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Subject: **Changes to ESBWR DCD Chapters 16, 16B, and 19ACM to Provide Staggered Testing of Flow Paths for Passive Safety Systems.**

The purpose of this letter is to submit markups identifying changes to ESBWR DCD Chapters 16, 16B, and 19ACM. These changes are the result of interactions with NRC staff to address concerns raised during the August 17, 2010 meeting with the ACRS subcommittee.

The specific changes are shown on the markups provided in Enclosure 1. The changes identified on these markups will be incorporated into ESBWR DCD Revision 8.

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

Sincerely,

Richard E. Kingston
Vice President, ESBWR Licensing

Enclosure:

1. ESBWR DCD Chapters 16, 16B, and 19ACM Markups to Provide Staggered Testing of Flow Paths for Passive Safety Systems

cc: AE Cabbage USNRC (with enclosure)
JG Head GEH (with enclosure)
DH Hinds GEH (with enclosure)
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eDRFSection 122-9712

Enclosure 1

MFN 10-270

**ESBWR DCD Chapters 16, 16B, and 19ACM Markups to
Provide Staggered Testing of Flow Paths for Passive Safety
Systems**

SURVEILLANCE	FREQUENCY
<p>SR 3.5.2.3 -----</p> <p style="text-align: center;">- NOTE -</p> <p>Valve actuation may be excluded.</p> <p>-----</p> <p>Verify GDCS actuates on an actual or simulated automatic initiation signal.</p>	<p>24 months</p>
<p>SR 3.5.2.4 -----</p> <p style="text-align: center;">- NOTE -</p> <p>Valve actuation may be excluded.</p> <p>-----</p> <p>Verify the flow path for each GDCS injection branch line and equalizing line is not obstructed.</p>	<p>10 years<u>24 months on a STAGGERED TEST BASIS for each pair of injection branch lines</u></p>
<p><u>SR 3.5.2.5 -----</u></p> <p style="text-align: center;">- NOTE -</p> <p><u>Valve actuation may be excluded.</u></p> <p><u>-----</u></p> <p><u>Verify the flow path for each GDCS equalizing line is not obstructed.</u></p>	<p><u>24 months on a STAGGERED TEST BASIS for each equalizing line</u></p>

SURVEILLANCE	FREQUENCY
<p>SR 3.5.3.5 -----</p> <p style="text-align: center;">- NOTE -</p> <ol style="list-style-type: none"> 1. For ADS valves, only required to be met in MODE 5 and in MODE 6 prior to removal of the reactor pressure vessel head. 2. Valve actuation may be excluded. <p>-----</p> <p>Verify each required GDCS valve and ADS valve required to support relief capacity equivalent to 6 DPVs actuates on an actual or simulated automatic initiation signal.</p>	<p>24 months</p>
<p>SR 3.5.3.6 For GDCS injection branch lines and equalizing lines required to be OPERABLE. SRs 3.5.2.4 and 3.5.2.5 are applicable.</p>	<p>In accordance with applicable SRs</p>

SURVEILLANCE		FREQUENCY
SR 3.5.5.3	<p>-----</p> <p style="text-align: center;">- NOTE -</p> <p>Not required to be met for one initiator intermittently disabled under administrative controls.</p> <p>-----</p> <p>Verify continuity of two initiators associated with DC and Uninterruptible AC Electrical Power Distribution Divisions required by LCO 3.8.6, "Distribution Systems - Operating," and LCO 3.8.7, "Distribution Systems - Shutdown."</p>	31 days
SR 3.5.5.4	Verify required ICS pool subcompartment manual isolation valves are locked open.	24 months
SR 3.5.5.5	Verify ICS actuates on an actual or simulated automatic initiation signal.	24 months
SR 3.5.5.6	For ICS trains required to be OPERABLE, SR 3.5.4.6 is applicable.	In accordance with SR 3.5.4.6

