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Subject: **Response to Portion of NRC Request for Additional Information Letter No. 269 Related to ESBWR Design Certification Application – Technical Specifications – RAI Number 16.2-145 S01**

Enclosures 1 and 2 contain the GE Hitachi Nuclear Energy (GEH) response to the subject NRC RAI transmitted via the Reference 1 letter.

If you have any questions or require additional information regarding the information provided here, please contact me.

Sincerely,

Richard E. Kingston

Richard E. Kingston
Vice President, ESBWR Licensing

D068
NRO

Reference:

1. MFN 08-885, Letter from U.S. Nuclear Regulatory Commission to Robert E. Brown, *Request for Additional Information Letter No. 269 Related to ESBWR Design Certification Application,* October 31, 2008

Enclosures:

1. MFN 09-071 – Response to Portion of NRC Request for Additional Information Letter No. 269 Related to ESBWR Design Certification Application – Technical Specifications – RAI Number 16.2-145 S01
2. MFN 09-071 – DCD Markups for RAI Number 16.2-145 S01

cc:

AE Cubbage	USNRC (with enclosures)
RE Brown	GEH (with enclosures)
DH Hinds	GEH (with enclosures)
eDRF	94-8226

Enclosure 1

MFN 09-071

Response to Portion of NRC Request for

Additional Information Letter No. 269

Related to ESBWR Design Certification Application

- Technical Specifications -

RAI Number 16.2-145 S01

NRC RAI 16.2-145S01

The staff requests that the applicant revise frequencies for instrumentation channel checks and channel functional tests to be consistent with the STS.

In its supplemental response to RAI 16.2-154 (MFN 08-372, dated April 21, 2008), and as indicated in Table entitled "Chapter 16 Changes From Revision 4 to Revision 5" change numbers 38, 53, 54, 59, 72, 76, 77, 81, 83, 86, 98, 99, 100, 103, 105, 112, 113, 117, 125, 135, 141, 147, 157, 164, 181, 184, 198, 199, 201, and 206, instrumentation channel checks have been revised with a 24-hour frequency, and channel functional tests (CFTs) have been revised with a 24-month frequency; both sets of relaxations are justified by capabilities of the online self diagnostic feature of the Q-DCIS. In response to RAI 16.2-145, in DCD Revision 5, the applicant revised DCD Section 7.1.3.4 with additional details of his feature and how it supports channel checks and CFTs. However, this DCD discussion does not address the justification for the surveillance frequency relaxations; this is only addressed in the proposed Bases for these surveillances in GTS Section 3.3. Pending NRO technical staff acceptance of this feature as a sufficient basis for these frequencies, the GTS should denote these frequencies with brackets containing frequency values consistent with those provided in NUREG-1434, Revision 3.1, along with a suitable reviewer's note for the combined license applicant's use. (Note that RAIs 16.2-152, 153, and 154 are considered resolved based on the revised Q-DCIS discussion in DCD 7.1.3.4; the issue of the frequency relaxations will be addressed under this supplement to RAI 16.2-145.)

GEH Response

GEH concurs that the Generic Technical Specification (GTS) Channel Check and Channel Functional Test Surveillance Requirements (SRs) should be revised to more closely reflect similar requirements for Channel Checks and Channel Functional Tests provided in NUREG-1434, 'Standard Technical Specifications General Electric Plants, BWR/6,' Revision 3.1. GEH has determined that the applicable frequencies should not be presented in brackets; therefore, brackets and reviewer's notes are not incorporated. The Chapter 16 and Chapter 16B changes described below are incorporated in the enclosed markup pages.

The following table provides a comparison of the NUREG-1434 Channel Check SRs to the GTS instrumentation Channel Check SRs.

GTS SR	Frequency	NUREG-1434 SR	Frequency
3.3.1.1.1	Revised from 24 hours to 12 hours	3.3.1.1.1	12 hours
3.3.1.4.1	Revised from 24 hours to 12 hours	3.3.1.1.1	12 hours
3.3.1.6.1	Revised from 24 hours to 12 hours	3.3.1.2.1	12 hours
3.3.3.2.1	31 days (No change required)	3.3.3.1.1	31 days
3.3.4.1.1	Revised from 24 hours to 12 hours	3.4.7.1	12 hours
3.3.5.1.1	Revised from 24 hours to 12 hours	3.3.5.1.1	12 hours
3.3.5.3.1	Revised from 24 hours to 12 hours	3.3.5.2.1 used as model	12 hours
3.3.6.1.1	Revised from 24 hours to 12 hours	3.3.6.1.1	12 hours
3.3.6.3.1	Revised from 24 hours to 12 hours	3.3.6.1.1	12 hours

GTS SR	Frequency	NUREG-1434 SR	Frequency
3.3.7.1.1	Revised from 24 hours to 12 hours	3.3.7.1.1	12 hours
3.3.8.1.1	Revised from 24 hours to 12 hours	N/A	N/A

A new SR 3.3.1.6.3 is added requiring performance of a Channel Check every 24 hours, consistent with NUREG-1434, Revision 3.1, SR 3.3.1.2.3. As required by Table 3.3.1.6-1, Channel Check of the required Startup Range Neutron Monitors is performed per SR 3.3.1.6.3 during operation in Modes 3, 4, and 5, while Channel Check is performed per SR 3.3.1.6.1 during operation in Mode 6. This division of testing and the revised Frequencies are consistent with similar requirements in NUREG-1434, Rev. 3.1. Conforming changes are also incorporated in the Bases.

Channel Checks were added to the ESBWR GTS I&C 'Actuation' specifications and GTS 3.3.2.1 in DCD Revision 5 in response to RAI 16.2-154 (MFN 08-372, Revision 1). These enhanced Channel Check requirements were based on the online self-diagnostic features of the Distributed Control and Information System (DCIS), in conjunction with the Technical Specifications Monitor that provide overall instrumentation and actuation logic system verification of continued functionality. In keeping with 'channel' reflecting the 'instrument' portion of the division, and 'actuation' being the logic portion of the division after the 'channel' has lost identity, Channel Checks should not be applied to the actuation specifications. Therefore, Channel Check surveillance requirements are deleted from the actuation specifications. Channel Check is not required by NUREG-1434, Revision 3.1 for Control Rod Block Instrumentation. As discussed above, Channel Check was added to GTS 3.3.2.1 based on the capabilities of the online self-diagnostic features of DCIS. Therefore, in response to the request to revise Channel Check frequencies for consistency with NUREG-1434, Revision 3.1, Channel Check is deleted from GTS 3.3.2.1.

Conforming changes are also incorporated in the associated instrumentation tables, as appropriate, and in the associated SR Bases discussions.

The following table provides a comparison of the NUREG-1434 Channel Functional Test SRs to the GTS instrumentation Channel Functional Test SRs.

GTS SR	Frequency	NUREG-1434 SR	Frequency
3.3.1.1.2	Revised from 24 months to 92 days	3.3.1.1.7	[92] days
3.3.1.3.1	Revised from 24 months to 7 days	3.3.1.1.5	7 days
3.3.1.4.3	Revised from 24 months to 7 days	3.3.1.1.4	7 days
3.3.1.6.4	Revised from 24 months to 7 days	3.3.1.2.5	7 days
3.3.2.1.2	Revised from 24 months to 92 days	Based on 3.3.2.1.1, 3.3.2.1.2, 3.3.2.1.3, and 3.3.2.1.4	[92] days
3.3.2.1.3	Revised from 24 months to 92 days		
3.3.2.1.4	Revised from 24 months to 92 days		
3.3.2.1.5	Revised from 24 months to 92 days		
3.3.2.1.9	24 months (No change required)	3.3.2.1.8	[18] months
3.3.3.1.1	24 months (No change required)	3.3.3.2.2	[18] months
3.3.4.1.2	Revised from 24 months to 31 days	3.4.7.2	31 days

GTS SR	Frequency	NUREG-1434 SR	Frequency
3.3.5.1.2	Revised from 24 months to 92 days	3.3.5.1.2	[92] days
3.3.5.3.2	Revised from 24 months to 92 days	3.3.5.2.2 used as model	[92] days
3.3.6.1.2	Revised from 24 months to 92 days	3.3.6.1.2	[92] days
3.3.6.3.2	Revised from 24 months to 92 days	3.3.6.1.2	[92] days
3.3.7.1.2	Revised from 24 months to 92 days	3.3.7.1.2	[92] days
3.3.8.1.2	Revised from 24 months to 92 days	N/A	N/A

Conforming changes are also incorporated in the associated instrumentation tables, as appropriate, and in the associated SR Bases discussions. Additional information describing the self-test features of the instrumentation platforms is added to the Channel Functional Test Bases discussions. The change in Frequency provides a more conservative surveillance interval that is consistent with similar surveillance intervals in NUREG-1434, Revision 3.1.

GTS 3.3.1.3, 'Reactor Protection System (RPS) Manual Actuation,' SR 3.3.1.3.1 is revised to apply only to the RPS Manual Scram Function channels, consistent with NUREG-1434, Revision 3.1, SR 3.3.1.1.5. A new SR 3.3.1.3.2 is added requiring performance of a Channel Functional Test for the Reactor Mode Switch - Shutdown Position Function every 24 months, consistent with NUREG-1434, Revision 3.1, SR 3.3.1.1.10. The testing required by SR 3.3.1.3.1 and SR 3.3.1.3.2 is consistent with similar requirements in NUREG-1434, Rev. 3.1. Conforming changes are also incorporated in the associated Bases. Additional information describing the self-test features of the instrumentation platforms is added to the Channel Functional Test Bases discussions.

A new GTS 3.3.1.4, 'Neutron Monitoring System (NMS) Instrumentation,' SR 3.3.1.4.4 is added requiring performance of a Channel Functional Test every 92 days. As required by Table 3.3.1.4-1, Functions 1.a, 1.b, 1.c, and 2.a are tested by the Channel Functional Test of SR 3.3.1.4.3, while Functions 2.b, 2.c, 2.d, and 3 are tested by the Channel Functional Test of SR 3.3.1.4.4. This division of testing and the revised Frequencies are consistent with similar requirements in NUREG-1434, Rev. 3.1, SR 3.3.1.1.4 and SR 3.3.1.1.7. Conforming changes are also incorporated in the Bases. Additional information describing the self-test features of the instrumentation platforms is added to the Channel Functional Test Bases discussions.

A new GTS 3.3.1.6, 'Startup Range Neutron Monitor (SRNM) Instrumentation,' SR 3.3.1.6.6 is added requiring performance of a Channel Functional Test every 31 days, consistent with NUREG-1434, Revision 3.1, SR 3.3.1.2.6. As required by Table 3.3.1.6-1, Channel Functional Test of the required Startup Range Neutron Monitors is performed per SR 3.3.1.6.6 during operation in Modes 3, 4, and 5, while Channel Functional Testing is performed per SR 3.3.1.6.5 during operation in Mode 6. This division of testing and the revised Frequencies are consistent with similar requirements in NUREG-1434, Rev. 3.1. Conforming changes are also incorporated in the Bases. Additional information describing the self-test features of the instrumentation platforms is added to the Channel Functional Test Bases discussions.

Channel Functional Tests were added to the ESBWR GTS I&C 'Actuation' specifications in DCD Revision 5 in response to RAI 16.2-154 (MFN 08-372, Revision 1). Upon further evaluation, GEH has determined that these Channel Functional Tests should be deleted from the surveillance requirements of the actuation specifications.

Conforming changes are also incorporated in the associated SR Bases discussions.

The ESBWR GTS presentation divides the RPS, NMS, ECCS, ICS, MSIV, Isolation, and CRHAVS requirements into 'instrumentation' specifications (i.e., "channels") and 'actuation' specifications (i.e., "logic"). Removal of Channel Checks and Channel Functional Tests that were inappropriately added to the Actuation specifications in Revision 5 results in testing requirements that are consistent with NUREG-1434, Rev. 3.1; that is, the "logic" portions of the system are tested by response time test and logic system functional test surveillances and the instrumentation portions are tested by "channel" surveillances (Channel Check, Channel Functional Test and Channel Calibration).

The ESBWR DCD Chapter 7, Section 7.1.3.4, description of Channel Functional Test is revised to limit the Channel Functional Test to the sensor channel, as described above for removal of the Channel FUNCTIONAL Test from the GTS actuation specifications, and to properly define the scope of the Channel Functional Test.

DCD Impact

DCD Chapter 7, Chapter 16, and Chapter 16B will be revised in Revision 6 as described above and as shown in Enclosure 2.

Enclosure 2

MFN 09-071

DCD Markups for

RAI Number 16.2-145 S01

The channel check is a qualitative assessment of channel behavior during operation. The online self-diagnostic features of ~~NUMAC/TRICON~~the safety-related platforms, in conjunction with the TSM, accomplish the channel check requirements for detecting unacceptable deviations by automatic cyclic comparison of channel outputs. TSM provides a log of the results and sends out-of-limits alarms to the Alarm Management System (AMS). The TSM uses a hardware/software platform different from the safety-related platforms~~NUMAC and TRICON~~. The TSM functions are listed in Subsection 7.1.5.2.4.5.

If there are any self-diagnostic test results and indicating alarms, a summary report is available to the operator on demand.

Sensor and actuation logic channel monitoring capability are provided at the VDUs to enable manual validation of TSM report results.

Channel Functional Test

The channel functional test ensures that the entire sensor ~~and actuation logic~~ channel performs its intended function. The online self-diagnostic features of the safety-related platforms~~NUMAC and TRICON~~, in conjunction with the TSM, support the channel functional test requirements. The channel functional test can be conducted by manual injection of a simulated signal, one division at a time. The channel functional test confirms the channel through ~~its logic output contact~~ the DTM function is functioning correctly. The coincidence logic, involving more than one channel, and the final control elements are not activated in the channel functional test.

Logic System Functional Test

A LOGIC SYSTEM FUNCTIONAL TEST shall be a test of all logic components required for OPERABILITY of a logic circuit, from as close to the sensor as practicable up to, but not including, the actuated device, to verify OPERABILITY. The LOGIC SYSTEM FUNCTIONAL TEST may be performed by means of any series of sequential, overlapping, or total system steps so that the entire logic system is tested. ~~The logic system functional test is performed from sensor inputs to the actuated devices for all logic components required for operability of a logic circuit. To confirm that the trip logic is functioning, testing requires manual injection of simulated signals in two sensor channels of NUMAC/TRICON.~~

Response Time Test

The response time test is performed by a series of sequential, overlapping, or total steps to measure the entire response time. The logic processor or logic function~~instrument~~ self-diagnostics and the TSM support the performance of the response time test for the safety-related platforms~~NUMAC/TRICON~~. Watchdog timers monitor logic processor or logic function~~instrument~~ internal clocks and alarms for out-of-limit conditions and the completion of application code per logic processor or logic function~~instrument~~ cycle. Since the clocks set the response time, there is no mechanism for the response time to change without alarm or trip. All time delays incorporated into system logics are performed by software and the values are set during factory and preoperational testing in accordance with approved test procedures. Subsequent to final V&V of the code, there is no mechanism for the time delay values to inadvertently change.

