



NUCLEAR ENERGY INSTITUTE

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March 12, 1998

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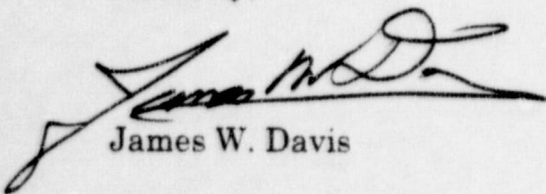
**PROJECT NUMBER: 689**

Dear Dr. Beckner:

Enclosed is a proposed change to the Improved Technical Specification NUREGs,  
NEI Technical Specification Task Force (TSTF) traveler number TSTF-254, Rev. 0.

Please contact me at (202) 739-8105 if you have any questions or need to meet with  
industry experts on this recommended change.

Sincerely,



James W. Davis

JVG/rs  
Enclosure

~~c. Deborah L. Johnson~~

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PDR NUREG  
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PROJ 689

AD69

## Industry/TSTF Standard Technical Specification Change Traveler

**Delete accumulated water checks for DG fuel oil.**

Priority/Classification 2) Consistency/Standardization

NUREGs Affected: ☒ 1430 ☒ 1431 ☒ 1432 ☒ 1433 ☒ 1434

Description:

Delete SR 3.8.1.5 and SR 3.8.3.5 and renumber subsequent SRs and correct references to SR numbers.

Justification:

SR 3.8.1.5 & SR 3.8.3.5 are deleted since their inclusion is inconsistent with the remainder of the NUREG (and the philosophy of 10 CFR 50.36 as revised to incorporate the Policy Statement) which does not include "preventive maintenance" requirements. The Bases for each of these SRs indicates that they are "preventive maintenance" requirements and that their failure does not necessarily mean that the equipment is not OPERABLE. Therefore, they are not appropriate as SRs, since SR 3.0.1 indicates that failure to meet an SR is failure to meet the LCO. The safety analyses do not specifically address these requirements and they are not necessary to assure the equipment's capability to perform its respective safety function. The preventive maintenance program, along with the Diesel Generator Fuel Oil Testing Program and the routine start testing of the DGs, will adequately identify detrimental fuel oil parameters. Therefore, providing additional surveillances is an unnecessary deviation from the normal scope of TSs, and these SRs should be omitted.

### Revision History

**OG Revision 0**

**Revision Status: Active**

**Next Action: NRC**

Revision Proposed by: ANO-1

Revision Description:

Original Issue

### Owners Group Review Information

Date Originated by OG: 17-Mar-97

Owners Group Comments

ANO-1-037

Owners Group Resolution: Approved Date: 22-Aug-97

### TSTF Review Information

TSTF Received Date: 06-Nov-97

Date Distributed for Review 15-Dec-97

OG Review Completed: ☒ BWOG ☒ WOG ☒ CEOG ☒ BWROJ

TSTF Comments:

All 3.8.1 SRs subsequent to 3.8.1.5 and 3.8.3.5 must be renumbered (including the Bases and all cross-references).

Applicable to all.

TSTF Resolution: Approved Date: 05-Feb-98

### Incorporation Into the NUREGs

File to BBS/LAN Date:

TSTF Informed Date:

TSTF Approved Date:

2/26/98

NUREG Rev Incorporated:

**Affected Technical Specifications**

SR 3.8.1.2	AC Sources - Operating
SR 3.8.1.2 Bases	AC Sources - Operating
SR 3.8.1.3	AC Sources - Operating
SR 3.8.1.3 Bases	AC Sources - Operating
SR 3.8.1.5	AC Sources - Operating Change Description: Deleted
SR 3.8.1.5 Bases	AC Sources - Operating Change Description: Deleted
SR 3.8.1.6	AC Sources - Operating Change Description: Relabeled SR 3.8.1.5
SR 3.8.1.6 Bases	AC Sources - Operating Change Description: Relabeled SR 3.8.1.5
SR 3.8.1.7	AC Sources - Operating Change Description: Relabeled SR 3.8.1.6
SR 3.8.1.7 Bases	AC Sources - Operating Change Description: Relabeled SR 3.8.1.6
SR 3.8.1.8	AC Sources - Operating Change Description: Relabeled SR 3.8.1.7
SR 3.8.1.8 Bases	AC Sources - Operating Change Description: Relabeled SR 3.8.1.7
SR 3.8.1.9	AC Sources - Operating Change Description: Relabeled SR 3.8.1.8
SR 3.8.1.9 Bases	AC Sources - Operating Change Description: Relabeled SR 3.8.1.8
SR 3.8.1.10	AC Sources - Operating Change Description: Relabeled SR 3.8.1.9
SR 3.8.1.10 Bases	AC Sources - Operating Change Description: Relabeled SR 3.8.1.9
SR 3.8.1.11	AC Sources - Operating Change Description: Relabeled SR 3.8.1.10
SR 3.8.1.11 Bases	AC Sources - Operating Change Description: Relabeled SR 3.8.1.10

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SR 3.8.1.12	AC Sources - Operating
	Change Description: Relabeled SR 3.8.1.11
SR 3.8.1.12 Bases	AC Sources - Operating
	Change Description: Relabeled SR 3.8.1.11
SR 3.8.1.13	AC Sources - Operating
	Change Description: Relabeled SR 3.8.1.12
SR 3.8.1.13 Bases	AC Sources - Operating
	Change Description: Relabeled SR 3.8.1.12
SR 3.8.1.14	AC Sources - Operating
	Change Description: Relabeled SR 3.8.1.13
SR 3.8.1.14 Bases	AC Sources - Operating
	Change Description: Relabeled SR 3.8.1.13
SR 3.8.1.15	AC Sources - Operating
	Change Description: Relabeled SR 3.8.1.14
SR 3.8.1.15 Bases	AC Sources - Operating
	Change Description: Relabeled SR 3.8.1.14
SR 3.8.1.16	AC Sources - Operating
	Change Description: Relabeled SR 3.8.1.15
SR 3.8.1.16 Bases	AC Sources - Operating
	Change Description: Relabeled SR 3.8.1.15
SR 3.8.1.17	AC Sources - Operating
	Change Description: Relabeled SR 3.8.1.16
SR 3.8.1.17 Bases	AC Sources - Operating
	Change Description: Relabeled SR 3.8.1.16
SR 3.8.1.18	AC Sources - Operating
	Change Description: Relabeled SR 3.8.1.17
SR 3.8.1.18 Bases	AC Sources - Operating
	Change Description: Relabeled SR 3.8.1.17
SR 3.8.1.19	AC Sources - Operating
	Change Description: Relabeled SR 3.8.1.18
SR 3.8.1.19 Bases	AC Sources - Operating
	Change Description: Relabeled SR 3.8.1.18
SR 3.8.1.20	AC Sources - Operating
	Change Description: Relabeled SR 3.8.1.19
SR 3.8.1.20 Bases	AC Sources - Operating
	Change Description: Relabeled SR 3.8.1.19
SR 3.8.2.1	AC Sources - Shutdown

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SR 3.8.2.1 Bases	AC Sources - Shutdown	
SR 3.8.3.5	Diesel Fuel Oil, Lube Oil, and Starting Air	
	Change Description:	Deleted
SR 3.8.3.5 Bases	Diesel Fuel Oil, Lube Oil, and Starting Air	
	Change Description:	Deleted
SR 3.8.3.6	Diesel Fuel Oil, Lube Oil, and Starting Air	
	Change Description:	Relabeled SR 3.9.3.5
SR 3.8.3.6 Bases	Diesel Fuel Oil, Lube Oil, and Starting Air	
	Change Description:	Relabeled SR 3.8.3.5
Action 3.8.3.C Bases	Diesel Fuel Oil, Lube Oil, and Starting Air	NUREG(s)- 1430 1431 1432 Only

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SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.8.1.1    Verify correct breaker alignment and indicated power availability for each [required] offsite circuit.	7 days
<div> <div> <div>SR 3.8.1.2</div> <div> <p>-----NOTES-----</p> <ol style="list-style-type: none"> <li>Performance of SR 3.8.1 satisfies this SR.</li> <li>All DG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading.</li> <li>A modified DG start involving idling and gradual acceleration to synchronous speed may be used for this SR as recommended by the manufacturer. When modified start procedures are not used, the time, voltage, and frequency tolerances of SR 3.8.1 must be met.</li> </ol> </div> </div> <div> <p>Verify each DG starts from standby conditions and achieves steady state voltage <math>\geq</math> [3740] V and <math>\leq</math> [4580] V, and frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz.</p> </div> </div>	<p>As specified in Table 3.8.1-1</p>

(continued)

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## SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.3 -----NOTES-----</p> <ol style="list-style-type: none"><li>1. DG loadings may include gradual loading as recommended by the manufacturer.</li><li>2. Momentary transients outside the load range do not invalidate this test.</li><li>3. This Surveillance shall be conducted on only one DG at a time.</li><li>4. This SR shall be preceded by and immediately follow, without shutdown, a successful performance of SR 3.8.1.2 or SR 3.8.1.1. <sup>5</sup></li></ol> <p>Verify each DG is synchronized and loaded and operates for <math>\geq 60</math> minutes at a load <math>\geq [4500]</math> kW and <math>\leq [5000]</math> kW.</p>	As specified in Table 3.8.1-1
SR 3.8.1.4 Verify each day tank [and engine mounted tank] contains $\geq [220]$ gal of fuel oil.	31 days
<del>SR 3.8.1.5 Check for and remove accumulated water from each day tank [and engine mounted tank].</del>	<del>[31] days</del>
SR 3.8.1.1 <sup>5</sup> Verify the fuel oil transfer system operates to [automatically] transfer fuel oil from storage tank[s] to the day tank [and engine mounted tank].	[92] days

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.⑥ -----NOTE-----  All DG starts may be preceded by an engine  prelube period.</p> <p>Verify each DG starts from standby  condition and achieves, in <math>\leq [10]</math> seconds,  voltage <math>\geq [3740]</math> V and <math>\leq [4580]</math> V, and  frequency <math>\geq [58.8]</math> Hz and <math>\leq [61.2]</math> Hz.</p>	<p>184 days</p>
<p>SR 3.8.1.⑦ -----NOTE-----  This Surveillance shall not be  performed in MODE 1 or 2. However,  credit may be taken for unplanned  events that satisfy this SR.</p> <p>Verify [automatic [and] manual] transfer  of AC power sources from the normal offsite  circuit to each alternate [required]  offsite circuit.</p>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.8</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</li> <li>2. If performed with the DG synchronized with offsite power, it shall be performed at a power factor <math>\leq</math> [0.9].</li> </ol> <p style="text-align: center;">-----</p> </div> <p>Verify each DG rejects a load greater than or equal to its associated single largest post-accident load, and:</p> <ol style="list-style-type: none"> <li>a. Following load rejection, the frequency is <math>\leq</math> [63] Hz;</li> <li>b. Within [3] seconds following load rejection, the voltage is <math>\geq</math> [3740] V and <math>\leq</math> [4580] V; and</li> <li>c. Within [3] seconds following load rejection, the frequency is <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz.</li> </ol>	<p>[18 months]</p>
<p>SR 3.8.1.10</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">-----NOTE-----</p> <p>This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</p> <p style="text-align: center;">-----</p> </div> <p>Verify each DG operating at a power factor <math>\leq</math> [0.9] does not trip, and voltage is maintained <math>\leq</math> [5000] V during and following a load rejection of <math>\geq</math> [4500] kW and <math>\leq</math> [5000] kW.</p>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.11 <sup>10</sup></p> <p>-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. All DG starts may be preceded by an engine prelube period.</li> <li>2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR.</li> </ol> <p>-----</p> <p>Verify on an actual or simulated loss of offsite power signal:</p> <ol style="list-style-type: none"> <li>a. De-energization of emergency buses;</li> <li>b. Load shedding from emergency buses; and</li> <li>c. DG auto-starts from standby condition and:               <ol style="list-style-type: none"> <li>1. energizes permanently connected loads in <math>\leq</math> [10] seconds,</li> <li>2. energizes auto-connected shutdown load through [automatic load sequencer],</li> <li>3. maintains steady-state voltage <math>\geq</math> [3740] V and <math>\leq</math> [4580] V,</li> <li>4. maintains steady-state frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz, and</li> <li>5. supplies permanently connected and auto-connected shutdown loads for <math>\geq</math> 5 minutes.</li> </ol> </li> </ol>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.12</p> <p>-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. All DG starts may be preceded by an engine prelube period.</li> <li>2. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</li> </ol> <p>-----</p> <p>Verify on an actual or simulated [Engineered Safety Feature (ESF)] actuation signal each DG auto-starts from standby condition and:</p> <ol style="list-style-type: none"> <li>a. In <math>\leq</math> [12] seconds after auto-start and during tests, achieves voltage <math>\geq</math> [3740] V and <math>\leq</math> [4580] V;</li> <li>b. In <math>\leq</math> [12] seconds after auto-start and during tests, achieves frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz;</li> <li>c. Operates for <math>\geq</math> 5 minutes;</li> <li>d. Permanently connected loads remain energized from the offsite power system; and</li> <li>e. Emergency loads are energized [or auto-connected through the automatic load sequencer] from the offsite power system.</li> </ol>	<p>[18 months]</p>

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.12</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">-----NOTE-----</p> <p>This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</p> <p style="text-align: center;">-----</p> </div> <p>Verify each DG automatic trip is bypassed on [actual or simulated loss of voltage signal on the emergency bus concurrent with an actual or simulated ESF actuation signal] except:</p> <ul style="list-style-type: none"> <li>a. Engine overspeed; [and]</li> <li>b. Generator differential current[;</li> <li>c. Low lube oil pressure;</li> <li>d. High crankcase pressure; and</li> <li>e. Start failure relay].</li> </ul>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.14 13</p> <p>-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. Momentary transients outside the load and power factor ranges do not invalidate this test.</li> <li>2. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</li> </ol> <p>-----</p> <p>Verify each DG operating at a power factor <math>\leq [0.9]</math> operates for <math>\geq 24</math> hours:</p> <ol style="list-style-type: none"> <li>a. For <math>\geq [2]</math> hours loaded <math>\geq [5250]</math> kW and <math>\leq [6000]</math> kW; and</li> <li>b. For the remaining hours of the test loaded <math>\geq [4500]</math> kW and <math>\leq [5000]</math> kW.</li> </ol>	<p>[18 months]</p>
<p>SR 3.8.1.15 14</p> <p>-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. This Surveillance shall be performed within 5 minutes of shutting down the DG after the DG has operated <math>\geq [2]</math> hours loaded <math>\geq [4500]</math> kW and <math>\leq [5000]</math> kW.</li> </ol> <p>Momentary transients outside of load range do not invalidate this test.</p> <ol style="list-style-type: none"> <li>2. All DG starts may be preceded by an engine prelube period.</li> </ol> <p>-----</p> <p>Verify each DG starts and achieves, in <math>\leq [10]</math> seconds, voltage <math>\geq [3740]</math> V and <math>\leq [4580]</math> V, and frequency <math>\geq [58.8]</math> Hz and <math>\leq [61.2]</math> Hz.</p>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.15</p> <p>-----NOTE----- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR.</p> <p>Verify each DG:</p> <ul style="list-style-type: none"> <li>a. Synchronizes with offsite power source while loaded with emergency loads upon a simulated restoration of offsite power;</li> <li>b. Transfers loads to offsite power source; and</li> <li>c. Returns to ready-to-load operation.</li> </ul>	<p>[18 months]</p>
<p>SR 3.8.1.16</p> <p>-----NOTE----- This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR.</p> <p>Verify, with a DG operating in test mode and connected to its bus, an actual or simulated ESF actuation signal overrides the test mode by:</p> <ul style="list-style-type: none"> <li>a. Returning DG to ready-to-load operation[; and</li> <li>b. Automatically energizing the emergency load from offsite power].</li> </ul>	<p>[18 months]</p>

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.18  <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <div style="text-align: center;">-----NOTE-----</div> <p>This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR.</p> </div> <p>Verify interval between each sequenced load block is within <math>\pm</math> [10% of design interval] for each emergency [and shutdown] load sequencer.</p> </p>	<p>[18 months]</p>

(continued)

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## SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.18 18</p> <p>-----NOTES-----</p> <ol style="list-style-type: none"><li>1. All DG starts may be preceded by an engine prelube period.</li><li>2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR.</li></ol> <p>-----</p> <p>Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated ESF actuation signal:</p> <ol style="list-style-type: none"><li>a. De-energization of emergency buses;</li><li>b. Load shedding from emergency buses;</li><li>c. DG auto-starts from standby condition and:<ol style="list-style-type: none"><li>1. energizes permanently connected loads in <math>\leq</math> [10] seconds,</li><li>2. energizes auto-connected emergency loads through [load sequencer],</li><li>3. achieves steady-state voltage <math>\geq</math> [3740] V and <math>\leq</math> [4580] V,</li><li>4. achieves steady-state frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz, and</li><li>5. supplies permanently connected and auto-connected emergency loads for <math>\geq</math> [5] minutes.</li></ol></li></ol>	<p>[18 months]</p>

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.20  <div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center; margin-left: 10px;">19</div> <div style="margin-left: 10px;"> <p>-----NOTE-----</p> <p>All DG starts may be preceded by an engine prelube period.</p> <p>-----</p> <p>Verify, when started simultaneously from standby condition, each DG achieves, in <math>\leq [10]</math> seconds, voltage <math>\geq [3740]</math> V and <math>\leq [4580]</math> V, and frequency <math>\geq [58.8]</math> Hz and <math>\leq [61.2]</math> Hz.</p> </div> </p>	<p>10 years</p>

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SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.2.1</p> <p>-----NOTE-----</p> <p>The following SRs are not required to be performed: SR 3.8.1.3, SR 3.8.1.7 through SR 3.8.1.11, SR 3.8.1.13 through SR 3.8.1.16, [SR 3.8.1.18,] and SR 3.8.1.19.</p> <p>For AC sources required to be OPERABLE, the SRs of Specification 3.8.1, "AC Sources—Operating," except SR 3.8.1.6, SR 3.8.1.17, and SR 3.8.1.20, are applicable.</p>	<p>In accordance with applicable SRs</p>

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.3.2 Verify lube oil inventory is $\geq$ [500] gal.	31 days
SR 3.8.3.3 Verify fuel oil properties of new and stored fuel oil are tested in accordance with, and maintained within the limits of, the Diesel Fuel Oil Testing Program.	In accordance with the Diesel Fuel Oil Testing Program
SR 3.8.3.4 Verify each DG air start receiver pressure is $\geq$ [C25] psig.	31 days
<del>SR 3.8.3.5 Check for and remove accumulated water from each fuel oil storage tank.</del>	<del>[31] days</del>
SR 3.8.3.6 For each fuel oil storage tank: a. Drain the fuel oil; b. Remove the sediment; and c. Clean the tank.	10 years

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BASES

SURVEILLANCE  
REQUIREMENTS  
(continued)

Where the SRs discussed herein specify voltage and frequency tolerances, the following is applicable. The minimum steady state output voltage of [3740] V is 90% of the nominal 4160 V output voltage. This value, which is specified in ANSI C84.1 (Ref. 11), allows for voltage drop to the terminals of 4000 V motors whose minimum operating voltage is specified as 90% or 3600 V. It also allows for voltage drops to motors and other equipment down through the 120 V level where minimum operating voltage is also usually specified as 90% of name plate rating. The specified maximum steady state output voltage of [4756] V is equal to the maximum operating voltage specified for 4000 V motors. It ensures that for a lightly loaded distribution system, the voltage at the terminals of 4000 V motors is no more than the maximum rated operating voltages. The specified minimum and maximum frequencies of the DG are 58.8 Hz and 61.2 Hz, respectively. These values are equal to  $\pm 2\%$  of the 60 Hz nominal frequency and are derived from the recommendations given in Regulatory Guide 1.9 (Ref. 3).

SR 3.8.1.1

This SR ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. The breaker alignment verifies that each breaker is in its correct position to ensure that distribution buses and loads are connected to their preferred power source, and that appropriate independence of offsite circuits is maintained. The 7 day Frequency is adequate since breaker position is not likely to change without the operator being aware of it and because its status is displayed in the control room.

SR 3.8.1.2 and SR 3.8.1.6

These SRs help to ensure the availability of the standby electrical power supply to mitigate DBAs and transients and to maintain the unit in a safe shutdown condition.

To minimize the wear on moving parts that do not get lubricated when the engine is not running, these SRs are modified by a Note (Note 2 for SR 3.8.1.2) to indicate that all DG starts for these Surveillances may be preceded an

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BASES

SURVEILLANCE  
REQUIREMENTS

SR 3.8.1.2 and SR 3.8.1.1<sup>6</sup> (continued)

engine prelube period and followed by a warmup period prior to loading by an engine prelube period.

For the purposes of SR 3.8.1.2 and SR 3.8.1.1<sup>6</sup> testing, the DGs are started from standby conditions. Standby conditions for a DG means that the diesel engine coolant and oil are being continuously circulated and temperature is being maintained consistent with manufacturer recommendations.

In order to reduce stress and wear on diesel engines, some manufacturers recommend a modified start in which the starting speed of DGs is limited, warmup is limited to this lower speed, and the DGs are gradually accelerated to synchronous speed prior to loading. This is the intent of Note 3, which is only applicable when such modified start procedures are recommended by the manufacturer.

SR 3.8.1.1<sup>6</sup> requires that, at a 184 day Frequency, the DG starts from standby conditions and achieves required voltage and frequency within 10 seconds. The 10 second start requirement supports the assumptions of the design basis LOCA analysis in the FSAR, Chapter [15] (Ref. 5).

The 10 second start requirement is not applicable to SR 3.8.1.2 (see Note 3) when a modified start procedure as described above is used. If a modified start is not used, the 10 second start requirement of SR 3.8.1.1<sup>6</sup> applies.

Since SR 3.8.1.1<sup>6</sup> requires a 10 second start, it is more restrictive than SR 3.8.1.2, and it may be performed in lieu of SR 3.8.1.2. This is the intent of Note 1 of SR 3.8.1.2.

The normal 31 day Frequency for SR 3.8.1.2 (see Table 3.8.1-1, "Diesel Generator Test Schedule," in the accompanying LCO) is consistent with Regulatory Guide 1.9 (Ref. 3). The 184 day Frequency for SR 3.8.1.1<sup>6</sup> is a reduction in cold testing consistent with Generic Letter 84-15 (Ref. 7). These Frequencies provide adequate assurance of DG OPERABILITY, while minimizing degradation resulting from testing.