SURVEILLANCE		FREQUENCY
SR 3.7.1.10	<p>-----</p> <p style="text-align: center;">- NOTES -</p> <p>1. Valve actuation may be excluded.</p> <p>2. Not required to be met in MODES 3 and 4.</p> <p>-----</p> <p>Verify each IC/PCCS expansion pool-to-equipment pool cross-connect valve actuates on an actual or simulated automatic initiation signal.</p>	24 months
SR 3.7.1.11	Perform CHANNEL CALIBRATION on each required IC/PCCS expansion pool level instrumentation channel consistent with Specification 5.5.11, "Setpoint Control Program (SCP)."	24 months
SR 3.7.1.12	Perform LOGIC SYSTEM FUNCTIONAL TEST on each required division of the IC/PCCS expansion pool-to-equipment pool cross-connect actuation logic.	24 months
SR 3.7.1.13	Verify each IC/PCCS pool subcompartment has an unobstructed path through moisture separator to the atmosphere.	10 years ⁴⁸ months on a STAGGERED TEST BASIS for the flow path associated with each moisture separator

BASES

SURVEILLANCE REQUIREMENTS (continued)

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

SR 3.5.2.4 and SR 3.5.2.5

~~This~~ SR 3.5.2.4 requires verification every ~~10 years~~ 24 months on a STAGGERED TEST BASIS that the flow path for each pair of GDCS injection branch lines, from the GDCS pool to the associated squib valve and the associated RPV injection nozzle, is not obstructed. ~~This~~ SR 3.5.2.5 ~~also~~ requires verification every ~~10 years~~ 24 months on a STAGGERED TEST BASIS that the flow path for each GDCS equalizing line, from the suppression pool to the associated squib valve and the associated RPV injection nozzle, is not obstructed. Verification that the GDCS lines and RPV nozzles are not obstructed can be performed using the GDCS line test connections and any combination of flow tests, flushing, visual inspection, or boroscopic inspection.

~~These~~ is SRs ~~is~~ are modified by a Note that excludes squib valve actuation as a requirement for ~~the~~ is SR to be met. This is acceptable because test connections allow access to both sides of the squib-actuated valves, allowing verification that the flow path is free of obstructions without actuating the squib valve.

The ~~10-year~~ Frequency for performing ~~these~~ is SRs is based on engineering judgment. This Frequency is acceptable because cleanliness controls provide a high degree of assurance that foreign material that could obstruct the GDCS lines will not be introduced into the GDCS pools, the suppression pool, or reactor vessel.

REFERENCES

1. Chapter 6.
2. Chapter 15.
3. 10 CFR 50.46.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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

[SR 3.5.3.6](#)

[SR 3.5.3.6 requires the performance of SRs 3.5.2.4 and 3.5.2.5 from LCO 3.5.2. Refer to the corresponding Bases for LCO 3.5.2 for a discussion of each SR.](#)

REFERENCES

1. Chapter 6.
 2. Chapter 15.
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BASES

SURVEILLANCE REQUIREMENTS (continued)

acceptable because the manual isolation valves between the IC/PCCS pool and the ICS subcompartments are locked open and maintained in their correct position under administrative controls.

SR 3.5.5.5

This SR requires verification every 24 months that the ICS actuates on an actual or simulated automatic initiation signal. The ICS is required to actuate automatically to perform its design function. This Surveillance test verifies that the automatic initiation logic will cause the ICS to operate as designed when a system initiation signal (actual or simulated) is received. The LOGIC SYSTEM FUNCTIONAL TEST performed in LCO 3.3.5.4 overlaps this Surveillance to provide complete testing of the assumed ICS function.

The 24-month Frequency for performing this SR is acceptable 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 SR were performed with the reactor at power.

[SR 3.5.5.6](#)

[SR 3.5.5.6 requires the performance of SR 3.5.4.6 from LCO 3.5.4. Refer to the corresponding Bases for LCO 3.5.4 for a discussion of this SR.](#)

REFERENCES

1. Section 5.4.6.
 2. NEDO-33201, ESBWR Certification Probabilistic Risk Assessment, Section 16.4.1, Revision 5, February 2010.
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BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.7.1.12

This SR requires performance of a LOGIC SYSTEM FUNCTIONAL TEST for the logic associated with automatic opening of the IC/PCCS expansion pool-to-equipment pool cross-connect valves. The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required logic for a specific division.

