 were made. TSTF-111, Rev. 6, added references to WCAP-13632-P-A and WCAP-14036-P, but did not indicate a link to the References Section. Also, the incorporation of Reference 11 into the Background section was not done correctly during Revision 2 to the ITS NUREGs.

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JUSTIFICATION

WCAP-15376-P, Rev. 0, provides the technical justification for extending the STIs for components of the Reactor Protection System. The components specifically included are the analog channels, logic cabinets, master relays, and reactor trip breakers. This WCAP also provides the technical justification for extending the reactor trip breaker (RTB) Completion Time (allowed outage time) for one RTB inoperable to 24 hours and the bypass time for a RTB to 4 hours. Note 2 in Condition O is deleted based on the 24 hours allowed to restore the train to OPERABLE status which would allow for maintenance on the undervoltage or shunt trip mechanism. This Completion Time and bypass time are consistent with the Completion Time and bypass time for the logic cabinets. This evaluation considers both the Solid State Protection System and the Relay Protection Systems. Extension of the STIs for slave relays are not included in this assessment, since they were previously addressed in other WOG programs. Depending on the plant protection system design, some of the actuation logic and master relays associated with the Containment Purge and Exhaust Isolation Instrumentation (3.3.6) and CREFS Actuation Instrumentation (3.3.7) Technical Specifications may be processed through the Relay or Solid State Protection System. Since the STIs for the actuation logic and master relays of the ESFAS Instrumentation were justified to be relaxed in this report, these STI relaxations are also applicable to the actuation logic and master relays for all signals processed through the Relay or Solid State Protection System.

The STI for the source range neutron flux COT in the RTS Instrumentation (3.3.1) Technical Specification was justified to be relaxed in WCAP-15376-P. Since this source range neutron flux channel is also used for the BDPS in Technical Specification 3.3.9, the STI relaxation is also applicable to that STI.

The approach used in WCAP-15376-P is consistent with the Nuclear Regulatory Commission's (NRC) approach for using probabilistic risk assessment in risk-informed decisions on plant-specific changes to the current licensing basis as presented in Regulatory Guides 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Current Licensing Basis," and 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications." The approach addresses, as documented in this report, the impact on defense-in-depth and the impact on safety margins, as well as an evaluation of the impact on risk. The risk evaluation considers the three-tiered approach as presented by the NRC in Regulatory Guide 1.177 for the extension to the RTB Completion Time. Tier 1, *PRA Capability and Insights*, assesses the impact of the proposed Completion Time (AOT) change on core damage frequency (CDF), incremental conditional core damage probability (ICCDP), large early release frequency (LERF), and incremental conditional large early release probability (ICLERP). Tier 2, *Avoidance of Risk-Significant Plant Configurations*, considers potential risk-significant plant operating configurations. Tier 3, *Risk-Informed Plant Configuration Control and Management*, will be addressed on a plant specific basis when the Technical Specification Completion Time change is implemented by each utility.

The Westinghouse Owners Group is evaluating these changes as part of an overall program addressing Technical Specification improvements for the Reactor Protection System which includes reactor trip signals and engineered safety features actuation signals. The initial studies (References 3, 4, 5, 6 of WCAP-15376) evaluated changes to AOTs, bypass time, and STIs to the analog channels, logic cabinets, master relays, slave relays, and reactor trip breakers of the RPS. The previously approved changes to these parameters are summarized in Table 1.1 and 1.2 of WCAP-15376 for the Solid State Protection System and the Relay Protection Systems.

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DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION

The proposed changes to the Improved Standard Technical Specifications (ISTS) will revise Technical Specifications 3.3.1, 3.3.2, 3.3.6, 3.3.7, and 3.3.9. Specifically, the Reactor Trip Breaker bypass test time is relaxed from 2 hours to 4 hours, the Completion Time from 1 hour to 24 hours, and the Surveillance Frequency from 2 months to 4 months in Technical Specification 3.3.1. The Surveillance Frequencies for the Logic Cabinet are relaxed from 2 months to 6 months for SSPS plants and 1 month to 6 months for Relay Protection System plants, the Master Relays are relaxed from 2 months to 6 months for SSPS plants, and the Analog Channels from 3 months to 6 months in Technical Specifications 3.3.1, 3.3.2, 3.3.6, 3.3.7, and 3.3.9.

In accordance with the criteria set forth in 10 CFR 50.92, the proposed changes to NUREG-1431 have been evaluated and determined they do not represent a significant hazards consideration. The following is provided in support of this conclusion:

Standard I - Involves a Significant Increase in the Probability or Consequences of an Accident Previously Evaluated

The proposed changes to the Completion Time, bypass test time, and Surveillance Frequencies reduce the potential for inadvertent reactor trips and spurious actuations, and therefore do not increase the probability of any accident previously evaluated. The proposed changes to the allowed Completion Time, bypass test time and Surveillance Frequencies do not change the response of the plant to any accidents and have an insignificant impact on the reliability of the reactor trip system and engineered safety feature actuation system (RTS and ESFAS) signals. The RTS and ESFAS will remain highly reliable and the proposed changes will not result in a significant increase in the risk of plant operation. This is demonstrated by showing that the impact on plant safety as measured by core damage frequency (CDF) is less than 1.0E-06 per year and the impact on large early release frequency (LERF) is less than 1.0E-07 per year. In addition, for the Completion Time change, the incremental conditional core damage probabilities (ICCDP) and incremental conditional large early release probabilities (ICLERP) are less than 5.0E-08. These changes meet the acceptance criteria in Regulatory Guides 1.174 and 1.177. Therefore, since the RTS and ESFAS will continue to perform their functions with high reliability as originally assumed, and the increase in risk as measured by CDF, LERF, ICCDP, ICLERP is within the acceptance criteria of existing regulatory guidance, there will not be a significant increase in the consequences of any accidents.

The proposed changes do not adversely affect accident initiators or precursors nor alter the design assumptions, conditions, or configuration of the facility or the manner in which the plant is operated and maintained. The proposed changes do not alter or prevent the ability of structures, systems, and components (SSCs) from performing their intended function to mitigate the consequences of an initiating event within the assumed acceptance limits. The proposed changes do not affect the source term, containment isolation, or radiological release assumptions used in evaluating the radiological consequences of an accident previously evaluated. Further, the proposed changes do not increase the types or amounts of radioactive effluent that may be released offsite, nor significantly increase individual or cumulative occupational/public radiation exposures. The proposed changes are consistent with the safety analysis assumptions and resultant consequences.

Therefore, it is concluded that this change does not increase the probability of occurrence of a malfunction of equipment important to safety.

Standard II - Create the Possibility of a New or Different Kind of Accident from any Previously Evaluated

The proposed changes do not result in a change in the manner in which the RTS and ESFAS provide plant protection. The RTS and ESFAS will continue to have the same setpoints after the proposed changes are implemented. There are no design changes associated with the license amendment. The changes to Completion Time, bypass test time, and Surveillance Frequency do not change any existing accident scenarios, nor create any new or different accident scenarios.

The changes do not involve a physical alteration of the plant (i.e., no new or different type of equipment will be

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installed) or a change in the methods governing normal plant operation. In addition, the changes do not impose any new or different requirements or eliminate any existing requirements. The changes do not alter assumptions made in the safety analysis. The proposed changes are consistent with the safety analysis assumptions and current plant operating practice.

Therefore, the possibility of a new or different malfunction of safety related equipment is not created.

Standard III - Involve a Significant Reduction in the Margin of Safety

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 impacted by these changes. Redundant RTS and ESFAS trains are maintained, and diversity with regard to the signals that provide reactor trip and engineered safety features actuation is also maintained. All signals credited as primary or secondary, and all operator actions credited in the accident analyses will remain the same. The proposed changes will not result in plant operation in a configuration outside the design basis. The calculated impact on risk is insignificant and meets the acceptance criteria contained in Regulatory Guides 1.174 and 1.177. Although there was no attempt to quantify any positive human factors benefit due to increased Completion Time, bypass test time, and Surveillance Frequencies, it is expected that there would be a net benefit due to a reduced potential for spurious reactor trips and actuations associated with testing.