(continued)

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SR 3.8.1.4 (continued)

selected to ensure adequate fuel oil for a minimum of 1 hour of DG operation at full load plus 10%.

The 31 day Frequency is adequate to assure that a sufficient supply of fuel oil is available, since low level alarms are provided and unit operators would be aware of any large uses of fuel oil during this period.

SR 3.8.1.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel oil day [and engine mounted] tanks once every [31] days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and from breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref. 10). This SR is for preventive maintenance. The presence of water does not necessarily represent failure of this SR, provided the accumulated water is removed during the performance of this Surveillance.

SR 3.8.1.6 (5)

This Surveillance demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from its associated storage tank to its associated day tank. This is required to support continuous operation of standby power sources. This Surveillance provides assurance that the fuel oil transfer pump is OPERABLE, the fuel oil piping system is intact, the fuel delivery piping is not obstructed, and the controls and control systems for automatic fuel transfer systems are OPERABLE.

(continued)

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SR 3.8.1.5 (continued)

The Frequency for this SR is variable, depending on individual system design, with up to a [92] day interval. The [92] day Frequency corresponds to the testing requirements for pumps as contained in the ASME Section XI (Ref. 12); however, the design of fuel transfer systems is such that pumps will operate automatically or must be started manually in order to maintain an adequate volume of fuel oil in the day [and engine mounted] tanks during or following DG testing. In such a case, a 31 day Frequency is appropriate. Since proper operation of fuel transfer systems is an inherent part of DC OPERABILITY, the Frequency of this SR should be modified to reflect individual designs.

SR 3.8.1.6

See SR 3.8.1.2.

SR 3.8.1.7

Transfer of each [4.16 kV ESF bus] power supply from the normal offsite circuit to the alternate offsite circuit demonstrates the OPERABILITY of the alternate circuit distribution network to power the shutdown loads. The [18 month] Frequency of the Surveillance is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the [18 month] Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

This SR is modified by a Note. The reason for the Note is that during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Credit may be taken for unplanned events that satisfy this SR.

(continued)

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(continued)

SR 3.8.1.1 <sup>⑧</sup>

Each DG is provided with an engine overspeed trip to prevent damage to the engine. Recovery from the transient caused by the loss of a large load could cause diesel engine overspeed, which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the DG load response characteristics and capability to reject the largest single load without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. For the CR-3 emergency DGs, the largest single load is 616 kW (HPI pump). After performance of SR 3.8.1.1 <sup>⑧</sup>, the diesel load is reduced to approximately 1200 kW and allowed to run at this load for 3 to 5 minutes. The load is then reduced to  $\geq 616$  kW and the DGs output breaker is opened. Verification that the DG did not trip is made. This Surveillance may be accomplished by:

- a. Tripping the DG output breaker with the DG carrying greater than or equal to its associated single largest post-accident load while paralleled to offsite power, or while solely supplying the bus; or
- b. Tripping its associated single largest post-accident load with the DG solely supplying the bus.

As required by IEEE-308 (Ref. 13), the load rejection test is acceptable if the increase in diesel speed does not exceed 75% of the difference between synchronous speed and the overspeed trip setpoint, or 15% above synchronous speed, whichever is lower.

The time, voltage, and frequency tolerances specified in this SR are derived from Regulatory Guide 1.9 (Ref. 3) recommendations for response during load sequence intervals. The [3] seconds specified is equal to 60% of a typical 5 second load sequence interval associated with sequencing of the largest load. The voltage and frequency specified are consistent with the design range of the equipment powered by the DG. SR 3.8.1.1 <sup>⑧</sup> a corresponds to the maximum frequency excursion, while SR 3.8.1.1 <sup>⑧</sup> b and SR 3.8.1.1 <sup>⑧</sup> c are steady state voltage and frequency values to which the system must recover to following load rejection. The [18 month] Frequency is consistent with the recommendation of Regulatory Guide 1.108 (Ref. 9).

(continued)

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SR 3.8.1.9 (continued)

This SR is modified by a Note. The reason for the Note is that during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Credit may be taken for unplanned events that satisfy this SR. In order to ensure that the DG is tested under load conditions that are as close to design basis conditions as possible, Note 2 requires that, if synchronized to offsite power, testing must be performed using a power factor  $\leq [0.9]$ . This power factor is chosen to be representative of the actual design basis inductive loading that the DG would experience.

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

- a. Performance of the SR will not render any safety system or component inoperable;
- b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and
- c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

SR 3.8.1.10

This Surveillance demonstrates the DG capability to reject a full load without overspeed tripping or exceeding the predetermined voltage limits. The DG full load rejection may occur because of a system fault or inadvertent breaker tripping. This Surveillance ensures proper engine generator load response under the simulated test conditions. This test simulates the loss of the total connected load that the DG experiences following a full load rejection and verifies that the DG will not trip upon loss of the load. These

(continued)

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SR 3.8.1.10<sup>9</sup> (continued)

acceptance criteria provide DG damage protection. While the DG is not expected to experience this transient during an event and continues to be available, this response ensures that the DG is not degraded for future application, including reconnection to the bus if the trip initiator can be corrected or isolated.

In order to ensure that the DG is tested under load conditions that are as close to design basis conditions as possible, testing must be performed using a power factor  $\leq [0.9]$ . This power factor is chosen to be representative of the actual design basis inductive loading that the DG would experience.

The [18 month] Frequency is consistent with the recommendation of Regulatory Guide 1.108 (Ref. 9) and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that during operation with the reactor critical, performance of this SR could cause perturbation to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems.

Credit may be taken for unplanned events that satisfy this SR.

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

- a. Performance of the SR will not render any safety system or component inoperable;
- b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and
- c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

(continued)

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(continued)

SR 3.8.1.10

As required by Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(1), this Surveillance demonstrates the as designed operation of the standby power sources during loss of the offsite source. This test verifies all actions encountered from the loss of offsite power, including shedding of the non-essential loads and energization of the emergency buses and respective loads from the DG. It further demonstrates the capability of the DG to automatically achieve the required voltage and frequency within the specified time.

The DG auto-start time of [10] seconds is derived from requirements of the accident analysis to respond to a design basis large break LOCA. The Surveillance should be continued for a minimum of 5 minutes in order to demonstrate that all starting transients have decayed and stability has been achieved.

The requirement to verify the connection and power supply of permanent and auto-connected loads is intended to satisfactorily show the relationship of these loads to the DG loading logic. In certain circumstances, many of these loads can not actually be connected or loaded without undue hardship or potential for undesired operation. For instance, Emergency Core Cooling Systems (ECCS) injection valves are not desired to be stroked open, high pressure injection systems are not capable of being operated at full flow, or decay heat removal (DHR) systems performing a DHR function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(1), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

(continued)

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SR 3.8.1.10 (continued)

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations. The reason for Note 2 is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.11

This Surveillance demonstrates that the DG automatically starts and achieves the required voltage and frequency within the specified time ([10] seconds) from the design basis actuation signal (LOCA signal) and operates for  $\geq 5$  minutes. The 5 minute period provides sufficient time to demonstrate stability. SR 3.8.1.10.d and SR 3.8.1.10.e ensure that permanently connected loads and emergency loads are energized from the offsite electrical power system on an ESF signal without loss of offsite power.

The requirement to verify the connection of permanent and auto-connected loads is intended to satisfactorily show the relationship of these loads to the DG loading logic. In certain circumstances, many of these loads can not actually be connected or loaded without undue hardship or potential for undesired operation. For instance, ECCS injection valves are not desired to be stroked open, high pressure injection systems are not capable of being operated at full flow, or DHR systems performing a DHR function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

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## SR 3.8.1.12 (continued)

The Frequency of [18 months] takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with the expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the [18 month] Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations. The reason for Note 2 is that during operation with the reactor critical, performance of this Surveillance could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Credit may be taken for unplanned events that satisfy this SR.

## SR 3.8.1.13 (12)

This Surveillance demonstrates that DG noncritical protective functions (e.g., high jacket water temperature) are bypassed on a loss of voltage signal concurrent with an ESF actuation test signal, and critical protective functions (engine overspeed, generator differential current[, low lube oil pressure, high crankcase pressure, and start failure relay]) trip the DG to avert substantial damage to the DG unit. The noncritical trips are bypassed during DBAs and provide an alarm on an abnormal engine condition. This alarm provides the operator with sufficient time to react appropriately. The DG availability to mitigate the DBA is more critical than protecting the engine against minor problems that are not immediately detrimental to emergency operation of the DG.

The [18 month] Frequency is based on engineering judgment, taking into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has

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SR 3.8.1.13<sup>(12)</sup> (continued)

shown that these components usually pass the SR when performed at the [18 month] Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

The SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required DG from service. Credit may be taken for unplanned events that satisfy this SR.

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

- a. Performance of the SR will not render any safety system or component inoperable;
- b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and
- c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

SR 3.8.1.14<sup>(13)</sup>

Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(3), requires demonstration once per 18 months that the DGs can start and run continuously at full load capability for an interval of not less than 24 hours,  $\geq$  [2] hours of which is at a load equivalent to 110% of the continuous duty rating and the remainder of the time at a load equivalent to the continuous duty rating of the DG. The DG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for prelubricating and warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are applicable to this SR.

(continued)

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SR 3.8.1.14<sup>(13)</sup> (continued)

In order to ensure that the DG is tested under load conditions that are as close to design conditions as possible, testing must be performed using a power factor of  $\leq [0.9]$ . This power factor is chosen to be representative of the actual design basis inductive loading that the DG would experience. The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections, in accordance with vendor recommendations, in order to maintain DG OPERABILITY.

The [18 month] Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 7), paragraph 2.a.(3), takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with expected fuel cycle lengths.

This Surveillance is modified by two Notes. Note 1 states that momentary transients due to changing bus loads do not invalidate this test. Similarly, momentary power factor transients above the power factor limit will not invalidate the test. The reason for Note 2 is that during operation with the reactor critical, performance of this Surveillance could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.15<sup>(14)</sup>

This Surveillance demonstrates that the diesel engine can restart from a hot condition, such as subsequent to shutdown from normal Surveillances, and achieve the required voltage and frequency within [10 seconds]. The [10 second] time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The [18 month] Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(5).

This SR is modified by two Notes. Note 1 ensures that the test is performed with the diesel sufficiently hot. The load band is provided to avoid routine overloading of the DG. Routine overloads may result in more frequent teardown

(continued)

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SR 3.8.1.14 (continued)

inspections, in accordance with vendor recommendations, in order to maintain DG OPERABILITY. The requirement that the diesel has operated for at least [2] hours at full load conditions prior to performance of this Surveillance is based on manufacturer recommendations for achieving hot conditions. Momentary transients due to changing bus loads do not invalidate this test. Note 2 allows all DG starts to be preceded by an engine prelube period to minimize wear and tear on the diesel during testing.

SR 3.8.1.15

As required by Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(6), this Surveillance ensures that the manual synchronization and automatic load transfer from the DG to the offsite source can be made and the DG can be returned to ready to load status when offsite power is restored. It also ensures that the auto-start logic is reset to allow the DG to reload if a subsequent loss of offsite power occurs. The DG is considered to be in ready to load status when the DG is at rated speed and voltage, the output breaker is open and can receive and auto-close signal on bus undervoltage, and the load sequence timers are reset.

The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(6), and takes into consideration unit conditions required to perform the Surveillance.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.16

Demonstration of the test mode override ensures that the DG availability under accident conditions will not be compromised as the result of testing and the DG will automatically reset to ready to load operation if a LOCA actuation signal is received during operation in the test

(continued)

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SR 3.8.1.17 (continued)

mode. Ready to load operation is defined as the DG running at rated speed and voltage with the DG output breaker open. These provisions for automatic switchover are required by IEEE-308 (Ref. 13), paragraph 6.2.6(2).

The requirement to automatically energize the emergency loads with offsite power is essentially identical to that of SR 3.8.1.12. The intent in the requirement associated with SR 3.8.1.12.b is to show that the emergency loading was not affected by the DG operation in test mode. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the emergency loads to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The [18 month] Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(8), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.18 (17)

Under accident [and loss of offsite power] conditions loads are sequentially connected to the bus by the [automatic load sequencer]. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading of the DGs due to high motor starting currents. The [10]% load sequence time interval tolerance ensures that sufficient time exists for the DG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. Reference 2 provides a summary of the automatic loading of ESF buses.

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SR 3.8.1.18 (continued)

The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(2), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

- a. Performance of the SR will not render any safety system or component inoperable;
- b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and
- c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

SR 3.8.1.19

In the event of a DBA coincident with a loss of offsite power, the DGs are required to supply the necessary power to ESF systems so that the fuel, RCS, and containment design limits are not exceeded.

This Surveillance demonstrates the DG operation, as discussed in the Bases for SR 3.8.1.12, during a loss of offsite power actuation test signal in conjunction with an ESF actuation signal. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG system to perform these

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SURVEILLANCE  
REQUIREMENTS

SR 3.8.1.18<sup>18</sup> (continued)

functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of [18 months] takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with an expected fuel cycle length of [18 months].

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations for DGs. The reason for Note 2 is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.20<sup>19</sup>

This Surveillance demonstrates that the DG starting independence has not been compromised. Also, this Surveillance demonstrates that each engine can achieve proper speed within the specified time when the DGs are started simultaneously.

The 10 year Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9).

This SR is modified by a Note. The reason for the Note is to minimize wear on the DG during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated, and temperature maintained consistent with manufacturer recommendations.

(continued)

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BASES

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ACTIONS

A.2.1, A.2.2, A.2.3, A.2.4, B.1, B.2, B.3, and B.4  
(continued)

power sources is not available. It is, therefore, required to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies, and operations involving positive reactivity additions. The Required Action to suspend positive reactivity additions does not preclude actions to maintain or increase reactor vessel inventory provided the required SDM is maintained.

Suspension of these activities does not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability or the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC sources and to continue this action until restoration is accomplished in order to provide the necessary AC power to the unit safety systems.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required AC electrical power sources should be completed as quickly as possible in order to minimize the time during which the unit safety systems may be without sufficient power.

Pursuant to LCO 3.0.6, the Distribution System's ACTIONS are not entered even if all AC sources to it are inoperable, resulting in de-energization. Therefore, the Required Actions of Condition A are modified by a Note to indicate that when Condition A is entered with no AC power to any required ESF bus, the ACTIONS for LCO 3.8.10 must be immediately entered. This Note allows Condition A to provide requirements for the loss of the offsite circuit, whether or not a train is de-energized. LCO 3.8.10 provides the appropriate restrictions for the situation involving a de-energized train.

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SURVEILLANCE  
REQUIREMENTS

SR 3.8.2.1

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the AC sources in other than MODES 1, 2, 3, and 4. SR 3.8.1.2 is not required

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(continued)

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REQUIREMENTS

SR 3.8.2.1 (continued)

to be met since only one offsite circuit is required to be OPERABLE. SR 3.8.1.6 is not required to be met because the required OPERABLE DG(s) is not required to undergo periods of being synchronized to the offsite circuit. SR 3.8.1.8 is excepted because starting independence is not required with the DG(s) that is not required to be OPERABLE.

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DG(s) from being paralleled with the offsite power network or otherwise rendered inoperable during performance of SRs, and to preclude deenergizing a required 4160 V ESF bus or disconnecting a required offsite circuit during performance of SRs. With limited AC sources available, a single event could compromise both the required circuit and the DG. It is the intent that these SRs must still be capable of being met, but actual performance is not required during periods when the DG and offsite circuit is required to be OPERABLE. Refer to the corresponding Bases for LCO 3.8.1 for a discussion of each SR.

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REFERENCES

None.

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ACTIONS

B.1 (continued)

of the required volume prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> 6 days), the low rate of usage, the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

C.1

This Condition is entered as a result of a failure to meet the acceptance criterion of SR 3.8.3.4. Normally, trending of particulate levels allows sufficient time to correct high particulate levels prior to reaching the limit of acceptability. Poor sample procedures (bottom sampling), contaminated sampling equipment, and errors in laboratory analysis can produce failures that do not follow a trend. Since the presence of particulates does not mean failure of the fuel oil to burn properly in the diesel engine, particulate concentration is unlikely to change significantly between Surveillance Frequency intervals, and proper engine performance has been recently demonstrated (within 31 days), it is prudent to allow a brief period prior to declaring the associated DG inoperable. The 7 day Completion Time allows for further evaluation, resampling, and re-analysis of the DG fuel oil.

D.1

With the new fuel oil properties defined in the Bases for SR 3.8.3.4 not within the required limits, a period of 30 days is allowed for restoring the stored fuel oil properties. This period provides sufficient time to test the stored fuel oil to determine that the new fuel oil, when mixed with previously stored fuel oil, remains acceptable, or to restore the stored fuel oil properties. This restoration may involve feed and bleed procedures, filtering, or combinations of these procedures. Even if a DG start and load was required during this time interval and the fuel oil properties were outside limits, there is a high likelihood that the DG would still be capable of performing its intended function.

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REQUIREMENTS  
(continued)

SR 3.8.3.4

This Surveillance ensures that, without the aid of the refill compressor, sufficient air start capacity for each DG is available. The system design requirements provide for a minimum of [five] engine start cycles without recharging. [A start cycle is defined by the DG vendor, but usually is measured in terms of time (seconds of cranking) or engine cranking speed.] The pressure specified in this SR is intended to reflect the lowest value at which the [five] starts can be accomplished.

The 31 day Frequency takes into account the capacity, capability, redundancy, and diversity of the AC sources and other indications available in the control room, including alarms, to alert the operator to below normal air start pressure.

SR 3.8.3.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel storage tanks once every [31] days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and from breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance frequencies are established by Regulatory Guide 1.137 (Ref. 2). This SR is for preventive maintenance. The presence of water does not necessarily represent failure of this SR, provided the accumulated water is removed during performance of the Surveillance.

SR 3.8.3.6 (5)

Draining of the fuel oil stored in the supply tanks, removal of accumulated sediment, and tank cleaning are required at

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REQUIREMENTS

SR 3.8.3.8<sup>5</sup> (continued)

10 year intervals by Regulatory Guide 1.137 (Ref. 2), paragraph 2.f. This SR also requires the performance of the ASME Code, Section XI (Ref. 8), examinations of the tanks. To preclude the introduction of surfactants in the fuel oil system, the cleaning should be accomplished using sodium hypochlorite solutions, or their equivalent, rather than soap or detergents. This SR is for preventive maintenance. The presence of sediment does not necessarily represent a failure of this SR, provided that accumulated sediment is removed during performance of the Surveillance.

REFERENCES

1. FSAR, Section [9.5.4.2].
2. Regulatory Guide 1.137.
3. ANSI N195-1976, Appendix B.
4. FSAR, Chapter [6].
5. FSAR, Chapter [15].
6. ASTM Standards: D4057-[ ]; D975-[ ];  
D4176-[ ]; D1552-[ ]; D2622-[ ];  
D2276-[ ], Method A.
7. ASTM Standards, D975, Table 1.
8. ASME, Boiler and Pressure Vessel Code, Section XI.

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SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.8.1.1    Verify correct breaker alignment and indicated power availability for each [required] offsite circuit.	7 days
<div data-bbox="147 576 331 608">SR 3.8.1.2</div> <div data-bbox="391 576 1094 1144"> <p>-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. Performance of SR 3.8.1.1 satisfies this SR.</li> <li>2. All DG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading.</li> <li>3. A modified DG start involving idling and gradual acceleration to synchronous speed may be used for this SR as recommended by the manufacturer. When modified start procedures are not used, the time, voltage, and frequency tolerances of SR 3.8.1.1 must be met.</li> </ol> </div> <div data-bbox="391 1193 1019 1332"> <p>Verify each DG starts from standby conditions and achieves steady state voltage <math>\geq</math> [3740] V and <math>\leq</math> [4580] V, and frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz.</p> </div>	<div data-bbox="1138 1193 1386 1257">As specified in Table 3.8.1-1</div>

(continued)

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## SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.3 -----NOTES-----</p> <ol style="list-style-type: none"><li>1. DG loadings may include gradual loading as recommended by the manufacturer.</li><li>2. Momentary transients outside the load range do not invalidate this test.</li><li>3. This Surveillance shall be conducted on only one DG at a time.</li><li>4. This SR shall be preceded by and immediately follow without shutdown a successful performance of SR 3.8.1.2 or SR 3.8.1.1.</li></ol> <p>-----</p> <p>Verify each DG is synchronized and loaded and operates for <math>\geq 60</math> minutes at a load <math>\geq [4500]</math> kW and <math>\leq [5000]</math> kW.</p>	As specified in Table 3.8.1-1
SR 3.8.1.4 Verify each day tank [and engine mounted tank] contains $\geq [220]$ gal of fuel oil.	31 days
<del>SR 3.8.1.5 Check for and remove accumulated water from each day tank [and engine mounted tank].</del>	<del>[31] days</del>
SR 3.8.1.1 <sup>5</sup> Verify the fuel oil transfer system operates to [automatically] transfer fuel oil from storage tank[s] to the day tank [and engine mounted tank].	[92] days