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. As required by Required Action B.1 and referenced in Table 3.3.1.1-1.	D.1 Reduce THERMAL POWER to < 25% RTP.	4 hours
E. As required by Required Action B.1 and referenced in Table 3.3.1.1-1.	E.1 Be in MODE 2.	6 hours
F. As required by Required Action B.1 and referenced in Table 3.3.1.1-1.	F.1 Be in MODE 3.	12 hours
G. As required by Required Action B.1 and referenced in Table 3.3.1.1-1.	G.1 Initiate action to fully insert all insertable control rods in core cells containing one or more fuel assemblies.	Immediately

SURVEILLANCE REQUIREMENTS

- NOTE -

Refer to Table 3.3.1.1-1 to determine which SRs apply for each RPS Function.

SURVEILLANCE		FREQUENCY
SR 3.3.1.1.1	Perform CHANNEL CHECK on each required channel.	~~24~~ 12 hours
SR 3.3.1.1.2	Perform CHANNEL FUNCTIONAL TEST on each required channel.	~~24 months~~92 days

CONDITION	REQUIRED ACTION	COMPLETION TIME
C Required Action and associated Completion Time of Condition A not met in MODE 6. OR RPS automatic actuation capability not maintained in MODE 6.	C.1 Initiate action to fully insert all insertable control rods in core cells containing one or more fuel assemblies.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
~~SR 3.3.1.2.1~~	~~Perform CHANNEL CHECK on each required division.~~	~~24 hours~~
~~SR 3.3.1.2.2~~	~~Perform CHANNEL FUNCTIONAL TEST on each required division.~~	~~24 months~~
SR 3.3.1.2.~~3~~1	Perform LOGIC SYSTEM FUNCTIONAL TEST on each required division.	24 months on a STAGGERED TEST BASIS
SR 3.3.1.2.4<u>2</u>	Verify RPS RESPONSE TIME of each required division is within limits.	24 months on a STAGGERED TEST BASIS

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Both manual actuation channels inoperable in one or both Functions in MODE 6. OR Required Action and associated Completion Time of Condition A or B not met in MODE 6.	D.1 Initiate action to fully insert all insertable control rods in core cells containing one or more fuel assemblies.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.1.3.1	Perform CHANNEL FUNCTIONAL TEST for each RPS ~~m~~Manual ~~actuation channel~~Scram Function channel.	~~24 months~~7 days
SR 3.3.1.3.2	Perform CHANNEL FUNCTIONAL TEST for Reactor Mode Switch - Shutdown Position Function.	24 months

SURVEILLANCE REQUIREMENTS

- NOTE -
Refer to Table 3.3.1.4-1 to determine which SRs apply for each NMS Instrumentation Function.

	SURVEILLANCE	FREQUENCY
SR 3.3.1.4.1	Perform CHANNEL CHECK on each required channel.	~~24~~ 12 hours
SR 3.3.1.4.2	**- NOTE -** Not required to be performed until 12 hours after THERMAL POWER ≥ 25% RTP. Verify absolute difference between the average power range monitor (APRM) channels and calculated power ≤ 2% RTP while operating at ≥ 25% RTP for each required channel.	7 days
SR 3.3.1.4.3	**- NOTE -** ~~For Functions 1.a, 1.b, 1.c, and 2.a not~~Not required to be performed when entering MODE 2 from MODE 1 until 12 hours after entering MODE 2. Perform CHANNEL FUNCTIONAL TEST on each required channel.	~~24 months~~7 days
SR 3.3.1.4.4	Perform CHANNEL FUNCTIONAL TEST on each required channel.	92 days
SR 3.3.1.4.~~4~~5	Calibrate local power range monitors on each required channel.	~~1000~~750 MWD/T average core exposure

SURVEILLANCE		FREQUENCY
SR 3.3.1.4.~~5~~6	---------- **- NOTES -** 1. For Functions 1.a, 1.b, 1.c, and 2.a not required to be performed when entering MODE 2 from MODE 1 until 12 hours after entering MODE 2. 2. Neutron detectors may be excluded. ---------- Perform CHANNEL CALIBRATION on each required channel consistent with Specification 5.5.11, "Setpoint Control Program (SCP)."	24 months
SR 3.3.1.4.~~6~~7	Verify APRM Simulated Thermal Power – High time constant is within limit for each required channel.	24 months
SR 3.3.1.4.~~7~~8	---------- **- NOTE -** Neutron detectors are excluded. ---------- Verify RPS RESPONSE TIME of each required channel is within limits.	24 months on a STAGGERED TEST BASIS
SR 3.3.1.4.~~8~~9	Verify OPRM is not bypassed when THERMAL POWER is ≥ 25% RTP.	24 months

Table 3.3.1.4-1 (page 1 of 2)
Neutron Monitoring System (NMS) Instrumentation

COL 16.0-2-H
3.3.1.4-1

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER REQUIRED DIVISION	CONDITIONS REFERENCED FROM REQUIRED ACTION B.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
1. Startup Range Neutron Monitors (SRNM)					
a. Neutron Flux - High	2	2	D	SR 3.3.1.4.1 ~~SR 3.3.1.4.3~~ SR 3.3.1.4.~~5~~6 SR 3.3.1.4.~~7~~8	≤ [ ]% RTP
	6[a]	2	G	SR 3.3.1.4.1 SR 3.3.1.4.3 SR 3.3.1.4.~~5~~6 SR 3.3.1.4.~~7~~8	≤ [ ]% RTP
b. Neutron Flux - Short Period	2	2	D	SR 3.3.1.4.1 SR 3.3.1.4.3 SR 3.3.1.4.~~5~~6 SR 3.3.1.4.~~7~~8	≥ [ ] second period
c. Inop	2	2	D	SR 3.3.1.4.3	N/A
	6[a]	2	G	SR 3.3.1.4.3	N/A

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

Table 3.3.1.4-1 (page 2 of 2)
Neutron Monitoring System (NMS) Instrumentation

COL 16.0-2-H 3.3.1.4-1

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS PER REQUIRED DIVISION	CONDITIONS REFERENCED FROM REQUIRED ACTION B.1	SURVEILLANCE REQUIREMENTS	ALLOWABLE VALUE
2. Average Power Range Monitors					
a. Fixed Neutron Flux - High, Setdown	2	1	D	SR 3.3.1.4.1 SR 3.3.1.4.3 SR 3.3.1.4.~~4~~5 SR 3.3.1.4.~~5~~6 SR 3.3.1.4.~~7~~8	≤ [ ]% RTP
b. APRM Simulated Thermal Power - High	1	1	C	SR 3.3.1.4.1 SR 3.3.1.4.2 SR 3.3.1.4.~~3~~4 SR 3.3.1.4.~~4~~5 SR 3.3.1.4.~~5~~6 SR 3.3.1.4.~~6~~7 SR 3.3.1.4.~~7~~8	≤ [ ]% RTP
c. Fixed Neutron Flux - High	1	1	C	SR 3.3.1.4.1 SR 3.3.1.4.2 SR 3.3.1.4.~~3~~4 SR 3.3.1.4.~~4~~5 SR 3.3.1.4.~~5~~6 SR 3.3.1.4.~~7~~8	≤ [ ]% RTP
d. Inop	1,2	1	D	SR 3.3.1.4.~~3~~4	N/A
3. Oscillation Power Range Monitor - Upscale	≥ 25% RTP	1	E	SR 3.3.1.4.~~3~~4 SR 3.3.1.4.~~5~~6 SR 3.3.1.4.~~7~~8 SR 3.3.1.4.~~8~~9	~~N/A~~In accordance with the COLR

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. As required by Required Action B.1 and referenced in Table 3.3.1.4-1.	C.1 Initiate alternate method to detect and suppress thermal hydraulic instability oscillations. AND C.2 Restore required channels to OPERABLE status.	12 hours 120 days
D. Required Action and associated Completion Time of Condition C not met.	D.1 Reduce THERMAL POWER to < 25% RTP.	4 hours
E. As required by Required Action B.1and referenced in Table 3.3.1.5-1.	E.1 Be in MODE 3.	12 hours
F. As required by Required Action B.1and referenced in Table 3.3.1.5-1.	F.1 Initiate action to fully insert all insertable control rods in core cells containing one or more fuel assemblies.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
~~SR 3.3.1.5.1 Perform CHANNEL CHECK on each required division.~~	~~24 hours~~
~~SR 3.3.1.5.2 Perform CHANNEL FUNCTIONAL TEST on each required division.~~	~~24 months~~

SURVEILLANCE		FREQUENCY
SR 3.3.1.5.~~3~~1	Perform LOGIC SYSTEM FUNCTIONAL TEST on each required division.	24 months on a STAGGERED TEST BASIS
SR 3.3.1.5.~~4~~2	Verify RPS RESPONSE TIME of each required division is within limits.	24 months on a STAGGERED TEST BASIS

SURVEILLANCE REQUIREMENTS

- NOTE -

Refer to Table 3.3.1.6-1 to determine which SRs apply for each applicable MODE or other specified conditions.

	SURVEILLANCE	FREQUENCY
SR 3.3.1.6.1	Perform CHANNEL CHECK on each required channel.	~~24~~ 12 hours
SR 3.3.1.6.2	**- NOTES -** 1. Only required to be met during CORE ALTERATIONS. 2. One SRNM may be used to satisfy more than one of the following.	
	Verify an OPERABLE SRNM detector is located in: a. The fueled region; b. The core quadrant where CORE ALTERATIONS are being performed when the associated SRNM is included in the fueled region; and c. A core quadrant adjacent to where CORE ALTERATIONS are being performed, when the associated SRNM is included in the fueled region.	12 hours
SR 3.3.1.6.3	Perform CHANNEL CHECK on each required channel.	24 hours

	SURVEILLANCE	FREQUENCY
SR 3.3.1.6.~~34~~	---------- **- NOTE -** Not required to be met with less than or equal to four fuel assemblies adjacent to the SRNM and no other fuel assemblies in the associated core quadrant. ----------	
COL 16.0-2-H 3.3.1.6-1	Verify count rate is ≥ [3.0] cps.	12 hours during CORE ALTERATIONS AND 24 hours
SR 3.3.1.6.~~45~~	Perform CHANNEL FUNCTIONAL TEST on each required channel.	~~24 months~~7 days
SR 3.3.1.6.6	Perform CHANNEL FUNCTIONAL TEST on each required channel.	31 days
SR 3.3.1.6.~~57~~	---------- **- NOTE -** Neutron detectors may be excluded. ----------	
	Perform CHANNEL CALIBRATION on each required channel.	24 months

Table 3.3.1.6-1 (page 1 of 1)
Startup Range Neutron Monitor Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	SURVEILLANCE REQUIREMENTS
1. Startup Range Neutron Monitor	3,4,5	2	SR 3.3.1.6.~~1~~3 SR 3.3.1.6.~~3~~4 SR 3.3.1.6.~~4~~6 SR 3.3.1.6.~~5~~7
	6	2[(a)]	SR 3.3.1.6.1 SR 3.3.1.6.2 SR 3.3.1.6.~~3~~4 SR 3.3.1.6.~~4~~5 SR 3.3.1.6.~~5~~7

(a) Only one SRNM channel is required to be OPERABLE during spiral offload or reload when the fueled region includes only that SRNM detector.

SURVEILLANCE REQUIREMENTS

- NOTES -

1. Refer to Table 3.3.2.1-1 to determine which SRs apply for each Control Rod Block Function.
2. When a required ATLM, RWM, or MRBM channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided the associated Function maintains control rod block capability.

SURVEILLANCE		FREQUENCY
~~SR 3.3.2.1.1~~	~~Perform CHANNEL CHECK on each required channel.~~	~~24 hours~~
SR 3.3.2.1.~~2~~1	**- NOTE -** Not required to be performed until one hour after THERMAL POWER is ≥ 30% RTP. Perform CHANNEL FUNCTIONAL TEST on each required channel.	~~24 months~~92 days
SR 3.3.2.1.~~3~~2	**- NOTE -** Not required to be performed until one hour after any control rod is withdrawn in MODE 2. Perform CHANNEL FUNCTIONAL TEST on each required channel.	~~24 months~~92 days
SR 3.3.2.1.~~4~~3	**- NOTE -** Not required to be performed until one hour after THERMAL POWER is ≤ 10% RTP. Perform CHANNEL FUNCTIONAL TEST on each required channel.	~~24 months~~92 days

SURVEILLANCE		FREQUENCY
SR 3.3.2.1.~~54~~	---------- **- NOTE -** Not required to be performed until one hour after THERMAL POWER is ≥ 30% RTP. ---------- Perform CHANNEL FUNCTIONAL TEST on each required channel.	~~24 months~~92 days
SR 3.3.2.1.~~65~~	Verify required RWM channels are not bypassed when THERMAL POWER is ≤ 10% RTP.	24 months
SR 3.3.2.1.~~76~~	Verify required ATLM channels are not bypassed when THERMAL POWER is ≥ 30% RTP.	24 months
SR 3.3.2.1.~~87~~	Verify required MRBM channels are not bypassed when THERMAL POWER is ≥ 30% RTP.	24 months
SR 3.3.2.1.~~98~~	---------- **- NOTE -** Not required to be performed until one hour after reactor mode switch is in shutdown position. ---------- Perform CHANNEL FUNCTIONAL TEST on each required channel.	24 months
SR 3.3.2.1.~~109~~	Verify the bypassing and movement of control rods required to be bypassed in the Rod Action Control Subsystem (RACS) cabinets by a second licensed operator or other qualified member of the technical staff.	Prior to and during the movement of control rods bypassed in RACS

Table 3.3.2.1-1 (page 1 of 1)
Control Rod Block Instrumentation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	SURVEILLANCE REQUIREMENTS
1. Rod Control and Information System			
a. Automated Thermal Limit Monitor	(a)	2	~~SR 3.3.2.1.1~~ SR 3.3.2.1.~~2~~1 SR 3.3.2.1.~~7~~6
b. Rod Worth Minimizer	1(b),2(b)	2	~~SR 3.3.2.1.1~~ SR 3.3.2.1.~~3~~2 SR 3.3.2.1.~~4~~3 SR 3.3.2.1.~~6~~5 SR 3.3.2.1.~~10~~9
c. Multi-Channel Rod Block Monitor	(a)	2	~~SR 3.3.2.1.1~~ SR 3.3.2.1.~~5~~4 SR 3.3.2.1.~~8~~7
2. Reactor Mode Switch - Shutdown Position	(c)	2	SR 3.3.2.1.~~9~~8

(a) THERMAL POWER ≥ 30% RTP.