Therefore, it is concluded that this change does not involve a significant reduction in the margin of safety.

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Revision History

OG Revision 0 Revision Status: Closed

Revision Proposed by: WOG

Revision Description:
Original Issue

Owners Group Review Information

Date Originated by OG: 08-Mar-01

Owners Group Comments
(No Comments)

Owners Group Resolution: Approved Date: 08-Mar-01

TSTF Review Information

TSTF Received Date: 09-Mar-01 Date Distributed for Review 06-Apr-01

OG Review Completed: ☐ BWOG ☑ WOG ☐ CEOG ☐ BWROG

TSTF Comments:

Make changes to the Bases of 3.3.1, Condition R. Put the Reviewer's Note in the Table column. Markup on Revision 2 pages. Approved WOG only.

TSTF Resolution: Approved Date: 02-May-01

NRC Review Information

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OG Revision 0 Revision Status: Closed

NRC Received Date: 24-May-01

NRC Comments:

7/26/2002 Letter from NRC:

The staff recommendations are as follows: for TSTF-411, revise the allowed bypass time for reactor trip breaker testing and for maintenance on the undervoltage or shunt trip mechanisms, and the surveillance test frequencies for performing neutron flux channel operational tests; for TSTF-418 revise Reviewers Notes, and the allowed bypass times for testing other channels when one reactor coolant pump breaker position channel is inoperable. In addition, the staff recommends several Bases changes for both TSTFs. These changes to TSTF-411 and TSTF-418 will establish STS that are consistent with the analysis, as accepted by the staff in safety evaluations for WCAP-15376-P, Rev. 0 (Proprietary) and WCAP-15377-NP, Rev. 0 (Non-Proprietary), both entitled "Risk-Informed Assessment of the RTS and ESFAS Surveillance Test Intervals and Reactor Trip Breaker Test and Completion Times" and in WCAP-14333-P, (Proprietary), and WCAP-14334-NP, (Non-Proprietary), both entitled "Probabilistic Risk Analysis of the RPS and ESFAS Test Times and Completion Times," respectfully.

In addition, TSTFs 41 1 and 418 propose different TS requirements for one RTB train inoperable (NUREG-1431, Condition 0). For Condition 0 Required Actions, TSTF-418 adds a 4 hour surveillance test bypass time allowance as a third note whereas, TSTS-411 modifies note 1 and deletes note 2 but does not address any note 3 changes. Therefore, the staff requests the TSTF include the appropriate notations with the next revisions to TSTFs 411 and 418 to show how individual licensees can prepare TS amendment requests that adopt either or both TSTFs without deviating from the TS approved by the staff.

Final Resolution: Superceded by Revision Final Resolution Date: 26-Jul-02

TSTF Revision 1 Revision Status: Active Next Action: NRC

Revision Proposed by: WOG

Revision Description:
TSTF-411 is revised to address the NRC's comments:

1. TS 3.3.1, Note 1 to Required Actions of Condition 0 is modified from 2 hours to 4 hours as evaluated in the Topical Report.

2. A Reviewer's Note is added to Condition O Bases to address the interaction between TSTF-411 and TSTF-418.

3. Various brackets on new References 10 and 11 and the comment to add brackets around WCAP-15376 in several specification are eliminated. In reviewing this comment, it was determined that the brackets that were added by TSTF-111 which dealt with the approval and changes associated with WCAPs 13632 and 14036 should not have been added. There are Reviewer's Notes that discuss the adoption of Topicals and the generic approval of the Topicals by the NRC would indicate that the NUREG should be revised to incorporate what has been approved generically and brackets should not be required in most cases.

4. Reviewer's Notes were added to Bases pages B 3.3.1-33 and B 3.3.3-27 discussing WCAP-15376.

5. Bases page B 3.3.1-42 is modified to indicate that the 24 hour Completion Time is allowed for channel corrective maintenance.

TSTF Review Information

TSTF Received Date: 07-Aug-02 Date Distributed for Review 07-Aug-02

OG Review Completed: ☑ BWOG ☑ WOG ☑ CEOG ☑ BWROG

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TSTF Revision 1 **Revision Status: Active** **Next Action: NRC**

TSTF Comments:
(No Comments)

TSTF Resolution: Approved Date: 07-Aug-02

NRC Review Information

NRC Received Date: 08-Aug-02

Affected Technical Specifications

Action 3.3.1 Bases	RTS Instrumenation
Action 3.3.1.O	RTS Instrumenation
Action 3.3.1.O Bases	RTS Instrumenation
SR 3.3.1.4	RTS Instrumenation
SR 3.3.1.4 Bases	RTS Instrumenation
SR 3.3.1.5	RTS Instrumenation
SR 3.3.1.5 Bases	RTS Instrumenation
SR 3.3.1.7	RTS Instrumenation
SR 3.3.1.7 Bases	RTS Instrumenation
SR 3.3.1.8	RTS Instrumenation
SR 3.3.1.8 Bases	RTS Instrumenation
Action 3.3.2 Bases	ESFAS Instrumenation
SR 3.3.2.2	ESFAS Instrumenation
SR 3.3.2.2 Bases	ESFAS Instrumenation
SR 3.3.2.4	ESFAS Instrumenation
SR 3.3.2.4 Bases	ESFAS Instrumenation
SR 3.3.2.5	ESFAS Instrumenation
SR 3.3.2.5 Bases	ESFAS Instrumenation
SR 3.3.6.4	Containment Purge and Exhaust Isolation Instrumentation

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SR 3.3.6.4 Bases	Containment Purge and Exhaust Isolation Instrumentation
SR 3.3.6.5	Containment Purge and Exhaust Isolation Instrumentation
SR 3.3.6.5 Bases	Containment Purge and Exhaust Isolation Instrumentation
SR 3.3.7.5	CREFS Actuation Instrumentation
SR 3.3.7.5 Bases	CREFS Actuation Instrumentation
SR 3.3.9.1	BDPS
SR 3.3.9.1 Bases	BDPS

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ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
N. One train inoperable.	**- NOTE -** One train may be bypassed for up to [4] hours for surveillance testing provided the other train is OPERABLE.	
	N.1 Restore train to OPERABLE status.	6 hours
	OR	
	N.2 Be in MODE 3.	12 hours
O. One RTB train inoperable.	**- NOTE -** ~~1.~~ One train may be bypassed for up to 4 ~~2~~ hours for surveillance testing, provided the other train is OPERABLE. ~~2. One RTB may be bypassed for up to 2 hours for maintenance on undervoltage or shunt trip mechanisms, provided the other train is OPERABLE.~~	
	O.1 Restore train to OPERABLE status.	24 ~~1~~ hours
	OR	
	O.2 Be in MODE 3.	30 ~~7~~ hours

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.1.2	---------- **- NOTES -** 1. Adjust NIS channel if absolute difference is > 2%. 2. Not required to be performed until [12] hours after THERMAL POWER is ≥ 15% RTP. ---------- Compare results of calorimetric heat balance calculation to Nuclear Instrumentation System (NIS) channel output.	24 hours
SR 3.3.1.3	---------- **- NOTES -** 1. Adjust NIS channel if absolute difference is ≥ 3%. 2. Not required to be performed until [24] hours after THERMAL POWER is ≥ [15]% RTP. ---------- Compare results of the incore detector measurements to NIS AFD.	31 effective full power days (EFPD)
SR 3.3.1.4	---------- **- NOTE -** This Surveillance must be performed on the reactor trip bypass breaker prior to placing the bypass breaker in service. ---------- Perform TADOT.	62 ~~31~~ days on a STAGGERED TEST BASIS
SR 3.3.1.5	Perform ACTUATION LOGIC TEST. 92	~~31~~ days on a STAGGERED TEST BASIS