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1 <sup>56</sup> -----NOTE-----  All DG starts may be preceded by an engine  prelube period.</p> <p>Verify each DG starts from standby  condition and achieves in <math>\leq</math> [10] seconds,  voltage <math>\geq</math> [3740] V and <math>\leq</math> [4580] V, and  frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz.</p>	<p>184 days</p>
<p>SR 3.8.1 <sup>57</sup> -----NOTE-----  This Surveillance shall not be performed  in MODE 1 or 2. However, credit may be  taken for unplanned events that satisfy  this SR.</p> <p>Verify [automatic [and] manual] transfer  of AC power sources from the normal offsite  circuit to each alternate [required]  offsite circuit.</p>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.8 <sup>8</sup></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</li> <li>2. If performed with the DG synchronized with offsite power, it shall be performed at a power factor <math>\leq</math> [0.9].</li> </ol> <p style="text-align: center;">-----</p> </div> <p>Verify each DG rejects a load greater than or equal to its associated single largest post-accident load, and:</p> <ol style="list-style-type: none"> <li>a. Following load rejection, the frequency is <math>\leq</math> [63] Hz;</li> <li>b. Within [3] seconds following load rejection, the voltage is <math>\geq</math> [3740] V and <math>\leq</math> [4580] V; and</li> <li>c. Within [3] seconds following load rejection, the frequency is <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz.</li> </ol>	<p>[18 months]</p>
<p>SR 3.8.1.10 <sup>10</sup></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">-----NOTE-----</p> <p>This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</p> <p style="text-align: center;">-----</p> </div> <p>Verify each DG operating at a power factor <math>\leq</math> [0.9] does not trip and voltage is maintained <math>\leq</math> [5000] V during and following a load rejection of <math>\geq</math> [4500] kW and <math>\leq</math> [5000] kW.</p>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.11 <sup>(10)</sup> -----NOTES-----</p> <ol style="list-style-type: none"> <li>1. All DG starts may be preceded by an engine prelube period.</li> <li>2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR.</li> </ol> <p>-----</p> <p>Verify on an actual or simulated loss of offsite power signal:</p> <ol style="list-style-type: none"> <li>a. De-energization of emergency buses;</li> <li>b. Load shedding from emergency buses;</li> <li>c. DG auto-starts from standby condition and:               <ol style="list-style-type: none"> <li>1. energizes permanently connected loads in <math>\leq [10]</math> seconds,</li> <li>2. energizes auto-connected shutdown loads through [automatic load sequencer],</li> <li>3. maintains steady state voltage <math>\geq [3740]</math> V and <math>\leq [4580]</math> V,</li> <li>4. maintains steady state frequency <math>\geq [58.8]</math> Hz and <math>\leq [61.2]</math> Hz, and</li> <li>5. supplies permanently connected [and auto-connected] shutdown loads for <math>\geq 5</math> minutes.</li> </ol> </li> </ol>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.12</p> <p>-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. All DG starts may be preceded by prelube period.</li> <li>2. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</li> </ol> <p>-----</p> <p>Verify on an actual or simulated Engineered Safety Feature (ESF) actuation signal each DG auto-starts from standby condition and:</p> <ol style="list-style-type: none"> <li>a. In <math>\leq</math> [10] seconds after auto-start and during tests, achieves voltage <math>\geq</math> [3740] V and <math>\leq</math> [4580] V;</li> <li>b. In <math>\leq</math> [10] seconds after auto-start and during tests, achieves frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz;</li> <li>c. Operates for <math>\geq</math> 5 minutes;</li> <li>d. Permanently connected loads remain energized from the offsite power system; and</li> <li>e. Emergency loads are energized [or auto-connected through the automatic load sequencer] from the offsite power system.</li> </ol>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.12</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">NOTE</p> <p>This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</p> </div> <p>Verify each DG's automatic trips are bypassed on [actual or simulated loss of voltage signal on the emergency bus concurrent with an actual or simulated ESF actuation signal] except:</p> <ul style="list-style-type: none"> <li>a. Engine overspeed; [and]</li> <li>b. Generator differential current;</li> <li>c. [Low lube oil pressure;]</li> <li>d. [High crankcase pressure;] and</li> <li>e. [Start failure relay].</li> </ul>	<p>[18 months]</p>

(continued)

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## SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.14 (13)</p> <p>-----NOTES-----</p> <ol style="list-style-type: none"><li>1. Momentary transients outside the load and power factor ranges do not invalidate this test.</li><li>2. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</li></ol> <p>-----</p> <p>Verify each DG operating at a power factor <math>\leq [0.9]</math> operates for <math>\geq 24</math> hours:</p> <ol style="list-style-type: none"><li>a. For <math>\geq [2]</math> hours loaded <math>\geq [5250]</math> kW and <math>\leq [5500]</math> kW; and</li><li>b. For the remaining hours of the test loaded <math>\geq [4500]</math> kW and <math>\leq [5000]</math> kW.</li></ol>	<p>[18 months]</p>
<p>SR 3.8.1.15 (14)</p> <p>-----NOTES-----</p> <ol style="list-style-type: none"><li>1. This Surveillance shall be performed within 5 minutes of shutting down the DG after the DG has operated <math>\geq [2]</math> hours loaded <math>\geq [4500]</math> kW and <math>\leq [5000]</math> kW.</li></ol> <p>Momentary transients outside of load range do not invalidate this test.</p> <ol style="list-style-type: none"><li>2. All DG starts may be preceded by an engine prelube period.</li></ol> <p>-----</p> <p>Verify each DG starts and achieves, in <math>\leq [10]</math> seconds, voltage <math>\geq [3740]</math> V, and <math>\leq [4580]</math> V and frequency <math>\geq [58.8]</math> Hz and <math>\leq [61.2]</math> Hz.</p>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.15</p> <p>-----NOTE----- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR.</p> <p>-----</p> <p>Verify each DG:</p> <ul style="list-style-type: none"> <li>a. Synchronizes with offsite power source while loaded with emergency loads upon a simulated restoration of offsite power;</li> <li>b. Transfers loads to offsite power source; and</li> <li>c. Returns to ready-to-load operation.</li> </ul>	<p>[18 months]</p>
<p>SR 3.8.1.16</p> <p>-----NOTE----- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR.</p> <p>-----</p> <p>Verify, with a DG operating in test mode and connected to its bus, an actual or simulated ESF actuation signal overrides the test mode by:</p> <ul style="list-style-type: none"> <li>a. Returning DG to ready-to-load operation [; and</li> <li>b. Automatically energizing the emergency load from offsite power].</li> </ul>	<p>[18 months]</p>

(continued)

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## SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.17</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"><p style="text-align: center;">-----NOTE-----</p><p>This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR.</p><p style="text-align: center;">-----</p></div> <p>Verify interval between each sequenced load block is within <math>\pm</math> [10% of design interval] for each emergency [and shutdown] load sequencer.</p>	<p>[18 months]</p>
<p>SR 3.8.1.18</p> <p style="text-align: center;">-----NOTES-----</p> <ol style="list-style-type: none"><li>1. All DG starts may be preceded by an engine prelube period.</li><li>2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR.</li></ol> <p style="text-align: center;">-----</p> <p>Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated ESF actuation signal:</p> <ol style="list-style-type: none"><li>a. De-energization of emergency buses;</li><li>b. Load shedding from emergency buses; and</li><li>c. DG auto-starts from standby condition and:<ol style="list-style-type: none"><li>1. energizes permanently connected loads in <math>\leq</math> [10] seconds,</li></ol></li></ol>	<p>[18 months]</p> <p>(continued)</p>

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## SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.18 (continued)</p> <p>2. energizes auto-connected emergency loads through load sequencer,</p> <p>3. achieves steady state voltage <math>\geq [3740]</math> V and <math>\leq [4580]</math> V,</p> <p>4. achieves steady state frequency <math>\geq [58.8]</math> Hz and <math>\leq [61.2]</math> Hz, and</p> <p>5. supplies permanently connected [and auto-connected] emergency loads for <math>\geq 5</math> minutes.</p>	
<p>SR 3.8.1.20</p> <p>-----NOTE----- All DG starts may be preceded by an engine prelube period. -----</p> <p>Verify when started simultaneously from standby condition, each DG achieves, in <math>\leq [10]</math> seconds, voltage <math>\geq [3744]</math> V and <math>\leq [4576]</math> V, and frequency <math>\geq [58.8]</math> Hz and <math>\leq [61.2]</math> Hz.</p>	10 years

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SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.2.1 -----NOTE-----</p> <p>The following SRs are not required to be performed: SR 3.8.1.3, SR 3.8.1.4 through SR 3.8.1.11, SR 3.8.1.13 through SR 3.8.1.18, [SR 3.8.1.19,] and SR 3.8.1.20.</p> <p>For AC sources required to be OPERABLE, the SRs of Specification 3.8.1, "AC Sources—Operating," except SR 3.8.1.8, SR 3.8.1.17, and SR 3.8.1.20, are applicable.</p>	<p>In accordance with applicable SRs</p>

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.3.2 Verify lubricating oil inventory is $\geq$ [500] gal.	31 days
SR 3.8.3.3 Verify fuel oil properties of new and stored fuel oil are tested in accordance with, and maintained within the limits of, the Diesel Fuel Oil Testing Program.	In accordance with the Diesel Fuel Oil Testing Program
SR 3.8.3.4 Verify each DG air start receiver pressure is $\geq$ [225] psig.	31 days
<del>SR 3.8.3.5 Check for and remove accumulated water from each fuel oil storage tank.</del>	<del>[31] days</del>
SR 3.8.3.5 For each fuel oil storage tank: a. Drain the fuel oil; b. Remove the sediment; and c. Clean the tank.	10 years

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(continued)

ANSI C84.1 (Ref. 11), allows for voltage drop to the terminals of 4000 V motors whose minimum operating voltage is specified as 90% or 3600 V. It also allows for voltage drops to motors and other equipment down through the 120 V level where minimum operating voltage is also usually specified as 90% of name plate rating. The specified maximum steady state output voltage of [4756] V is equal to the maximum operating voltage specified for 4000 V motors. It ensures that for a lightly loaded distribution system, the voltage at the terminals of 4000 V motors is no more than the maximum rated operating voltages. The specified minimum and maximum frequencies of the DG are 58.8 Hz and 61.2 Hz, respectively. These values are equal to  $\pm 2\%$  of the 60 Hz nominal frequency and are derived from the recommendations given in Regulatory Guide 1.9 (Ref. 3).

SR 3.8.1.1

This SR ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. The breaker alignment verifies that each breaker is in its correct position to ensure that distribution buses and loads are connected to their preferred power source, and that appropriate independence of offsite circuits is maintained. The 7 day Frequency is adequate since breaker position is not likely to change without the operator being aware of it and because its status is displayed in the control room.

SR 3.8.1.2 and SR 3.8.1.2 <sup>6</sup>

These SRs help to ensure the availability of the standby electrical power supply to mitigate DBAs and transients and to maintain the unit in a safe shutdown condition.

To minimize the wear on moving parts that do not get lubricated when the engine is not running, these SRs are modified by a Note (Note 2 for SR 3.8.1.2) to indicate that all DG starts for these Surveillances may be preceded by an engine prelube period and followed by a warmup period prior to loading.

For the purposes of SR 3.8.1.2 and SR 3.8.1.2 testing, the DGs are started from standby conditions. Standby conditions

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SR 3.8.1.2 and SR 3.8.1.1<sup>6</sup> (continued)

for a DG mean that the diesel engine coolant and oil are being continuously circulated and temperature is being maintained consistent with manufacturer recommendations.

In order to reduce stress and wear on diesel engines, some manufacturers recommend a modified start in which the starting speed of DGs is limited, warmup is limited to this lower speed, and the DGs are gradually accelerated to synchronous speed prior to loading. These start procedures are the intent of Note 3, which is only applicable when such modified start procedures are recommended by the manufacturer.

SR 3.8.1.1<sup>6</sup> requires that, at a 184 day Frequency, the DG starts from standby conditions and achieves required voltage and frequency within 10 seconds. The 10 second start requirement supports the assumptions of the design basis LOCA analysis in the FSAR, Chapter [15] (Ref. 5).

The 10 second start requirement is not applicable to SR 3.8.1.2 (see Note 3) when a modified start procedure as described above is used. If a modified start is not used, the 10 second start requirement of SR 3.8.1.1<sup>6</sup> applies.

Since SR 3.8.1.1<sup>6</sup> requires a 10 second start, it is more restrictive than SR 3.8.1.2, and it may be performed in lieu of SR 3.8.1.2. This is the intent of Note 1 of SR 3.8.1.2.

The normal 31 day Frequency for SR 3.8.1.2 (see Table 3.8.1-1, "Diesel Generator Test Schedule," in the accompanying LCO) is consistent with Regulatory Guide 1.9 (Ref. 3). The 184 day Frequency for SR 3.8.1.1<sup>6</sup> is a <sup>6</sup> reduction in cold testing consistent with Generic Letter 84-15 (Ref. 7). These Frequencies provide adequate assurance of DG OPERABILITY, while minimizing degradation resulting from testing.

SR 3.8.1.3

This Surveillance verifies that the DGs are capable of synchronizing with the offsite electrical system and accepting loads greater than or equal to the equivalent of the maximum expected accident loads. A minimum run time of

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SR 3.8.1.4 (continued)

provided and facility operators would be aware of any large uses of fuel oil during this period.

SR 3.8.1.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel oil day [and engine mounted] tanks once every [31] days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref. 10). This SR is for preventative maintenance. The presence of water does not necessarily represent failure of this SR, provided the accumulated water is removed during the performance of this Surveillance.

SR 3.8.1.6 (5)

This Surveillance demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from its associated storage tank to its associated day tank. This is required to support continuous operation of standby power sources. This Surveillance provides assurance that the fuel oil transfer pump is OPERABLE, the fuel oil piping system is intact, the fuel delivery piping is not obstructed, and the controls and control systems for automatic fuel transfer systems are OPERABLE.

The Frequency for this SR is variable, depending on individual system design, with up to a [92] day interval. The [92] day Frequency corresponds to the testing requirements for pumps as contained in the ASME Code,

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SR 3.8.1.5 (continued)

Section XI (Ref. 11); however, the design of fuel transfer systems is such that pumps operate automatically or must be started manually in order to maintain an adequate volume of fuel oil in the day [and engine mounted] tanks during or following DG testing. In such a case, a 31 day Frequency is appropriate. Since proper operation of fuel transfer systems is an inherent part of DG OPERABILITY, the Frequency of this SR should be modified to reflect individual designs.

SR 3.8.1.6

See SR 3.8.1.2.

SR 3.8.1.7

Transfer of each [4.16 kV ESF bus] power supply from the normal offsite circuit to the alternate offsite circuit demonstrates the OPERABILITY of the alternate circuit distribution network to power the shutdown loads. The [18 month] Frequency of the Surveillance is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the [18 month] Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

This SR is modified by a Note. The reason for the Note is that, during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.8

Each DG is provided with an engine overspeed trip to prevent damage to the engine. Recovery from the transient caused by the loss of a large load could cause diesel engine

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SR 3.8.1.8 (continued)

overspeed, which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the DG load response characteristics and capability to reject the largest single load without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. [For this unit, the single load for each DG and its horsepower rating is as follows:] This Surveillance may be accomplished by:

- a. Tripping the DG output breaker with the DG carrying greater than or equal to its associated single largest post-accident load while paralleled to offsite power, or while solely supplying the bus; or
- b. Tripping its associated single largest post-accident load with the DG solely supplying the bus.

As required by IEEE-308 (Ref. 12), the load rejection test is acceptable if the increase in diesel speed does not exceed 75% of the difference between synchronous speed and the overspeed trip setpoint, or 15% above synchronous speed, whichever is lower.

The time, voltage, and frequency tolerances specified in this SR are derived from Regulatory Guide 1.9 (Ref. 3) recommendations for response during load sequence intervals. The 3 seconds specified is equal to 60% of a typical 5 second load sequence interval associated with sequencing of the largest load. The voltage and frequency specified are consistent with the design range of the equipment powered by the DG. SR 3.8.1.8.a corresponds to the maximum frequency excursion, while SR 3.8.1.8.b and SR 3.8.1.8.c are steady state voltage and frequency values to which the system must recover following load rejection. The [18 month] Frequency is consistent with the recommendation of Regulatory Guide 1.108 (Ref. 9).

This SR is modified by two Notes. The reason for Note 1 is that during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Credit may be taken for unplanned events that satisfy this SR. In order to ensure that the DG is tested under load

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SR 3.8.1.10 (continued)

conditions that are as close to design basis conditions as possible, Note 2 requires that, if synchronized to offsite power, testing must be performed using a power factor  $\leq [0.9]$ . This power factor is chosen to be representative of the actual design basis inductive loading that the DG would experience.

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

- a. Performance of the SR will not render any safety system or component inoperable;
- b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and
- c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

SR 3.8.1.10 (9)

This Surveillance demonstrates the DG capability to reject a full load without overspeed tripping or exceeding the predetermined voltage limits. The DG full load rejection may occur because of a system fault or inadvertent breaker tripping. This Surveillance ensures proper engine generator load response under the simulated test conditions. This test simulates the loss of the total connected load that the DG experiences following a full load rejection and verifies that the DG does not trip upon loss of the load. These acceptance criteria provide for DG damage protection. While the DG is not expected to experience this transient during an event and continues to be available, this response ensures that the DG is not degraded for future application, including reconnection to the bus if the trip initiator can be corrected or isolated.

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SR 3.8.1.10<sup>9</sup> (continued)

In order to ensure that the DG is tested under load conditions that are as close to design basis conditions as possible, testing must be performed using a power factor  $\leq [0.9]$ . This power factor is chosen to be representative of the actual design basis inductive loading that the DG would experience.

The [18 month] Frequency is consistent with the recommendation of Regulatory Guide 1.108 (Ref. 9) and is intended to be consistent with expected fuel cycle lengths.

This SR has been modified by a Note. The reason for the Note is that during operation with the reactor critical, performance of this SR could cause perturbation to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Credit may be taken for unplanned events that satisfy this SR.

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

- a. Performance of the SR will not render any safety system or component inoperable;
- b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and
- c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

SR 3.8.1.11

As required by Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(1), this Surveillance demonstrates the as designed operation of the standby power sources during loss of the offsite source. This test verifies all actions

(continued)

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SR 3.8.1.10 (continued)

encountered from the loss of offsite power, including shedding of the nonessential loads and energization of the emergency buses and respective loads from the DG. It further demonstrates the capability of the DG to automatically achieve the required voltage and frequency within the specified time.

The DG autostart time of [10] seconds is derived from requirements of the accident analysis to respond to a design basis large break LOCA. The Surveillance should be continued for a minimum of 5 minutes in order to demonstrate that all starting transients have decayed and stability is achieved.

The requirement to verify the connection and power supply of permanent and autoconnected loads is intended to satisfactorily show the relationship of these loads to the DG loading logic. In certain circumstances, many of these loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. For instance, Emergency Core Cooling Systems (ECCS) injection valves are not desired to be stroked open, or high pressure injection systems are not capable of being operated at full flow, or residual heat removal (RHR) systems performing a decay heat removal function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG systems to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(1), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained

(continued)

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## SR 3.8.1.10 (continued)

consistent with manufacturer recommendations. The reason for Note 2 is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

## SR 3.8.1.12 (11)

This Surveillance demonstrates that the DG automatically starts and achieves the required voltage and frequency within the specified time ([10] seconds) from the design basis actuation signal (LOCA signal) and operates for  $\geq 5$  minutes. The 5 minute period provides sufficient time to demonstrate stability. SR 3.8.1.12.d and SR 3.8.1.12.e ensure that permanently connected loads and emergency loads are energized from the offsite electrical power system on an ESF signal without loss of offsite power.

The requirement to verify the connection of permanent and autoconnected loads is intended to satisfactorily show the relationship of these loads to the DG loading logic. In certain circumstances, many of these loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. For instance, ECCS injection valves are not desired to be stroked open, or high pressure injection systems are not capable of being operated at full flow, or RHR systems performing a decay heat removal function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of [18 months] takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with the expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the [18 month] Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

(continued)

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SR 3.8.1.12<sup>(11)</sup> (continued)

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations. The reason for Note 2 is that during operation with the reactor critical, performance of this Surveillance could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.13<sup>(12)</sup>

This Surveillance demonstrates that DG noncritical protective functions (e.g., high jacket water temperature) are bypassed on a loss of voltage signal concurrent with an ESF actuation test signal, and critical protective functions (engine overspeed, generator differential current, [low lube oil pressure, high crankcase pressure, and start failure relay]) trip the DG to avert substantial damage to the DG unit. The noncritical trips are bypassed during DBAs and provide an alarm on an abnormal engine condition. This alarm provides the operator with sufficient time to react appropriately. The DG availability to mitigate the DBA is more critical than protecting the engine against minor problems that are not immediately detrimental to emergency operation of the DG.

The [18 month] Frequency is based on engineering judgment, taking into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the [18 month] Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

The SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required DG from service. Credit may be taken for unplanned events that satisfy this SR.

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SR 3.8.1.13<sup>(2)</sup> (continued)

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

- a. Performance of the SR will not render any safety system or component inoperable;
- b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and
- c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

SR 3.8.1.14<sup>(2)</sup>

Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(3), requires demonstration once per 18 months that the DGs can start and run continuously at full load capability for an interval of not less than 24 hours,  $\geq$  [2] hours of which is at a load equivalent to 110% of the continuous duty rating and the remainder of the time at a load equivalent to the continuous duty rating of the DG. The DG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for prelubricating and warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are applicable to this SR.

In order to ensure that the DG is tested under load conditions that are as close to design conditions as possible, testing must be performed using a power factor of  $\leq$  [0.9]. This power factor is chosen to be representative of the actual design basis inductive loading that the DG would experience. The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

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SR 3.8.1.14<sup>(13)</sup> (continued)

The [18 month] Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(3), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This Surveillance is modified by two Notes. Note 1 states that momentary transients due to changing bus loads do not invalidate this test. Similarly, momentary power factor transients above the power factor limit will not invalidate the test. The reason for Note 2 is that during operation with the reactor critical, performance of this Surveillance could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.15<sup>(14)</sup>

This Surveillance demonstrates that the diesel engine can restart from a hot condition, such as subsequent to shutdown from normal Surveillances, and achieve the required voltage and frequency within [10] seconds. The [10] second time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The [18 month] Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(5).

This SR is modified by two Notes. Note 1 ensures that the test is performed with the diesel sufficiently hot. The load band is provided to avoid routine overloading of the DG. Routine overloads may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY. The requirement that the diesel has operated for at least [2] hours at full load conditions prior to performance of this Surveillance is based on manufacturer recommendations for achieving hot conditions. Momentary transients due to changing bus loads do not invalidate this test. Note 2 allows all DG starts to be preceded by an engine prelube period to minimize wear and tear on the diesel during testing.

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SURVEILLANCE  
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(continued)

SR 3.8.1.16 (15)

As required by Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(6), this Surveillance ensures that the manual synchronization and automatic load transfer from the DG to the offsite source can be made and the DG can be returned to ready to load status when offsite power is restored. It also ensures that the autostart logic is reset to allow the DG to reload if a subsequent loss of offsite power occurs. The DG is considered to be in ready to load status when the DG is at rated speed and voltage, the output breaker is open and can receive an autoclose signal on bus undervoltage, and the load sequence timers are reset.

The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(6), and takes into consideration unit conditions required to perform the Surveillance.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.17 (16)

Demonstration of the test mode override ensures that the DG availability under accident conditions will not be compromised as the result of testing and the DG will automatically reset to ready to load operation if a LOCA actuation signal is received during operation in the test mode. Ready to load operation is defined as the DG running at rated speed and voltage with the DG output breaker open. These provisions for automatic switchover are required by IEEE-308 (Ref. 13), paragraph 6.2.6(2).