(b) THERMAL POWER ≤ 10% RTP.

(c) Reactor mode switch in the shutdown position.

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Drywell fission product monitoring system particulate channel inoperable. AND Drywell air coolers condensate flow monitoring system inoperable.	D.1 Restore drywell fission product monitoring system particulate channel to OPERABLE status. OR D.2 Restore drywell air cooler condensate flow rate monitoring system to OPERABLE status.	30 days 30 days
E. Required Action and associated Completion Time not met. OR All required LEAKAGE detection systems inoperable.	E.1 Be in MODE 3. AND E.2 Be in MODE 5.	12 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.4.1.1	Perform CHANNEL CHECK on required leakage detection instrumentation.	~~24~~ 12 hours
SR 3.3.4.1.2	Perform CHANNEL FUNCTIONAL TEST on required leakage detection instrumentation.	~~24 months~~31 days
SR 3.3.4.1.3	Perform CHANNEL CALIBRATION on required leakage detection instrumentation.	24 months

SURVEILLANCE REQUIREMENTS

- NOTE -

Refer to Table 3.3.5.1-1 to determine which SRs apply for each ECCS Instrumentation Function.

SURVEILLANCE		FREQUENCY
SR 3.3.5.1.1	Perform CHANNEL CHECK on each required channel.	~~24~~ 12 hours
SR 3.3.5.1.2	Perform CHANNEL FUNCTIONAL TEST on each required channel.	~~24 months~~92 days
SR 3.3.5.1.3	Perform CHANNEL CALIBRATION on each required channel consistent with Specification 5.5.11, "Setpoint Control Program (SCP)."	24 months
SR 3.3.5.1.4	Verify ECCS RESPONSE TIME of each required channel is within limits.	24 months on a STAGGERED TEST BASIS

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
~~SR 3.3.5.2.1~~	~~Perform CHANNEL CHECK on each required division.~~	~~24 hours~~
~~SR 3.3.5.2.2~~	~~Perform CHANNEL FUNCTIONAL TEST on each required division.~~	~~24 months~~
SR 3.3.5.2.~~3~~1	Perform LOGIC SYSTEM FUNCTIONAL TEST on each required division.	24 months on a STAGGERED TEST BASIS
SR 3.3.5.2.4<u>2</u>	Verify ECCS RESPONSE TIME of each required division is within limits.	24 months on a STAGGERED TEST BASIS

SURVEILLANCE REQUIREMENTS

- NOTES -

Refer to Table 3.3.5.3-1 to determine which SRs apply for each ICS Function.

	SURVEILLANCE	FREQUENCY
SR 3.3.5.3.1	Perform CHANNEL CHECK on each required channel.	~~24~~ 12 hours
SR 3.3.5.3.2	Perform CHANNEL FUNCTIONAL TEST on each required channel.	~~24 months~~92 days
SR 3.3.5.3.3	Perform CHANNEL CALIBRATION on each required channel consistent with Specification 5.5.11, "Setpoint Control Program (SCP)."	24 months
SR 3.3.5.3.4	Verify ICS RESPONSE TIME of each required channel is within limits.	24 months on a STAGGERED TEST BASIS

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
~~SR 3.3.5.4.1~~	~~Perform CHANNEL CHECK on each required division.~~	~~24 hours~~
~~SR 3.3.5.4.2~~	~~Perform CHANNEL FUNCTIONAL TEST on each required division.~~	~~24 months~~
SR 3.3.5.4.~~3~~1	Perform LOGIC SYSTEM FUNCTIONAL TEST on each required division.	24 months on a STAGGERED TEST BASIS
SR 3.3.5.4.4<u>2</u>	Verify ICS RESPONSE TIME of each required division is within limits.	24 months on a STAGGERED TEST BASIS

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. As required by Required Action B.1 and referenced in Table 3.3.6.1-1.	D.1 Declare associated MSIV(s) and MSL drain isolation valve(s) inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

- NOTE -
Refer to Table 3.3.6.1-1 to determine which SRs shall be performed for each isolation Function.

SURVEILLANCE		FREQUENCY
SR 3.3.6.1.1	Perform CHANNEL CHECK on each required channel.	~~24~~ 12 hours
SR 3.3.6.1.2	Perform CHANNEL FUNCTIONAL TEST on each required channel.	~~24 months~~92 days
SR 3.3.6.1.3	Perform CHANNEL CALIBRATION on each required channel consistent with Specification 5.5.11, "Setpoint Control Program (SCP)."	24 months
SR 3.3.6.1.4	Verify ISOLATION SYSTEM RESPONSE TIME for each required channel is within limits.	24 months on a STAGGERED TEST BASIS

3.3 INSTRUMENTATION

3.3.6.2 Main Steam Isolation Valve (MSIV) Actuation

LCO 3.3.6.2 Three MSIV actuation divisions associated with the DC and Uninterruptible AC Electrical Power Distribution Divisions required by LCO 3.8.6, "Distribution Systems - Operating," shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

- NOTE -
Separate Condition entry is allowed for each MSIV actuation division.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One required MSIV actuation division inoperable.	A.1 Verify required MSIV actuation division in trip.	12 hours
B. Required Action and associated Completion Time of Condition A not met. OR MSIV actuation capability not maintained.	B.1 Declare affected actuation device(s) inoperable.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
~~SR 3.3.6.2.1 Perform CHANNEL CHECK on each required division.~~	~~24 hours~~

SURVEILLANCE		FREQUENCY
~~SR 3.3.6.2.2~~	~~Perform CHANNEL FUNCTIONAL TEST on each required division.~~	~~24 months~~
SR 3.3.6.2.~~3~~1	Perform LOGIC SYSTEM FUNCTIONAL TEST on each required division.	24 months on a STAGGERED TEST BASIS
SR 3.3.6.2.4<u>2</u>	Verify ISOLATION SYSTEM RESPONSE TIME for each required division is within limits.	24 months on a STAGGERED TEST BASIS

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. As required by Required Action B.1 and referenced in Table 3.3.6.3-1.	C.1 Declare associated containment isolation valves inoperable.	Immediately
D. As required by Required Action B.1 and referenced in Table 3.3.6.3-1.	D.1 Be in MODE 3. AND D.2 Be in MODE 5.	12 hours 36 hours
E. As required by Required Action B.1 and referenced in Table 3.3.6.3-1.	E.1 Initiate action to restore required channel to OPERABLE status. OR E.2 Initiate action to isolate RWCU/SDC.	Immediately Immediately

SURVEILLANCE REQUIREMENTS

- NOTE -

Refer to Table 3.3.6.3-1 to determine which SRs shall be performed for each isolation Function.

SURVEILLANCE		FREQUENCY
SR 3.3.6.3.1	Perform CHANNEL CHECK on each required channel.	~~24~~ 12 hours
SR 3.3.6.3.2	Perform CHANNEL FUNCTIONAL TEST on each required channel.	~~24 months~~92 days

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. As required by Required Action B.1 and referenced in Table 3.3.6.4-1.	C.1 Declare affected actuation device(s) inoperable.	Immediately
D. As required by Required Action B.1 and referenced in Table 3.3.6.4-1.	D.1 Be in MODE 3. AND D.2 Be in MODE 5.	12 hours 36 hours
E. As required by Required Action B.1 and referenced in Table 3.3.6.4-1.	E.1 Initiate action to restore required division to OPERABLE status. OR E.2 Initiate action to isolate RWCU/SDC.	Immediately Immediately

SURVEILLANCE REQUIREMENTS

- NOTE -

Refer to Table 3.3.6.4-1 to determine which SRs shall be performed for each isolation Function.

SURVEILLANCE	FREQUENCY
~~SR 3.3.6.4.1 Perform CHANNEL CHECK on each required division.~~	~~24 hours~~
~~SR 3.3.6.4.2 Perform CHANNEL FUNCTIONAL TEST on each required division.~~	~~24 months~~

SURVEILLANCE		FREQUENCY
SR 3.3.6.4.~~3~~1	Perform LOGIC SYSTEM FUNCTIONAL TEST on each required division.	24 months on a STAGGERED TEST BASIS
SR 3.3.6.4.42	Verify ISOLATION SYSTEM RESPONSE TIME of each required division is within limits.	24 months on a STAGGERED TEST BASIS
SR 3.3.6.4.~~5~~3	Perform a system functional test.	24 months

Table 3.3.6.4-1 (page 1 of 2)
Isolation Actuation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	CONDITIONS REFERENCED FROM REQUIRED ACTION B.1	SURVEILLANCE REQUIREMENTS
1. Reactor Water Cleanup/Shutdown Cooling System Isolation	1,2,3,4	C	SR 3.3.6.4.1 SR 3.3.6.4.2 ~~SR 3.3.6.4.3~~ ~~SR 3.3.6.4.4~~
	5,6	E	SR 3.3.6.4.1 SR 3.3.6.4.2 SR 3.3.6.4.3 ~~SR 3.3.6.4.4~~ ~~SR 3.3.6.4.5~~
2. Isolation Condenser System Isolation	1,2,3,4	C	SR 3.3.6.4.1 SR 3.3.6.4.2 ~~SR 3.3.6.4.3~~ ~~SR 3.3.6.4.4~~
3. Process Radiation Monitoring System Isolation	1,2,3,4	C	SR 3.3.6.4.1 SR 3.3.6.4.2 ~~SR 3.3.6.4.3~~ ~~SR 3.3.6.4.4~~
4. Equipment and Floor Drain System Isolation	1,2,3,4	C	SR 3.3.6.4.1 SR 3.3.6.4.2 ~~SR 3.3.6.4.3~~ ~~SR 3.3.6.4.4~~
5. Containment Inerting System Isolation	1,2,3,4	C	SR 3.3.6.4.1 SR 3.3.6.4.2 ~~SR 3.3.6.4.3~~ ~~SR 3.3.6.4.4~~
6. Chilled Water System Isolation	1,2,3,4	C	SR 3.3.6.4.1 SR 3.3.6.4.2 ~~SR 3.3.6.4.3~~ ~~SR 3.3.6.4.4~~

Table 3.3.6.4-1 (page 2 of 2)
Isolation Actuation

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	CONDITIONS REFERENCED FROM REQUIRED ACTION B.1	SURVEILLANCE REQUIREMENTS
7. Fuel and Auxiliary Pools Cooling System Process Isolation	1,2,3,4	C	SR 3.3.6.4.1 SR 3.3.6.4.2 ~~SR 3.3.6.4.3~~ ~~SR 3.3.6.4.4~~
8. Reactor Building Heating, Ventilation and Air Conditioning System Isolation	1,2,3,4	C	SR 3.3.6.4.1 SR 3.3.6.4.2 ~~SR 3.3.6.4.3~~ ~~SR 3.3.6.4.4~~
9. High Pressure Nitrogen Gas Supply System Isolation	1,2,3,4	C	SR 3.3.6.4.1 SR 3.3.6.4.2 ~~SR 3.3.6.4.3~~ ~~SR 3.3.6.4.4~~
10. Feedwater Isolation Valves Isolation	1,2,3,4	D	SR 3.3.6.4.1 SR 3.3.6.4.2 SR 3.3.6.4.3 ~~SR 3.3.6.4.4~~ ~~SR 3.3.6.4.5~~

SURVEILLANCE REQUIREMENTS

- NOTE -

Refer to Table 3.3.7.1-1 to determine which SRs apply for each CRHAVS Instrumentation Function.

	SURVEILLANCE	FREQUENCY
SR 3.3.7.1.1	Perform CHANNEL CHECK on each required channel.	~~24~~ 12 hours
SR 3.3.7.1.2	Perform CHANNEL FUNCTIONAL TEST on each required channel.	~~24 months~~92 days
SR 3.3.7.1.3	Perform CHANNEL CALIBRATION on each required channel consistent with Specification 5.5.11, "Setpoint Control Program (SCP)."	24 months
SR 3.3.7.1.4	**- NOTE -** Radiation detectors may be excluded. Verify CRHAVS RESPONSE TIME of each required channel is within limits.	24 months on a STAGGERED TEST BASIS

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
~~SR 3.3.7.2.1~~	~~Perform CHANNEL CHECK on each required division.~~	~~24 hours~~
~~SR 3.3.7.2.2~~	~~Perform CHANNEL FUNCTIONAL TEST on each required division.~~	~~24 months~~
SR 3.3.7.2.~~3~~1	Perform LOGIC SYSTEM FUNCTIONAL TEST on each required division.	24 months on a STAGGERED TEST BASIS
SR 3.3.7.2.4<u>2</u>	Verify CRHAVS RESPONSE TIME of each required division is within limits.	24 months on a STAGGERED TEST BASIS

3.3 INSTRUMENTATION

3.3.8.1 Diverse Protection System (DPS)

LCO 3.3.8.1 The DPS Functions in Table 3.3.8.1-1 shall be OPERABLE.

APPLICABILITY MODES 1, 2, 3, and 4

ACTIONS

- NOTE -
Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required DPS Functions inoperable.	A.1 Restore required DPS Function to OPERABLE status.	30 days
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	12 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.8.1.1	Perform CHANNEL CHECK	~~24~~ 12 hours
SR 3.3.8.1.2	Perform CHANNEL FUNCTIONAL TEST.	~~24 months~~92 days
SR 3.3.8.1.3	Perform CHANNEL CALIBRATION.	24 months

BASES

ACTIONS (continued)

B.1

Required Action B.1 directs entry into the appropriate Condition referenced in Table 3.3.1.1-1 if the Required Action and Completion Time of Condition A is not met or if multiple, inoperable, untripped required channels (i.e., two or more required channels for most Functions) for the same Function result in the Function not maintaining RPS trip capability. A Function is considered to be maintaining RPS trip capability when sufficient channels are OPERABLE or in trip such that the RPS logic will generate a trip signal from the given Function on a valid signal.

The applicable Condition specified in the Table is Function and MODE or other specified condition dependent and may change as the Required Action of a previous Condition is completed.

C.1, D.1, E.1, F.1, and G.1

If the required RPS instrumentation channel(s) is not restored to OPERABLE status, or the affected instrumentation division is not in trip within the allowed Completion Time, or if RPS trip capability is not maintained, the plant must be placed in a MODE or other specified condition in which the LCO does not apply. The Completion Times are reasonable, based on operating experience, to reach the specified condition from full power conditions in an orderly manner and without challenging plant systems. In addition, the Completion Time of Required Actions C.1 and D.1 are consistent with the Completion Time provided in LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)."