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.1.6	---------- **- NOTE -** Not required to be performed until [24] hours after THERMAL POWER is ≥ 50% RTP. ---------- Calibrate excore channels to agree with incore detector measurements.	[92] EFPD
SR 3.3.1.7	---------- **- NOTE -** Not required to be performed for source range instrumentation prior to entering MODE 3 from MODE 2 until 4 hours after entry into MODE 3. ---------- Perform COT.	184 ~~[92]~~ days

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.1.8	---------- **- NOTE -** This Surveillance shall include verification that interlocks P-6 and P-10 are in their required state for existing unit conditions. ---------- Perform COT.	---------- **- NOTE -** Only required when not performed within previous [~~92~~ 184] days ---------- Prior to reactor startup AND Four hours after reducing power below P-6 for source range instrumentation AND [Twelve] hours after reducing power below P-10 for power and intermediate range instrumentation AND Every [~~92~~ 184] days thereafter
SR 3.3.1.9	---------- **- NOTE -** Verification of setpoint is not required. ---------- Perform TADOT.	[92] days

TSTF-411, Rev. 1

B 3.3 INSTRUMENTATION

B 3.3.1 Reactor Trip System (RTS) Instrumentation

BASES

BACKGROUND

The RTS initiates a unit shutdown, based on the values of selected unit parameters, to protect against violating the core fuel design limits and Reactor Coolant System (RCS) pressure boundary during anticipated operational occurrences (AOOs) and to assist the Engineered Safety Features (ESF) Systems in mitigating accidents.

The protection and monitoring systems have been designed to assure safe operation of the reactor. This is achieved by specifying limiting safety system settings (LSSS) in terms of parameters directly monitored by the RTS, as well as specifying LCOs on other reactor system parameters and equipment performance.

Technical specifications are required by 10 CFR 50.36 to contain LSSS defined by the regulation as "...settings for automatic protective devices...so chosen that automatic protective action will correct the abnormal situation before a Safety Limit (SL) is exceeded." The Analytic Limit is the limit of the process variable at which a safety action is initiated, as established by the safety analysis, to ensure that a SL is not exceeded. Any automatic protection action that occurs on reaching the Analytic Limit therefore ensures that the SL is not exceeded. However, in practice, the actual settings for automatic protective devices must be chosen to be more conservative that the Analytic Limit to account for instrument loop uncertainties related to the setting at which the automatic protective action would actually occur.

The Trip Setpoint is a predetermined setting for a protective device chosen to ensure automatic actuation prior to the process variable reaching the Analytic Limit and thus ensuring that the SL would not be exceeded. As such, the Trip Setpoint accounts for uncertainties in setting the device (e.g. calibration), uncertainties in how the device might actually perform (e.g., repeatability), changes in the point of action of the device over time (e.g., drift during surveillance intervals), and any other factors which may influence its actual performance (e.g., harsh accident environments). In this manner, the Trip Setpoint plays an important role in ensuring that SLs are not exceeded. As such, the Trip Setpoint meets the definition of an LSSS (Ref. 11) and could be used to meet the requirement that they be contained in the technical specifications.

(Ref. 11)

Technical specifications contain values related to the OPERABILITY of equipment required for safe operation of the facility. OPERABLE is

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

that no single trip mechanism failure will prevent opening any breaker on a valid signal.

These trip Functions must be OPERABLE in MODE 1 or 2 when the reactor is critical. In MODE 3, 4, or 5, these RTS trip Functions must be OPERABLE when the Rod Control System is capable of rod withdrawal or one or more rods are not fully inserted.

21. Automatic Trip Logic

The LCO requirement for the RTBs (Functions 19 and 20) and Automatic Trip Logic (Function 21) ensures that means are provided to interrupt the power to allow the rods to fall into the reactor core. Each RTB is equipped with an undervoltage coil and a shunt trip coil to trip the breaker open when needed. Each RTB is equipped with a bypass breaker to allow testing of the trip breaker while the unit is at power. The reactor trip signals generated by the RTS Automatic Trip Logic cause the RTBs and associated bypass breakers to open and shut down the reactor.

The LCO requires two trains of RTS Automatic Trip Logic to be OPERABLE. Having two OPERABLE channels ensures that random failure of a single logic channel will not prevent reactor trip.

These trip Functions must be OPERABLE in MODE 1 or 2 when the reactor is critical. In MODE 3, 4, or 5, these RTS trip Functions must be OPERABLE when the Rod Control System is capable of rod withdrawal or one or more rods are not fully inserted.

The RTS instrumentation satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

ACTIONS

INSERT 5

A Note has been added to the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each Function listed in Table 3.3.1-1.

In the event a channel's Trip Setpoint is found nonconservative with respect to the Allowable Value, or the transmitter, instrument loop, signal processing electronics, or bistable is found inoperable, then all affected Functions provided by that channel must be declared inoperable and the LCO Condition(s) entered for the protection Function(s) affected.

When the number of inoperable channels in a trip Function exceed those specified in one or other related Conditions associated with a trip

INSERT 5

-Reviewers Note-

In Table 3.3.1-1, Functions 11.a and 11.b were not included in the generic evaluations approved in either WCAP-10271, as supplemented, or WCAP-15376. In order to apply the WCAP-10271, as supplemented, and WCAP-15376 TS relaxations to plant specific Functions not evaluated generically, licensees must submit plant specific evaluations for NRC review and approval.

BASES

ACTIONS (continued)

tripped condition and the 4 hours allowed for reducing power are justified in Reference 7.

The Required Actions have been modified by a Note that allows placing the inoperable channel in the bypassed condition for up to 4 hours while performing routine surveillance testing of the other channels. The 4 hour time limit is justified in Reference 7.

N.1 and N.2

Condition N applies to the SI Input from ESFAS reactor trip and the RTS Automatic Trip Logic in MODES 1 and 2. These actions address the train orientation of the RTS for these Functions. With one train inoperable, 6 hours are allowed to restore the train to OPERABLE status (Required Action N.1) or the unit must be placed in MODE 3 within the next 6 hours. The Completion Time of 6 hours (Required Action N.1) is reasonable considering that in this Condition, the remaining OPERABLE train is adequate to perform the safety function and given the low probability of an event during this interval. The Completion Time of 6 hours (Required Action N.2) is reasonable, based on operating experience, to reach MODE 3 from full power in an orderly manner and without challenging unit systems.

The Required Actions have been modified by a Note that allows bypassing one train up to [4] hours for surveillance testing, provided the other train is OPERABLE.

For train corrective maintenance

The 24 hour Completion Time is justified in Reference 8.

O.1 and O.2

24 hours

Condition O applies to the RTBs in MODES 1 and 2. These actions address the train orientation of the RTS for the RTBs. With one train inoperable, ~~1 hour~~ is allowed to restore the train to OPERABLE status or the unit must be placed in MODE 3 within the next 6 hours. The Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power in an orderly manner and without challenging unit systems. ~~The 1 hour and 6 hour Completion Times are equal to the time allowed by LCO 3.0.3 for shutdown actions in the event of a complete loss of RTS Function.~~ Placing the unit in MODE 3 results in ACTION C entry while RTB(s) are inoperable.

Insert 6

a The

The Required Actions have been modified by ~~two~~ Notes. Note ~~1~~ allows one ~~channel~~ train to be bypassed for up to ~~2~~ 4 hours for surveillance testing, provided the other ~~channel~~ train is OPERABLE. ~~Note 2 allows one RTB to be~~

INSERT 6

-Reviewer's Note-

WCAP-14333-P-A, Rev. 1, "Probabilistic Risk Analysis of the RPS and ESFAS Test Times and Completion Times," and the associated TSTF (TSTF-418) contain three Notes to TS 3.3.1 Condition O. Note 1 states, "One train may be bypassed for up to 2 hours for surveillance testing, provided the other train is OPERABLE." Note 2 states, "One RTB may be bypassed for up to 2 hours for maintenance on undervoltage or shunt trip mechanisms, provided the other train is OPERABLE." WCAP-14333-P-A, Rev. 1 also adds a third Note, which states: "One RTB train may be bypassed for up to [4] hours for concurrent surveillance testing of the RTB and automatic trip logic, provided the other train is OPERABLE."