The requirement to automatically energize the emergency loads with offsite power is essentially identical to that of SR 3.8.1.18. The intent in the requirement associated with SR 3.8.1.17.b is to show that the emergency loading was not affected by the DG operation in test mode. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the emergency loads to perform these functions is acceptable.

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SURVEILLANCE  
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SR 3.8.1.17<sup>(16)</sup> (continued)

This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The [18 month] Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(8), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.18<sup>(17)</sup>

Under accident [and loss of offsite power] conditions loads are sequentially connected to the bus by the [automatic load sequencer]. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading of the DGs due to high motor starting currents. The [10]% load sequence time interval tolerance ensures that sufficient time exists for the DG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. Reference 2 provides a summary of the automatic loading of ESF buses.

The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(2), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

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BASES

SURVEILLANCE  
REQUIREMENTS

SR 3.8.1.18<sup>(17)</sup> (continued)

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

- a. Performance of the SR will not render any safety system or component inoperable;
- b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and
- c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

SR 3.8.1.18<sup>(18)</sup>

In the event of a DBA coincident with a loss of offsite power, the DGs are required to supply the necessary power to ESF systems so that the fuel, RCS, and containment design limits are not exceeded.

This Surveillance demonstrates the DG<sup>(19)</sup> operation, as discussed in the Bases for SR 3.8.1.18<sup>(17)</sup>, during a loss of offsite power actuation test signal in conjunction with an ESF actuation signal. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of [18 months] takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with an expected fuel cycle length of [18 months].

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For

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SR 3.8.1.14<sup>18</sup> (continued)

the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations for DGs. The reason for Note 2 is that the performance of the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.20<sup>15</sup>

This Surveillance demonstrates that the DG starting independence has not been compromised. Also, this Surveillance demonstrates that each engine can achieve proper speed within the specified time when the DGs are started simultaneously.

The 10 year Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9).

This SR is modified by a Note. The reason for the Note is to minimize wear on the DG during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations.

Diesel Generator Test Schedule

The DG test schedule (Table 3.8.1-1) implements the recommendations of Revision 3 to Regulatory Guide 1.9 (Ref. 3). The purpose of this test schedule is to provide timely test data to establish a confidence level associated with the goal to maintain DG reliability > 0.95 per demand.

According to Regulatory Guide 1.9, Revision 3 (Ref. 3), each DG should be tested at least once every 31 days. Whenever a DG has experienced 4 or more valid failures in the last 25 valid tests, the maximum time between tests is reduced to 7 days. Four failures in 25 valid tests is a failure rate of 0.16, or the threshold of acceptable DG performance, and

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BASES (continued)

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REQUIREMENTS

SR 3.8.2.1

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the AC sources in other than MODES 1, 2, 3, and 4. SR 3.8.1.10 is not required to be met since only one offsite circuit is required to be OPERABLE. SR 3.8.1.11 is not required to be met because the required OPERABLE DG(s) is not required to undergo periods of being synchronized to the offsite circuit. SR 3.8.1.12 is excepted because starting independence is not required with the DG(s) that is not required to be operable. (7) (16) (19)

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DG(s) from being paralleled with the offsite power network or otherwise rendered inoperable during performance of SRs, and to preclude deenergizing a required 4160 V ESF bus or disconnecting a required offsite circuit during performance of SRs. With limited AC sources available, a single event could compromise both the required circuit and the DG. It is the intent that these SRs must still be capable of being met, but actual performance is not required during periods when the DG and offsite circuit is required to be OPERABLE. Refer to the corresponding Bases for LCO 3.8.1 for a discussion of each SR.

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REFERENCES

None.

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ACTIONS

B.1 (continued)

restoration of the required volume prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> 6 days), the low rate of usage, the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

C.1

This Condition is entered as a result of a failure to meet the acceptance criterion of SR 3.8.3.3. Normally, trending of particulate levels allows sufficient time to correct high particulate levels prior to reaching the limit of acceptability. Poor sample procedures (bottom sampling), contaminated sampling equipment, and errors in laboratory analysis can produce failures that do not follow a trend. Since the presence of particulates does not mean failure of the fuel oil to burn properly in the diesel engine, and particulate concentration is unlikely to change significantly between Surveillance Frequency intervals, and proper engine performance has been recently demonstrated (within 31 days), it is prudent to allow a brief period prior to declaring the associated DG inoperable. The 7 day Completion Time allows for further evaluation, resampling and re-analysis of the DG fuel oil.

D.1

With the new fuel oil properties defined in the Bases for SR 3.8.3.4 not within the required limits, a period of 30 days is allowed for restoring the stored fuel oil properties. This period provides sufficient time to test the stored fuel oil to determine that the new fuel oil, when mixed with previously stored fuel oil, remains acceptable, or to restore the stored fuel oil properties. This restoration may involve feed and bleed procedures, filtering, or combinations of these procedures. Even if a DG start and load was required during this time interval and the fuel oil properties were outside limits, there is a high likelihood that the DG would still be capable of performing its intended function.

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(continued)

SR 3.8.3.4

This Surveillance ensures that, without the aid of the refill compressor, sufficient air start capacity for each DG is available. The system design requirements provide for a minimum of [five] engine start cycles without recharging. [A start cycle is defined by the DG vendor, but usually is measured in terms of time (seconds of cranking) or engine cranking speed.] The pressure specified in this SR is intended to reflect the lowest value at which the [five] starts can be accomplished.

The 31 day Frequency takes into account the capacity, capability, redundancy, and diversity of the AC sources and other indications available in the control room, including alarms, to alert the operator to below normal air start pressure.

SR 3.8.3.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel storage tanks once every [31] days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, and contaminated fuel oil, and from breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref. 2). This SR is for preventive maintenance. The presence of water does not necessarily represent failure of this SR, provided the accumulated water is removed during performance of the Surveillance.

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SURVEILLANCE  
REQUIREMENTS  
(continued)

SR 3.8.3.6 (5)

Draining of the fuel oil stored in the supply tanks, removal of accumulated sediment, and tank cleaning are required at 10 year intervals by Regulatory Guide 1.137 (Ref. 2), paragraph 2.f. This SR also requires the performance of the ASME Code, Section XI (Ref. 8), examinations of the tanks. To preclude the introduction of surfactants in the fuel oil system, the cleaning should be accomplished using sodium hypochlorite solutions, or their equivalent, rather than soap or detergents. This SR is for preventive maintenance. The presence of sediment does not necessarily represent a failure of this SR, provided that accumulated sediment is removed during performance of the Surveillance.

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REFERENCES

1. FSAR, Section [9.5.4.2].
  2. Regulatory Guide 1.137.
  3. ANSI N195-1976, Appendix B.
  4. FSAR, Chapter [6].
  5. FSAR, Chapter [15].
  6. ASTM Standards: D4057-[ ]; D975-[ ]; D4176-[ ]; D1552-[ ]; D2622-[ ]; D2276, Method A.
  7. ASTM Standards, D975, Table 1.
  8. ASME, Boiler and Presser Vessel Code, Section XI.
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SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.8.1.1    Verify correct breaker alignment and indicated power availability for each [required] offsite circuit.	7 days
<div> <div>           SR 3.8.1.2           <div> <p>-----NOTES-----</p> <ol style="list-style-type: none"> <li>Performance of SR 3.8.1.1 satisfies this SR.</li> <li>All DG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading.</li> <li>A modified DG start involving idling and gradual acceleration to synchronous speed may be used for this SR as recommended by the manufacturer. When modified start procedures are not used, the time, voltage, and frequency tolerances of SR 3.8.1.1 must be met.</li> </ol> </div> </div> <div> <p>Verify each DG starts from standby conditions and achieves steady state voltage <math>\geq</math> [3740] V and <math>\leq</math> [4580] V, and frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz.</p> </div> </div>	As specified in Table 3.8.1-1

(continued)

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## SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.3 -----NOTES-----</p> <ol style="list-style-type: none"><li>1. DG loadings may include gradual loading as recommended by the manufacturer.</li><li>2. Momentary transients outside the load range do not invalidate this test.</li><li>3. This Surveillance shall be conducted on only one DG at a time.</li><li>4. This SR shall be preceded by and immediately follow without shutdown a successful performance of SR 3.8.1.2 or SR 3.8.1 <del>2.6</del></li></ol> <p>-----</p> <p>Verify each DG is synchronized and loaded, and operates for <math>\geq 60</math> minutes at a load <math>\geq [4500]</math> kW and <math>\leq [5000]</math> kW.</p>	As specified in Table 3.8.1-1
SR 3.8.1.4 Verify each day tank [and engine mounted tank] contains $\geq [220]$ gal of fuel oil.	31 days
<del>SR 3.8.1.5 Check for and remove accumulated water from each day tank [and engine mounted tank].</del>	<del>[31] days</del>
SR 3.8.1. <sup>5</sup> Verify the fuel oil transfer system operates to [automatically] transfer fuel oil from storage tank[s] to the day tank [and engine mounted tank].	[92] days

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1. <sup>6</sup> -----NOTE-----  All DG starts may be preceded by an engine  prelube period.</p> <p>Verify each DG starts from standby  condition and achieves, in <math>\leq [10]</math> seconds,  voltage <math>\geq [3740]</math> V and <math>\leq [4580]</math> V, and  frequency <math>\geq [58.8]</math> Hz and <math>\leq [61.2]</math> Hz.</p>	<p>184 days</p>
<p>SR 3.8.1. <sup>7</sup> -----NOTE-----  This Surveillance shall not be performed  in MODE 1 or 2. However, credit may be  taken for unplanned events that satisfy  this SR.</p> <p>Verify [automatic [and] manual] transfer  of AC power sources from the normal offsite  circuit to each alternate [required]  offsite circuit.</p>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.10</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</li> <li>2. If performed with the DG synchronized with offsite power, it shall be performed at a power factor <math>\leq</math> [0.9].</li> </ol> <p style="text-align: center;">-----</p> </div> <p>Verify each DG rejects a load greater than or equal to its associated single largest post-accident load, and:</p> <ol style="list-style-type: none"> <li>a. Following load rejection, the frequency is <math>\leq</math> [63] Hz;</li> <li>b. Within [3] seconds following load rejection, the voltage is <math>\geq</math> [3740] V and <math>\leq</math> [4580] V; and</li> <li>c. Within [3] seconds following load rejection, the frequency is <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz.</li> </ol>	<p>[18 months]</p>
<p>SR 3.8.1.10</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">-----NOTE-----</p> <p>This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</p> <p style="text-align: center;">-----</p> </div> <p>Verify each DG, operating at a power factor <math>\leq</math> [0.9], does not trip, and voltage is maintained <math>\leq</math> [3000] V during and following a load rejection of <math>\geq</math> [4500] kW and <math>\leq</math> [5000] kW.</p>	<p>[18 months]</p>

(continued)

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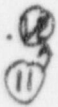
SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1. <sup>(10)</sup> <del>11</del> -----NOTE-----</p> <ol style="list-style-type: none"> <li>1. All DG starts may be preceded by an engine prelube period.</li> <li>2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR.</li> </ol> <p>-----</p> <p>Verify on an actual or simulated loss of offsite power signal:</p> <ol style="list-style-type: none"> <li>a. De-energization of emergency buses;</li> <li>b. Load shedding from emergency buses;</li> <li>c. DG auto-starts from standby condition and:               <ol style="list-style-type: none"> <li>1. energizes permanently connected loads in <math>\leq</math> [10] seconds,</li> <li>2. energizes auto-connected shutdown loads through [automatic load sequencer],</li> <li>3. maintains steady state voltage <math>\geq</math> [3740] V and <math>\leq</math> [4580] V,</li> <li>4. maintains steady state frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz, and</li> <li>5. supplies permanently connected [and auto-connected] shutdown loads for <math>\geq</math> 5 minutes.</li> </ol> </li> </ol>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1. </p> <p>-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. All DG starts may be preceded by an engine prelube period.</li> <li>2. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</li> </ol> <p>-----</p> <p>Verify on an actual or simulated Engineered Safety Feature (ESF) actuation signal each DG auto-starts from standby condition and:</p> <ol style="list-style-type: none"> <li>a. In <math>\leq</math> [10] seconds after auto-start and during tests, achieves voltage <math>\geq</math> [3740] V and <math>\leq</math> [4580] V;</li> <li>b. In <math>\leq</math> [10] seconds after auto-start and during tests, achieves frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz;</li> <li>c. Operates for <math>\geq</math> 5 minutes;</li> <li>d. Permanently connected loads remain energized from the offsite power system; and</li> <li>e. Emergency loads are energized [or auto-connected through the automatic load sequencer] from the offsite power system.</li> </ol>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.12<sup>12</sup></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>-----NOTE----- This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR. -----</p> </div> <p>Verify each DG automatic trip is bypassed on [actual or simulated loss of voltage signal on the emergency bus concurrent with an actual or simulated ESF actuation signal] except:</p> <ul style="list-style-type: none"> <li>a. Engine overspeed; [and]</li> <li>b. Generator differential current[;</li> <li>c. Low lube oil pressure;</li> <li>d. High crankcase pressure; and</li> <li>e. Start failure relay].</li> </ul>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.14 ⑬</p> <p>-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. Momentary transients outside the load and power factor ranges do not invalidate this test.</li> <li>2. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</li> </ol> <p>-----</p> <p>Verify each DG, operating at a power factor <math>\leq [0.9]</math>, operates for <math>\geq 24</math> hours:</p> <ol style="list-style-type: none"> <li>a. For <math>\geq [2]</math> hours loaded <math>\geq [5250]</math> kW and <math>\leq [5500]</math> kW; and</li> <li>b. For the remaining hours of the test loaded <math>\geq [4500]</math> kW and <math>\leq [5000]</math> kW.</li> </ol>	<p>[18 months]</p>
<p>SR 3.8.1.15 ⑭</p> <p>-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. This Surveillance shall be performed within 5 minutes of shutting down the DG after the DG has operated <math>\geq [2]</math> hours loaded <math>\geq [4500]</math> kW and <math>\leq [5000]</math> kW.</li> </ol> <p>Momentary transients outside of load range do not invalidate this test.</p> <ol style="list-style-type: none"> <li>2. All DG starts may be preceded by an engine prelube period.</li> </ol> <p>-----</p> <p>Verify each DG starts and achieves, in <math>\leq [10]</math> seconds, voltage <math>\geq [3740]</math> V and <math>\leq [4580]</math> V, and frequency <math>\geq [58.8]</math> Hz and <math>\leq [61.2]</math> Hz.</p>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.15</p> <p>-----NOTE----- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR. -----</p> <p>Verify each DG:</p> <ul style="list-style-type: none"> <li>a. Synchronizes with offsite power source while loaded with emergency loads upon a simulated restoration of offsite power;</li> <li>b. Transfers loads to offsite power source; and</li> <li>c. Returns to ready-to-load operation.</li> </ul>	<p>[18 months]</p>
<p>SR 3.8.1.16</p> <p>-----NOTE----- This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR. -----</p> <p>Verify, with a DG operating in test mode and connected to its bus, an actual or simulated ESF actuation signal overrides the test mode by:</p> <ul style="list-style-type: none"> <li>a. Returning DG to ready-to-load operation [; and</li> <li>b. Automatically energizing the emergency load from offsite power].</li> </ul>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.18 (17)</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">-----NOTE-----</p> <p>This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR.</p> <p style="text-align: center;">-----</p> </div> <p>Verify interval between each sequenced load block is within <math>\pm</math> [10% of design interval] for each emergency [and shutdown] load sequencer.</p>	<p>[18 months]</p>

(continued)

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## SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.19</p> <p>-----NOTES-----</p> <ol style="list-style-type: none"><li>1. All DG starts may be preceded by an engine prelube period.</li><li>2. This Surveillance shall not be performed in MODE 1, 2, 3, or 4. However, credit may be taken for unplanned events that satisfy this SR.</li></ol> <p>-----</p> <p>Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated ESF actuation signal:</p> <ol style="list-style-type: none"><li>a. De-energization of emergency buses;</li><li>b. Load shedding from emergency buses;</li><li>c. DG auto-starts from standby condition and:<ol style="list-style-type: none"><li>1. energizes permanently connected loads in <math>\leq</math> [10] seconds,</li><li>2. energizes auto-connected emergency loads through [load sequencer],</li><li>3. achieves steady state voltage <math>\geq</math> [3740] V and <math>\leq</math> [4580] V,</li><li>4. achieves steady state frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz, and</li><li>5. supplies permanently connected [and auto-connected] emergency loads for <math>\geq</math> [5] minutes.</li></ol></li></ol>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.20 (19) -----NOTE----- All DG starts may be preceded by an engine prelube period.</p> <p>Verify, when started simultaneously from standby condition, each DG achieves, in ≤ [10] seconds, voltage ≥ [3740] V and ≤ [4580] V, and frequency ≥ [58.8] Hz and ≤ [61.2] Hz.</p>	<p>10 years</p>

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SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.2.1 -----NOTE-----</p> <p>The following SRs are not required to be performed: SR 3.8.1.3, SR 3.8.1.4 through SR 3.8.1.17, SR 3.8.1.18 through SR 3.8.1.19, [SR 3.8.1.20,] and SR 3.8.1.21.</p> <p>For AC sources required to be OPERABLE, the SRs of Specification 3.8.1, "AC Sources—Operating," except SR 3.8.1.8, SR 3.8.1.17, and SR 3.8.1.20, are applicable.</p>	<p>In accordance with applicable SRs</p>

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
SR 3.8.3.2 Verify lubricating oil inventory is $\geq$ [500] gal.	31 days
SR 3.8.3.3 Verify fuel oil properties of new and stored fuel oil are tested in accordance with, and maintained within the limits of, the Diesel Fuel Oil Testing Program.	In accordance with the Diesel Fuel Oil Testing Program
SR 3.8.3.4 Verify each DG air start receiver pressure is $\geq$ [225] psig.	31 days
<del>SR 3.8.3.5 Check for and remove accumulated water from each fuel oil storage tank.</del>	<del>[31] days</del>
SR 3.8.3.6 For each fuel oil storage tank: <div data-bbox="289 1187 354 1251" style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center; margin-left: 10px;">5</div> <ul style="list-style-type: none"> <li>a. Drain the fuel oil;</li> <li>b. Remove the sediment; and</li> <li>c. Clean the tank.</li> </ul>	10 years

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ANSI C84.1-1982 (Ref. 11), allows for voltage drop to the terminals of 4000 V motors whose minimum operating voltage is specified as 90% or 3600 V. It also allows for voltage drops to motors and other equipment down through the 120 V level where minimum operating voltage is also usually specified as 80% of name plate rating. The specified maximum steady state output voltage of [4756] V is equal to the maximum operating voltage specified for 4000 V motors. It ensures that for a lightly loaded distribution system, the voltage at the terminals of 4000 V motors is no more than the maximum rated operating voltages. The specified minimum and maximum frequencies of the DG are 58.8 Hz and 61.2 Hz, respectively. These values are equal to  $\pm 2\%$  of the 60 Hz nominal frequency and are derived from the recommendations given in Regulatory Guide 1.9 (Ref. 3).

SR 3.8.1.1

This SR assures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. The breaker alignment verifies that each breaker is in its correct position to ensure that distribution buses and loads are connected to their preferred power source, and that appropriate independence of offsite circuits is maintained. The 7 day Frequency is adequate since breaker position is not likely to change without the operator being aware of it and because its status is displayed in the control room.

SR 3.8.1.2 and SR 3.8.1.1<sup>⑥</sup>

These SRs help to ensure the availability of the standby electrical power supply to mitigate D3As and transients and to maintain the unit in a safe shutdown condition.

To minimize the wear on moving parts that do not get lubricated when the engine is not running, these SRs are modified by a Note (Note 2 for SR 3.8.1.2) to indicate that all DG starts for these Surveillances may be preceded by an engine prelube period and followed by a warmup period prior to loading by an engine prelube period.

For the purposes of SR 3.8.1.2 and SR 3.8.1.1<sup>⑥</sup> testing, the DGs are started from standby conditions. Standby conditions

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SR 3.8.1.2 and SR 3.8.1.1<sup>⑥</sup> (continued)

for a DG mean the diesel engine coolant and oil are being continuously circulated and temperature is being maintained consistent with manufacturer recommendations.

In order to reduce stress and wear on diesel engines, some manufacturers recommend a modified start in which the starting speed of DGs is limited, warmup is limited to this lower speed, and the DGs are gradually accelerated to synchronous speed prior to loading. This is the intent of Note 3, which is only applicable when such modified start procedures are recommended by the manufacturer.

SR 3.8.1.1<sup>⑥</sup> requires that, at a 184 day Frequency, the DG starts from standby conditions and achieves required voltage and frequency within 10 seconds. The 10 second start requirement supports the assumptions of the design basis LOCA analysis in the FSAR, Chapter [15] (Ref. 5).

The 10 second start requirement is not applicable to SR 3.8.1.2 (see Note 3) when a modified start procedure as described above is used. If a modified start is not used, 10 second start requirement of SR 3.8.1.1<sup>⑥</sup> applies.

Since SR 3.8.1.1<sup>⑥</sup> requires a 10 second start, it is more restrictive than SR 3.8.1.2, and it may be performed in lieu of SR 3.8.1.2. This is the intent of Note 1 of SR 3.8.1.2.

The normal 31 day Frequency for SR 3.8.1.2 (see Table 3.8.1-1, "Diesel Generator Test Schedule," in the accompanying LCO) is consistent with Regulatory Guide 1.9 (Ref. 3). The 184 day Frequency for SR 3.8.1.1<sup>⑥</sup> is a <sup>⑥</sup> reduction in cold testing consistent with Generic Letter 84-15 (Ref. 7). These Frequencies provide adequate assurance of DG OPERABILITY, while minimizing degradation resulting from testing.

SR 3.8.1.3

This Surveillance verifies that the DGs are capable of synchronizing with the offsite electrical system and accepting loads greater than or equal to the equivalent of the maximum expected accident loads. A minimum run time of 60 minutes is required to stabilize engine temperatures,

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SR 3.8.1.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel oil day [and engine mounted] tanks once every [31] days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and from breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref. 10). This SR is for preventive maintenance. The presence of water does not necessarily represent failure of this SR provided the accumulated water is removed during the performance of this Surveillance.