SURVEILLANCE REQUIREMENTS

As noted at the beginning of the SRs, the SRs for each RPS instrumentation Function are located in the SRs column of Table 3.3.1.1-1.

SR 3.3.1.1.1

Performance of the CHANNEL CHECK once every ~~24~~ 12 hours ensures that a gross failure of instrumentation has not occurred. ~~This test overlaps the testing required by SR 3.3.1.2.1 to ensure a complete CHANNEL CHECK of required instrument channels and required actuation divisions from the sensor input to the logic contact output.~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

The RPS is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).

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 plant 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 instrument has drifted outside its limit.

The Frequency is based upon operating experience that demonstrates channel failure is rare and the self-diagnostic features that monitor the channels for proper operation. The CHANNEL CHECKs every ~~24~~ 12 hours supplement less formal, but more frequent, checks of channels during normal operational use of the displays associated with the channels required by the LCO.

SR 3.3.1.1.2

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the entire channel will perform the intended function. This test ~~overlaps the testing required by SR 3.3.1.2.2 to~~ ensures a complete CHANNEL FUNCTIONAL TEST of required instrument channels ~~and required actuation divisions~~ from the sensor input ~~to~~ through the ~~logic contact output~~DTM function.

The RPS is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).

The Frequency of ~~24 months~~92 days is based on the reliability of the channels and the self-diagnostic features that monitor the channels for proper operation.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.1.3

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the required channel responds to the measured parameter within the necessary range and accuracy.

CHANNEL CALIBRATION leaves the required channel adjusted to the $NTSP_F$ within the "as-left" tolerance to account for instrument drifts between successive calibrations consistent with the methods and assumptions required by the SCP.

The Frequency is based upon the assumption of a 24-month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.1.1.4

This SR ensures that the individual required channel response times are less than or equal to the maximum values assumed in the accident analysis. The RPS RESPONSE TIME acceptance criteria are included in Reference 14.

RPS RESPONSE TIME may be verified by actual response time measurements in any series of sequential, overlapping, or total channel measurements. This test encompasses the sensor channels up through the DTMs and overlaps the testing required by SR 3.3.1.2.42 to ensure complete testing of instrument channels and actuation circuitry.

COL 16.0-1-A
3.3.1.1-2

[However, some sensors for Functions are allowed to be excluded from specific RPS RESPONSE TIME measurement if the conditions of Reference XX are satisfied. If these conditions are satisfied, sensor response time may be allocated based on either assumed design sensor response time or the manufacturer's stated design response time. When the requirements of Reference XX are not satisfied, sensor response time must be measured. Furthermore, measurement of the instrument loops response times is not required if the conditions of Reference XX are satisfied.]

RPS RESPONSE TIME tests are conducted on a 24 month STAGGERED TEST BASIS for three channels. The Frequency of 24 months on a STAGGERED TEST BASIS ensures that the required

BASES

ACTIONS (continued)

are fully inserted. Control rods in core cells containing no fuel assemblies do not affect the reactivity of the core and, therefore, do not have to be inserted.

SURVEILLANCE REQUIREMENTS

SR 3.3.1.2.1

~~Performance of the CHANNEL CHECK once every 24 hours ensures that a gross failure of a required actuation division has not occurred. This test overlaps the testing required by SR 3.3.1.1.1 to ensure a complete CHANNEL CHECK of required instrument channels and required actuation divisions from the sensor input to the logic contact output.~~

~~The RPS is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).~~

~~A CHANNEL CHECK will detect gross actuation division failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.~~

~~The Frequency is based upon operating experience that demonstrates actuation division failure is rare and the self-diagnostic features that monitor the divisions for proper operation. The CHANNEL CHECKs every 24 hours supplement less formal, but more frequent, checks of divisions during normal operational use of the displays associated with the actuation divisions required by the LCO.~~

~~SR 3.3.1.2.2~~

~~A CHANNEL FUNCTIONAL TEST is performed on each required division to ensure that the entire division will perform the intended function. This test overlaps the testing required by SR 3.3.1.1.2 to ensure a complete CHANNEL FUNCTIONAL TEST of required instrument channels and required actuation divisions from the sensor input to the logic contact output.~~

~~The Frequency of 24 months is based on the reliability of the divisions and the self-diagnostic features that monitor the divisions for proper operation.~~

~~SR 3.3.1.2.3~~

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the RPS Actuation divisions, including the two-out-of-four function of the Trip Logic Unit (TLU), Output Logic Unit (OLU), and Load Drivers (LDs) for a specific division.

LOGIC SYSTEM FUNCTIONAL tests are conducted on a 24 month STAGGERED TEST BASIS for three divisions. The Frequency of 24 months on a STAGGERED TEST BASIS ensures that the channels associated with each required division are alternately tested. The functional testing of control rods, in LCO 3.1.3, overlaps this Surveillance to provide complete testing of the assumed safety function.

The 24-month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency.

SR 3.3.1.2.42

This SR ensures that the individual required division response times are less than or equal to the maximum values assumed in the accident analysis. The RPS RESPONSE TIME acceptance criteria are included in Reference 2.

COL 16.0-1-A
3.3.1.2-1

[However, some portions of the RPS actuation circuitry are allowed to be excluded from specific RPS RESPONSE TIME measurement if the conditions of Reference XX are satisfied. Furthermore, measurement of the instrument loops response times is not required if the conditions of Reference XX are satisfied.]

RPS RESPONSE TIME may be verified by actual response time measurements in any series of sequential, overlapping, or total channel measurements. This test encompasses the RPS actuation circuitry that

SURVEILLANCE REQUIREMENTS (continued)

consists of the Divisions of Trip Logic, and the Divisions of Trip Actuators and overlaps the testing required by SR 3.3.1.1.4 to ensure complete testing of instrument channels and actuation circuitry.

RPS RESPONSE TIME tests are conducted on a 24 month STAGGERED TEST BASIS for three divisions. The Frequency of

BASES

ACTIONS (continued)

D.1

With both manual actuation channels inoperable in one or both Functions in MODE 6 or if any Required Action and associated Completion Time of Condition A or B is not met in MODE 6, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must immediately initiate action to fully insert all insertable control rods in core cells containing one or more fuel assemblies. Action must continue until all such control rods are fully inserted. Control rods in core cells containing no fuel assemblies do not affect the reactivity of the core and, therefore, do not have to be inserted.

SURVEILLANCE REQUIREMENTS

SR 3.3.1.3.1

A CHANNEL FUNCTIONAL TEST is performed on each ~~manual~~ RPS Manual ~~actuation~~ Scram ~~channel~~ Function channel to ensure that each channel will perform the intended Function. The Frequency of ~~24 months~~7 days is based on the reliability of the RPS actuation logic and controls.

SR 3.3.1.3.2

A CHANNEL FUNCTIONAL TEST is performed on the Reactor Mode Switch - Shutdown Position Function to ensure that the Reactor Mode Switch will perform the intended Function. The Frequency of 24 months is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency.

REFERENCES None

BASES

SURVEILLANCE REQUIREMENTS

As noted at the beginning of the Surveillance Requirements, the SRs for each NMS instrumentation Function are located in the SRs column of Table 3.3.4.1-1.

SR 3.3.1.4.1

Performance of the CHANNEL CHECK once every ~~24~~ 12 hours ensures that a gross failure of instrumentation has not occurred. ~~This test overlaps the testing required by SR 3.3.1.5.1 to ensure a complete CHANNEL CHECK of required instrument channels and required actuation divisions from the sensor input to the logic contact output.~~

The NMS is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I//O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).

A CHANNEL CHECK will detect gross channel failure; thus, it is the key to verifying that the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

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

The Surveillance Frequency is based upon operating experience that demonstrates channel failure is rare and the self-diagnostic features that monitor the channels for proper operation. The CHANNEL CHECKS every ~~24~~ 12 hours supplement less formal, but more frequent checks of channels during normal operational use of the displays associated with the channels required by the LCO.

SR 3.3.1.4.2

To ensure the APRMs are accurately indicating the true core average power, the APRMs are calibrated to the reactor power calculated from a heat balance. The Frequency of once per 7 days is based on minor changes in LPRM sensitivity, which could affect the APRM reading between performances of SR 3.3.1.4.4 (LPRM calibrations).

BASES

SURVEILLANCE REQUIREMENTS (continued)

A Note is provided which only requires performance of the SR to be met at ≥ 25% RTP because it is difficult to accurately determine core THERMAL POWER from a heat balance when < 25% RTP. At low power levels, a high degree of accuracy is unnecessary because of the large, inherent margin to thermal limits (MCPR). At ≥ 25% RTP, the surveillance is required to have been satisfactorily performed within the last 7 days in accordance with SR 3.0.2. A Note is provided which allows an increase in THERMAL POWER above 25% if the 7-day Frequency is not met per SR 3.0.2. In this event, the SR must be performed within 12 hours after reaching or exceeding 25% RTP. The 12 hours is based on operating experience and in consideration of providing a reasonable time in which to complete the SR.

SR 3.3.1.4.3

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the entire channel will perform the intended function when required. This test ~~overlaps the testing required by SR 3.3.1.5.2 to~~ ensures a complete CHANNEL FUNCTIONAL TEST of required instrument channels ~~and required actuation divisions~~ from the sensor input ~~to~~ through the ~~logic contact output~~NMS DTM function.

The NMS is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I//O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).

As noted, for Functions 1.a, 1.b, 1.c, and 2.a, SR 3.3.1.4.3 is not required to be performed when entering MODE 2 from MODE 1 because testing of the MODE 2 required SRNM and APRM Functions cannot be performed in MODE 1. This allows entry into MODE 2 if the 24-month Frequency is not met per SR 3.0.2. In this event, the SR must be performed within 12 hours after entering MODE 2 from MODE 1. Twelve hours is based on operating experience and in consideration of providing a reasonable time in which to complete the SR.

A Surveillance Frequency of ~~24 months~~7 days provides an acceptable level of system average unavailability over the Surveillance Frequency interval and the self-diagnostic features that monitor the channels for proper operation.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.4.4

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the entire channel will perform the intended function. This test ensures a complete CHANNEL FUNCTIONAL TEST of required instrument channels from the sensor input through the NMS DTM function.

The NMS is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I//O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).

The Frequency of 92 days is based on the reliability of the reliability of the channels and the self-diagnostic features that monitor the channels for proper operation.

SR 3.3.1.4.45

LPRM gain settings are determined from the local flux profiles measured by the automated fixed incore probe (AFIP) subsystem of NMS. This establishes the relative local flux profile for appropriate representative input to the APRM system. The ~~1000~~750 MWD/T Surveillance Frequency is based on operating experience with LPRM sensitivity changes.

SR 3.3.1.4.~~5~~6

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies that the required channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the required channel adjusted to the $NTSP_F$ within the "as-left" tolerance to account for instrument drifts between successive calibrations consistent with the methods and assumptions required by the SCP.

SR 3.3.1.4.5 is modified by two Notes. Note 1 states, for Functions 1.a, 1.b, 1.c, and 2.a, SR 3.3.1.4.5 is not required to be performed when entering MODE 2 from MODE 1 because testing of the MODE 2 required SRNM and APRM Functions cannot be performed in MODE 1. This allows entry into MODE 2 if the Frequency is not met per SR 3.0.2. In this event, the SR must be performed within 12 hours after entering

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SURVEILLANCE REQUIREMENTS (continued)

MODE 2 from MODE 1. Twelve hours is based on operating experience and in consideration of providing a reasonable time in which to complete the SR. Note 2 states that neutron detectors are excluded from CHANNEL CALIBRATION because of the difficulty of simulating a meaningful signal. Changes in neutron detector sensitivity are compensated for by performing the calorimetric calibration (SR 3.3.1.4.2) and the LPRM calibration (SR 3.3.1.4.4). The Surveillance Frequency of SR 3.3.1.4.5 is based upon the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.1.4.~~6~~7

The APRM Simulated THERMAL POWER - High Function uses time constant to generate a signal proportional to the core THERMAL POWER from the APRM neutron flux signal. This time constant is representative of the fuel heat transfer dynamics that produce the relationship between the neutron flux and the core THERMAL POWER. The time constant must be verified to ensure that the channel is accurately reflecting the desired parameter.

The 24 month Frequency is based on engineering judgment considering the reliability of the components.

SR 3.3.1.4.~~7~~8

This SR ensures that the individual required channel response times are less than or equal to the maximum values assumed in the accident analysis. The RPS RESPONSE TIME acceptance criteria are included in Reference 7. RPS RESPONSE TIME may be verified by actual response time measurements in any series of sequential, overlapping, or total channel measurements. This test encompasses the SRNM channels from the sensors to the NMS Digital Trip Modules and up to each of the SRNM Trip Logic Units and the APRM and OPRM channels from the sensors (LPRMs) to the NMS Digital Trip Modules and up to each of the NMS Trip Logic Units, which house the APRM/OPRM logic. This test overlaps the testing required by SR 3.3.1.5.2 to ensure complete testing of instrument channels and actuation circuitry.

COL 16.0-1-A
3.3.1.4-2

[However, some sensors are allowed to be excluded from specific RPS RESPONSE TIME measurement if the conditions of Reference XX are satisfied. If these conditions are satisfied, sensor response time may be

SURVEILLANCE REQUIREMENTS (continued)

allocated based on either assumed design sensor response time or the manufacturer's stated design response time. When the requirements of Reference XX are not satisfied, sensor response time must be measured.

Furthermore, measurement of the instrument loops response times for some sensors is not required if the conditions of Reference XX are satisfied.]

As noted, neutron detectors are excluded from RPS RESPONSE TIME testing because the principles of detector operation virtually ensure an instantaneous response time.

RPS RESPONSE TIME tests are conducted on a 24 month STAGGERED TEST BASIS for three channels. The Frequency of 24 months on a STAGGERED TEST BASIS ensures that the channels associated with each required division are alternately tested. The 24 month test Frequency is consistent with the typical refueling cycle and with operating experience that shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent.

SR 3.3.1.4.~~89~~

This surveillance involves confirming the OPRM - Upscale trip auto-enable setpoints. This surveillance ensures that the OPRM - Upscale trip is enabled (not bypassed) when THERMAL POWER is ≥ 25% RTP.

If any auto-enable setpoint is nonconservative (i.e., the OPRM - Upscale trip is bypassed when THERMAL POWER is ≥ 25% RTP), then the affected channel is considered inoperable for the OPRM - Upscale Function. Alternatively, the OPRM - Upscale trip auto-enable setpoint(s) may be adjusted to place the channel in a conservative condition (not bypassed). If the OPRM - Upscale trip is placed in the not-bypassed condition, this SR is met and the channel is considered OPERABLE.