WCAP-15376-P, "Risk-Informed Assessment of the RTS and ESFAS Surveillance Test Intervals and Reactor Trip Breaker Test and Completion Times," and the associated TSTF (TSTF-411) relax the time that an RTB train may be bypassed for surveillance testing from 2 hours to 4 hours, and delete Notes 2 and 3 that are added by WCAP-14333-P-A, Rev. 1.

Implementation of Notes in TS 3.3.1, Condition O:

1. If WCAP-14333-P-A, Rev. 1 is implemented without implementing WCAP-15376-P, Condition O will contain the three Notes as discussed above, with 2 hours to bypass an RTB train for surveillance testing in Note 1.

2. If WCAP-15376-P is implemented without implementing WCAP-14333-P-A, Rev. 1, Condition O will only contain one Note (Note 1 as discussed in the first paragraph above), with 4 hours to bypass an RTB train for surveillance testing in the Note.

3. If WCAP-14333-P-A, Rev. 1, and WCAP-15376-P are both implemented, Condition O will contain only one Note as discussed in item 2 above.

BASES

ACTIONS (continued)

~~bypassed for up to 2 hours for maintenance if the other RTB train is OPERABLE. The 2 hour time limit is justified in Reference 2.~~

P.1 and P.2 4 8

Condition P applies to the P-6 and P-10 interlocks. With one or more channels inoperable for one-out-of-two or two-out-of-four coincidence logic, the associated interlock must be verified to be in its required state for the existing unit condition within 1 hour or the unit must be placed in MODE 3 within the next 6 hours. Verifying the interlock status manually accomplishes the interlock's Function. The Completion Time of 1 hour is based on operating experience and the minimum amount of time allowed for manual operator actions. The Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 3 from full power in an orderly manner and without challenging unit systems. The 1 hour and 6 hour Completion Times are equal to the time allowed by LCO 3.0.3 for shutdown actions in the event of a complete loss of RTS Function.

Q.1 and Q.2

Condition Q applies to the P-7, P-8, P-9, and P-13 interlocks. With one or more channels inoperable for one-out-of-two or two-out-of-four coincidence logic, the associated interlock must be verified to be in its required state for the existing unit condition within 1 hour or the unit must be placed in MODE 2 within the next 6 hours. These actions are conservative for the case where power level is being raised. Verifying the interlock status manually accomplishes the interlock's Function. The Completion Time of 1 hour is based on operating experience and the minimum amount of time allowed for manual operator actions. The Completion Time of 6 hours is reasonable, based on operating experience, to reach MODE 2 from full power in an orderly manner and without challenging unit systems.

R.1, and R.2

Condition R applies to the RTB Undervoltage and Shunt Trip Mechanisms, or diverse trip features, in MODES 1 and 2. With one of the diverse trip features inoperable, it must be restored to an OPERABLE status within 48 hours or the unit must be placed in a MODE where the requirement does not apply. This is accomplished by placing the unit in MODE 3 within the next 6 hours (54 hours total time). The Completion Time of 6 hours is a reasonable time, based on operating experience, to

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.3

SR 3.3.1.3 compares the incore system to the NIS channel output every 31 EFPD. If the absolute difference is ≥ 3%, the NIS channel is still OPERABLE, but must be readjusted.

If the NIS channel cannot be properly readjusted, the channel is declared inoperable. This Surveillance is performed to verify the f(ΔI) input to the overtemperature ΔT Function.

Two Notes modify SR 3.3.1.3. Note 1 indicates that the excore NIS channel shall be adjusted if the absolute difference between the incore and excore AFD is ≥ 3%. Note 2 clarifies that the Surveillance is required only if reactor power is ≥ [15%] RTP and that 24 hours is allowed for performing the first Surveillance after reaching [15%] RTP.

The Frequency of every 31 EFPD is adequate. It is based on unit operating experience, considering instrument reliability and operating history data for instrument drift. Also, the slow changes in neutron flux during the fuel cycle can be detected during this interval.

SR 3.3.1.4

SR 3.3.1.4 is the performance of a TADOT every 31 62 days on a STAGGERED TEST BASIS. This test shall verify OPERABILITY by actuation of the end devices. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable TADOT of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions.

The RTB test shall include separate verification of the undervoltage and shunt trip mechanisms. Independent verification of RTB undervoltage and shunt trip Function is not required for the bypass breakers. No capability is provided for performing such a test at power. The independent test for bypass breakers is included in SR 3.3.1.14. The bypass breaker test shall include a local shunt trip. A Note has been added to indicate that this test must be performed on the bypass breaker prior to placing it in service.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The Frequency of every 31 (62) days on a STAGGERED TEST BASIS is adequate. It is based on industry operating experience, considering instrument reliability and operating history data. (is justified in Reference 8.)

SR 3.3.1.5

SR 3.3.1.5 is the performance of an ACTUATION LOGIC TEST. The SSPS is tested every 31 (92) days on a STAGGERED TEST BASIS, using the semiautomatic tester. The train being tested is placed in the bypass condition, thus preventing inadvertent actuation. Through the semiautomatic tester, all possible logic combinations, with and without applicable permissives, are tested for each protection function. The Frequency of every 61 (92) days on a STAGGERED TEST BASIS is adequate. It is based on industry operating experience, considering instrument reliability and operating history data. (justified in Reference 8.)

SR 3.3.1.6

SR 3.3.1.6 is a calibration of the excore channels to the incore channels. If the measurements do not agree, the excore channels are not declared inoperable but must be calibrated to agree with the incore detector measurements. If the excore channels cannot be adjusted, the channels are declared inoperable. This Surveillance is performed to verify the f(ΔI) input to the overtemperature ΔT Function.

A Note modifies SR 3.3.1.6. The Note states that this Surveillance is required only if reactor power is > 50% RTP and that [24] hours is allowed for performing the first surveillance after reaching 50% RTP.

The Frequency of 92 EFPD is adequate. It is based on industry operating experience, considering instrument reliability and operating history data for instrument drift.

SR 3.3.1.7

SR 3.3.1.7 is the performance of a COT every [92] (184) days.

A COT is performed on each required channel to ensure the entire channel will perform the intended Function. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL OPERATIONAL TEST of a relay. This is acceptable because all of the other required contacts of the

BASES

SURVEILLANCE REQUIREMENTS (continued)

relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions.

Setpoints must be within the Allowable Values specified in Table 3.3.1-1.

The difference between the current "as found" values and the previous test "as left" values must be consistent with the drift allowance used in the setpoint methodology. The setpoint shall be left set consistent with the assumptions of the current unit specific setpoint methodology.

The "as found" and "as left" values must also be recorded and reviewed for consistency with the assumptions of Reference ~~7~~ 6.

SR 3.3.1.7 is modified by a Note that provides a 4 hours delay in the requirement to perform this Surveillance for source range instrumentation when entering MODE 3 from MODE 2. This Note allows a normal shutdown to proceed without a delay for testing in MODE 2 and for a short time in MODE 3 until the RTBs are open and SR 3.3.1.7 is no longer required to be performed. If the unit is to be in MODE 3 with the RTBs closed for > 4 hours this Surveillance must be performed prior to 4 hours after entry into MODE 3.

The Frequency of [92] 184 days is justified in Reference ~~7~~ 8.