SR 3.8.1.6 (5)

This Surveillance demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from its associated storage tank to its associated day tank. This is required to support continuous operation of standby power sources. This Surveillance provides assurance that the fuel oil transfer pump is OPERABLE, the fuel oil piping system is intact, the fuel delivery piping is not obstructed, and the controls and control systems for automatic fuel transfer systems are OPERABLE.

The Frequency for this SR is variable, depending on individual system design, with up to a [92] day interval. The [92] day Frequency corresponds to the testing requirements for pumps as contained in the ASME Code, Section XI (Ref. 12); however, the design of fuel transfer systems is such that pumps will operate automatically or must be started manually in order to maintain an adequate volume of fuel oil in the day [and engine mounted] tanks during or following DG testing. In such a case, a 31 day

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SR 3.8.1.6<sup>5</sup> (continued)

Frequency is appropriate. Since proper operation of fuel transfer systems is an inherent part of DG OPERABILITY, the Frequency of this SR should be modified to reflect individual designs.

SR 3.8.1.7<sup>6</sup>

See SR 3.8.1.2.

SR 3.8.1.8<sup>7</sup>

Transfer of each [4.16 kV ESF bus] power supply from the normal offsite circuit to the alternate offsite circuit demonstrates the OPERABILITY of the alternate circuit distribution network to power the shutdown loads. The [18 month] Frequency of the Surveillance is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the [18 month] Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

This SR is modified by a Note. The reason for the Note is that during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.9<sup>8</sup>

Each DG is provided with an engine overspeed trip to prevent damage to the engine. Recovery from the transient caused by the loss of a large load could cause diesel engine overspeed, which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the DG load response characteristics and capability to reject the largest single load without exceeding predetermined voltage

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SR 3.8.1.9<sup>(B)</sup> (continued)

and frequency and while maintaining a specified margin to the overspeed trip. [For this unit, the single load for each DG and its horsepower rating is as follows:] This Surveillance may be accomplished by:

- a. Tripping the DG output breaker with the DG carrying greater than or equal to its associated single largest post-accident load while paralleled to offsite power or while solely supplying the bus; or
- b. Tripping its associated single largest post-accident load with the DG solely supplying the bus.

As required by IEEE-308 (Ref. 13), the load rejection test is acceptable if the increase in diesel speed does not exceed 75% of the difference between synchronous speed and the overspeed trip setpoint, or 15% above synchronous speed, whichever is lower.

The time, voltage, and frequency tolerances specified in this SR are derived from Regulatory Guide 1.9 (Ref. 3) recommendations for response during load sequence intervals. The [3] seconds specified is equal to 60% of a typical 5 second load sequence interval associated with sequencing of the largest load. The voltage and frequency specified are consistent with the design range of the equipment powered by the DG. SR 3.8.1.9.a corresponds to the maximum frequency excursion, while SR 3.8.1.9.b and SR 3.8.1.9.c are steady state voltage and frequency values to which the system must recover following load rejection. The [18 month] Frequency is consistent with the recommendation of Regulatory Guide 1.108 (Ref. 9).

This SR is modified by a Note. The reason for the Note is that during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Credit may be taken for unplanned events that satisfy this SR. In order to ensure that the DG is tested under load conditions that are as close to design basis conditions as possible, Note 2 requires that, if synchronized to offsite power, testing must be performed using a power factor  $\leq [0.9]$ . This power factor is chosen to be representative

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SR 3.8.1.9 (continued)

of the actual design basis inductive loading that the DG would experience.

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

- a. Performance of the SR will not render any safety system or component inoperable;
- b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and
- c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

SR 3.8.1.10

This Surveillance demonstrates the DG capability to reject a full load without overspeed tripping or exceeding the predetermined voltage limits. The DG full load rejection may occur because of a system fault or inadvertent breaker tripping. This Surveillance ensures proper engine generator load response under the simulated test conditions. This test simulates the loss of the total connected load that the DG experiences following a full load rejection and verifies that the DG will not trip upon loss of the load. These acceptance criteria provide DG damage protection. While the DG is not expected to experience this transient during an event and continues to be available, this response ensures that the DG is not degraded for future application, including reconnection to the bus if the trip initiator can be corrected or isolated.

In order to ensure that the DG is tested under load conditions that are as close to design basis conditions as possible, testing must be performed using a power factor  $\leq [0.9]$ . This power factor is chosen to be representative

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SR 3.8.1.10<sup>9</sup> (continued)

of the actual design basis inductive loading that the DG would experience.

The [18 month] Frequency is consistent with the recommendation of Regulatory Guide 1.108 (Ref. 9) and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that during operation with the reactor critical, performance of this SR could cause perturbation to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Credit may be taken for unplanned events that satisfy this SR.

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

- a. Performance of the SR will not render any safety system or component inoperable;
- b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and
- c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

SR 3.8.1.11<sup>10</sup>

As required by Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(1), this Surveillance demonstrates the as designed operation of the standby power sources during loss of the offsite source. This test verifies all actions encountered from the loss of offsite power, including shedding of the nonessential loads and energization of the emergency buses and respective loads from the DG. It further demonstrates the capability of the DG to

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SR 3.8.1.14 (continued)

automatically achieve the required voltage and frequency within the specified time.

The DG auto-start time of [10] seconds is derived from requirements of the accident analysis to respond to a design basis large break LOCA. The Surveillance should be continued for a minimum of 5 minutes in order to demonstrate that all starting transients have decayed and stability has been achieved.

The requirement to verify the connection and power supply of permanent and auto-connected loads is intended to satisfactorily show the relationship of these loads to the DG loading logic. In certain circumstances, many of these loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. For instance, Emergency Core Cooling Systems (ECCS) injection valves are not desired to be stroked open, high pressure injection systems are not capable of being operated at full flow, or shutdown cooling (SDC) systems performing a decay heat removal function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(1), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations. The reason for Note 2 is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety

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SR 3.8.1.10 (continued)

systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.11

This Surveillance demonstrates that the DG automatically starts and achieves the required voltage and frequency within the specified time ([10] seconds) from the design basis actuation signal (LOCA signal) and operates for  $\geq 5$  minutes. The 5 minute period provides sufficient time to demonstrate stability. SR 3.8.1.10.d and SR 3.8.1.10.e ensure that permanently connected loads and emergency loads are energized from the offsite electrical power system on an ESF signal without loss of offsite power.

The requirement to verify the connection of permanent and autoconnected loads is intended to satisfactorily show the relationship of these loads to the DG loading logic. In certain circumstances, many of these loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. For instance, ECCS injection valves are not desired to be stroked open, high pressure injection systems are not capable of being operated at full flow, or SDC systems performing a decay heat removal function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of [18 months] takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with the expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the [18 month] Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from

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SR 3.8.1.12<sup>11</sup> (continued)

standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations. The reason for Note 2 is that during operation with the reactor critical, performance of this Surveillance could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.12<sup>12</sup>

This Surveillance demonstrates that DG noncritical protective functions (e.g., high jacket water temperature) are bypassed on a loss of voltage signal concurrent with an ESF actuation test signal, and critical protective functions (engine overspeed, generator differential current, [low lube oil pressure, high crankcase pressure, and start failure relay]) trip the DG to avert substantial damage to the DG unit. The noncritical trips are bypassed during DBAs and provide an alarm on an abnormal engine condition. This alarm provides the operator with sufficient time to react appropriately. The DG availability to mitigate the DBA is more critical than protecting the engine against minor problems that are not immediately detrimental to emergency operation of the DG.

The [18 month] Frequency is based on engineering judgment, taking into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the [18 month] Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

The SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required DG from service. Credit may be taken for unplanned events that satisfy this SR.

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SR 3.8.1.14<sup>(12)</sup> (continued)

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

- a. Performance of the SR will not render any safety system or component inoperable;
- b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and
- c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

SR 3.8.1.14<sup>(12)</sup>

Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(3), requires demonstration once per 18 months that the DGs can start and run continuously at full load capability for an interval of not less than 24 hours,  $\geq$  [2] hours of which is at a load equivalent to 110% of the continuous duty rating and the remainder of the time at a load equivalent to the continuous duty rating of the DG. The DG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for prelubricating and warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are applicable to this SR.

In order to ensure that the DG is tested under load conditions that are as close to design conditions as possible, testing must be performed using a power factor of  $\leq$  [0.9]. This power factor is chosen to be representative of the actual design basis inductive loading that the DG would experience. The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

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SR 3.8.1.13 (continued)

The [18 month] Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 7), paragraph 2.a.(3), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This Surveillance is modified by two Notes. Note 1 states that momentary transients due to changing bus loads do not invalidate this test. Similarly, momentary power factor transients above the power factor limit will not invalidate the test. The reason for Note 2 is that during operation with the reactor critical, performance of this Surveillance could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.14

This Surveillance demonstrates that the diesel engine can restart from a hot condition, such as subsequent to shutdown from normal Surveillances, and achieve the required voltage and frequency within [10] seconds. The [10] second time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The [18 month] Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(5).

This SR is modified by two Notes. Note 1 ensures that the test is performed with the diesel sufficiently hot. The load band is provided to avoid routine overloading of the DG. Routine overloads may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY. The requirement that the diesel has operated for at least [2] hours at full load conditions prior to performance of this Surveillance is based on manufacturer recommendations for achieving hot conditions. Momentary transients due to changing bus loads do not invalidate this test. Note 2 allows all DG starts to be preceded by an engine prelube period to minimize wear and tear on the diesel during testing.

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(continued)

SR 3.8.1.15 <sup>15</sup>

As required by Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(6), this Surveillance ensures that the manual synchronization and automatic load transfer from the DG to the offsite source can be made and that the DG can be returned to ready to load status when offsite power is restored. It also ensures that the auto-start logic is reset to allow the DG to reload if a subsequent loss of offsite power occurs. The DG is considered to be in ready to load status when the DG is at rated speed and voltage, the output breaker is open and can receive and autoclose signal on bus undervoltage, and the load sequence timers are reset.

The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(6), and takes into consideration unit conditions required to perform the Surveillance.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.16 <sup>16</sup>

Demonstration of the test mode override ensures that the DG availability under accident conditions will not be compromised as the result of testing and the DG will automatically reset to ready to load operation if a LOCA actuation signal is received during operation in the test mode. Ready to load operation is defined as the DG running at rated speed and voltage with the DG output breaker open. These provisions for automatic switchover are required by IEEE-308 (Ref. 13), paragraph 6.2.6(2).

The requirement to automatically energize the emergency loads with offsite power is essentially identical to that of SR 3.8.1.15. The intent in the requirement associated with SR 3.8.1.16.b is to show that the emergency loading was not affected by the DG operation in test mode. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the

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SR 3.8.1.17<sup>(16)</sup> (continued)

emergency loads to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The [18 month] Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(8); takes into consideration unit conditions required to perform the Surveillance; and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.18<sup>(17)</sup>

Under accident [and loss of offsite power] conditions loads are sequentially connected to the bus by the [automatic load sequencer]. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading of the DGs due to high motor starting currents. The [10]% load sequence time interval tolerance ensures that sufficient time exists for the DG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. Reference 1 provides a summary of the automatic loading of ESF buses.

The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(2); takes into consideration unit conditions required to perform the Surveillance; and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

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SR 3.8.1.18<sup>17</sup> (continued)

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

- a. Performance of the SR will not render any safety system or component inoperable;
- b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and
- c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

SR 3.8.1.19<sup>12</sup>

In the event of a DBA coincident with a loss of offsite power, the DGs are required to supply the necessary power to ESF systems so that the fuel, RCS, and containment design limits are not exceeded.

This Surveillance demonstrates the DG operation, as discussed in the Bases for SR 3.8.1.11<sup>10</sup>, during a loss of offsite power actuation test signal in conjunction with an ESF actuation signal. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of [18 months] takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with an expected fuel cycle length of [18 months].

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from

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SR 3.8.1.19 (continued)

standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations for DGs. The reason for Note 2 is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.20

This Surveillance demonstrates that the DG starting independence has not been compromised. Also, this Surveillance demonstrates that each engine can achieve proper speed within the specified time when the DGs are started simultaneously.

The 10 year Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9).

This SR is modified by a Note. The reason for the Note is to minimize wear on the DG during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated, and temperature maintained consistent with manufacturer recommendations.

Diesel Generator Test Schedule

The DG test schedule (Table 3.8.1-1) implements the recommendations of Revision 3 to Regulatory Guide 1.9 (Ref. 3). The purpose of this test schedule is to provide timely test data to establish a confidence level associated with the goal to maintain DG reliability above 0.95 per demand.

According to Regulatory Guide 1.9, Revision 3 (Ref. 3), each DG unit should be tested at least once every 31 days. Whenever a DG has experienced 4 or more valid failures in the last 25 valid tests, the maximum time between tests is reduced to 7 days. Four failures in 25 valid tests is a failure rate of 0.16, or the threshold of acceptable DG

(continued)

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BASES (continued)

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SR 3.8.2.1

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the AC sources in other than MODES 1, 2, 3, and 4. SR 3.8.1.8 is not required to be met since only one offsite circuit is required to be OPERABLE. SR 3.8.1.17 is not required to be met because the required OPERABLE DG(s) is not required to undergo periods of being synchronized to the offsite circuit. SR 3.8.1.20 is excepted because starting independence is not required with DG(s) that are not required to be OPERABLE. (16) (17) (19)

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DG(s) from being paralleled with the offsite power network or otherwise rendered inoperable during performance of SRs, and to preclude deenergizing a required 4160 V ESF bus or disconnecting a required offsite circuit during performance of SRs. With limited AC Sources available, a single event could compromise both the required circuit and the DG. It is the intent that these SRs must still be capable of being met, but actual performance is not required during periods when the DG and offsite circuit is required to be OPERABLE. Refer to the corresponding Bases for LCO 3.8.1 for a discussion of each SR.

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REFERENCES

None.

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ACTIONS

B.1 (continued)

restoration of the required volume prior to declaring the DG inoperable. This period is acceptable based on the remaining capacity (> 6 days), the low rate of usage, the fact that procedures will be initiated to obtain replenishment, and the low probability of an event during this brief period.

C.1

This Condition is entered as a result of a failure to meet the acceptance criterion of SR 3.8.3.3. Normally, trending of particulate levels allows sufficient time to correct high particulate levels prior to reaching the limit of acceptability. Poor sample procedures (bottom sampling), contaminated sampling equipment, and errors in laboratory analysis can produce failures that do not follow a trend. Since the presence of particulates does not mean failure of the fuel oil to burn properly in the diesel engine, and particulate concentration is unlikely to change significantly between Surveillance Frequency intervals, and proper engine performance has been recently demonstrated (within 31 days), it is prudent to allow a brief period prior to declaring the associated DG inoperable. The 7 day Completion Time allows for further evaluation, resampling, and re-analysis of the DG fuel oil.

D.1


With the new fuel oil properties defined in the Bases for SR 3.8.3.4 not within the required limits, a period of 30 days is allowed for restoring the stored fuel oil properties. This period provides sufficient time to test the stored fuel oil to determine that the new fuel oil, when mixed with previously stored fuel oil, remains acceptable, or restore the stored fuel oil properties. This restoration may involve feed and bleed procedures, filtering, or combinations of these procedures. Even if a DG start and load was required during this time interval and the fuel oil properties were outside limits, there is a high likelihood that the DG would still be capable of performing its intended function.

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SR 3.8.3.  5

Draining of the fuel oil stored in the supply tanks, removal of accumulated sediment, and tank cleaning are required at 10 year intervals by Regulatory Guide 1.137 (Ref. 2), paragraph 2.f. This also requires the performance of the ASME Code, Section XI (Ref. 8), examinations of the tanks. To preclude the introduction of surfactants in the fuel oil system, the cleaning should be accomplished using sodium hypochlorite solutions, or their equivalent, rather than soap or detergents. This SR is for preventative maintenance. The presence of sediment does not necessarily represent a failure of this SR, provided that accumulated sediment is removed during performance of the Surveillance.

REFERENCES

1. FSAR, Section [9.5.4.2].
2. Regulatory Guide 1.137.
3. ANSI N195-1976, Appendix B.
4. FSAR, Chapter [6].
5. FSAR, Chapter [15].
6. ASTM Standards: D4057-[ ]; D975-[ ];  
D4175-[ ]; D1552-[ ]; D2622-[ ];  
S2276, Method A.
7. ASTM Standards, D975, Table 1.
8. ASME, Boiler and Pressure Vessel Code, Section XI.

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SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.8.1.1	Verify correct breaker alignment and indicated power availability for each [required] offsite circuit.	7 days
SR 3.8.1.2	<div>-----NOTES-----</div> <div><div>1. Performance of SR 3.8.1.1 satisfies this SR.</div><div>2. All DG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading.</div><div>3. A modified DG start involving idling and gradual acceleration to synchronous speed may be used for this SR as recommended by the manufacturer. When modified start procedures are not used, the time, voltage, and frequency tolerances of SR 3.8.1.1 must be met.</div></div> <div>-----</div> <div>Verify each DG starts from standby conditions and achieves steady state voltage <math>\geq</math> [3740] V and <math>\leq</math> [4580] V and frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz.</div>	As specified in Table 3.8.1-1

(continued)

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## SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.3 -----NOTES-----</p> <ol style="list-style-type: none"><li>1. DG loadings may include gradual loading as recommended by the manufacturer.</li><li>2. Momentary transients outside the load range do not invalidate this test.</li><li>3. This Surveillance shall be conducted on only one DG at a time.</li><li>4. This SR shall be preceded by and immediately follow, without shutdown, a successful performance of SR 3.8.1.2 or SR 3.8.1. <i>DEB</i></li></ol> <p>-----</p> <p>Verify each DG is synchronized and loaded and operates for <math>\geq 60</math> minutes at a load <math>\geq [1710]</math> kW and <math>\leq [2000]</math> kW.</p>	<p>As specified in Table 3.8.1-1</p>
<p>SR 3.8.1.4 Verify each day tank [and engine mounted tank] contain[s] <math>\geq [900]</math> gal of fuel oil.</p>	<p>31 days</p>
<p><del>SR 3.8.1.5 Check for and remove accumulated water from each day tank [and engine mounted tank].</del></p>	<p><del>[31] days</del></p>
<p>SR 3.8.1. <i>DEB</i> Verify the fuel oil transfer system operates to [automatically] transfer fuel oil from storage tank[s] to the day tank [and engine mounted tank].</p>	<p>[92] days</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1 <sup>6</sup> -----NOTE-----  All DG starts may be preceded by an engine  prelube period.</p> <p>Verify each DG starts from standby  condition and achieves, in <math>\leq</math> [12] seconds,  voltage <math>\geq</math> [3740] V and <math>\leq</math> [4580] V and  frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz.</p>	<p>184 days</p>
<p>SR 3.8.1 <sup>7</sup> -----NOTE-----  This Surveillance shall not be performed  in MODE 1 or 2. However, credit may be  taken for unplanned events that satisfy  this SR.</p> <p>Verify [automatic [and] manual] transfer  of [unit power supply] from the [normal  offsite circuit to the alternate]  offsite circuit.</p>	<p>[18 months]</p>