The Frequency of 24 months is based on engineering judgment and reliability of the components.

REFERENCES

1. Chapter 7, Figure 7.2-1.

2. Chapter 15.

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ACTIONS (continued)

E.1 and F.1

If the affected actuation division is not restored to OPERABLE status, or is not in trip, within the allowed Completion Time, or if NMS actuation capability is not maintained, the plant must be placed in a MODE or other specified condition in which the LCO does not apply. The Completion Times are reasonable, based on operating experience, to reach the specified condition from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.3.1.5.1

~~Performance of the CHANNEL CHECK once every 24 hours ensures that a gross failure of a required actuation division has not occurred. This test overlaps the testing required by SR 3.3.1.4.1 to ensure complete testing of required instrument channels and actuation divisions from the sensor input to the logic contact output.~~

~~The NMS is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).~~

~~A CHANNEL CHECK will detect gross actuation division failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.~~

~~The Frequency is based upon operating experience that demonstrates actuation division failure is rare and the self-diagnostic features that monitor the divisions for proper operation.~~

~~The CHANNEL CHECKs every 24 hours supplement less formal, but more frequent, checks of divisions during normal operational use of the displays associated with the actuation divisions required by the LCO.~~

~~SR 3.3.1.5.2~~

~~A CHANNEL FUNCTIONAL TEST is performed on each required division to ensure that the entire division will perform the intended function. This test overlaps the testing required by SR 3.3.1.4.3 to ensure a complete~~

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~~SURVEILLANCE REQUIREMENTS (continued)~~

~~CHANNEL FUNCTIONAL TEST of required instrument channels and required actuation divisions from the sensor input to the logic contact output.~~

~~The Frequency of 24 months is based on the reliability of the divisions and the self-diagnostic features that monitor the divisions for proper operation.~~

~~SR 3.3.1.5.3~~

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the NMS automatic actuation divisions.

LOGIC SYSTEM FUNCTIONAL tests are conducted on a 24 month STAGGERED TEST BASIS for three divisions. The testing in LCO 3.3.1.1, 3.3.1.2, LCO 3.3.1.4, and the functional testing of control rods, in LCO 3.1.3, overlaps this Surveillance to provide complete testing of the assumed safety function.

The 24-month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency.

SR 3.3.1.5.42

This SR ensures that the individual required division response times are less than or equal to the maximum values assumed in the accident analysis. The RPS RESPONSE TIME acceptance criteria are included in Reference 2.

COL 16.0-1-A
3.3.1.5-2

[However, some portions of the NMS actuation circuitry are allowed to be excluded from specific RPS RESPONSE TIME measurement if the conditions of Reference XX are satisfied. Furthermore, measurement of the instrument loops response times is not required if the conditions of Reference XX are satisfied.]

SURVEILLANCE REQUIREMENTS (continued)

RPS RESPONSE TIME may be verified by actual response time measurements in any series of sequential, overlapping, or total channel

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measurements. This test encompasses the NMS automatic actuation divisions that include the SRNM Trip Logic Units, the APRM Trip Logic Units, which house the OPRM logic, and the associated output to RPS. This test overlaps the testing required by SR 3.3.1.4.~~7~~8 to ensure complete testing of instrument channels and actuation circuitry.

RPS RESPONSE TIME tests are conducted on a 24 month STAGGERED TEST BASIS for three divisions. The Frequency of 24 months on a STAGGERED TEST BASIS ensures that each required division is alternately tested. The 24-month test Frequency is consistent with the refueling cycle and with operating experience that shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent.

REFERENCES

1. Chapter 15.

2. Section 15.2.

BASES

ACTIONS

A.1 and A.2

With one or more required SRNM channels inoperable in MODE 3, 4, or 5, the neutron flux monitoring capability is degraded or it may not exist. The requirement to fully insert all insertable control rods ensures that the reactor will be at its minimum reactivity level while no neutron monitoring capability is available. Placing the reactor mode switch in the shutdown position prevents subsequent control rod withdrawal by maintaining a control rod block. The allowed Completion Time of 1 hour is sufficient to accomplish the Required Action and is acceptable based on engineering judgment considering the low probability of an event requiring the SRNM occurring during this interval.

B.1 and B.2

With one or more required SRNMs inoperable in MODE 6, the capability to detect local reactivity changes in the core during refueling is degraded. CORE ALTERATIONS must be immediately suspended, and action must be immediately initiated to insert all insertable control rods in core cells containing one or more fuel assemblies. Suspending CORE ALTERATIONS prevents the two most probable causes of reactivity changes, fuel loading and control-rod withdrawal, from occurring. Inserting all insertable control rods ensures that the reactor will be at its minimum reactivity, given that fuel is present in the core. Suspension of CORE ALTERATIONS shall not preclude completion of the movement of a component to a safe, conservative position.

Actions (once required to be initiated) to insert control rods must continue until all insertable rods in core cells containing one or more fuel assemblies are inserted and the required SRNMs are restored to OPERABLE status.

SURVEILLANCE REQUIREMENTS

The SRs for each SRNM Applicable MODE or other specified condition are found in the SRs column of Table 3.3.1.6-1.

SR 3.3.1.6.1 and SR 3.3.1.6.3

Performance of the CHANNEL CHECK ensures that a gross failure of instrumentation has not occurred.

The NMS is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks,

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SURVEILLANCE REQUIREMENTS (continued)

communication bus interface checks, and checks on the application program (checksum).

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 plant staff, based on a combination of the channel instrument uncertainties, including indication and readability. If a channel is outside the match criteria, it may be an indication that the instrument has drifted outside its limit.

The Frequency of once every ~~24~~ 12 hours for SR 3.3.1.6.1 is based on operating experience that demonstrates channel failure is rare and the self-diagnostic features that monitor the channels for proper operation. While in MODES 3, 4, and 5, reactivity changes are not expected; therefore, the 12-hour Frequency is relaxed to 24 hours for SR 3.3.1.6.3. The CHANNEL CHECK supplements less formal, but more frequent checks of channels during normal operational use of the displays associated with the channels required by the LCO.

SR 3.3.1.6.2

To provide adequate coverage of potential reactivity changes in the core, one SRNM is required to be OPERABLE in the quadrant where CORE ALTERATIONS are being performed and the other OPERABLE SRNM must be in an adjacent quadrant. Note 1 states that this SR is required to be met only during CORE ALTERATIONS. It is not required to be met at other times in MODE 6 since core reactivity changes are not occurring. This Surveillance consists of a review of plant logs to ensure that SRNMs required OPERABLE for given CORE ALTERATIONS are in fact OPERABLE. In the event that only one SRNM is required to be OPERABLE per Table 3.3.1.6-1, footnote (a), only the part 'a' portion of this SR is required. Note 2 clarifies that the three requirements can be met by the same or different OPERABLE SRNMs. The 12-hour Surveillance Frequency is based upon operating experience and supplements operational controls over refueling activities, which include steps to ensure the SRNMs required by the LCO are in the proper quadrant.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.6.~~34~~

This Surveillance consists of a verification of the plant SRNM instrument readout to ensure that the SRNM reading is greater than a specified minimum count rate. This ensures that the detectors are indicating count rates indicative of neutron flux levels within the core. With few fuel assemblies loaded, the SRNMs will not have a high enough count rate to satisfy the Surveillance Requirement. Therefore allowances are made for loading sufficient "source" material, in the form of irradiated fuel assemblies, to establish the minimum count rate.

To accomplish this, the SR is modified by a Note which states that the count rate is not required to be met on an SRNM that has less than or equal to four fuel assemblies adjacent to the SRNM and no other fuel assemblies are in the associated core quadrant. With four or less fuel assemblies loaded around each SRNM and no other fuel assemblies in the associated quadrant, even with a control rod withdrawn, the configuration will not be critical.

The Frequency is based upon channel redundancy and other information available in the control room and ensures the required channels are frequently monitored while core reactivity changes are occurring. When no reactivity changes are in progress, the Frequency is relaxed from 12 hours to 24 hours.

SR 3.3.1.6.~~4~~5 and SR 3.3.1.6.6

Performance of a CHANNEL FUNCTIONAL TEST demonstrates that the associated channel will function properly.

The NMS is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).

SR 3.3.1.6.5 is required in MODE 6. The 7-day Frequency ensures that the channels are OPERABLE while core reactivity changes could be in progress. The ~~24-month~~7-day Frequency is based on operating experience and on other Surveillances (such as CHANNEL CHECK) that ensure proper functioning between CHANNEL FUNCTIONAL TESTS,

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and on the self-diagnostic features that monitor the channels for proper operation.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.1.6.6 is required in MODES 3, 4, and 5. The Frequency for CFT has been extended from 7 days to 31 days because core reactivity changes do not normally take place in MODES 3, 4, and 5. The 31-day Frequency is based on operating experience and on other Surveillances (such as CHANNEL CHECK) that ensure proper functioning between CHANNEL FUNCTIONAL TESTS, and on the self-diagnostic features that monitor the channels for proper operation.

SR 3.3.1.6.~~5~~7

Performance of a CHANNEL CALIBRATION verifies the performance of the SRNM detectors and associated circuitry. The 24-month Frequency considers the unit conditions required to perform the test, the ease of performing the test, the likelihood of a change in the system or component status. The neutron detectors may be excluded from the CHANNEL CALIBRATION because they cannot readily be adjusted. The detectors are regenerative fission chambers that are designed to have a relatively constant sensitivity over the range, and with an accuracy specified for a fixed useful life.

REFERENCES None.

BASES

SURVEILLANCE REQUIREMENTS (continued)

Condition entered and Required Actions taken. The allowance of this Note is based on the reliability of the channels and the average time required to perform the channel Surveillance, and the low probability of an event occurring coincident with a failure in the remaining OPERABLE channels.

SR 3.3.2.1.1

~~Performance of the CHANNEL CHECK once every 24 hours ensures that a gross failure of instrumentation has not occurred. The associated controllers, displays, monitoring and input/output (I/O) communication interfaces continuously function during normal power operation. Abnormal operation of these components is detected and alarmed. In addition, the associated controllers are equipped with on-line diagnostic capabilities for cyclically monitoring the functionality of I/O signals, buses, power supplies, processors, and inter-processor communications.~~

~~A CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.~~

~~The Frequency is based upon operating experience that demonstrates channel failure is rare and the online diagnostics that monitor the channels for proper operation. The CHANNEL CHECKs every 24 hours supplement less formal, but more frequent, checks of channels during normal operational use of the displays associated with the channels required by the LCO.~~

~~SR 3.3.2.1.2~~

A CHANNEL FUNCTIONAL TEST is performed for each required ATLM channel to ensure that the entire channel will perform the intended function. It includes the RC&IS inputs. The associated controllers, displays, monitoring and input/output (I/O) communication interfaces continuously function during normal power operation. Abnormal operation of these components is detected and alarmed. In addition, the associated controllers are equipped with on-line diagnostic capabilities for cyclically monitoring the functionality of I/O signals, buses, power supplies, processors, and inter-processor communications.

The Frequency of ~~24 months~~92 days is based on the reliability of the channels and the online-diagnostic features that monitor the channels for proper operation.

As noted in the SR, SR 3.3.2.1.2 is not required to be performed until 1 hour after THERMAL POWER is ≥ 30% RTP. This allows THERMAL POWER to be increased to ≥ 30% RTP to perform the required Surveillance if the ~~24-month~~92-day Frequency is not met per SR 3.0.2. The 1-hour allowance is based on operating experience and in consideration of providing a reasonable time in which to complete the SRs.

SR 3.3.2.1.~~3~~2 and SR 3.3.2.1.43

A CHANNEL FUNCTIONAL TEST is performed for each required RWM channel to ensure that the entire system will perform the intended function. The CHANNEL FUNCTIONAL TEST for the RWM is performed by attempting to withdraw a control rod not in compliance with the prescribed sequence and verifying a control rod block occurs. The associated controllers, displays, monitoring and input/output (I/O) communication interfaces continuously function during normal power operation. Abnormal operation of these components is detected and alarmed. In addition, the associated controllers are equipped with on-line diagnostic capabilities for cyclically monitoring the functionality of I/O signals, buses, power supplies, processors, and inter-processor communications.

SURVEILLANCE REQUIREMENTS (continued)

As noted in the SR, SR 3.3.2.1.3 is not required to be performed until 1 hour after any control rod is withdrawn in MODE 2. As noted in the SR, SR 3.3.2.1.4 is not required to be performed until 1 hour after THERMAL POWER is ≤ 10% RTP. This allows entry into MODE 2 for SR 3.3.2.1.3, and THERMAL POWER to be decreased to ≤ 10% for SR 3.3.2.1.4, to perform the required Surveillance if the ~~24-month~~92-day Frequency is not met per SR 3.0.2. The 1-hour allowance is based on operating experience and in consideration of providing a reasonable time in which to complete the SRs. The Frequencies of ~~24 months~~92 days are based on the reliability of the channels and the online-diagnostic features that monitor the channels for proper operation.

SR 3.3.2.1.~~5~~4

A CHANNEL FUNCTIONAL TEST is performed for each required MRBM channel to ensure that the entire channel will perform the intended function. It includes the RC&IS inputs. The associated controllers, displays, monitoring and input/output (I/O) communication interfaces continuously function during normal power operation. Abnormal operation of these components is detected and alarmed. In addition, the

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associated controllers are equipped with on-line diagnostic capabilities for cyclically monitoring the functionality of I/O signals, buses, power supplies, processors, and inter-processor communications.

The Frequency of ~~24 months~~92 days is based on the reliability of the channels and the online-diagnostic features that monitor the channels for proper operation.

As noted in the SR, SR 3.3.2.1.5 is not required to be performed until 1 hour after THERMAL POWER is ≥ 30% RTP. This allows THERMAL POWER to be increased to ≥ 30% RTP to perform the required Surveillance if the ~~24-month~~92-day Frequency is not met per SR 3.0.2. The 1-hour allowance is based on operating experience and in consideration of providing a reasonable time in which to complete the SRs.

SR 3.3.2.1.~~6~~5

The required RWM channels are bypassed when power is above a specified value (LPSP). The power level is determined from the APRM signals. The RWM bypass setpoint must be verified periodically to be > 10% RTP (i.e., the RWM is not bypassed at or below the LPSP). If the RWM LPSP is nonconservative, then the affected RWM channel is

SURVEILLANCE REQUIREMENTS (continued)

considered inoperable. Alternately, each required RWM channel associated with a nonconservative RWM LPSP can be placed in the conservative condition (manually enabled). If manually enabled, the SR is met and the affected RWM channel is not considered inoperable.