SR 3.3.1.8

SR 3.3.1.8 is the performance of a COT as described in SR 3.3.1.7, except it is modified by a Note that this test shall include verification that the P-6 and P-10 interlocks are in their required state for the existing unit condition. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL OPERATIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. The Frequency is modified by a Note that allows this surveillance to be satisfied if it has been performed within [92] 184 days of the Frequencies prior to reactor startup and four hours after reducing power below P-10 and P-6. The Frequency of "prior to startup" ensures this surveillance is performed prior to critical operations and applies to the source, intermediate and power range low instrument channels. The Frequency of [12] hours after reducing power

BASES

SURVEILLANCE REQUIREMENTS (continued)

below P-10 (applicable to intermediate and power range low channels) and 4 hours after reducing power below P-6 (applicable to source range channels) allows a normal shutdown to be completed and the unit removed from the MODE of Applicability for this surveillance without a delay to perform the testing required by this surveillance. The Frequency of every 92 days thereafter applies if the plant remains in the MODE of Applicability after the initial performances of prior to reactor startup and [12] and four hours after reducing power below P-10 or P-6, respectively. The MODE of Applicability for this surveillance is < P-10 for the power range low and intermediate range channels and < P-6 for the source range channels. Once the unit is in MODE 3, this surveillance is no longer required. If power is to be maintained < P-10 for more than [12] hours or < P-6 for more than 4 hours, then the testing required by this surveillance must be performed prior to the expiration of the time limit. [Twelve] hours and four hours are reasonable times to complete the required testing or place the unit in a MODE where this surveillance is no longer required. This test ensures that the NIS source, intermediate, and power range low channels are OPERABLE prior to taking the reactor critical and after reducing power into the applicable MODE (< P-10 or < P-6) for periods > [12] and 4 hours, respectively.

SR 3.3.1.9

The Frequency of [184] days is justified in Reference 8.

SR 3.3.1.9 is the performance of a TADOT and is performed every [92] days, as justified in Reference 7. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable TADOT of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions.

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 requires elaborate bench calibration and is accomplished during the CHANNEL CALIBRATION.

SR 3.3.1.10

A CHANNEL CALIBRATION is performed every [18] months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test

BASES

SURVEILLANCE REQUIREMENTS (continued)

Manual Reactor Trip Function for the Reactor Trip Breakers and Reactor Trip Bypass Breakers. The Reactor Trip Bypass Breaker test shall include testing of the automatic undervoltage trip.

The Frequency is based on the known reliability of the Functions and the multichannel redundancy available, and has been shown to be acceptable through operating experience.

The SR is modified by a Note that excludes verification of setpoints from the TADOT. The Functions affected have no setpoints associated with them.

SR 3.3.1.15

SR 3.3.1.15 is the performance of a TADOT of Turbine Trip Functions. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable TADOT of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. This TADOT is as described in SR 3.3.1.4, except that this test is performed prior to exceeding the [P-9] interlock whenever the unit has been in MODE 3. This Surveillance is not required if it has been performed within the previous 31 days. Verification of the Trip Setpoint does not have to be performed for this Surveillance. Performance of this test will ensure that the turbine trip Function is OPERABLE prior to exceeding the [P-9] interlock.

SR 3.3.1.16

SR 3.3.1.16 verifies that the individual channel/train actuation response times are less than or equal to the maximum values assumed in the accident analysis. Response time testing acceptance criteria are included in Technical Requirements Manual, Section 15 (Ref. 9). Individual component response times are not modeled in the analyses.

The analyses model the overall or total elapsed time, from the point at which the parameter exceeds the trip setpoint value at the sensor to the point at which the equipment reaches the required functional state (i.e., control and shutdown rods fully inserted in the reactor core).

BASES

SURVEILLANCE REQUIREMENTS (continued)

For channels that include dynamic transfer Functions (e.g., lag, lead/lag, rate/lag, etc.), the response time test may be performed with the transfer Function set to one, with the resulting measured response time compared to the appropriate FSAR response time. Alternately, the response time test can be performed with the time constants set to their nominal value, provided the required response time is analytically calculated assuming the time constants are set at their nominal values. The response time may be measured by a series of overlapping tests such that the entire response time is measured.

- REVIEWER'S NOTE -

Applicable portions of the following Bases are applicable for plants adopting WCAP-13632-P-A and/or WCAP-14036-P.

Response time may be verified by actual response time tests in any series of sequential, overlapping or total channel measurements, or by the summation of allocated sensor, signal processing and actuation logic response times with actual response time tests on the remainder of the channel. Allocations for sensor response times may be obtained from: (1) historical records based on acceptable response time tests (hydraulic, noise, or power interrupt tests), (2) in place, onsite, or offsite (e.g. vendor) test measurements, or (3) utilizing vendor engineering specifications. WCAP-13632-P-A, Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the WCAP. Response time verification for other sensor types must be demonstrated by test.

(Ref. 10)

[WCAP-14036-P, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," provides the basis and methodology for using allocated signal processing and actuation logic response times in the overall verification of the protection system channel response time.] The allocations for sensor, signal conditioning, and actuation logic response times must be verified prior to placing the component in operational service and re-verified following maintenance that my adversely affect response time. In general, electrical repair work does not impact response time provided the parts used for repair are of the same type and value. Specific components identified in the WCAP may re replaced without verification testing. One example where response time could be affected is replacing the sensing assembly of a transmitter.

(Ref. 11)

BASES

SURVEILLANCE REQUIREMENTS (continued)

As appropriate, each channel's response must be verified every [18] months on a STAGGERED TEST BASIS. Testing of the final actuation devices is included in the testing. Response times cannot be determined during unit operation because equipment operation is required to measure response times. Experience has shown that these components usually pass this surveillance when performed at the 18 months Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.3.1.16 is modified by a Note stating that neutron detectors are excluded from RTS RESPONSE TIME testing. This Note is necessary because of the difficulty in generating an appropriate detector input signal. Excluding the detectors is acceptable because the principles of detector operation ensure a virtually instantaneous response.

REFERENCES

1. FSAR, Chapter [7].

2. FSAR, Chapter [6].

3. FSAR, Chapter [15].

4. IEEE-279-1971.

5. 10 CFR 50.49.

6. RTS/ESFAS Setpoint Methodology Study.

7. WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990.

9 ~~8~~ Technical Requirements Manual, Section 15, "Response Times."

10 ~~9~~ WCAP-13632-P-A, Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," January 1996.

11 ~~10~~ WCAP-14036-P, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," December 1995.

8. WCAP-15376, Rev.0, October 2000.

---- Reviewer's Note ----
The Frequency remains at 31 days on a STAGGERED TEST BASIS for plants with a Relay Protection System.

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.2.2	Perform ACTUATION LOGIC TEST.	~~31~~ 92 days on a STAGGERED TEST BASIS
SR 3.3.2.3	- NOTE - The continuity check may be excluded. Perform ACTUATION LOGIC TEST.	31 days on a STAGGERED TEST BASIS
SR 3.3.2.4	Perform MASTER RELAY TEST.	~~31~~ 92 days on a STAGGERED TEST BASIS
SR 3.3.2.5	Perform COT.	~~92~~ 184 days
SR 3.3.2.6	Perform SLAVE RELAY TEST.	[92] days
SR 3.3.2.7	- NOTE - Verification of relay setpoints not required. Perform TADOT.	[92] days
SR 3.3.2.8	- NOTE - Verification of setpoint not required for manual initiation functions. Perform TADOT.	[18] months
SR 3.3.2.9	- NOTE - This Surveillance shall include verification that the time constants are adjusted to the prescribed values. Perform CHANNEL CALIBRATION.	[18] months

BASES

APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

This Function must be OPERABLE in MODES 1, 2, and 3 when a secondary side break or stuck open valve could result in the rapid depressurization of the steam lines. This Function does not have to be OPERABLE in MODE 4, 5, or 6 because there is insufficient energy in the secondary side of the unit to have an accident.

The ESFAS instrumentation satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

ACTIONS

Insert 7

A Note has been added in the ACTIONS to clarify the application of Completion Time rules. The Conditions of this Specification may be entered independently for each Function listed on Table 3.3.2-1.