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 3.7.1.13

This SR requires verification ~~every 10 years~~ that each ICS and PCCS pool subcompartment has an unobstructed path for steam release through moisture separator to the atmosphere. This SR is needed to ensure that steam formed in the ICS and PCCS subcompartments will be properly vented to the atmosphere. [The Frequency of 48 months on a STAGGERED TEST BASIS for the flow path associated with each moisture separator](#) ~~The Frequency~~ is based on engineering judgment and the simplicity of the design. This Frequency is acceptable because the flow path from the ICS subcompartments to the expansions pool area and through the moisture separators will be verified whenever the ICS is used.

REFERENCES	1. Chapter 9.
	2. Chapter 5.
	3. Chapter 6.

SURVEILLANCE		FREQUENCY
ACSR 3.5.1.3	Perform CHANNEL CALIBRATION on GDCS deluge associated drywell atmosphere thermocouples and lower drywell basemat thermocouples.	24 months
ACSR 3.5.1.4	<p>-----</p> <p style="text-align: center;">- NOTE -</p> <p>Squib actuation may be excluded.</p> <p>-----</p> <p>Verify required deluge valves actuate on an actual or simulated automatic initiation signal.</p>	24 months
ACSR 3.5.1.5	Perform LOGIC SYSTEM FUNCTIONAL TEST.	24 months
ACSR 3.5.1.6	<p>-----</p> <p style="text-align: center;">- NOTE -</p> <p>Squib actuation may be excluded.</p> <p>-----</p> <p>Verify the flow path for each deluge line is not obstructed.</p>	<p>10 years <u>24 months on a STAGGERED TEST BASIS for each deluge line</u></p>

ACM B 3.5 EMERGENCY CORE COOLING SYSTEM (ECCS)

AC B 3.5.1 Gravity-Driven Cooling System (GDCS) Deluge Function

BASES

The deluge function provides a means of flooding the lower drywell region and the Basemat Internal Melt Arrest and Coolability (BiMAC) device with GDCS pool water in the event of a core melt sequence which causes failure of the lower vessel head and allows molten fuel to reach the lower drywell floor. Deluge line flow is initiated by thermocouples, which sense high lower drywell region basemat temperatures indicative of molten fuel on the lower drywell floor. Logic circuits actuate squib-type valves in the deluge lines upon detection of basemat temperatures exceeding setpoint values, provided another set of dedicated thermocouples also sense the drywell temperature to be higher than a preset value. The pyrotechnic material of the squib charge used in the deluge valve is different than what is used in the other GDCS squib valves to prevent common mode failure.

Only six of the deluge valves, and their associated instrumentation sensors and actuation logics, are required to be AVAILABLE to remove decay heat energy and the energy from zirconium-water reaction and allow for quenching of core debris. Three GDCS pools, located above the wetwell, at an elevation above the reactor core, contain the water that supports all four GDCS trains for the injection and deluge subsystems and is assured by Technical Specification LCO 3.5.2, "GDCS - Operating." Only two of these GDCS pools are required to support the availability of the six required deluge valves.

The deluge function is a nonsafety-related function that satisfies the significance criteria for Regulatory Treatment of Non-Safety Systems, and therefore requires regulatory oversight. The short-term availability controls for this function, which are specified as Completion Times, are acceptable to ensure that the availability of this function is consistent with the functional unavailability in the ESBWR PRA. The surveillance requirements also provide an adequate level of support to ensure that component performance is consistent with the functional reliability in the ESBWR PRA. [The STAGGERED TEST BASIS for each deluge line requires verification of the flow path through each of the four deluge lines and its associated three tailpipes to be alternated every 24 months so that the deluge flow path for each GDCS train is verified every 96 months.](#)