SR 3.3.2.1.~~7~~6

The required ATLM channels are bypassed when power is below a specified value (ATLM enable setpoint). The power level is determined from the APRM signals. The ATLM bypass setpoint must be verified periodically to be < 30% RTP (i.e., the ATLM is not bypassed at or above the ATLM enable setpoint). If the ATLM enable setpoint is nonconservative, then the affected ATLM channel is considered inoperable. Alternately, each required ATLM channel associated with a nonconservative ATLM enable setpoint can be placed in the conservative condition (manually enabled). If manually enabled, the SR is met and the affected ATLM channel is not considered inoperable.

SR 3.3.2.1.~~8~~7

The required MRBM channels are bypassed when power is below a specified value (ATLM enable setpoint). The power level is determined from the APRM signals. The MRBM bypass setpoint must be verified periodically to be < 30% RTP (i.e., the MRBM is not bypassed at or above the LPSP). If the ATLM enable setpoint is nonconservative, then the affected MRBM channel is considered inoperable. Alternately, each required MRBM channel associated with a nonconservative ATLM enable setpoint can be placed in the conservative condition (manually enabled). If manually enabled, the SR is met and the affected MRBM channel is not considered inoperable.

SR 3.3.2.1.~~98~~

The CHANNEL FUNCTIONAL TEST for the Reactor Mode Switch - Shutdown Position control rod withdrawal block is performed by attempting to withdraw any control rod with the reactor mode switch in the shutdown position and verifying that a control rod block occurs.

As noted in the SR, the Surveillance is only required to be performed until 1 hour after the reactor mode switch is in the shutdown position, since testing of this interlock with the reactor mode switch in any other position cannot be performed without using jumpers, lifted leads or moveable

SURVEILLANCE REQUIREMENTS (continued)

links. This allows entry into MODES 3, 4, 5, and 6 if the 24-month Frequency is not met per SR 3.0.2. The 1-hour allowance is based on operating experience and in consideration of providing a reasonable time in which to complete the SRs.

The 24-month Surveillance Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the surveillance when performed at the 24-month Frequency.

SR 3.3.2.1.~~109~~

LCO 3.1.3 and LCO 3.1.6 may require individual control rods to be bypassed in the RC&IS cabinets to allow insertion of an inoperable control rod or correction of a control rod pattern not in compliance with GWSR. With the control rods bypassed in the RC&IS cabinets, the RWM will not control the movement of these bypassed control rods. To ensure the proper bypassing and movement of those affected control rods, a second licensed operator or other qualified member of the technical staff

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ACTIONS (continued)

D.1 and D.2

With both the drywell fission product monitoring system particulate channel and the drywell air cooler condensate flow rate monitor inoperable, the only means of detecting LEAKAGE is the drywell floor drain HCW sump monitoring system. This Condition does not provide the required diverse means of leakage detection. The Required Action is to restore either of the inoperable monitors to OPERABLE status within 30 days to regain the intended leakage detection diversity. The 30-day Completion Time ensures that the plant will not be operated in a degraded configuration for a lengthy time period.

E.1 and E.2

If any Required Action and associated Completion Time of Condition A, B, C, or D cannot be met or if all required monitors are inoperable the plant must be placed in a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and to MODE 5 within 36 hours. The Completion Time is reasonable, based on plant design, to reach required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.3.4.1.1

Performance of the CHANNEL CHECK once every ~~24~~ 12 hours ensures that a gross failure of instrumentation has not occurred. The associated controllers, displays, monitoring and input/output (I/O) communication interfaces continuously function during normal power operation. Abnormal operation of these components is detected and alarmed. In addition, the associated controllers are equipped with on-line diagnostic capabilities for cyclically monitoring the functionality of I/O signals, buses, power supplies, processors, and inter-processor communications.

A CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

The Frequency is based upon operating experience that demonstrates channel failure is rare and the online-diagnostics that monitor the

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SURVEILLANCE REQUIREMENTS (continued)

channels for proper operation. The CHANNEL CHECKs every ~~24~~ 12 hours supplement less formal, but more frequent, checks of channels during normal operational use of the displays associated with the channels required by the LCO.

SR 3.3.4.1.2

This SR requires the performance of a CHANNEL FUNCTIONAL TEST of the required RCS leakage detection instrumentation. The test ensures that the required channels can perform their intended function.

The associated controllers, displays, monitoring and input/output (I/O) communication interfaces continuously function during normal power operation. Abnormal operation of these components is detected and alarmed. In addition, the associated controllers are equipped with on-line diagnostic capabilities for cyclically monitoring the functionality of I/O signals, buses, power supplies, processors, and inter-processor communications.

The Frequency of ~~24 months~~31 days is based on instrument reliability and the online-diagnostic features that monitor the channels for proper operation.

SR 3.3.4.1.3

This SR requires the performance of a CHANNEL CALIBRATION of the required RCS leakage detection instrumentation channels. The calibration verifies the accuracy of the instrument string, including the instruments located inside the drywell. The Frequency of 24 months is a typical refueling cycle and considers channel reliability. Operating experience has proven this Frequency is acceptable.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 30.
2. Regulatory Guide 1.45, May 1973.
3. Section 5.2.5.

BASES

ACTIONS (continued)

Function is considered to be maintaining ECCS actuation capability when sufficient channels are OPERABLE or in trip such that the ECCS logic will generate a trip signal from the given Function on a valid signal.

SURVEILLANCE REQUIREMENTS

As noted at the beginning of the SRs, The SRs for each ECCS instrumentation Function are found in the SRs column of Table 3.3.5.1-1.

SR 3.3.5.1.1

Performance of the CHANNEL CHECK once every ~~24~~ 12 hours ensures that a gross failure of instrumentation has not occurred. ~~This test overlaps the testing required by SR 3.3.5.2.1 to ensure a complete CHANNEL CHECK of required instrument channels and required actuation divisions from the sensor input to the logic contact output.~~

The SSLC/ESF is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).

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 plant staff, based on a combination of the channel instrument uncertainties, including indication and readability. If a channel is outside the match criteria, it may be an indication that the instrument has drifted outside its limit.

The Surveillance Frequency is based upon operating experience that demonstrates channel failure is rare and the self-diagnostic features that monitor the channels for proper operation. The CHANNEL CHECK every ~~24~~ 12 hours supplements less formal, but more frequent checks of channels during normal operational use of the displays associated with the channels required by the LCO.

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SR 3.3.5.1.2

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure the entire channel will perform the intended function. This test ~~overlaps the testing required by SR 3.3.5.2.2 to~~ ensures a complete CHANNEL FUNCTIONAL TEST of required instrument channels ~~and required actuation divisions~~ from the sensor input ~~to~~ through the ~~logic contact output~~DTM function.

SURVEILLANCE REQUIREMENTS (continued)

The SSLC/ESF is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).

The Frequency of ~~24 months~~ 92 days is based on the reliability of the ECCS instrumentation channels and the self-diagnostic features that monitor the channels for proper operation.

SR 3.3.5.1.3

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the required channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the required channel adjusted to the $NTSP_F$ within the "as-left" tolerance to account for instrument drifts between successive calibrations consistent with the methods and assumptions required by the SCP.

The Frequency is based upon the assumption of a 24-month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.5.1.4

This SR ensures that the individual required channel response times are less than or equal to the maximum values assumed in the accident analysis. The ECCS RESPONSE TIME acceptance criteria are included in Reference 5.

ECCS RESPONSE TIME may be verified by actual response time measurements in any series of sequential, overlapping, or total channel measurements. This test encompasses the ECCS instrumentation from

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the input variable sensors through the DTM function. This test overlaps the testing required by SR 3.3.5.2.4-2 to ensure complete testing of instrument channels and actuation circuitry

COL 16.0-1-A
3.3.5.1-2

[However, some sensors for Functions are allowed to be excluded from specific ECCS RESPONSE TIME measurement if the conditions of Reference XX are satisfied. If these conditions are satisfied, sensor

SURVEILLANCE REQUIREMENTS (continued)

response time may be allocated based on either assumed design sensor response time or the manufacturer's stated design response time. When the requirements of Reference XX are not satisfied, sensor response time must be measured. Furthermore, measurement of the instrument loops response times is not required if the conditions of Reference XX are satisfied.]

ECCS RESPONSE TIME tests are conducted on a 24 month STAGGERED TEST BASIS for three channels. The Frequency of 24 months on a STAGGERED TEST BASIS ensures that the required channels associated with each division are alternately tested.

The 24-month test Frequency is consistent with the typical industry refueling cycle and with operating experience that shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent.

REFERENCES

1. Chapter 7.
2. Chapter 15.
3. Chapter 6.
4. Section 15.2.

BASES

ACTIONS (continued)

considering the reliability of the remaining OPERABLE channels and considering that most repairs will involve only card changes or transmitter replacement. However, this out of service time is only acceptable provided the associated Function still maintains ECCS actuation capability (refer to Required Actions B.1 Bases).

B.1

If the Required Actions and associated Completion Times of Condition A are not met or two or more required actuation divisions are inoperable, the affected actuation device(s) must be declared inoperable immediately. In this Condition, a loss of ECCS actuation capability occurs to numerous ECCSactuation devices. ECCS automatic actuation capability is considered to be maintained when sufficient actuation divisions are OPERABLE or in trip such that the ECCS logic will generate an actuation signal on a valid signal.

SURVEILLANCE REQUIREMENTS

SR 3.3.5.2.1

~~Performance of the CHANNEL CHECK once every 24 hours ensures that a gross failure of a required actuation division has not occurred. This test overlaps the testing required by SR 3.3.5.1.1 to ensure a complete CHANNEL CHECK of required instrument channels and required actuation divisions from the sensor input to the logic contact output.~~

~~The Safety System Logic and Control Engineered Safety Feature (SSLC/ESF) System is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).~~

~~A CHANNEL CHECK will detect gross actuation division failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.~~

~~The Frequency is based upon operating experience that demonstrates actuation division failure is rare and the self-diagnostic features that monitor the divisions for proper operation.~~

BASES

SURVEILLANCE REQUIREMENTS (continued)

The CHANNEL CHECKs every 24 hours supplement less formal, but more frequent, checks of divisions during normal operational use of the displays associated with the actuation divisions required by the LCO.

SR 3.3.5.2.2

A CHANNEL FUNCTIONAL TEST is performed on each required division to ensure that the entire division will perform the intended function. This test overlaps the testing required by SR 3.3.5.1.2 to ensure a complete CHANNEL FUNCTIONAL TEST of required instrument channels and required actuation divisions from the sensor input to the logic contact output.

The Frequency of 24 months is based on the reliability of the divisions and the self-diagnostic features that monitor the divisions for proper operation.

SR 3.3.5.2.3

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required ECCS logic for a specific channel.

LOGIC SYSTEM FUNCTIONAL tests are conducted on a 24 month STAGGERED TEST BASIS for three divisions. The Frequency of 24 months on a STAGGERED TEST BASIS ensures that each required division is alternately tested.

The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency.

SR 3.3.5.2.42

This SR ensures that the individual required division response times are less than or equal to the maximum values assumed in the accident analysis. The ECCS RESPONSE TIME acceptance criteria are included in Reference 3.

BASES

SURVEILLANCE REQUIREMENTS

The Surveillance Requirements are modified by a Note. The Note directs the reader to Table 3.3.5.3-1 to determine the correct SRs to perform for each ICS Instrumentation Function.

SR 3.3.5.3.1

Performance of the CHANNEL CHECK once every ~~24~~12 hours ensures that a gross failure of instrumentation has not occurred. ~~This test overlaps the testing required by SR 3.3.5.4.1 to ensure a complete CHANNEL CHECK of required instrument channels and required actuation divisions from the sensor input to the logic contact output.~~

The SSLC/ESF is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).

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 plant 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 instrument has drifted outside its limit.

The Frequency is based upon operating experience that demonstrates channel failure is rare and the self-diagnostic features that monitor the channels for proper operation. The CHANNEL CHECK every ~~24~~ 12 hours supplements less formal, but more frequent, checks of channels during normal operational use of the displays associated with the channels required by the LCO.

SR 3.3.5.3.2

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the entire channel will perform the intended function. This test ~~overlaps the testing required by SR 3.3.5.4.2 to~~ ensures a complete CHANNEL FUNCTIONAL TEST of required instrument channels ~~and required actuation divisions~~ from the sensor input ~~to~~ through the ~~logic contact output~~DTM function.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The SSLC/ESF is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).

The Frequency of ~~24 months~~92 days is based on the reliability of the channels and the self-diagnostic features that monitor the channels for proper operation.

SR 3.3.5.3.3

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the required channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the required channel adjusted to the $NTSP_F$ within the "as-left" tolerance to account for instrument drifts between successive calibrations consistent with the methods and assumptions required by the SCP.

The Frequency is based upon the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.5.3.4

This SR ensures that the individual required channel response times are less than or equal to the maximum values assumed in the accident analysis. The ICS RESPONSE TIME acceptance criteria are included in Reference 3.

ICS RESPONSE TIME may be verified by actual response time measurements or any series of sequential, overlapping, or total channel measurements. This test encompasses the ICS instrumentation from the input variable sensors through the DTM function. This test overlaps the testing required by SR 3.3.5.4.~~4~~2 to ensure complete testing of instrumentation channels and actuation circuitry.

COL 16.0-1-A
3.3.5.3-2

[However, some sensors for Functions are allowed to be excluded from specific ICS RESPONSE TIME measurement if the conditions of Reference XX are satisfied. If these conditions are satisfied, sensor response time may be allocated based on either assumed design sensor

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APPLICABLE SAFETY ANALYSES, LCO, and APPLICABILITY (continued)

The ICS Actuation is required to be OPERABLE in MODES 1, 2, 3, 4, and 5, to preclude actuation of safety relief valves and limit the peak RPV pressure to less than the ASME Section III Code limits. Additionally, ICS Actuation assists in preserving the integrity of the fuel cladding by limiting the post-LOCA peak cladding temperature to less than the 10 CFR 50.46 limits, and removing reactor decay heat following reactor shutdown and isolation.

ACTIONS

A.1

Condition A exists when one required ICS actuation division is inoperable. In this Condition, ICS actuation still maintains actuation trip capability but can not accommodate a single failure. The 12-hour Completion Time is acceptable based on engineering judgment considering the diversity of sensors available to provide trip signals, the redundancy of the ICS actuation design, and the low probability of an event requiring ICS actuation during this period. However, this out of service time is only acceptable provided the associated Function still maintains ICS actuation capability (refer to Required Actions B.1 Bases).