In the event a channel's Trip Setpoint is found nonconservative with respect to the Allowable Value, or the transmitter, instrument Loop, signal processing electronics, or bistable is found inoperable, then all affected Functions provided by that channel must be declared inoperable and the LCO Condition(s) entered for the protection Function(s) affected. When the Required Channels in Table 3.3.2-1 are specified (e.g., on a per steam line, per loop, per SG, etc., basis), then the Condition may be entered separately for each steam line, loop, SG, etc., as appropriate.

When the number of inoperable channels in a trip function exceed those specified in one or other related Conditions associated with a trip function, then the unit is outside the safety analysis. Therefore, LCO 3.0.3 should be immediately entered if applicable in the current MODE of operation.

- REVIEWER'S NOTE -

Certain LCO Completion Times are based on approved topical reports. In order for a licensee to use these times, the licensee must justify the Completion Times as required by the staff Safety Evaluation Report (SER) for the topical report.

A.1

Condition A applies to all ESFAS protection functions.

Condition A addresses the situation where one or more channels or trains for one or more Functions are inoperable at the same time. The Required Action is to refer to Table 3.3.2-1 and to take the Required

INSERT 7

-Reviewers Note-

In Table 3.3.2-1, Functions 7.b and 7.c were not included in the generic evaluations approved in either WCAP-10271, as supplemented, or WCAP-15376. In order to apply the WCAP-10271, as supplemented, and WCAP-15376 TS relaxations to plant specific Functions not evaluated generically, licensees must submit plant specific evaluations for NRC review and approval.

BASES

SURVEILLANCE REQUIREMENTS (continued)

similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. A CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the unit staff, based on a combination of the channel instrument uncertainties, including indication and reliability. If a channel is outside the criteria, it may be an indication that the sensor or the signal processing equipment has drifted outside its limit.

The Frequency is based on operating experience that demonstrates channel failure is rare. The CHANNEL CHECK supplements less formal, but more frequent, checks of channels during normal operational use of the displays associated with the LCO required channels.

SR 3.3.2.2

92 SR 3.3.2.2 is the performance of an ACTUATION LOGIC TEST. The SSPS is tested every 31 days on a STAGGERED TEST BASIS, using the semiautomatic tester. The train being tested is placed in the bypass condition, thus preventing inadvertent actuation. Through the semiautomatic tester, all possible logic combinations, with and without applicable permissives, are tested for each protection function. In addition, the master relay coil is pulse tested for continuity. This verifies that the logic modules are OPERABLE and that there is an intact voltage signal path to the master relay coils. The Frequency of every 31 days on a STAGGERED TEST BASIS is adequate. It is based on industry operating experience, considering instrument reliability and operating history data. 92

justified in Reference 9.

SR 3.3.2.3

SR 3.3.2.3 is the performance of an ACTUATION LOGIC TEST as described in SR 3.3.2.2, except that the semiautomatic tester is not used and the continuity check does not have to be performed, as explained in the Note. This SR is applied to the balance of plant actuation logic and relays that do not have the SSPS test circuits installed to utilize the semiautomatic tester or perform the continuity check. This test is also

BASES

SURVEILLANCE REQUIREMENTS (continued)

performed every 31 days on a STAGGERED TEST BASIS. The Frequency is adequate based on industry operating experience, considering instrument reliability and operating history data.

SR 3.3.2.4

SR 3.3.2.4 is the performance of a MASTER RELAY TEST. The MASTER RELAY TEST is the energizing of the master relay, verifying contact operation and a low voltage continuity check of the slave relay coil. Upon master relay contact operation, a low voltage is injected to the slave relay coil. This voltage is insufficient to pick up the slave relay, but large enough to demonstrate signal path continuity. This test is performed every 31 days on a STAGGERED TEST BASIS. The time allowed for the testing (4 hours) and the surveillance interval are justified in Reference 8.

92 is

The Frequency of 92 days is justified in Reference 9.

SR 3.3.2.5

SR 3.3.2.5 is the performance of a COT.

A COT is performed on each required channel to ensure the entire channel will perform the intended Function. Setpoints must be found within the Allowable Values specified in Table 3.3.1-1. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL OPERATIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions.

The difference between the current "as found" values and the previous test "as left" values must be consistent with the drift allowance used in the setpoint methodology. The setpoint shall be left set consistent with the assumptions of the current unit specific setpoint methodology.

The "as found" and "as left" values must also be recorded and reviewed for consistency with the assumptions of the surveillance interval extension analysis (Ref. 8) when applicable.

Reference 6.

The Frequency of 92 days is justified in Reference 8.

184 9

BASES

SURVEILLANCE REQUIREMENTS (continued)

the relay. This clarifies what is an acceptable TADOT of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. In some instances, the test includes actuation of the end device (i.e., pump starts, valve cycles, etc.). The Frequency is adequate, based on industry operating experience and is consistent with the typical refueling cycle. The SR is modified by a Note that excludes verification of setpoints during the TADOT for manual initiation Functions. The manual initiation Functions have no associated setpoints.

SR 3.3.2.9

SR 3.3.2.9 is the performance of a CHANNEL CALIBRATION.

A CHANNEL CALIBRATION is performed every [18] months, or approximately at every refueling. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor. The test verifies that the channel responds to measured parameter within the necessary range and accuracy.

CHANNEL CALIBRATIONS must be performed consistent with the assumptions of the unit specific setpoint methodology. The difference between the current "as found" values and the previous test "as left" values must be consistent with the drift allowance used in the setpoint methodology.

The Frequency of [18] months is based on the assumption of an [18] month calibration interval in the determination of the magnitude of equipment drift in the setpoint methodology.

This SR is modified by a Note stating that this test should include verification that the time constants are adjusted to the prescribed values where applicable.

SR 3.3.2.10

This SR ensures the individual channel ESF RESPONSE TIMES are less than or equal to the maximum values assumed in the accident analysis. Response Time testing acceptance criteria are included in the Technical Requirements Manual, Section 15 (Ref. 10). Individual component response times are not modeled in the analyses. The analyses model the overall or total elapsed time, from the point at which the parameter

BASES

SURVEILLANCE REQUIREMENTS (continued)

exceeds the Trip Setpoint value at the sensor, to the point at which the equipment in both trains reaches the required functional state (e.g., pumps at rated discharge pressure, valves in full open or closed position).

For channels that include dynamic transfer functions (e.g., lag, lead/lag, rate/lag, etc.), the response time test may be performed with the transfer functions set to one with the resulting measured response time compared to the appropriate FSAR response time. Alternately, the response time test can be performed with the time constants set to their nominal value provided the required response time is analytically calculated assuming the time constants are set at their nominal values. The response time may be measured by a series of overlapping tests such that the entire response time is measured.

- REVIEWER'S NOTE -

Applicable portions of the following Bases are applicable for plants adopting WCAP-13632-P-A. and/or WCAP-14036-P.

Response time may be verified by actual response time tests in any series of sequential, overlapping or total channel measurements, or by the summation of allocated sensor, signal processing and actuation logic response times with actual response time tests on the remainder of the channel. Allocations for sensor response times may be obtained from: (1) historical records based on acceptable response time tests (hydraulic, noise, or power interrupt tests), (2) in place, onsite, or offsite (e.g. vendor) test measurements, or (3) utilizing vendor engineering specifications. WCAP-13632-P-A, Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," dated January 1996, provides the basis and methodology for using allocated sensor response times in the overall verification of the channel response time for specific sensors identified in the WCAP. Response time verification for other sensor types must be demonstrated by test.

(Ref. 12)

WCAP-14036-P, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," provides the basis and methodology for using allocated signal processing and actuation logic response times in the overall verification of the protection system channel response time. The allocations for sensor, signal conditioning, and actuation logic response times must be verified prior to placing the component in operational service and re-verified following maintenance that may adversely affect response time. In general, electrical repair work does not impact

(Ref. 13)

BASES

REFERENCES (continued)

5. 10 CFR 50.49.