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.9</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</li> <li>2. If performed with the DG synchronized with offsite power, it shall be performed at a power factor <math>\leq</math> [0.9].</li> </ol> <p style="text-align: center;">-----</p> </div> <p>Verify each DG rejects a load greater than or equal to its associated single largest post-accident load, and:</p> <ol style="list-style-type: none"> <li>a. Following load rejection, the frequency is <math>\leq</math> [65.5] Hz;</li> <li>b. Within [3] seconds following load rejection, the voltage is <math>\geq</math> [3740] V and <math>\leq</math> [4580] V; and</li> <li>c. Within [6] seconds following load rejection, the frequency is <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz.</li> </ol>	<p>[18 months]</p>
<p>SR 3.8.1.10</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">-----NOTE-----</p> <p>This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</p> <p style="text-align: center;">-----</p> </div> <p>Verify each DG operating at a power factor <math>\leq</math> [0.9] does not trip and voltage is maintained <math>\leq</math> [4800] V during and following a load rejection of <math>\geq</math> [1710] kW and <math>\leq</math> [2000] kW.</p>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.11 <sup>10</sup></p> <p>-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. All DG starts may be preceded by an engine prelube period.</li> <li>2. This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR.</li> </ol> <p>-----</p> <p>Verify on an actual or simulated loss of offsite power signal:</p> <ol style="list-style-type: none"> <li>a. De-energization of emergency buses;</li> <li>b. Load shedding from emergency buses; and</li> <li>c. DG auto-starts from standby condition and:               <ol style="list-style-type: none"> <li>1. energizes permanently connected loads in <math>\leq</math> [12] seconds,</li> <li>2. energizes auto-connected shutdown loads through [automatic load sequencer],</li> <li>3. maintains steady state voltage <math>\geq</math> [3740] V and <math>\leq</math> [4580] V,</li> <li>4. maintains steady state frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz, and</li> <li>5. supplies permanently connected and auto-connected shutdown loads for <math>\geq</math> [5] minutes.</li> </ol> </li> </ol>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<div data-bbox="170 372 365 500"> <p>SR 3.8.1.12</p> <p>(11)</p> </div> <div data-bbox="397 372 1096 649"> <p>-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. All DG starts may be preceded by an engine prelube period.</li> <li>2. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</li> </ol> <p>-----</p> <p>Verify on an actual or simulated Emergency Core Cooling System (ECCS) initiation signal each DG auto-starts from standby condition and:</p> <ol style="list-style-type: none"> <li>a. In <math>\leq</math> [12] seconds after auto-start and during tests, achieves voltage <math>\geq</math> [3740] V and <math>\leq</math> [4580] V;</li> <li>b. In <math>\leq</math> [12] seconds after auto-start and during tests, achieves frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz;</li> <li>c. Operates for <math>\geq</math> [5] minutes;</li> <li>d. Permanently connected loads remain energized from the offsite power system; and</li> <li>e. Emergency loads are energized [or auto-connected through the automatic load sequencer] from the offsite power system.</li> </ol> </div>	<div data-bbox="1144 691 1323 734"> <p>[18 months]</p> </div>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.13  <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">12</span></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">-----NOTE-----</p> <p>This Surveillance shall not be performed in MODE 1, 2 or 3. However, credit may be taken for unplanned events that satisfy this SR.</p> <p style="text-align: center;">-----</p> </div> <p>Verify each DG's automatic trips are bypassed on [actual or simulated loss of voltage signal on the emergency bus concurrent with an actual or simulated ECCS initiation signal] except:</p> <ul style="list-style-type: none"> <li>a. Engine overspeed; [and]</li> <li>b. Generator differential current[;</li> <li>c. Low lube oil pressure;</li> <li>d. High crankcase pressure; and</li> <li>e. Start failure relay].</li> </ul>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.14 (13)</p> <p>-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. Momentary transients outside the load and power factor ranges do not invalidate this test.</li> <li>2. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</li> </ol> <p>-----</p> <p>Verify each DG operating at a power factor <math>\leq [0.9]</math> operates for <math>\geq 24</math> hours:</p> <ol style="list-style-type: none"> <li>a. For <math>\geq [2]</math> hours loaded <math>\geq [3100]</math> kW and <math>\leq [3400]</math> kW; and</li> <li>b. For the remaining hours of the test loaded <math>\geq [2850]</math> kW and <math>\leq [3150]</math> kW.</li> </ol>	<p>[18 months]</p>
<p>SR 3.8.1.15 (14)</p> <p>-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. This Surveillance shall be performed within 5 minutes of shutting down the DG after the DG has operated <math>\geq [2]</math> hours loaded <math>\geq [1710]</math> kW and <math>\leq [2000]</math> kW.</li> </ol> <p>Momentary transients outside of load range do not invalidate this test.</p> <ol style="list-style-type: none"> <li>2. All DG starts may be preceded by an engine prelube period.</li> </ol> <p>-----</p> <p>Verify each DG starts and achieves, in <math>\leq [12]</math> seconds, voltage <math>\geq [3740]</math> V and <math>\leq [4584]</math> V and frequency <math>\geq [58.8]</math> Hz and <math>\leq [61.2]</math> Hz.</p>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.15 <sup>16</sup> -----NOTE-----  This Surveillance shall not be performed in  MODE 1, 2, or 3. However, credit may be  taken for unplanned events that satisfy  this SR.  -----</p> <p>Verify each DG:</p> <ul style="list-style-type: none"> <li>a. Synchronizes with offsite power source while loaded with emergency loads upon a simulated restoration of offsite power;</li> <li>b. Transfers loads to offsite power source; and</li> <li>c. Returns to ready-to-load operation.</li> </ul>	<p>[18 months]</p>
<p>SR 3.8.1.16 <sup>17</sup> -----NOTE-----  This Surveillance shall not be performed  in MODE 1, 2, or 3. However, credit may be  taken for unplanned events that satisfy  this SR.  -----</p> <p>Verify with a DG operating in test mode and connected to its bus, an actual or simulated ECCS initiation signal overrides the test mode by:</p> <ul style="list-style-type: none"> <li>a. Returning DG to ready-to-load operation[; and]</li> <li>b. Automatically energizing the emergency load from offsite power.</li> </ul>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.18  <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">-----NOTE-----</p> <p>This Surveillance shall not be performed in MODE 1, 2 or 3. However, credit may be taken for unplanned events that satisfy this SR.</p> <p style="text-align: center;">-----</p> </div> <p>Verify interval between each sequenced load block is within <math>\pm</math> [10% of design interval] [for each load sequencer timer].</p> </p>	<p>[18 months]</p>
<p>SR 3.8.1.19  <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: center;">-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. All DG starts may be preceded by an engine prelube period.</li> <li>2. This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR.</li> </ol> <p style="text-align: center;">-----</p> <p>Verify, on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated ECCS initiation signal:</p> <ol style="list-style-type: none"> <li>a. De-energization of emergency buses;</li> <li>b. Load shedding from emergency buses; and</li> <li>c. DG auto-starts from standby condition and:               <ol style="list-style-type: none"> <li>1. energizes permanently connected loads in <math>\leq</math> [12] seconds,</li> <li>2. energizes auto-connected emergency loads through [load sequencer],</li> </ol> </li> </ol> </div> </p>	<p>[18 months]</p> <p style="text-align: right;">(continued)</p>

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SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.18 (continued)</p> <p>3. achieves steady state voltage <math>\geq [3740]</math> V and <math>\leq [4580]</math> V,</p> <p>4. achieves steady state frequency <math>\geq [58.8]</math> Hz and <math>\leq [61.2]</math> Hz, and</p> <p>5. supplies permanently connected and auto-connected emergency loads for <math>\geq [5]</math> minutes.</p>	
<p>SR 3.8.1.20</p> <p>-----NOTE----- All DG starts may be preceded by an engine prelube period. -----</p> <p>Verify, when started simultaneously from standby condition, [each] [2A and 2C] DG achieves, in <math>\leq [12]</math> seconds, voltage <math>\geq [3740]</math> V and <math>\leq [4580]</math> V and frequency <math>\geq [58.8]</math> Hz and <math>\leq [61.2]</math> Hz.</p>	<p>10 years</p>

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ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. One required DG inoperable.	B.1 Suspend CORE ALTERATIONS.	Immediately
	<u>AND</u>	
	B.2 Suspend movement of irradiated fuel assemblies in [secondary] containment.	Immediately
	<u>AND</u>	
	B.3 Initiate action to suspend OPDRVs.	Immediately
	<u>AND</u>	
	B.4 Initiate action to restore required DG to OPERABLE status.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.2.1</p> <p style="text-align: center;">-----NOTE----- (12)</p> <p>The following SRs are not required to be performed: SR 3.8.1.3, SR 3.8.1.4 through SR 3.8.1.11, SR 3.8.1.13 through SR 3.8.1.18, [SR 3.8.1.18], and SR 3.8.1.19. (13) (14) (15)</p> <p>For AC sources required to be OPERABLE the SRs of Specification 3.8.1, except SR 3.8.1.4, SR 3.8.1.17, and SR 3.8.1.20, are applicable. (7) (16) (19)</p>	<p>In accordance with applicable SRs</p>

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SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.8.3.1 Verify each fuel oil storage tank contains $\geq$ [33,000] gal of fuel.	31 days
SR 3.8.3.2 Verify lube oil inventory is $\geq$ [500] gal.	31 days
SR 3.8.3.3 Verify fuel oil properties of new and stored fuel oil are tested in accordance with, and maintained within the limits of, the Diesel Fuel Oil Testing Program.	In accordance with the Diesel Fuel Oil Testing Program
SR 3.8.3.4 Verify each DG air start receiver pressure is $\geq$ [225] psig.	31 days
<del>SR 3.8.3.5 Check for and remove accumulated water from each fuel oil storage tank.</del>	<del>[31] days</del>
SR 3.8.3.5 For each fuel oil storage tank: a. Drain the fuel oil; b. Remove the sediment; and c. Clean the tank.	10 years

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(continued)

minimum and maximum frequencies of the DG are 58.8 Hz and 61.2 Hz, respectively. These values are equal to  $\pm 2\%$  of the 60 Hz nominal frequency and are derived from the recommendations found in Regulatory Guide 1.9 (Ref. 3).

SR 3.8.1.1

This SR ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. The breaker alignment verifies that each breaker is in its correct position to ensure that distribution buses and loads are connected to their preferred power source and that appropriate independence of offsite circuits is maintained. The 7 day Frequency is adequate since breaker position is not likely to change without the operator being aware of it and because its status is displayed in the control room.

SR 3.8.1.2 and SR 3.8.1.26

These SRs help to ensure the availability of the standby electrical power supply to mitigate DBAs and transients and maintain the unit in a safe shutdown condition.

To minimize the wear on moving parts that do not get lubricated when the engine is not running, these SRs have been modified by a Note (Note 2 for SR 3.8.1.2 and Note 1 for SR 3.8.1.26) to indicate that all DG starts for these Surveillances may be preceded by an engine prelube period and followed by a warmup prior to loading.

For the purposes of this testing, the DGs are started from standby conditions. Standby conditions for a DG mean that the diesel engine coolant and oil are being continuously circulated and temperature is being maintained consistent with manufacturer recommendations.

In order to reduce stress and wear on diesel engines, some manufacturers recommend a modified start in which the starting speed of DGs is limited, warmup is limited to this lower speed, and the DGs are gradually accelerated to synchronous speed prior to loading. These start procedures are the intent of Note 3, which is only applicable when such modified start procedures are recommended by the manufacturer.

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SR 3.8.1.2 and SR 3.8.1.1 (continued)

SR 3.8.1.1 requires that, at a 184 day Frequency, the DG starts from standby conditions and achieves required voltage and frequency within 12 seconds. The 12 second start requirement supports the assumptions in the design basis LOCA analysis of FSAR, Section [6.3] (Ref. 12). The 12 second start requirement is not applicable to SR 3.8.1.2 (see Note 3 of SR 3.8.1.2), when a modified start procedure as described above is used. If a modified start is not used, the 12 second start requirement of SR 3.8.1.1 applies.

Since SR 3.8.1.1 does require a 12 second start, it is more restrictive than SR 3.8.1.2, and it may be performed in lieu of SR 3.8.1.2. This procedure is the intent of Note 1 of SR 3.8.1.2.

The normal 31 day Frequency for SR 3.8.1.2 (see Table 3.8.1-1, "Diesel Generator Test Schedule") is consistent with Regulatory Guide 1.9 (Ref. 3). The 184 day Frequency for SR 3.8.1.1 is a reduction in cold testing consistent with Generic Letter 84-15 (Ref. 7). These Frequencies provide adequate assurance of DG OPERABILITY, while minimizing degradation resulting from testing.

SR 3.8.1.3

This Surveillance verifies that the DGs are capable of synchronizing and accepting greater than or equal to the equivalent of the maximum expected accident loads. A minimum run time of 60 minutes is required to stabilize engine temperatures, while minimizing the time that the DG is connected to the offsite source.

Although no power factor requirements are established by this SR, the DG is normally operated at a power factor between [0.8 lagging] and [1.0]. The [0.8] value is the design rating of the machine, while [1.0] is an operational limitation [to ensure circulating currents are minimized]. The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

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SR 3.8.1.3 (continued)

The normal 31 day Frequency for this Surveillance (see Table 3.8.1-1) is consistent with Regulatory Guide 1.9 (Ref. 3).

Note 1 modifies this Surveillance to indicate that diesel engine runs for this Surveillance may include gradual loading, as recommended by the manufacturer, so that mechanical stress and wear on the diesel engine are minimized.

Note 2 modifies this Surveillance by stating that momentary transients because of changing bus loads do not invalidate this test. Similarly, momentary power factor transients above the limit do not invalidate the test.

Note 3 indicates that this Surveillance should be conducted on only one DG at a time in order to avoid common cause failures that might result from offsite circuit or grid perturbations.

Note 4 stipulates a prerequisite requirement for performance of this SR. A successful DG start must precede this test to credit satisfactory performance.

SR 3.8.1.4

This SR provides verification that the level of fuel oil in the day tank [and engine mounted tank] is at or above the level at which fuel oil is automatically added. The level is expressed as an equivalent volume in gallons, and is selected to ensure adequate fuel oil for a minimum of 1 hour of DG operation at full load plus 10%.

The 31 day Frequency is adequate to ensure that a sufficient supply of fuel oil is available, since low level alarms are provided and facility operators would be aware of any large uses of fuel oil during this period.

SR 3.8.1.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in

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SR 3.8.1.5 (continued)

fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel oil day [and engine mounted] tanks once every [31] days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref. 10). This SR is for preventive maintenance. The presence of water does not necessarily represent a failure of this SR provided that accumulated water is removed during performance of this Surveillance.

SR 3.8.1.6 (5)

This Surveillance demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from its associated storage tank to its associated day tank. It is required to support continuous operation of standby power sources. This Surveillance provides assurance that the fuel oil transfer pump is OPERABLE, the fuel oil piping system is intact, the fuel delivery piping is not obstructed, and the controls and control systems for automatic fuel transfer systems are OPERABLE.

The Frequency for this SR is variable, depending on individual system design, with up to a [92] day interval. The [92] day Frequency corresponds to the testing requirements for pumps as contained in the ASME Boiler and Pressure Vessel Code, Section XI (Ref. 13); however, the design of fuel transfer systems is such that pumps operate automatically or must be started manually in order to maintain an adequate volume of fuel oil in the day [and engine mounted] tanks during or following DG testing. In such a case, a 31 day Frequency is appropriate. Since proper operation of fuel transfer systems is an inherent

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SR 3.8.1.1 <sup>5</sup> (continued)

part of DG OPERABILITY, the Frequency of this SR should be modified to reflect individual designs.

SR 3.8.1.1 <sup>6</sup>

See SR 3.8.1.2.

SR 3.8.1.1 <sup>7</sup>

Transfer of each 4.16 kV ESF bus power supply from the normal offsite circuit to the alternate offsite circuit demonstrates the OPERABILITY of the alternate circuit distribution network to power the shutdown loads. The [18 month] Frequency of the Surveillance is based on engineering judgment taking into consideration the plant conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed on the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

This SR is modified by a Note. The reason for the Note is that, during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, plant safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.1 <sup>8</sup>

Each DG is provided with an engine overspeed trip to prevent damage to the engine. Recovery from the transient caused by the loss of a large load could cause diesel engine overspeed, which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the DG load response characteristics and capability to reject the largest single load without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. The largest single load for each DG is a residual heat removal service water pump (1225 bhp). This Surveillance may be accomplished by:

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SR 3.8.1.1<sup>8</sup> (continued)

- a. Tripping the DG output breaker with the DG carrying greater than or equal to its associated single largest post-accident load while paralleled to offsite power, or while solely supplying the bus; or
- b. Tripping its associated single largest post-accident load with the DG solely supplying the bus.

As required by IEEE-308 (Ref. 14), the load rejection test is acceptable if the increase in diesel speed does not exceed 75% of the difference between synchronous speed and the overspeed trip setpoint, or 15% above synchronous speed, whichever is lower. For DGs 2A, 2C, and 1B, this represents 65.5 Hz, equivalent to 75% of the difference between nominal speed and the overspeed trip setpoint.

The time, voltage, and frequency tolerances specified in this SR are derived from Regulatory Guide 1.9 (Ref. 3) recommendations for response during load sequence intervals. The [6] seconds specified is equal to 60% of the 10 second load sequence interval associated with sequencing the residual heat removal (RHR) pumps during an undervoltage on the bus concurrent with a LOCA. The voltage and frequency specified are consistent with the design range of the equipment powered by the DG. SR 3.8.1.1<sup>8</sup>.a corresponds to the maximum frequency excursion, while SR 3.8.1.1<sup>8</sup>.b and SR 3.8.1.1<sup>8</sup>.c are steady state voltage and frequency values to which the system must recover following load rejection. The [18 month] Frequency is consistent with the recommendation of Regulatory Guide 1.108 (Ref. 9).

This SR is modified by two Notes. The reason for Note 1 is that, during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, plant safety systems. Credit may be taken for unplanned events that satisfy this SR. In order to ensure that the DG is tested under load conditions that are as close to design basis conditions as possible, Note 2 requires that, if synchronized to offsite power, testing must be performed using a power factor  $\leq [0.9]$ . This power factor is chosen to be representative of the actual design basis inductive loading that the DG would experience.

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SR 3.8.1.9 (continued)

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

- a. Performance of the SR will not render any safety system or component inoperable;
- b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and
- c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

SR 3.8.1.10

This Surveillance demonstrates the DG capability to reject a full load without overspeed tripping or exceeding the predetermined voltage limits. The DG full load rejection may occur because of a system fault or inadvertent breaker tripping. This Surveillance ensures proper engine generator load response under the simulated test conditions. This test simulates the loss of the total connected load that the DG experiences following a full load rejection and verifies that the DG does not trip upon loss of the load. These acceptance criteria provide DG damage protection. While the DG is not expected to experience this transient during an event, and continues to be available, this response ensures that the DG is not degraded for future application, including reconnection to the bus if the trip initiator can be corrected or isolated.

In order to ensure that the DG is tested under load conditions that are as close to design basis conditions as possible, testing must be performed using a power factor  $\leq [0.9]$ . This power factor is chosen to be representative of the actual design basis inductive loading that the DG would experience.

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SR 3.8.1.10<sup>9</sup> (continued)

The [18 month] Frequency is consistent with the recommendation of Regulatory Guide 1.108 (Ref. 9) and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that would challenge continued steady state operation and, as a result, plant safety systems. Credit may be taken for unplanned events that satisfy this SR.

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

- a. Performance of the SR will not render any safety system or component inoperable;
- b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and
- c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

SR 3.8.1.11<sup>10</sup>

As required by Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(1), this Surveillance demonstrates the as designed operation of the standby power sources during loss of the offsite source. This test verifies all actions encountered from the loss of offsite power, including shedding of the nonessential loads and energization of the emergency buses and respective loads from the DG. It further demonstrates the capability of the DG to automatically achieve the required voltage and frequency within the specified time.

The DG auto-start time of 12 seconds is derived from requirements of the accident analysis for responding to a

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SR 3.8.1.12<sup>10</sup> (continued)

design basis large break LOCA. The Surveillance should be continued for a minimum of 5 minutes in order to demonstrate that all starting transients have decayed and stability has been achieved.

The requirement to verify the connection and power supply of permanent and auto-connected loads is intended to satisfactorily show the relationship of these loads to the DG loading logic. In certain circumstances, many of these loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. For instance, Emergency Core Cooling Systems (ECCS) injection valves are not desired to be stroked open, or systems are not capable of being operated at full flow, or RHR systems performing a decay heat removal function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of the connection and loading of these loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(1), takes into consideration plant conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs shall be started from standby conditions, that is, with the engine coolant and oil being continuously circulated and temperature maintained consistent with manufacturer recommendations. The reason for Note 2 is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

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(continued)

SR 3.8.1.12 (11)

This Surveillance demonstrates that the DG automatically starts and achieves the required voltage and frequency within the specified time ([12] seconds) from the design basis actuation signal (LOCA signal) and operates for  $\geq$  [5] minutes. The [5] minute period provides sufficient time to demonstrate stability. SR 3.8.1.12.d and SR 3.8.1.12.e ensure that permanently connected loads and emergency loads are energized from the offsite electrical power system on a LOCA signal without loss of offsite power. (11)

The requirement to verify the connection and power supply of permanent and autoconnected loads is intended to satisfactorily show the relationship of these loads to the loading logic for loading onto offsite power. In certain circumstances, many of these loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. For instance, ECCS injection valves are not desired to be stroked open, high pressure injection systems are not capable of being operated at full flow, or RHR systems performing a decay heat removal function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of the connection and loading of these loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of [18 months] takes into consideration plant conditions required to perform the Surveillance and is intended to be consistent with the expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the [18 month] Frequency. Therefore, the Frequency is acceptable from a reliability standpoint.

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil being continuously circulated and temperature maintained consistent with manufacturer recommendations. The reason for Note 2 is that during operation with the reactor critical,

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SURVEILLANCE  
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SR 3.8.1.12<sup>11</sup> (continued)

performance of this Surveillance could potentially cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, plant safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.12<sup>12</sup>

This Surveillance demonstrates that DG non-critical protective functions (e.g., high jacket water temperature) are bypassed on an ECCS initiation test signal and critical protective functions (engine overspeed, generator differential current, and low lubricating oil pressure) trip the DG to avert substantial damage to the DG unit. The non-critical trips are bypassed during DBAs and provide an alarm on an abnormal engine condition. This alarm provides the operator with sufficient time to react appropriately. The DG availability to mitigate the DBA is more critical than protecting the engine against minor problems that are not immediately detrimental to emergency operation of the DG.

The [18 month] Frequency is based on engineering judgment, takes into consideration plant conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the [18 month] Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

The SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required DG from service. Credit may be taken for unplanned events that satisfy this SR.

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

- a. Performance of the SR will not render any safety system or component inoperable;

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SR 3.8.1.12 (continued)

- b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and
- c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOC with attendant challenge to plant safety systems.

SR 3.8.1.13

Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(3), requires demonstration once per [18 months] that the DGs can start and run continuously at full load capability for an interval of not less than 24 hours—22 hours of which is at a load equivalent to the continuous rating of the DG, and 2 hours of which is at a load equivalent to 110% of the continuous duty rating of the DG. Plant Hatch has taken an exception to this requirement and performs the 2 hour run at the 2000 hour rating (3100 kW). The DG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for prelube and warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are applicable to this SR.

In order to ensure that the DG is tested under load conditions that are as close to design conditions as possible, testing must be performed using a power factor  $\leq$  [0.9]. This power factor is chosen to be representative of the actual design basis inductive loading that the DG could experience. A load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

The [18 month] Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(3); takes into consideration plant conditions required to perform the Surveillance; and is intended to be consistent with expected fuel cycle lengths.

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SR 3.8.1.13 (continued)

This Surveillance has been modified by two Notes. Note 1 states that momentary transients due to changing bus loads do not invalidate this test. Similarly, momentary power factor transients above the limit do not invalidate the test. The reason for Note 2 is that during operation with the reactor critical, performance of this Surveillance could cause perturbations to the electrical distribution systems that would challenge continued steady state operation and, as a result, plant safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.14

This Surveillance demonstrates that the diesel engine can restart from a hot condition, such as subsequent to shutdown from normal Surveillances, and achieve the required voltage and frequency within [12] seconds. The [12] second time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The [18 month] Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(5).

This SR is modified by two Notes. Note 1 ensures that the test is performed with the diesel sufficiently hot. The requirement that the diesel has operated for at least 2 hours at full load conditions prior to performance of this Surveillance is based on manufacturer recommendations for achieving hot conditions. The load band is provided to avoid routine overloading of the DG. Routine overloads may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY. Momentary transients due to changing bus loads do not invalidate this test. Note 2 allows all DG starts to be preceded by an engine prelube period to minimize wear and tear on the diesel during testing.

SR 3.8.1.15

As required by Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(6), this Surveillance ensures that the manual synchronization and automatic load transfer from the DG to the offsite source can be made and that the DG can be returned

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SR 3.8.1.15 (continued)

to ready-to-load status when offsite power is restored. It also ensures that the auto-start logic is reset to allow the DG to reload if a subsequent loss of offsite power occurs. The DG is considered to be in ready-to-load status when the DG is at rated speed and voltage, the output breaker is open and can receive an auto-close signal on bus undervoltage, and the load sequence timers are reset.

The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(6), and takes into consideration plant conditions required to perform the Surveillance.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.16

Demonstration of the test mode override ensures that the DG availability under accident conditions is not compromised as the result of testing. Interlocks to the LOCA sensing circuits cause the DG to automatically reset to ready-to-load operation if an ECCS initiation signal is received during operation in the test mode. Ready-to-load operation is defined as the DG running at rated speed and voltage with the DG output breaker open. These provisions for automatic switchover are required by IEEE-308 (Ref. 14), paragraph 6.2.6(2).