B.1

With the Required Action and associated Completion Time of Condition A not met or if two or more required actuation divisions are inoperable, the affected ICS actuation device(s) must be declared inoperable immediately. ICS automatic actuation capability is considered to be maintained when sufficient actuation divisions are OPERABLE or in trip such that the ICS logic will generate a actuation signal on a valid signal.

SURVEILLANCE REQUIREMENTS

SR 3.3.5.4.1

~~Performance of the CHANNEL CHECK once every 24 hours ensures that a gross failure of a required actuation division has not occurred. This test overlaps the testing required by SR 3.3.5.3.1 to ensure a complete CHANNEL CHECK of required instrument channels and required actuation divisions from the sensor input to the logic contact output.~~

~~The Safety System Logic and Control Engineered Safety Feature (SSLC/ESF) System is cyclically tested from the sensor input point to the~~

~~SURVEILLANCE REQUIREMENTS (continued)~~

~~logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).~~

~~A CHANNEL CHECK will detect gross actuation division failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.~~

~~The Frequency is based upon operating experience that demonstrates actuation division failure is rare and the self-diagnostic features that monitor the divisions for proper operation.~~

~~The CHANNEL CHECKs every 24 hours supplement less formal, but more frequent, checks of divisions during normal operational use of the displays associated with the actuation divisions required by the LCO.~~

~~SR 3.3.5.4.2~~

~~A CHANNEL FUNCTIONAL TEST is performed on each required division to ensure that the entire division will perform the intended function. This test overlaps the testing required by SR 3.3.5.3.2 to ensure complete testing of required instrument channels and actuation divisions from the sensor input to the logic contact output.~~

~~The Frequency of 24 months is based on the reliability of the divisions and the self-diagnostic features that monitor the divisions for proper operation.~~

~~SR 3.3.5.4.3~~

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required ICS logic for a specific channel.

LOGIC SYSTEM FUNCTIONAL tests are conducted on a 24 month STAGGERED TEST BASIS for three divisions. The Frequency of 24 months on a STAGGERED TEST BASIS ensures that each required division is alternately tested.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The 24 month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed at the 24 month Frequency.

SR 3.3.5.4.42

This SR ensures that the individual required division response times are less than or equal to the maximum values assumed in the accident analysis. The ICS RESPONSE TIME acceptance criteria are included in Reference 2.

ICS RESPONSE TIME may be verified by actual response time measurements in any series of sequential, overlapping, or total division measurements. This test encompasses the ICS actuation circuitry from the outputs of the DTMs through the LDs that consists of VLUs, the timers and the LDs associated with the ICS. This test overlaps the testing required by SR 3.3.5.3.4 to ensure complete testing of instrument channels and actuation circuitry.

COL 16.0-1-A
3.3.5.4-1

[However, some portions of the ICS actuation circuitry are allowed to be excluded from specific ICS RESPONSE TIME measurement if the conditions of Reference XX are satisfied. Furthermore, measurement of the instrument loops response times is not required if the conditions of Reference XX are satisfied.]

ICS RESPONSE TIME tests are conducted on a 24 month STAGGERED TEST BASIS for three divisions. The Frequency of 24 months on a STAGGERED TEST BASIS ensures that each required division is alternately tested.

The 24-month test Frequency is consistent with the typical industry refueling cycle and with operating experience that shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent.

BASES

ACTIONS (continued)

D.1

If the required channel(s) is not restored to OPERABLE status, or verified to be in trip within the allowed Completion Time, or if MSIV isolation capability is not maintained, plant operations may continue if the associated MSIV(s) and MSL drain isolation valve(s) are declared inoperable. Because this Function is required to ensure that the MSIVs and MSL drain isolation valves perform their intended function, sufficient remedial measures are provided by declaring the associated MSIV(s) and MSL drain isolation valves inoperable immediately.

SURVEILLANCE REQUIREMENTS

As noted at the beginning of the Surveillance Requirements, the SRs for each isolation instrumentation Function are located in the SRs column of Table 3.3.6.1-1.

SR 3.3.6.1.1

Performance of the CHANNEL CHECK once every ~~24~~ 12 hours ensures that a gross failure of instrumentation has not occurred. ~~This test overlaps the testing required by SR 3.3.6.2.1 to ensure a complete CHANNEL CHECK of required instrument channels and required actuation divisions from the sensor input to the logic contact output.~~

The RTIF is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).

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 readability. If a channel is outside the match criteria, it may be an indication that the instrument has drifted outside its limit.

The Surveillance Frequency is based on operating experience that demonstrates channel failure is rare and the self-diagnostic features that monitor the channels for proper operation.

SURVEILLANCE REQUIREMENTS (continued)

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 3.3.6.1.2

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the channel will perform the intended function. This test ~~overlaps the testing required by SR 3.3.6.2.2 to~~ ensures a complete CHANNEL FUNCTIONAL TEST of required instrument channels ~~and required actuation divisions~~ from the sensor input ~~to~~ through the ~~logic contact output~~DTM function.

The RTIF is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).

The Frequency of ~~24 months~~92 days is based on the reliability of the Isolation Instrumentation channels and the self-diagnostic features that monitor the channels for proper operation.

SR 3.3.6.1.3

CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies that the required channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the required channel adjusted to the $NTSP_F$ within the "as-left" tolerance to account for instrument drifts between successive calibrations consistent with the methods and assumptions required by the SCP.

The Surveillance Frequency is based upon the assumption of a 24-month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

SR 3.3.6.1.4

This SR ensures that the individual required channel response times are less than or equal to the maximum values assumed in the accident

analysis. The instrument response times must be added to the associated closure times to obtain the ISOLATION SYSTEM RESPONSE

SURVEILLANCE REQUIREMENTS (continued)

TIME. ISOLATION SYSTEM RESPONSE TIME acceptance criteria are included in Reference 10. ISOLATION SYSTEM RESPONSE TIME may be verified by actual response time measurements in any series of sequential, overlapping, or total channel measurements. This test encompasses the MSIV isolation instrumentation from the input variable sensors through the DTM digital trip function. This test overlaps the testing required by SR 3.3.6.2.4-2 to ensure complete testing of instrumentation channels and actuation circuitry.

COL 16.0-1-A
3.3.6.1-2

[However, some sensors are allowed to be excluded from specific ISOLATION SYSTEM RESPONSE TIME measurement if the conditions of Reference XX are satisfied. If these conditions are satisfied, sensor response time may be allocated based on either assumed design sensor response time or the manufacturer's stated design response time. When the requirements of Reference XX are not satisfied, sensor response time must be measured. Furthermore, measurement of the instrument loops response time for some Functions is not required if the conditions of Reference XX are satisfied.]

ISOLATION SYSTEM RESPONSE TIME tests are conducted on a 24 month STAGGERED TEST BASIS for three channels. The Frequency of 24 months on a STAGGERED TEST BASIS ensures that the channels associated with each required division are alternately tested. The 24-month test Frequency is consistent with the refueling cycle and with operating experience that shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent.

REFERENCES

1. Chapter 7, Figure 7.2-1.
2. Section 6.3.
3. Chapter 15.
4. Subsection 15.4.4.
5. Subsection 15.3.3.
6. Subsection 15.4.5.

BASES

ACTIONS (continued)

Alternately, if it is not desirable to verify the affected required actuation division in trip (as in the case where it is desired to place the affected division in bypass), Condition C must be entered and its Required Action taken when the Completion Time of Required Action A.1 expires.

B.1

If the Required Actions and associated Completion Times of Condition A are not met or two or more required MSIV actuation divisions are inoperable, the affected actuation device(s) must be declared inoperable immediately. In this Condition, a loss of MSIV actuation capability occurs to numerous actuation devices. MSIV actuation capability is considered to be maintained when sufficient required actuation divisions will generate an isolation from a given Function on a valid signal so that at least one valve in the associated penetration flow path is isolated.

SURVEILLANCE REQUIREMENTS

SR 3.3.6.2.1

~~Performance of the CHANNEL CHECK once every 24 hours ensures that a gross failure of a required actuation division has not occurred. This test overlaps the testing required by SR 3.3.6.1.1 to ensure a complete CHANNEL CHECK of required instrument channels and required actuation divisions from the sensor input to the logic contact output.~~

~~The RTIF is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).~~

~~A CHANNEL CHECK will detect gross actuation division failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.~~

~~The Frequency is based upon operating experience that demonstrates actuation division failure is rare and the self-diagnostic features that monitor the divisions for proper operation.~~

~~The CHANNEL CHECKs every 24 hours supplement less formal, but more frequent, checks of divisions during normal operational use of the displays associated with the actuation divisions required by the LCO.~~

BASES

~~SURVEILLANCE REQUIREMENTS (continued)~~

~~SR 3.3.6.2.2~~

~~A CHANNEL FUNCTIONAL TEST is performed on each required division to ensure that the entire division will perform the intended function. This test overlaps the testing required by SR 3.3.6.1.2 to ensure a complete CHANNEL FUNCTIONAL TEST of required instrument channels and actuation divisions from the sensor input to the logic contact output.~~

~~The Frequency of 24 months is based on the reliability of the divisions and the self-diagnostic features that monitor the divisions for proper operation.~~

~~SR 3.3.6.2.3~~

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the MSIV actuation divisions, including the two-out-of-four function of the Trip Logic Unit (TLU), Output Logic Unit (OLU), and Load Drivers (LDs) for a specific division.

LOGIC SYSTEM FUNCTIONAL tests are conducted on a 24 month STAGGERED TEST BASIS for three divisions. The Frequency of 24 months on a STAGGERED TEST BASIS ensures that the channels associated with each required division are alternately tested. The testing in LCO 3.3.6.1 and LCO 3.6.1.3 overlaps this Surveillance to provide complete testing of the assumed safety function.

The 24-month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24-month Frequency.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.6.2.42

This SR ensures that the individual required division response times are less than or equal to the maximum values assumed in the accident analysis. The instrument response times must be added to the associated closure times to obtain the ISOLATION SYSTEM RESPONSE TIME. ISOLATION SYSTEM RESPONSE TIME acceptance criteria are included in Reference 3. ISOLATION SYSTEM RESPONSE TIME may

BASES

ACTIONS (continued)

E.1 and E.2

If the affected instrumentation channel cannot be verified to be in trip within the specified Completion Time or if isolation capability is not maintained, the associated flow path should be isolated. However, if the RWCU/SDC function is needed to provide core cooling, these Required Actions allow the flow path to remain unisolated provided action is immediately initiated to restore the channel to OPERABLE status or to isolate the RWCU/SDC system (i.e., provide alternate decay heat removal capabilities so the flow path can be isolated). ACTIONS must continue until the channel is restored to OPERABLE status or the RWCU/SDC system is isolated.

SURVEILLANCE REQUIREMENTS

As noted at the beginning of the Surveillance Requirements, the SRs for each isolation instrumentation Function are located in the SRs column of Table 3.3.6.3-1.

SR 3.3.6.3.1

Performance of the CHANNEL CHECK once every ~~24~~ 12 hours ensures that a gross failure of instrumentation has not occurred. ~~This test overlaps the testing required by SR 3.3.6.4.1 to ensure a complete CHANNEL CHECK of required instrument channels and required actuation divisions from the sensor input to the logic contact output.~~

The SSLC/ESF is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).

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 readability. If a channel is outside the match criteria, it may be an indication that the instrument has drifted outside its limit.

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SURVEILLANCE REQUIREMENTS (continued)

The Surveillance Frequency is based on operating experience that demonstrates channel failure is rare and the self-diagnostic features that monitor the channels for proper operation.

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 3.3.6.3.2

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the channel will perform the intended function. This test ~~overlaps the testing required by SR 3.3.6.4.2 to~~ ensures a complete CHANNEL FUNCTIONAL TEST of required instrument channels ~~and required actuation divisions~~ from the sensor input ~~to~~ through the ~~logic contact output~~DTM function.

The SSLC/ESF is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).

The Frequency of ~~24 months~~92 days is based on the reliability of the Isolation Instrumentation channels and the self-diagnostic features that monitor the channels for proper operation.

SR 3.3.6.3.3

CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies that the required channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the required channel adjusted to the $NTSP_F$ within the "as-left" tolerance to account for instrument drifts between successive calibrations consistent with the methods and assumptions required by the SCP.

The Surveillance Frequency is based upon is based on the assumption of a 24 month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.6.3.4

This SR ensures that the individual required channel response times are less than or equal to the maximum values assumed in the accident analysis. The instrument response times must be added to the associated closure times to obtain the ISOLATION SYSTEM RESPONSE TIME. ISOLATION SYSTEM RESPONSE TIME acceptance criteria are included in Reference 5.

ISOLATION SYSTEM RESPONSE TIME may be verified by actual response time measurements in any series of sequential, overlapping, or total channel measurements. This test encompasses the isolation instrumentation from the input variable sensors through the DTM function. This test overlaps the testing required by SR 3.3.6.4.4-2 to ensure complete testing of instrumentation channels and actuation circuitry.

A Note to the Surveillance states that the radiation detectors may be excluded from ISOLATION SYSTEM RESPONSE TIME testing. This Note is necessary because of the difficulty of generating an appropriate detector input signal and because the principles of detector operation virtually ensure an instantaneous response time. Response Time for radiation detection channels shall be measured from detector output or the input of the first electronic component in the channel.

COL 16.0-1-A
3.3.6.3-2

[However, some sensors are allowed to be excluded from specific ISOLATION SYSTEM RESPONSE TIME measurement if the conditions of Reference XX are satisfied. If these conditions are satisfied, sensor response time may be allocated based on either assumed design sensor response time or the manufacturer's stated design response time. When the requirements of Reference XX are not satisfied, sensor response time must be measured. Furthermore, measurement of the instrument loops response time for some Functions is not required if the conditions of Reference XX are satisfied.]

ISOLATION SYSTEM RESPONSE TIME tests are conducted on a 24 month STAGGERED TEST BASIS for three channels. The Frequency of 24 months on a STAGGERED TEST BASIS ensures that the required channels associated with each division are alternately tested. The 24-month test Frequency is consistent with the refueling cycle and has with operating experience that shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent.

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ACTIONS (continued)

C.1

With the Required Action and associated Completion Time of Condition A not met, or if isolation actuation capability is not maintained, the affected isolation actuation device(s) must be declared inoperable immediately. Isolation actuation capability is considered to be maintained when sufficient actuation divisions are OPERABLE such that isolation logic will generate an actuation signal on a valid signal.