6. Plant-specific setpoint methodology study.

7. NUREG-1218, April 1988.

8. WCAP-10271-P-A, Supplement 2, Rev. 1, June 1990.

10. ~~9.~~ Technical Requirements Manual, Section 15, "Response Times."

11. ~~10.~~ Regulatory Guide 1.105, Revision 3, "Setpoints for Safety-Related Instrumentation."

12. [~~11.~~ WCAP-13632-P-A, Revision 2, "Elimination of Pressure Sensor Response Time Testing Requirements," January 1996.]

13. [~~12.~~ WCAP-14036-P, Revision 1, "Elimination of Periodic Protection Channel Response Time Tests," December 1995.]

9. WCAP-15376, Rev. 0, October 2000.

TSTF-411, Rev.1

SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE		FREQUENCY
SR 3.3.6.3	Perform MASTER RELAY TEST.	31 days on a STAGGERED TEST BASIS
INSERT 1		
SR 3.3.6.~~4~~ 6	Perform COT.	92 days
SR 3.3.6.~~5~~ 7	Perform SLAVE RELAY TEST.	[92] days
SR 3.3.6.~~6~~ 8	---------- **- NOTE -** Verification of setpoint is not required. ---------- Perform TADOT.	[18] months
SR 3.3.6.~~7~~ 9	Perform CHANNEL CALIBRATION.	[18] months

INSERT 1

TSTF-411, Rev.1

SURVEILLANCE		FREQUENCY
[SR 3.3.6.4	----------NOTE---------- This Surveillance is only applicable to the actuation logic of the ESFAS Instrumentation. ---------- Perform ACTUATION LOGIC TEST.	---------- -Reviewer's Note - The Frequency of 92 days on a STAGGERED TEST BASIS is applicable to the actuation logic processed through the Relay or Solid State Protection System. ---------- 92 days on a STAGGERED TEST BASIS]
[SR 3.3.6.5	----------NOTE---------- This Surveillance is only applicable to the master relays of the ESFAS Instrumentation. ---------- Perform MASTER RELAY TEST.	---------- -Reviewer's Note - The Frequency of 92 days on a STAGGERED TEST BASIS is applicable to the master relays processed through the Solid State Protection System. ---------- 92 days on a STAGGERED TEST BASIS]

BASES

SURVEILLANCE REQUIREMENTS (continued)

coil. Upon master relay contact operation, a low voltage is injected to the slave relay coil. This voltage is insufficient to pick up the slave relay, but large enough to demonstrate signal path continuity. This test is performed every 31 days on a STAGGERED TEST BASIS. The Surveillance interval is acceptable based on instrument reliability and industry operating experience.

INSERT 2

SR 3.3.6.~~5~~ 6

A COT is performed every 92 days on each required channel to ensure the entire channel will perform the intended Function. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL OPERATIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. The Frequency is based on the staff recommendation for increasing the availability of radiation monitors according to NUREG-1366 (Ref. ~~2~~ 3). This test verifies the capability of the instrumentation to provide the containment purge and exhaust system isolation. The setpoint shall be left consistent with the current unit specific calibration procedure tolerance.

SR 3.3.6.~~6~~ 7

SR 3.3.6.~~7~~ is the performance of a SLAVE RELAY TEST. The SLAVE RELAY TEST is the energizing of the slave relays. Contact operation is verified in one of two ways. Actuation equipment that may be operated in the design mitigation mode is either allowed to function or is placed in a condition where the relay contact operation can be verified without operation of the equipment. Actuation equipment that may not be operated in the design mitigation mode is prevented from operation by the SLAVE RELAY TEST circuit. For this latter case, contact operation is verified by a continuity check of the circuit containing the slave relay. This test is performed every [92] days. The Frequency is acceptable based on instrument reliability and industry operating experience.

SR 3.3.6.~~8~~ 8

SR 3.3.6.~~8~~ is the performance of a TADOT. This test is a check of the Manual Actuation Functions and is performed every [18] months. Each

INSERT 2

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[SR 3.3.6.4

SR 3.3.6.4 is the performance of an ACTUATION LOGIC TEST. The train being tested is placed in the bypass condition, thus preventing inadvertent actuation. Through the semiautomatic tester, all possible logic combinations, with and without applicable permissives, are tested for each protection function. In addition, the master relay coil is pulse tested for continuity. This verifies that the logic modules are OPERABLE and there is an intact voltage signal path to the master relay coils. This test is performed every 92 days on a STAGGERED TEST BASIS. The Surveillance interval is justified in Reference 2.

The SR is modified by a Note stating that the Surveillance is only applicable to the actuation logic of the ESFAS Instrumentation.]

[SR 3.3.6.5

SR 3.3.6.5 is the performance of a MASTER RELAY TEST. The MASTER RELAY TEST is the energizing of the master relay, verifying contact operation and a low voltage continuity check of the slave relay coil. Upon master relay contact operation, a low voltage is injected to the slave relay coil. This voltage is insufficient to pick up the slave relay, but large enough to demonstrate signal path continuity. This test is performed every 92 days on a STAGGERED TEST BASIS. The Surveillance interval is justified in Reference 2.

The SR is modified by a Note stating that the Surveillance is only applicable to the master relays of the ESFAS Instrumentation.]

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BASES

SURVEILLANCE REQUIREMENTS (continued)

Manual Actuation Function is tested up to, and including, the master relay coils. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable TADOT of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. In some instances, the test includes actuation of the end device (i.e., pump starts, valve cycles, etc.).

The test also includes trip devices that provide actuation signals directly to the SSPS, bypassing the analog process control equipment. The SR is modified by a Note that excludes verification of setpoints during the TADOT. The Functions tested have no setpoints associated with them.

The Frequency is based on the known reliability of the Function and the redundancy available, and has been shown to be acceptable through operating experience.

SR 3.3.6.~~8~~ 9

A CHANNEL CALIBRATION is performed every [18] months, or approximately at every refueling. 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.

The Frequency is based on operating experience and is consistent with the typical industry refueling cycle.

REFERENCES

1. 10 CFR 100.11.
2. WCAP-15376, Rev. 0, October 2000.
3. ~~2.~~ NUREG-1366, [date].

SURVEILLANCE REQUIREMENTS

- NOTE -
Refer to Table 3.3.7-1 to determine which SRs apply for each CREFS Actuation Function.

SURVEILLANCE		FREQUENCY
SR 3.3.7.1	Perform CHANNEL CHECK.	12 hours
SR 3.3.7.2	Perform COT.	92 days
SR 3.3.7.3	Perform ACTUATION LOGIC TEST.	31 days on a STAGGERED TEST BASIS
SR 3.3.7.4	Perform MASTER RELAY TEST.	31 days on a STAGGERED TEST BASIS
INSERT 3		
SR 3.3.7.~~5~~ 7	Perform SLAVE RELAY TEST.	[92] days
SR 3.3.7.~~6~~ 8	**- NOTE -** Verification of setpoint is not required. Perform TADOT.	[18] months
SR 3.3.7.~~7~~ 9	Perform CHANNEL CALIBRATION.	[18] months

INSERT 3

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SURVEILLANCE		FREQUENCY
[SR 3.3.7.5	----------NOTE---------- This Surveillance is only applicable to the actuation logic of the ESFAS Instrumentation. ---------- Perform ACTUATION LOGIC TEST.	---------- -Reviewer's Note - The Frequency of 92 days on a STAGGERED TEST BASIS is applicable to the actuation logic processed through the Relay or Solid State Protection System. ---------- 92 days on a STAGGERED TEST BASIS]
[SR 3.3.7.6	----------NOTE---------- This Surveillance is only applicable to the master relays of the ESFAS Instrumentation. ---------- Perform MASTER RELAY TEST.	---------- -Reviewer's Note - The Frequency of 92 days on a STAGGERED TEST BASIS is applicable to the master relays processed through the Solid State Protection System. ---------- 92 days on a STAGGERED TEST BASIS]

BASES

SURVEILLANCE REQUIREMENTS (continued)

Agreement criteria are determined by the unit staff, based on a combination of the channel instrument uncertainties, including indication and readability. If a channel is outside the criteria, it may be an indication that the sensor or the signal processing equipment has drifted outside its limit.