- (11) The requirement to automatically energize the emergency loads with offsite power is essentially identical to that of SR 3.8.1.15. The intent in the requirements associated with SR 3.8.1.15.b is to show that the emergency loading is not affected by the DG operation in test mode. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the emergency loads to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

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SR 3.8.1.16 (continued)

The [18 month] Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(8); takes into consideration plant conditions required to perform the Surveillance; and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.17

Under accident conditions [and loss of offsite power] loads are sequentially connected to the bus by the automatic load sequencer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading of the DGs due to high motor starting currents. The [10]% load sequence time interval tolerance ensures that sufficient time exists for the DG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. Reference 2 provides a summary of the automatic loading of ESF buses.

The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(2); takes into consideration plant conditions required to perform the Surveillance; and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

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SR 3.8.1.18<sup>(17)</sup> (continued)

- a. Performance of the SR will not render any safety system or component inoperable;
- b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and
- c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

SR 3.8.1.19<sup>(10)</sup>

In the event of a DBA coincident with a loss of offsite power, the DGs are required to supply the necessary power to ESF systems so that the fuel, RCS, and containment design limits are not exceeded.

This Surveillance demonstrates<sup>(10)</sup> DG operation, as discussed in the Bases for SR 3.8.1.18, during a loss of offsite power actuation test signal in conjunction with an ECCS initiation signal. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of [18 months] takes into consideration plant conditions required to perform the Surveillance and is intended to be consistent with an expected fuel cycle length of [18 months].

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil being continuously circulated and temperature maintained consistent with manufacturer recommendations. The reason for Note 2 is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical

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SR 3.8.1.18<sup>18</sup> (continued)

distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.19<sup>19</sup>

This Surveillance demonstrates that the DG starting independence has not been compromised. Also, this Surveillance demonstrates that each engine can achieve proper speed within the specified time when the DGs are started simultaneously.

The 10 year Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9).

This SR is modified by a Note. The reason for the Note is to minimize wear on the DG during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations.

Diesel Generator Test Schedule

The DG test schedule (Table 3.8.1-1) implements the recommendations of Revision 3 to Regulatory Guide 1.9 (Ref. 3). The purpose of this test schedule is to provide timely test data to establish a confidence level associated with the goal to maintain DG reliability at > 0.95 per test.

According to Regulatory Guide 1.9 (Ref. 3), Revision 3, each DG unit should be tested at least once every 31 days. Whenever a DG has experienced 4 or more valid failures in the last 25 valid tests, the maximum time between tests is reduced to 7 days. Four failures in 25 valid tests is a failure rate of 0.16, or the threshold of acceptable DG performance, and hence may be an early indication of the degradation of DG reliability. When considered in the light of a long history of tests, however, 4 failures in the last 25 valid tests may only be a statistically probable distribution of random events. Increasing the test Frequency allows a more timely accumulation of additional test data upon which to base judgment of the reliability of the DG. The

(continued)

BASES

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ACTIONS

A.2.1, A.2.2, A.2.3, A.2.4, B.1, B.2, B.3, and B.4  
(continued)

sufficiently conservative actions is made. With the required DG inoperable, the minimum required diversity of AC power sources is not available. It is, therefore, required to suspend CORE ALTERATIONS, movement of irradiated fuel assemblies in the [secondary] containment, and activities that could result in inadvertent draining of the reactor vessel.

Suspension of these activities shall not preclude completion of actions to establish a safe conservative condition. These actions minimize the probability of the occurrence of postulated events. It is further required to immediately initiate action to restore the required AC sources and to continue this action until restoration is accomplished in order to provide the necessary AC power to the plant safety systems.

The Completion Time of immediately is consistent with the required times for actions requiring prompt attention. The restoration of the required AC electrical power sources should be completed as quickly as possible in order to minimize the time during which the plant safety systems may be without sufficient power.

Pursuant to LCO 3.0.6, the Distribution System ACTIONS would not be entered even if all AC sources to it are inoperable, resulting in de-energization. Therefore, the Required Actions of Condition A have been modified by a Note to indicate that when Condition A is entered with no AC power to any required ESF bus, ACTIONS for LCO 3.8.10 must be immediately entered. This Note allows Condition A to provide requirements for the loss of the offsite circuit whether or not a division is de-energized. LCO 3.8.10 provides the appropriate restrictions for the situation involving a de-energized division.

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SURVEILLANCE  
REQUIREMENTS

SR 3.8.2.1

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the AC sources in other than MODES 1, 2, and 3. SR 3.8.1 ~~is~~ is not required to

(continued)

BASES

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SURVEILLANCE  
REQUIREMENTS

SR 3.8.2.1 (continued) (16)

be met since only one offsite circuit is required to be OPERABLE. SR 3.8.1.0 is not required to be met because the required OPERABLE DG(s) is not required to undergo periods of being synchronized to the offsite circuit. SR 3.8.1.0 is excepted because starting independence is not required with the DG(s) that is not required to be OPERABLE. Refer to the corresponding Bases for LCO 3.8.1 for a discussion of each SR. (17)

This SR is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DG(s) from being paralleled with the offsite power network or otherwise rendered inoperable during the performance of SRs, and to preclude deenergizing a required 4160 V ESF bus or disconnecting a required offsite circuit during performance of SRs. With limited AC sources available, a single event could compromise both the required circuit and the DG. It is the intent that these SRs must still be capable of being met, but actual performance is not required during periods when the DG and offsite circuit is required to be OPERABLE.

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REFERENCES

None.

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BASES

SURVEILLANCE  
REQUIREMENTS

SR 3.8.3.3 (continued)

concentration is unlikely to change significantly between Frequency intervals.

SR 3.8.3.4

This Surveillance ensures that, without the aid of the refill compressor, sufficient air start capacity for each DG is available. The system design requirements provide for a minimum of [five] engine start cycles without recharging. [A start cycle is defined by the DG vendor, but usually is measured in terms of time (seconds of cranking) or engine cranking speed.] The pressure specified in this SR is intended to reflect the lowest value at which the [five] starts can be accomplished.

The [31] day Frequency takes into account the capacity, capability, redundancy, and diversity of the AC sources and other indications available in the control room, including alarms, to alert the operator to below normal air start pressure.

SR 3.8.3.5


Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel storage tanks once every [31] days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and from breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref. 2). This SR is for preventive maintenance. The presence of water does not necessarily represent failure of this SR, provided the accumulated water is removed during performance of the Surveillance.

(continued)

BASES

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SURVEILLANCE  
REQUIREMENTS  
(continued)

SR 3.8.3. 

Draining of the fuel oil stored in the supply tanks, removal of accumulated sediment, and tank cleaning are required at 10 year intervals by Regulatory Guide 1.137 (Ref. 2), paragraph 2.f. This SR is typically performed in conjunction with ASME Boiler and Pressure Vessel Code, Section XI (Ref. 7), examinations of the tanks. To preclude the introduction of surfactants in the fuel oil system, the cleaning should be accomplished using sodium hypochlorite solutions or their equivalent, rather than soap or detergents. This SR is for preventive maintenance. The presence of sediment does not necessarily represent a failure of this SR, provided that accumulated sediment is removed during performance of the Surveillance.

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REFERENCES

1. FSAR, Section [9.5.2].
  2. Regulatory Guide 1.137.
  3. ANSI N195, 1976.
  4. FSAR, Chapter [6].
  5. FSAR, Chapter [15].
  6. ASTM Standards: D4057-[ ]; D975-[ ]; D4176-[ ]; D1552-[ ]; D2622-[ ]; and D2276-[ ].
  7. ASME, Boiler and Pressure Vessel Code, Section XI.
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SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.8.1.1    Verify correct breaker alignment and indicated power availability for each [required] offsite circuit.	7 days
<div data-bbox="201 647 389 680">SR 3.8.1.2</div> <div data-bbox="448 651 1153 685">-----NOTES-----</div> <div data-bbox="448 685 1139 1211"> <ol style="list-style-type: none"> <li>1. Performance of SR 3.8.1.1 satisfies this SR.</li> <li>2. All DG starts may be preceded by an engine prelube period and followed by a warmup period prior to loading.</li> <li>3. A modified DG start involving idling and gradual acceleration to synchronous speed may be used for this SR as recommended by the manufacturer. When modified start procedures are not used, the time, voltage, and frequency tolerances of SR 3.8.1.1 must be met.</li> </ol> </div> <div data-bbox="439 1303 1060 1442">           Verify each DG starts from standby conditions and achieves steady state voltage <math>\geq</math> [3744] V and <math>\leq</math> [4576] V and frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz.         </div>	<div data-bbox="1183 1308 1439 1375">As specified in Table 3.8.1-1</div>

(continued)

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## SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.3 -----NOTES-----</p> <ol style="list-style-type: none"><li>1. DG loadings may include gradual loading as recommended by the manufacturer.</li><li>2. Momentary transients outside the load range do not invalidate this test.</li><li>3. This Surveillance shall be conducted on only one DG at a time.</li><li>4. This SR shall be preceded by, and immediately follow, without shutdown, a successful performance of SR 3.8.1.2 or SR 3.8.1.0. <i>6</i></li></ol> <p>Verify each DG is synchronized and loaded and operates for <math>\geq 60</math> minutes at a load <math>\geq [5450]</math> kW and <math>\leq [5740]</math> kW for [Division 1 and 2] DGs, and <math>\geq [3300]</math> kW and <math>\leq [3500]</math> kW for [Division 3] DG.</p>	As specified in Table 3.8.1-1
<p>SR 3.8.1.4 Verify each day tank [and engine mounted tank] contains <math>\geq [220]</math> gal of fuel oil for [Divisions 1 and 2] and <math>\geq [220]</math> gal for [Division 3].</p>	31 days
<p><del>SR 3.8.1.5 Check for and remove accumulated water from each day tank [and engine mounted tank].</del></p>	<del>[31] days</del>
<p>SR 3.8.1.0 <i>5</i> Verify the fuel oil transfer system operates to [automatically] transfer fuel oil from storage tank[s] to the day tank [and engine mounted tank].</p>	[92] days

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1. <sup>⑥</sup> -----NOTE-----  All DG starts may be preceded by an engine  prelube period.  -----  Verify each DG starts from standby  condition and achieves, in <math>\leq [10]</math> seconds,  voltage <math>\geq [3744]</math> V and <math>\leq [4576]</math> V and  frequency <math>\geq [58.8]</math> Hz and <math>\leq [61.2]</math> Hz.</p>	<p>184 days</p>
<p>SR 3.8.1. <sup>⑦</sup> -----NOTE-----  This Surveillance shall not be performed  in MODE 1 or 2. However, credit may be  taken for unplanned events that satisfy  this SR.  -----  Verify [automatic and manual] transfer of  [unit power supply] from the [normal  offsite circuit to each [required]  alternate offsite circuit and between the  [required] alternate] offsite circuits.</p>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.8 <sup>23</sup></p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</li> <li>2. If performed with DG synchronized with offsite power, it shall be performed at a power factor <math>\leq [0.9]</math>.</li> </ol> <p style="text-align: center;">-----</p> </div> <p>Verify each DG rejects a load greater than or equal to its associated single largest post-accident load for [Division 1 and <math>\geq [550]</math> kW for Division 2] DGs and <math>\geq [2180]</math> kW for [Division 3] DG, and:</p> <ol style="list-style-type: none"> <li>a. Following load rejection, the frequency is <math>\leq [69]</math> Hz;</li> <li>b. Within [3] seconds following load rejection, the voltage is <math>\geq [3744]</math> V and <math>\leq [4576]</math> V; and</li> <li>c. Within [3] seconds following load rejection, the frequency is <math>\geq [58.8]</math> Hz and <math>\leq [61.2]</math> Hz.</li> </ol>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.10 9</p> <div style="border: 1px dashed black; padding: 5px; margin: 10px 0;"> <p>-----NOTE----- This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</p> </div> <p>Verify each DG operating at a power factor <math>\leq [0.9]</math> does not trip and voltage is maintained <math>\leq [5000]</math> V during and following a load rejection of a load <math>\geq [5450]</math> kW and <math>\leq [5740]</math> kW for [Division 1 and 2] DGs and <math>\geq [3300]</math> kW and <math>\leq [3500]</math> kW for [Division 3] DG.</p>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.11 (10)</p> <p>-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. All DG starts may be preceded by an engine prelube period.</li> <li>2. This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR.</li> </ol> <p>-----</p> <p>Verify on an actual or simulated loss of offsite power signal:</p> <ol style="list-style-type: none"> <li>a. De-energization of emergency buses;</li> <li>b. Load shedding from emergency buses; and</li> <li>c. DG auto-starts from standby condition and:               <ol style="list-style-type: none"> <li>1. energizes permanently connected loads in <math>\leq</math> [10] seconds,</li> <li>2. energizes auto-connected shutdown loads through [automatic load sequencer],</li> <li>3. maintains steady state voltage <math>\geq</math> [3744] V and <math>\leq</math> [4576] V,</li> <li>4. maintains steady state frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz, and</li> <li>5. supplies permanently connected and auto-connected shutdown loads for <math>\geq</math> [5] minutes.</li> </ol> </li> </ol>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.12  <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">11</span></p> <p style="text-align: center;">-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. All DG starts may be preceded by an engine prelube period.</li> <li>2. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</li> </ol> <p>-----</p> <p>Verify on an actual or simulated Emergency Core Cooling System (ECCS) initiation signal each DG auto-starts from standby condition and:</p> <ol style="list-style-type: none"> <li>a. In <math>\leq</math> [10] seconds after auto-start and during tests, achieves voltage <math>\geq</math> [3744] V and <math>\leq</math> [4576] V;</li> <li>b. In <math>\leq</math> [10] seconds after auto-start and during tests, achieves frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz;</li> <li>c. Operates for <math>\geq</math> [5] minutes;</li> <li>d. Permanently connected loads remain energized from the offsite power system; and</li> <li>e. Emergency loads are energized [or auto-connected through the automatic load sequencer] to from the offsite power system.</li> </ol>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1. (12) (12)</p> <div style="border: 1px dashed black; padding: 5px; margin: 10px 0;"> <p>-----NOTE-----</p> <p>This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR.</p> <p>-----</p> </div> <p>Verify each DG's automatic trips are bypassed on [actual or simulated loss of voltage signal on the emergency bus concurrent with an actual or simulated ECCS initiation signal] except:</p> <ul style="list-style-type: none"> <li>a. Engine overspeed; [and]</li> <li>b. Generator differential current[;</li> <li>c. Low lube oil pressure;</li> <li>d. High crankcase pressure; and</li> <li>e. Start failure relay].</li> </ul>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.14 13</p> <p>-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. Momentary transients outside the load and power factor ranges do not invalidate this test.</li> <li>2. This Surveillance shall not be performed in MODE 1 or 2. However, credit may be taken for unplanned events that satisfy this SR.</li> </ol> <p>-----</p> <p>Verify each DG operating at a power factor <math>\leq [0.9]</math> for Division 1 and 2 DGs, and <math>\leq [0.9]</math> for Division 3 DG, operates for <math>\geq 24</math> hours:</p> <ol style="list-style-type: none"> <li>a. For <math>\geq [2]</math> hours loaded, <math>\geq [5450]</math> kW and <math>\leq [5740]</math> kW for Division 1 and 2 DGs, <math>\geq [3630]</math> kW and <math>\leq [3830]</math> kW for Division 3 DG; and</li> <li>b. For the remaining hours of the test loaded <math>\geq [3744]</math> kW and <math>\leq [4576]</math> kW for Division 1 and 2 DGs, and <math>\geq [3300]</math> kW and <math>\leq [3500]</math> kW for Division 3 DG.</li> </ol>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.14</p> <p>-----NOTES-----</p> <p>1. This Surveillance shall be performed within 5 minutes of shutting down the DG after the DG has operated <math>\geq</math> [2] hours loaded <math>\geq</math> [4500] kW and <math>\leq</math> [5000] kW for [Division 1 and 2] DGs, and <math>\geq</math> [3300] kW and <math>\leq</math> [3500] kW for Division 3 DG.</p> <p>Momentary transients outside of load range do not invalidate this test.</p> <p>2. All DG starts may be preceded by an engine prelube period.</p> <p>-----</p> <p>Verify each DG starts and achieves, in <math>\leq</math> [10] seconds, voltage <math>\geq</math> [3744] V and <math>\leq</math> [4576] V and frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz.</p>	<p>[18 months]</p>
<p>SR 3.8.1.15</p> <p>-----NOTE-----</p> <p>This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR.</p> <p>-----</p> <p>Verify each DG:</p> <p>a. Synchronizes with offsite power source while loaded with emergency loads upon a simulated restoration of offsite power;</p> <p>b. Transfers loads to offsite power source; and</p> <p>c. Returns to ready-to-load operation.</p>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.16</p> <p>-----NOTE----- This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR. -----</p> <p>Verify, with a DG operating in test mode and connected to its bus, an actual or simulated ECCS initiation signal overrides the test mode by:</p> <ul style="list-style-type: none"> <li>a. Returning DG to ready-to-load operation[; and]</li> <li>b. Automatically energizing the emergency load from offsite power.</li> </ul>	<p>[18 months]</p>
<p>SR 3.8.1.17</p> <p>-----NOTE----- This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR. -----</p> <p>Verify interval between each sequenced load block is within <math>\pm</math> [10% of design interval] [for each load sequencer timer].</p>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.18</p> <p>-----NOTES-----</p> <ol style="list-style-type: none"> <li>1. All DG starts may be preceded by an engine prelube period.</li> <li>2. This Surveillance shall not be performed in MODE 1, 2, or 3. However, credit may be taken for unplanned events that satisfy this SR.</li> </ol> <p>-----</p> <p>Verify, on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated TCCS initiation signal:</p> <ol style="list-style-type: none"> <li>a. De-energization of emergency buses;</li> <li>b. Load shedding from emergency buses; and</li> <li>c. DG auto-starts from standby condition and:               <ol style="list-style-type: none"> <li>1. energizes permanently connected loads in <math>\leq</math> [10] seconds,</li> <li>2. energizes auto-connected emergency loads through [load sequencer],</li> <li>3. achieves steady state voltage <math>\geq</math> [3744] V and <math>\leq</math> [4576] V,</li> <li>4. achieves steady state frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz, and</li> <li>5. supplies permanently connected and auto-connected emergency loads for <math>\geq</math> [5] minutes.</li> </ol> </li> </ol>	<p>[18 months]</p>

(continued)

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SURVEILLANCE REQUIREMENTS (continued)

SURVEILLANCE	FREQUENCY
<p>SR 3.8.1.20  <div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center; margin-left: 10px;">19</div> <div style="margin-left: 10px;"> <p>-----NOTE-----</p> <p>All DG starts may be preceded by an engine prelube period.</p> <p>-----</p> <p>Verify, when started simultaneously from standby condition, [each] [Division 1, 2, and 3] DG achieves, in <math>\leq</math> [10] seconds, voltage <math>\geq</math> [3744] V and <math>\leq</math> [4576] V and frequency <math>\geq</math> [58.8] Hz and <math>\leq</math> [61.2] Hz.</p> </div> </p>	<p>10 years</p>

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SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.2.1 -----NOTE-----</p> <p>The following SRs are not required to be performed: SR 3.8.1.3, SR 3.8.1.12 through SR 3.8.1.14, SR 3.8.1.15 through SR 3.8.1.18, [SR 3.8.1.19], and SR 3.8.1.20. (10) (11) (12) (13) (14) (15) (16) (17) (18) (19)</p> <p>For AC sources required to be OPERABLE, the SRs of Specification 3.8.1, except SR 3.8.1.2, SR 3.8.1.7, and SR 3.8.1.20, are applicable. (7) (15) (19)</p>	<p>In accordance with applicable SRs</p>

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SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
<p>SR 3.8.3.1 Verify each fuel oil storage tank contains:</p> <p>a. <math>\geq</math> [62,000] gal of fuel for [DGs 11 and 12;] and</p> <p>b. <math>\geq</math> [41,200] gal of fuel for [DG 13].</p>	31 days
<p>SR 3.8.3.2 Verify lube oil inventory is:</p> <p>a. <math>\geq</math> [ ] gal for [DGs 11 and 12;] and</p> <p>b. <math>\geq</math> [ ] gal for [DG 13].</p>	31 days
<p>SR 3.8.3.3 Verify fuel oil properties of new and stored fuel oil are tested in accordance with, and maintained within the limits of, the Diesel Fuel Oil Testing Program.</p>	In accordance with the Diesel Fuel Oil Testing Program
<p>SR 3.8.3.4 Verify each DG air start receiver pressure is <math>\geq</math> [225] psig.</p>	31 days
<p><del>SR 3.8.3.5 Check for and remove accumulated water from each fuel oil storage tank.</del></p>	<del>[31] days</del>
<p>SR 3.8.3.5 For each fuel oil storage tank:</p> <p>a. Drain the fuel oil;</p> <p>b. Remove the sediment; and</p> <p>c. Clean the tank.</p>	10 years

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BASES

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SURVEILLANCE  
REQUIREMENTS  
(continued)

Where the SRs discussed herein specify voltage and frequency tolerances, the following summary is applicable. The minimum steady state output voltage of [3740] V is 90% of the nominal 4160 V output voltage. This value, which is specified in ANSI C84.1 (Ref. 11), allows for voltage drop to the terminals of 4000 V motors whose minimum operating voltage is specified as 90%, or 3600 V. It also allows for voltage drops to motors and other equipment down through the 120 V level where minimum operating voltage is also usually specified as 90% of name plate rating. The specified maximum steady state output voltage of [9756] V is equal to the maximum operating voltage specified for 4000 V motors. It ensures that for a lightly loaded distribution system, the voltage at the terminals of 4000 V motors is no more than the maximum rated operating voltages. The specified minimum and maximum frequencies of the DG are 58.8 Hz and 61.2 Hz, respectively. These values are equal to  $\pm 2\%$  of the 60 Hz nominal frequency and are derived from the recommendations given in Regulatory Guide 1.9 (Ref. 3).

SR 3.8.1.1

This SR ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. The breaker alignment verifies that each breaker is in its correct position to ensure that distribution buses and loads are connected to their preferred power source and that appropriate independence of offsite circuits is maintained. The 7 day Frequency is adequate since breaker position is not likely to change without the operator being aware of it and because its status is displayed in the control room.

SR 3.8.1.2 and SR 3.8.1.2<sup>6</sup>

These SRs help to ensure the availability of the standby electrical power supply to mitigate DBAs and transients and maintain the unit in a safe shutdown condition.