D.1 and D.2

With the Required Action and associated Completion Time of Condition A not met, or if two or more required actuation divisions inoperable, the plant must be placed in a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and to MODE 5 within 36 hours The Completion Time is reasonable, based on plant design, to reach required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

E.1 and E.2

If the affected actuation division cannot be verified to be in trip within the specified Completion Time or if isolation capability is not maintained, the associated flow path should be isolated. However, if the RWCU/SDC function is needed to provide core cooling, these Required Actions allow the flow path to remain unisolated provided action is immediately initiated to restore the division to OPERABLE status or to isolate the RWCU/SDC system (i.e., provide alternate decay heat removal capabilities so the flow path can be isolated). ACTIONS must continue until the division is restored to OPERABLE status or the RWCU/SDC system is isolated.

SURVEILLANCE REQUIREMENTS

As noted at the beginning of the SRs, the SRs for each isolation actuation Function are located in the SRs column of Table 3.3.6.4-1.

~~SR 3.3.6.4.1~~

~~Performance of the CHANNEL CHECK once every 24 hours ensures that a gross failure of a required actuation division has not occurred. This test overlaps the testing required by SR 3.3.6.3.1 to ensure a complete CHANNEL CHECK of required instrument channels and required actuation divisions from the sensor input to the logic contact output.~~

BASES

~~SURVEILLANCE REQUIREMENTS (continued)~~

~~The Safety System Logic and Control Engineered Safety Feature (SSLC/ESF) System is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).~~

~~A CHANNEL CHECK will detect gross actuation division failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.~~

~~The Frequency is based upon operating experience that demonstrates actuation division failure is rare and the self-diagnostic features that monitor the divisions for proper operation.~~

~~The CHANNEL CHECKs every 24 hours supplement less formal, but more frequent, checks of divisions during normal operational use of the displays associated with the actuation divisions required by the LCO.~~

~~SR 3.3.6.4.2~~

~~A CHANNEL FUNCTIONAL TEST is performed on each required division to ensure that the entire division will perform the intended function. This test overlaps the testing required by SR 3.3.6.3.2 to ensure a complete CHANNEL FUNCTIONAL TEST of required instrument channels and required actuation divisions from the sensor input to the logic contact output.~~

~~The Frequency of 24 months is based on the reliability of the divisions and the self-diagnostic features that monitor the divisions for proper operation.~~

SR 3.3.6.4.~~3~~1

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the isolation actuation divisions.

LOGIC SYSTEM FUNCTIONAL tests are conducted on a 24 month STAGGERED TEST BASIS for three divisions. The Frequency of

BASES

SURVEILLANCE REQUIREMENTS (continued)

24 months on a STAGGERED TEST BASIS ensures that the channels associated with each required division are alternately tested. The testing in LCO 3.3.6.3, LCO 3.6.1.3, and LCO 3.6.3.1 overlaps this Surveillance to provide complete testing of the assumed safety function.

The 24-month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency.

SR 3.3.6.4.42

This SR ensures that the individual required division response times are less than or equal to the maximum values assumed in the accident analysis. The instrument response times must be added to the associated closure times to obtain the ISOLATION SYSTEM RESPONSE TIME. ISOLATION SYSTEM RESPONSE TIME acceptance criteria are included in Reference 4.

ISOLATION SYSTEM RESPONSE TIME may be verified by actual response time measurements in any series of sequential, overlapping, or total channel measurements. This test encompasses the isolation actuation circuitry consisting of timers, VLUs, and load drivers. This test overlaps the testing required by SR 3.3.6.3.4 to ensure complete testing of instrumentation channels and actuation divisions.

COL 16.0-1-A
3.3.6.4-1

[However, some portions of the isolation actuation circuitry are allowed to be excluded from specific ISOLATION SYSTEM RESPONSE TIME measurement if the conditions of Reference XX are satisfied. Furthermore, measurement of the instrument loops response time for some Functions is not required if the conditions of Reference XX are satisfied.]

ISOLATION SYSTEM RESPONSE TIME tests are conducted on a 24-month STAGGERED TEST BASIS for three divisions. The Frequency of 24 months on a STAGGERED TEST BASIS ensures that the channels associated with each required division are alternately tested. The 24-month test Frequency is consistent with the refueling cycle andwith operating experience that shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.6.4.~~5~~3

A system functional test is performed to verify that the mechanical portions of the actuation function operate as designed when demanded. This includes verifying that RWCU/SDC isolation valves and feedwater isolation valves automatically close. The LOGIC SYSTEM FUNCTIONAL TEST in SR 3.3.6.4.~~3~~1 and LCO 3.3.8.1 (for RWCU/SDC isolation valves) overlaps this SR to provide complete testing of the safety function.

The 24-month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power.

REFERENCES

1. Section 6.3.
2. Chapter 15.
3. NEDO-33201, "ESBWR Design Certification Probabilistic Risk Assessment."
4. Section 15.2.

BASES

SURVEILLANCE REQUIREMENTS

The SRs are modified by a Note. The Note directs the reader to Table 3.3.7.1-1 to determine the correct SRs to perform for each CRHAVS Function.

SR 3.3.7.1.1

Performance of the CHANNEL CHECK once every ~~24~~ 12 hours ensures that a gross failure of instrumentation has not occurred. ~~This test overlaps the testing required by SR 3.3.7.2.1 to ensure a complete CHANNEL CHECK of required instrument channels and required actuation divisions from the sensor input to the logic contact output.~~

The SSLC/ESF is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks and communication bus interface checks, and checks on the application program (checksum).

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 plant 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 instrument has drifted outside its limit.

The Frequency is based upon operating experience that demonstrates channel failure is rare and the self-diagnostic features that monitor the channels for proper operation. The CHANNEL CHECK every ~~24~~ 12 hours supplements less formal, but more frequent, checks of channels during normal operational use of the displays associated with the channels required by the LCO.

SR 3.3.7.1.2

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the entire channel will perform the intended function. This test ~~overlaps the testing required by SR 3.3.7.2.2 to~~ ensures a complete CHANNEL FUNCTIONAL TEST of required instrument channels ~~and required actuation divisions~~ from the sensor input ~~to~~ through the ~~logic contact output~~DTM function.

SURVEILLANCE REQUIREMENTS (continued)

The SSLC/ESF is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks and communication bus interface checks, and checks on the application program (checksum).

The Frequency of ~~24 months~~92 days is based on the reliability of the CRHAVS instrumentation channels and the self-diagnostic features that monitor the channels for proper operation.

SR 3.3.7.1.3

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the required channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the required channel adjusted to the $NTSP_F$ within the "as-left" tolerance to account for instrument drifts between successive calibrations consistent with the methods and assumptions required by the SCP.

The Frequency is based upon the assumption of a 24-month calibration interval in the determination of the magnitude of equipment drift in the setpoint.

SR 3.3.7.1.4

This SR ensures that the individual required channel response times are less than or equal to the maximum values assumed in the accident analysis. The instrument response times must be added to the associated closure times to obtain the CRHAVS RESPONSE TIME. CRHAVS RESPONSE TIME acceptance criteria are included in Reference 4.

CRHAVS RESPONSE TIME may be verified by actual response time measurements in any series of sequential, overlapping, or total channel measurements. This test encompasses the isolation instrumentation from the input variable sensors through the DTM function.

This test overlaps the testing required by SR 3.3.7.2.~~4~~2 to ensure complete testing of instrumentation channels and actuation circuitry.

BASES

ACTIONS (continued)

Alternately, if it is not desired to restore the required actuation division to OPERABLE status, Condition C must be entered and its Required Action taken when the Completion Time of Required Action A.1 expires.

B.1.1, B.1.2, and B.2

With the Required Actions and associated Completion Times of Condition A or B are not met, or two or more required actuation divisions are inoperable, the associated feature(s) may be incapable of performing the intended function. CRHAVS automatic actuation capability is considered to be maintained when sufficient actuation divisions are OPERABLE or in trip such that the CRHAVS logic will generate an actuation signal on a valid signal.

Required Action B.1.1 and Required Action B.1.2 require manual isolation of the CRHA boundary and placing an OPERABLE CRHAVS train in the isolation mode, respectively, which accomplishes the safety function of the inoperable channel by ensuring radiological protection of the occupants within the CRHA boundary.

Alternatively, Required Action B.2 requires declaring the affected actuation device(s) inoperable in accordance with LCO 3.7.2. Declaring the affected actuation device(s) inoperable is acceptable, since the Required Actions of LCO 3.7.2 provide appropriate actions for the inoperable components.

SURVEILLANCE REQUIREMENTS

SR 3.3.7.2.1

~~Performance of the CHANNEL CHECK once every 24 hours ensures that a gross failure of a required actuation division has not occurred. This test overlaps the testing required by SR 3.3.7.1.1 to ensure a complete CHANNEL CHECK of required instrument channels and required actuation divisions from the sensor input to the logic contact output.~~

~~The Safety System Logic and Control Engineered Safety Feature (SSLC/ESF) is cyclically tested from the sensor input point to the logic contact output by online self-diagnostics. The self-diagnostic capabilities include microprocessor checks, system initialization, watchdog timers, memory integrity checks, input/output (I/O) data integrity checks, communication bus interface checks, and checks on the application program (checksum).~~

~~SURVEILLANCE REQUIREMENTS (continued)~~

~~A CHANNEL CHECK will detect gross actuation division failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.~~

~~The Frequency is based upon operating experience that demonstrates actuation division failure is rare and the self-diagnostic features that monitor the divisions for proper operation.~~

~~The CHANNEL CHECKs every 24 hours supplement less formal, but more frequent, checks of divisions during normal operational use of the displays associated with the actuation divisions required by the LCO.~~

~~SR 3.3.7.2.2~~

~~A CHANNEL FUNCTIONAL TEST is performed on each required division to ensure that the entire division will perform the intended function. This test overlaps the testing required by SR 3.3.7.1.2 to ensure a complete CHANNEL FUNCTIONAL TEST of required instrument channels and required actuation divisions from the sensor input to the logic contact output.~~

~~The Frequency of 24 months is based on the reliability of the divisions and the diagnostic self-test features that monitor the divisions for proper operation.~~

~~SR 3.3.7.2.3~~

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required CRHAVS logic for a specific channel.

LOGIC SYSTEM FUNCTIONAL TESTs are conducted on a 24 month STAGGERED TEST BASIS for three divisions. The Frequency of 24 months on a STAGGERED TEST BASIS ensures that the channels associated with each required division are alternately tested.

The 24-month Frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power. Operating experience has shown these components usually pass the Surveillance when performed at the 24 month Frequency.

BASES

SR 3.3.7.2.42

This SR ensures that the individual required division response times are less than or equal to the maximum values assumed in the accident analysis. The instrument response times must be added to the associated closure times to obtain the CRHAVS RESPONSE TIME. CRHAVS RESPONSE TIME acceptance criteria are included in Reference 3.

CRHAVS RESPONSE TIME may be verified by actual response time measurements in any series of sequential, overlapping, or total channel measurements. This test encompasses the isolation actuation circuitry consisting of timers, VLUs, and load drivers. This test overlaps the testing required by SR 3.3.7.1.4 to ensure complete testing of instrumentation channels and actuation divisions.

COL 16.0-1-A
3.3.7.2-2

[However, some portions of the isolation actuation circuitry are allowed to be excluded from specific CRHAVS RESPONSE TIME measurement if the conditions of Reference XX are satisfied. Furthermore, measurement of the instrument loops response time for some Functions is not required if the conditions of Reference XX are satisfied.]

CRHAVS RESPONSE TIME tests are conducted on a 24 month STAGGERED TEST BASIS for three divisions. The Frequency of 24 months on a STAGGERED TEST BASIS ensures that the channels associated with each division are alternately tested. The 24-month test Frequency is consistent with the refueling cycle and with operating experience that shows that random failures of instrumentation components causing serious response time degradation, but not channel failure, are infrequent.

REFERENCES

1. Section 6.4.
2. Section 15.4.
3. Section 15.2.

BASES

APPLICABLE SAFETY ANALYSES, LCO, AND APPLICABILITY (continued)

The Isolation Condenser/Passive Containment Cooling System Pool Level – Low Function is required to be OPERABLE in MODES 1, 2, 3, and 4, consistent with the assumptions in Reference 1.

ACTIONS

A.1

In this Condition, required safety-related actuators will actuate the components assumed in the design basis LOCA analysis in Reference 2 concurrent with any additional single failure. However, design features intended to mitigate digital protection system common mode failures may not be available.

In this Condition, the inoperable Function must be restored to OPERABLE status within 30 days. This Completion Time is acceptable because the required safety-related actuators will actuate the minimum number of components required to respond to the design basis LOCA concurrent with any additional single failure.

B.1 and B.2

With the Required Action and associated Completion Time of Condition A not met, the plant must be placed in a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and to MODE 5 within 36 hours. The Completion Time is reasonable, based on plant design, to reach required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.3.8.1.1

Performance of the CHANNEL CHECK once every ~~24~~ 12 hours ensures that a gross failure of DPS has not occurred. The associated controllers, displays, monitoring and input/output (I/O) communication interfaces continuously function during normal power operation. Abnormal operation of these components is detected and alarmed. In addition, the associated controllers are equipped with on-line diagnostic capabilities for cyclically monitoring the functionality of I/O signals, buses, power supplies, processors, and inter-processor communications.

BASES

SURVEILLANCE REQUIREMENTS (continued)

A CHANNEL CHECK will detect gross DPS failure; thus, it is key to verifying the DPS continues to operate properly between each CHANNEL CALIBRATION.

The Frequency is based upon operating experience that demonstrates failure of the DPS components is rare and the on-line diagnostics that monitor the DPS for proper operation. The CHANNEL CHECKS every ~~24~~ 12 hours supplement less formal, but more frequent checks of DPS during normal operational use of the displays associated with the Functions required to be OPERABLE by the LCO.

SR 3.3.8.1.2

A CHANNEL FUNCTIONAL TEST is performed on the DPS to ensure that the entire DPS will perform the intended Functions. The associated controllers, displays, monitoring and input/output (I/O) communication interfaces continuously function during normal power operation. Abnormal operation of these components is detected and alarmed. In addition, the associated controllers are equipped with on-line diagnostic capabilities for cyclically monitoring the functionality of I/O signals, buses, power supplies, processors, and inter-processor communications.

The ~~24-month~~92-day Frequency is based on the reliability of the DPS and the self-diagnostic features that monitor the DPS for proper operation.

SR 3.3.8.1.3

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the required DPS responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the DPS adjusted to the $NTSP_F$ within the "as-left" tolerance to account for instrument drifts between successive calibrations consistent with the methods and assumptions required by the SCP.

The Frequency is based upon the assumption of a 24-month calibration interval in the determination of the magnitude of equipment drift in the setpoint analysis.