The Frequency is based on operating experience that demonstrates channel failure is rare. The CHANNEL CHECK supplements less formal, but more frequent, checks of channels during normal operational use of the displays associated with the LCO required channels.

SR 3.3.7.2

A COT is performed once every 92 days on each required channel to ensure the entire channel will perform the intended function. This test verifies the capability of the instrumentation to provide the CREFS actuation. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL OPERATIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. The setpoints shall be left consistent with the unit specific calibration procedure tolerance. The Frequency is based on the known reliability of the monitoring equipment and has been shown to be acceptable through operating experience.

SR 3.3.7.3

SR 3.3.7.3 is the performance of an ACTUATION LOGIC TEST. The train being tested is placed in the bypass condition, thus preventing inadvertent actuation. Through the semiautomatic tester, all possible logic combinations, with and without applicable permissives, are tested for each protection function. In addition, the master relay coil is pulse tested for continuity. This verifies that the logic modules are OPERABLE and there is an intact voltage signal path to the master relay coils. This test is performed every 31 days on a STAGGERED TEST BASIS. The Frequency is ~~justified in WCAP-10271-P-A, Supplement 2, Rev.1.~~ acceptable based on instrument reliability and industry operating experience.

SR 3.3.7.4

SR 3.3.7.4 is the performance of a MASTER RELAY TEST. The MASTER RELAY TEST is the energizing of the master relay, verifying

BASES

SURVEILLANCE REQUIREMENTS (continued)

contact operation and a low voltage continuity check of the slave relay coil. Upon master relay contact operation, a low voltage is injected to the slave relay coil. This voltage is insufficient to pick up the slave relay, but large enough to demonstrate signal path continuity. This test is performed every 31 days on a STAGGERED TEST BASIS. The Frequency is acceptable based on instrument reliability and industry operating experience.

INSERT 4

SR 3.3.7.~~6~~ 7

SR 3.3.7.~~5~~ is the performance of a SLAVE RELAY TEST. The SLAVE RELAY TEST is the energizing of the slave relays. Contact operation is verified in one of two ways. Actuation equipment that may be operated in the design mitigation MODE is either allowed to function or is placed in a condition where the relay contact operation can be verified without operation of the equipment. Actuation equipment that may not be operated in the design mitigation MODE is prevented from operation by the SLAVE RELAY TEST circuit. For this latter case, contact operation is verified by a continuity check of the circuit containing the slave relay. This test is performed every [92] days. The Frequency is acceptable based on instrument reliability and industry operating experience.

SR 3.3.7.~~6~~ 8

SR 3.3.7.~~5~~ is the performance of a TADOT. This test is a check of the Manual Actuation Functions and is performed every [18] months. Each Manual Actuation Function is tested up to, and including, the master relay coils. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable TADOT of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. In some instances, the test includes actuation of the end device (i.e., pump starts, valve cycles, etc.).

The test also includes trip devices that provide actuation signals directly to the Solid State Protection System, bypassing the analog process control equipment. The Frequency is based on the known reliability of the Function and the redundancy available, and has been shown to be acceptable through operating experience. The SR is modified by a Note that excludes verification of setpoints during the TADOT. The Functions tested have no setpoints associated with them.

INSERT 4

[SR 3.3.7.5

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SR 3.3.7.5 is the performance of an ACTUATION LOGIC TEST. The train being tested is placed in the bypass condition, thus preventing inadvertent actuation. Through the semiautomatic tester, all possible logic combinations, with and without applicable permissives, are tested for each protection function. In addition, the master relay coil is pulse tested for continuity. This verifies that the logic modules are OPERABLE and there is an intact voltage signal path to the master relay coils. This test is performed every 92 days on a STAGGERED TEST BASIS. The Surveillance interval is justified in Reference 1.

The SR is modified by a Note stating that the Surveillance is only applicable to the actuation logic of the ESFAS Instrumentation.]

[SR 3.3.7.6

SR 3.3.7.6 is the performance of a MASTER RELAY TEST. The MASTER RELAY TEST is the energizing of the master relay, verifying contact operation and a low voltage continuity check of the slave relay coil. Upon master relay contact operation, a low voltage is injected to the slave relay coil. This voltage is insufficient to pick up the slave relay, but large enough to demonstrate signal path continuity. This test is performed every 92 days on a STAGGERED TEST BASIS. The Surveillance interval is justified in Reference 1.

The SR is modified by a Note stating that the Surveillance is only applicable to the master relays of the ESFAS Instrumentation.]

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.7.~~2~~ 9

A CHANNEL CALIBRATION is performed every [18] months, or approximately at every refueling. 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.

The Frequency is based on operating experience and is consistent with the typical industry refueling cycle.

REFERENCES ~~None~~ 1. WCAP-15376, Rev. 0, October 2000.

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
	B.2.2.1 Close unborated water source isolation valves. AND B.2.2.2 Perform SR 3.1.1.1.	1 hour 1 hour AND Once per 12 hours thereafter

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.9.1	Perform CHANNEL CHECK.	12 hours
SR 3.3.9.2	Perform COT.	[92] days 184
SR 3.3.9.3	--- **- NOTE -** Neutron detectors are excluded from CHANNEL CALIBRATION. --- Perform CHANNEL CALIBRATION.	[18] months

BASES

SURVEILLANCE REQUIREMENTS (continued)

is normally a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between the two instrument channels could be an indication of excessive instrument drift in one of the channels or of something even more serious. A CHANNEL CHECK will detect gross channel failure: thus, it is key to verifying that the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the unit staff based on a combination of the channel instrument uncertainties, including indication and readability. If a channel is outside the criteria, it may be an indication that the senor or the signal processing equipment has drifted outside its limit.

The Frequency is based on operating experience that demonstrates channel failure is rare. The CHANNEL CHECK supplements less formal, but more frequent, checks of channels during normal operational use of the displays associated with the LCO required channels.

SR 3.3.9.2

SR 3.3.9.2 requires the performance of a COT every [92] days, to ensure that each train of the BDPS and associated trip setpoint are fully operational. A successful test of the required contact(s) of a channel relay may be performed by the verification of the change of state of a single contact of the relay. This clarifies what is an acceptable CHANNEL OPERATIONAL TEST of a relay. This is acceptable because all of the other required contacts of the relay are verified by other Technical Specifications and non-Technical Specifications tests at least once per refueling interval with applicable extensions. This test shall include verification that the boron dilution alarm setpoint is equal to or less than an increase of twice the count rate within a 10 minute period. The Frequency of [92] days is consistent with the requirements for source range channels in WCAP-~~10271-P-A~~ 15376 (Ref. 2).

SR 3.3.9.3

SR 3.3.9.3 is the performance of a CHANNEL CALIBRATION every [18] months. CHANNEL CALIBRATION is a complete check of the instrument loop, including the sensor except the neutron detector of the SRM circuit. The test verifies that the channel responds to a measured

BASES

SURVEILLANCE REQUIREMENTS (continued)

parameter within the necessary range and accuracy. For the BDPS, the CHANNEL CALIBRATION shall include verification that on a simulated or actual boron dilution flux doubling signal the centrifugal charging pump suction valves from the RWST open, and the normal CVCS volume control tank discharge valves close in the required closure time of ≤ 20 seconds.

The Frequency is based on operating experience and consistency with the typical industry refueling cycle.

REFERENCES

1. FSAR, Chapter [15].

2. ~~WCAP-10271-P-A, Supplement 2, Revision 1, June 1990.~~ WCAP-15376, Rev. 0, October 2000.