To minimize the wear on moving parts that do not get lubricated when the engine is not running, these SRs have been modified by Notes (Note 1 for SR 3.8.1.2<sup>6</sup> and Note 2 for SR 3.8.1.2) to indicate that all DG starts for these

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BASES

SURVEILLANCE  
REQUIREMENTS

SR 3.8.1.2 and SR 3.8.1.1 (continued)

Surveillances may be preceded by an engine prelube period and followed by a warmup period prior to loading.

For the purposes of this testing, the DGs are started from standby conditions. Standby conditions for a DG mean that the diesel engine coolant and oil are being continuously circulated and temperature is being maintained consistent with manufacturer recommendations.

In order to reduce stress and wear on diesel engines, some manufacturers recommend that the starting speed of DGs be limited, that warmup be limited to this lower speed, and that DGs be gradually accelerated to synchronous speed prior to loading. These start procedures are the intent of Note 3, which is only applicable when such procedures are recommended by the manufacturer.

SR 3.8.1.1 requires that, at a 184 day Frequency, the DG starts from standby conditions and achieves required voltage and frequency within 10 seconds. The 10 second start requirement supports the assumptions in the design basis LOCA analysis (Ref. 10). The 10 second start requirement may not be applicable to SR 3.8.1.2 (see Note 3 of SR 3.8.1.2), when a modified start procedure as described above is used. If a modified start is not used, the 10 second start requirement of SR 3.8.1.1 applies. Since SR 3.8.1.1 does require a 10 second start, it is more restrictive than SR 3.8.1.2, and it may be performed in lieu of SR 3.8.1.2. This procedure is the intent of Note 1 of SR 3.8.1.2.

The normal 31 day Frequency for SR 3.8.1.2 (see Table 3.8.1-1, "Diesel Generator Test Schedule") is consistent with Regulatory Guide 1.9 (Ref. 3). The 184 day Frequency for SR 3.8.1.1 is a reduction in cold testing consistent with Generic Letter 84-15 (Ref. 7). These Frequencies provide adequate assurance of DG OPERABILITY, while minimizing degradation resulting from testing.

SR 3.8.1.3

This Surveillance demonstrates that the DGs are capable of synchronizing and accepting greater than or equal to the

(continued)

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BASES

SURVEILLANCE  
REQUIREMENTS

SR 3.8.1.4 (continued)

level at which fuel oil is automatically added. The level is expressed as an equivalent volume in gallons, and is selected to ensure adequate fuel oil for a minimum of 1 hour of DG operation at full load plus 10%.

The 31 day Frequency is adequate to assure that a sufficient supply of fuel oil is available, since low level alarms are provided and facility operators would be aware of any large uses of fuel oil during this period.

SR 3.8.1.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel oil day [and engine mounted] tanks once every [31] days eliminates the necessary environment for bacterial survival. This is most effective means in controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref 10). This SR is for preventive maintenance. The presence of water does not necessarily represent a failure of this SR provided that accumulated water is removed during performance of this Surveillance.

SR 3.8.1.6 (5)

This Surveillance demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from its associated storage tank to its associated day tank. It is required to support the continuous operation of standby power sources. This Surveillance provides assurance that the fuel oil transfer pump is OPERABLE, the fuel oil piping

(continued)

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SR 3.8.1.6 (continued)

system is intact, the fuel delivery piping is not obstructed, and the controls and control systems for automatic fuel transfer systems are OPERABLE.

The Frequency for this SR is variable, depending on individual system design, with up to a 92 day interval. The 92 day Frequency corresponds to the testing requirements for pumps as contained in the ASME Boiler and Pressure Vessel Code, Section XI (Ref. 12); however, the design of fuel transfer systems is such that pumps operate automatically or must be started manually in order to maintain an adequate volume of fuel oil in the day [and engine mounted] tanks during or following DG testing. In such a case, a 31 day Frequency is appropriate. Since proper operation of fuel transfer systems is an inherent part of DG OPERABILITY, the Frequency of this SR should be modified to reflect individual designs.

SR 3.8.1.7

See SR 3.8.1.2.

SR 3.8.1.8

Transfer of each 4.16 kV ESF bus power supply from the normal offsite circuit to the alternate offsite circuit demonstrates the OPERABILITY of the alternate circuit distribution network to power the shutdown loads. The [18 month] Frequency of the Surveillance is based on engineering judgment taking into consideration the plant conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed on the [18 month] Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

This SR is modified by a Note. The reason for the Note is that, during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, plant

(continued)

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SR 3.8.1.8 (continued)

safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.9

Each DG is provided with an engine overspeed trip to prevent damage to the engine. Recovery from the transient caused by the loss of a large load could cause diesel engine overspeed, which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the DG load response characteristics and capability to reject the largest single load without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. The load referenced for DG 11 is the 1200 kW low pressure core spray pump; for DG 12, the 550 kW residual heat removal (RHR) pump; and for DG 13 the 2180 kW HPCS pump. The Standby Service Water (SSW) pump values are not used as the largest load since the SSW supplies cooling to the associated DG. If this load were to trip, it would result in the loss of the DG. This Surveillance may be accomplished by:

- a. Tripping the DG output breaker with the DG carrying greater than or equal to its associated single largest post-accident load while paralleled to offsite power, or while solely supplying the bus; or
- b. Tripping its associated single largest post-accident load with the DG solely supplying the bus.

As required by IEEE-308 (Ref. 13), the load rejection test is acceptable if the increase in diesel speed does not exceed 75% of the difference between synchronous speed and the overspeed trip setpoint, or 15% above synchronous speed, whichever is lower. For the Grand Gulf Nuclear Station these values are the same.

The time, voltage, and frequency tolerances specified in this SR are derived from Regulatory Guide 1.9 (Ref. 3) recommendations for response during load sequence intervals. The 3 seconds specified is equal to 60% of the 5 second load

(continued)

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SR 3.8.1.8 (continued)

sequence interval associated with sequencing of this largest load. The voltage and frequency specified are consistent with the design range of the equipment powered by the DG.

SR 3.8.1.8.a corresponds to the maximum frequency excursion, while SR 3.8.1.8.b and SR 3.8.1.8.c are steady state voltage and frequency values to which the system must recover following load rejection. The [18 month] Frequency is consistent with the recommendation of Regulatory Guide 1.108 (Ref. 9).

This SR has been modified by two Notes. The reason for Note 1 is that during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, plant safety systems. Credit may be taken for unplanned events that satisfy this SR. In order to ensure that the DG is tested under load conditions that are as close to design basis conditions as possible, Note 2 requires that, if synchronized to offsite power, testing must be performed using a power factor  $\leq [0.9]$ . This power factor is chosen to be representative of the actual design basis inductive loading that the DG could experience.

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

- a. Performance of the SR will not render any safety system or component inoperable;
- b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and
- c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

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REQUIREMENTS  
(continued)

SR 3.8.1.10<sup>9</sup>

This Surveillance demonstrates the DG capability to reject a full load without overspeed tripping or exceeding the predetermined voltage limits. The DG full load rejection may occur because of a system fault or inadvertent breaker tripping. This Surveillance ensures proper engine generator load response under the simulated test conditions. This test simulates the loss of the total connected load that the DG experiences following a full load rejection and verifies that the DG does not trip upon loss of the load. These acceptance criteria provide DG damage protection. While the DG is not expected to experience this transient during an event, and continues to be available, this response ensures that the DG is not degraded for future application, including reconnection to the bus if the trip initiator can be corrected or isolated.

In order to ensure that the DG is tested under load conditions that are as close to design basis conditions as possible, testing must be performed using a power factor  $\leq [0.9]$ . This power factor is chosen to be representative of the actual design basis inductive loading that the DG would experience.

The [18 month] Frequency is consistent with the recommendation of Regulatory Guide 1.108 (Ref. 9) and is intended to be consistent with expected fuel cycle lengths.

This SR has been modified by a Note. The reason for the Note is that during operation with the reactor critical, performance of this SR could cause perturbation to the electrical distribution systems that could challenge continued steady state operation and, as a result, plant safety systems. Credit may be taken for unplanned events that satisfy this SR.

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

- a. Performance of the SR will not render any safety system or component inoperable;

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REQUIREMENTS

SR 3.8.1.10 (continued)

- b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and
- c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

SR 3.8.1.10

As required by Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(1), this Surveillance demonstrates the as designed operation of the standby power sources during loss of the offsite source. This test verifies all actions encountered from the loss of offsite power, including shedding of the nonessential loads and energization of the emergency buses and respective loads from the DG. It further demonstrates the capability of the DG to automatically achieve the required voltage and frequency within the specified time.

The DG auto-start time of 10 seconds is derived from requirements of the accident analysis to respond to a design basis large break LOCA. The Surveillance should be continued for a minimum of 5 minutes in order to demonstrate that all starting transients have decayed and stability has been achieved.

The requirement to verify the connection and power supply of permanent and auto-connected loads is intended to satisfactorily show the relationship of these loads to the DG loading logic. In certain circumstances, many of these loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. For instance, ECCS injection valves are not desired to be stroked open, systems are not capable of being operated at full flow, or RHR systems performing a decay heat removal function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of the connection and loading of these loads, testing that adequately shows the capability of the DG system to perform

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SR 3.8.1.10 (continued)

these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(1), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil being continuously circulated and temperature maintained consistent with manufacturer recommendations for [Division 1 and 2] DGs. [For the [Division 3] DG, standby conditions mean that the lube oil is heated and continuously circulated through a portion of the system as recommended by the vendor. Engine jacket water is heated by the lubricating oil and circulates through the system by natural circulation.] The reason for Note 2 is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge plant safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.11

This Surveillance demonstrates that the DG automatically starts and achieves the required voltage and frequency within the specified time ([10] seconds) from the design basis actuation signal (LOCA signal) and operates for  $\geq$  [5] minutes. The [5] minute period provides sufficient time to demonstrate stability. SR 3.8.1.10.d and 11 SR 3.8.1.12 ensure that permanently connected loads and emergency loads are energized from the offsite electrical power system on an ECCS signal without loss of offsite power.

The requirement to verify the connection and power supply of permanent and autoconnected loads is intended to satisfactorily show the relationship of these loads to the

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SR 3.8.1.12<sup>11</sup> (continued)

loading logic for loading onto offsite power. In certain circumstances, many of these loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. For instance, ECCS injection valves are not desired to be stroked open, high pressure injection systems are not capable of being operated at full flow, or RHR systems performing a decay heat removal function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of the connection and loading of these loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of [18 months] takes into consideration plant conditions required to perform the Surveillance and is intended to be consistent with the expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the [18 month] Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

This SR is modified by two Notes. The reason for the Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil being continuously circulated and temperature maintained consistent with manufacturer recommendations. The reason for Note 2 is that during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, plant safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.12<sup>12</sup>

This Surveillance demonstrates that DG non-critical protective functions (e.g., high jacket water temperature) are bypassed on a loss of voltage signal concurrent with an ECCS initiation test signal and critical protective functions (engine overspeed, generator differential current,

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SR 3.8.1.13 (continued)

and low lube oil pressure) trip the DG to avert substantial damage to the DG unit. The non-critical trips are bypassed during DBAs and provide an alarm on an abnormal engine condition. This alarm provides the operator with sufficient time to react appropriately. The DG availability to mitigate the DBA is more critical than protecting the engine against minor problems that are not immediately detrimental to emergency operation of the DG.

The [18 month] Frequency is based on engineering judgment, taking into consideration plant conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the [18 month] Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

The SR is modified by a Note. The reason for the Note is that performing the Surveillance removes a required DG from service. Credit may be taken for unplanned events that satisfy this SR.

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

- a. Performance of the SR will not render any safety system or component inoperable;
- b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and
- c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

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(continued)

SR 3.8.1.14 (13)

Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(3), requires demonstration once per 18 months that the DGs can start and run continuously at full load capability for an interval of not less than 24 hours—22 hours of which is at a load equivalent to the continuous rating of the DG, and 2 hours of which is at a load equivalent to 110% of the continuous duty rating of the DG. The DG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for prelube and warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are applicable to this SR.

In order to ensure that the DG is tested under load conditions that are as close to design conditions as possible, testing must be performed using a power factor  $\leq [0.9]$ . This power factor is chosen to be representative of the actual design basis inductive loading that the DG could experience.

The [18 month] Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(3); takes into consideration plant conditions required to perform the Surveillance; and is intended to be consistent with expected fuel cycle lengths.

This Surveillance is modified by two Notes. Note 1 states that momentary transients due to changing bus loads do not invalidate this test. The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY. Similarly, momentary power factor transients above the limit do not invalidate the test. The reason for Note 2 is that during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that would challenge continued steady state operation and, as a result, plant safety systems. Credit may be taken for unplanned events that satisfy this SR.

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SURVEILLANCE  
REQUIREMENTS  
(continued)

SR 3.8.1.15 (14)

This Surveillance demonstrates that the diesel engine can restart from a hot condition, such as subsequent to shutdown from normal Surveillances, and achieve the required voltage and frequency within 10 seconds. The 10 second time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA.

The [18 month] Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(5).

This SR has been modified by two Notes. Note 1 ensures that the test is performed with the diesel sufficiently hot. The requirement that the diesel has operated for at least 2 hours at full load conditions prior to performance of this Surveillance is based on manufacturer recommendations for achieving hot conditions. The load band is provided to avoid routine overloading of the DG. Routine overloads may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY. Momentary transients due to changing bus loads do not invalidate this test. Note 2 allows all DG starts to be preceded by an engine prelube period to minimize wear and tear on the diesel during testing.

SR 3.8.1.16 (15)

As required by Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(6), this Surveillance ensures that the manual synchronization and automatic load transfer from the DG to the offsite source can be made and that the DG can be returned to ready-to-load status when offsite power is restored. It also ensures that the auto-start logic is reset to allow the DG to reload if a subsequent loss of offsite power occurs. The DG is considered to be in ready-to-load status when the DG is at rated speed and voltage, the output breaker is open and can receive an auto-close signal on bus undervoltage, and the load sequence timers are reset.

The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9),

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REQUIREMENTS

SR 3.8.1.16<sup>(5)</sup> (continued)

paragraph 2.1.(6), and takes into consideration plant conditions required to perform the Surveillance.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.17<sup>(16)</sup>

Demonstration of the test mode override ensures that the DG availability under accident conditions is not compromised as the result of testing. Interlocks to the LOCA sensing circuits cause the DG to automatically reset to ready-to-load operation if an ECCS initiation signal is received during operation in the test mode. Ready-to-load operation is defined as the DG running at rated speed and voltage with the DG output breaker open. These provisions for automatic switchover are required by IEEE-308 (Ref. 13), paragraph 6.2.6(2).

(11) The requirement to automatically energize the emergency loads with offsite power is essentially identical to that of SR 3.8.1.12. The intent in the requirement associated with SR 3.8.1.12.b is to show that the emergency loading is not (16) affected by the DG operation in test mode. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the emergency loads to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The [18 month] Frequency is consistent with the recommendations of Regulatory Guide 1.102 (Ref. 9), paragraph 2.a.(8); takes into consideration plant conditions required to perform the Surveillance; and is intended to be consistent with expected fuel cycle lengths.

This SR has been modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the

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SURVEILLANCE  
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SR 3.8.1.17 (continued)

electrical distribution system, and challenge safety systems. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.18

Under accident conditions [and loss of offsite power] loads are sequentially connected to the bus by the load sequencing panel. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading of the DGs due to high motor starting currents. The [10]% load sequence time interval tolerance ensures that sufficient time exists for the DG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. Reference 2 provides a summary of the automatic loading of ESF buses.

The Frequency of [18 months] is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(2); takes into consideration plant conditions required to perform the Surveillance; and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance during these MODES would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge plant safety systems. Credit may be taken for unplanned events that satisfy this SR.

Reviewer's Note: The above MODE restrictions may be deleted if it can be demonstrated to the staff, on a plant specific basis, that performing the SR with the reactor in any of the restricted MODES can satisfy the following criteria, as applicable:

- a. Performance of the SR will not render any safety system or component inoperable;

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REQUIREMENTS

SR 3.8.1.18<sup>17</sup> (continued)

- b. Performance of the SR will not cause perturbations to any of the electrical distribution systems that could result in a challenge to steady state operation or to plant safety systems; and
- c. Performance of the SR, or failure of the SR, will not cause, or result in, an AOO with attendant challenge to plant safety systems.

SR 3.8.1.19<sup>18</sup>

In the event of a DBA coincident with a loss of offsite power, the DGs are required to supply the necessary power to ESF systems so that the fuel, RCS, and containment design limits are not exceeded.

This Surveillance demonstrates the DG operation, as discussed in the Bases for SR 3.8.1.11, during a loss of offsite power actuation test signal in conjunction with an ECCS initiation signal. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the DG system to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The Frequency of [18 months] takes into consideration plant conditions required to perform the Surveillance and is intended to be consistent with an expected fuel cycle length of [18 months].

This SR is modified by two Notes. The reason for Note 1 is to minimize wear and tear on the DGs during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil being continuously circulated and temperature maintained consistent with manufacturer recommendations. The reason for Note 2 is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge plant safety systems. Credit may be taken for unplanned events that satisfy this SR.

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BASES

SURVEILLANCE  
REQUIREMENTS  
(continued)

SR 3.8.1.20 (19)

This Surveillance demonstrates that the DG starting independence has not been compromised. Also, this Surveillance demonstrates that each engine can achieve proper speed within the specified time when the DGs are started simultaneously.

The 10 year Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9).

This SR is modified by a Note. The reason for the Note is to minimize wear on the DG during testing. For the purpose of this testing, the DGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations.

Diesel Generator Test Schedule

The DG test schedule (Table 3.8.1-1) implements the recommendations of Revision 3 to Regulatory Guide 1.9 (Ref. 3). The purpose of this test schedule is to provide timely test data to establish a confidence level associated with the goal to maintain DG reliability at > 0.95 per test.

According to Regulatory Guide 1.9 (Ref. 3), Revision 3, each DG unit should be tested at least once every 31 days. Whenever a DG has experienced 4 or more valid failures in the last 25 valid tests, the maximum time between tests is reduced to 7 days. Four failures in 25 valid tests is a failure rate of 0.16, or the threshold of acceptable DG performance, and hence may be an early indication of the degradation of DG reliability. When considered in the light of a long history of tests, however, 4 failures in the last 25 valid tests may only be a statistically probable distribution of random events. Increasing the test Frequency allows a more timely accumulation of additional test data upon which to base judgment of the reliability of the DG. The increased test Frequency must be maintained until seven consecutive failure free tests have been performed.

The Frequency for accelerated testing is 7 days, but no less than 24 hours. Tests conducted at intervals of less than 24

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BASES

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ACTIONS

A.2.1, A.2.2, A.2.3, A.2.4, B.1, B.2, B.3, and B.4  
(continued)

Pursuant to LCO 3.0.6, the Distribution System ACTIONS are not entered even if all AC sources to it are inoperable, resulting in de-energization. Therefore, the Required Actions of Condition A have been modified by a Note to indicate that when Condition A is entered with no AC power to any required ESF bus, ACTIONS for LCO 3.8.10 must be immediately entered. This Note allows Condition A to provide requirements for the loss of the offsite circuit whether or not a division is de-energized. LCO 3.8.10 provides the appropriate restrictions for the situation involving a de-energized division.

C.1

When the HPCS is required to be OPERABLE, and the additional required Division 3 AC source is inoperable, the required diversity of AC power sources to the HPCS is not available. Since these sources only affect the HPCS, the HPCS is declared inoperable and the Required Actions of the affected Emergency Core Cooling Systems LCO entered.

In the event all sources of power to Division 3 are lost, Condition A will also be entered and direct that the ACTIONS of LCO 3.8.10 be taken. If only the Division 3 additional required AC source is inoperable, and power is still supplied to HPCS, 72 hours is allowed to restore the additional required AC source to OPERABLE. This is reasonable considering HPCS will still perform its function, absent an additional single failure.

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SR 3.8.2.1

SR 3.8.2.1 requires the SRs from LCO 3.8.1 that are necessary for ensuring the OPERABILITY of the AC sources in other than MODES 1, 2, and 3. SR 3.8.1.17 is not required to be met since only one offsite circuit is required to be OPERABLE. SR 3.8.1.18 is not required to be met because the required OPERABLE DG(s) is not required to undergo periods of being synchronized to the offsite circuit. SR 3.8.1.19 is excepted because starting independence is not required

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SR 3.8.3.3 (continued)

concentration is unlikely to change between Frequency intervals.

SR 3.8.3.4

This Surveillance ensures that, without the aid of the refill compressor, sufficient air start capacity for each DG is available. The system design requirements provide for a minimum of five engine start cycles without recharging. [A start cycle is defined by the DG vendor, but usually is measured in terms of time (seconds of cranking) or engine cranking speed.] The pressure specified in this SR is intended to reflect the lowest value at which the [five] starts can be accomplished.

The 31 day Frequency takes into account the capacity, capability, redundancy, and diversity of the AC sources and other indications available in the control room, including alarms, to alert the operator to below normal air start pressure.

SR 3.8.3.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the storage tanks once every 31 days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and from breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref. 2). This SR is for preventive maintenance. The presence of water does not necessarily represent a failure of this SR provided that accumulated water is removed during performance of the Surveillance.


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BASES

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SURVEILLANCE  
REQUIREMENTS  
(continued)

SR 3.8.3. 

Draining of the fuel oil stored in the supply tanks, removal of accumulated sediment, and tank cleaning are required at 10 year intervals by Regulatory Guide 1.137 (Ref. 2), paragraph 2.f. This SR is typically performed in conjunction with the ASME Boiler and Pressure Vessel Code, Section XI (Ref. 7), examinations of the tanks. To preclude the introduction of surfactants in the fuel oil system, the cleaning should be accomplished using sodium hypochlorite solutions, or their equivalent, rather than soap or detergents. This SR is for preventive maintenance. The presence of sediment does not necessarily represent a failure of this SR provided that accumulated sediment is removed during performance of the Surveillance.

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REFERENCES

1. FSAR, Section [9.5.4].
  2. Regulatory Guide 1.137.
  3. ANSI N195, Appendix B, 1976.
  4. FSAR, Chapter [6].
  5. FSAR, Chapter [15].
  6. ASTM Standards: D4057-[ ]; D975-[ ]; D4176-[ ]; D975-[ ]; D1552-[ ]; D2622-[ ]; D2276-[ ].
  7. ASME, Boiler and Pressure Vessel Code, Section XI.
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