Tennessee Valley Authority, Sequoyah Nuclear Plant, P.O. Box 2000, Soddy Daisy, Tennessee 37384

May 31, 2019

10 CFR 50.4
10 CFR 50.71(e)

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Sequoyah Nuclear Plant, Units 1 and 2
Renewed Facility Operating License Nos. DPR-77 and DPR-79
NRC Docket Nos. 50-327 and 50-328

Subject: **Revisions to the Sequoyah Nuclear Plant Units 1 and 2 Technical Specification Bases**

References: TVA Letter to NRC, “Revisions to the Sequoyah Nuclear Plant Units 1 and 2 Technical Specification Bases,” dated November 29, 2017.

Pursuant to the Sequoyah Nuclear Plant (SQN) Technical Specification 5.5.12, "Technical Specifications (TS) Bases Control Program," these changes to the SQN TS Bases are submitted in accordance with 10 CFR 50.71(e). The previous revisions of the SQN TS Bases were submitted in the referenced letter. The enclosure to this letter provides a description of the TS Bases revisions with attachments of the updated pages.

There are no new regulatory commitments contained in this letter. If you have any questions, please contact Mr. Jonathan Johnson, Site Licensing Manager, at (423) 843-8129.

I certify that I am duly authorized by TVA, and that, to the best of my knowledge and belief, the information contained herein accurately presents changes made since the previous submittal, necessary to reflect information and analyses submitted to the Commission or prepared pursuant to Commission requirements.

Respectfully,

Matthew Rasmussen
Site Vice President
Sequoyah Nuclear Plant

Enclosure:
Description of Revisions for the Sequoyah Nuclear Plant (SQN), Units 1 and 2 Technical Specification Bases

cc (Enclosure):
NRC Regional Administrator – Region II
NRC Senior Resident Inspector – Sequoyah Nuclear Plant

ENCLOSURE

DESCRIPTION OF REVISIONS FOR THE SEQUOYAH NUCLEAR PLANT (SQN), UNITS 1 AND 2 TECHNICAL SPECIFICATION BASES

Revisions 53 to the SQN, Units 1 and 2 Technical Specification (TS) Bases were approved on February 2, 2018, and implemented on March 26, 2018. These Bases revisions are associated with TS Change 16-04, "AC Sources – Operating," that was approved by NRC on February 2, 2018, for SQN Units 1 and 2 under Amendment Nos. 340 and 333, respectively. The TS amendment deleted the Limiting Condition for Operation (LCO) 3.8.1, "AC Sources – Operating," Surveillance Requirement (SR) 3.8.1.17 Note, thus permitting shutdown board load sequence timer setpoint testing in Modes 1 through 4 when the associated load is out of service for maintenance or testing.

Revisions 54 to the SQN, Units 1 and 2 TS Bases were approved on February 12, 2018, and implemented on April 5, 2018. These Bases revisions are associated with TS Change 14-02, "AC Sources – Operating," which corrected non-conservative SRs 3.8.1.2, 3.8.1.7, 3.8.1.9, 3.8.1.11, 3.8.1.12, 3.8.1.15, and 3.8.1.18 acceptance criterion for the diesel generator (DG) steady state frequency in LCO 3.8.1. NRC approved for SQN Units 1 and 2, Amendment Nos. 341 and 333 on February 12, 2018.

Revisions 55 to the SQN, Units 1 and 2 TS Bases were approved on February 22, 2018, and implemented on June 19, 2018. These Bases revisions were developed to address corrective action program condition report (CR) Nos. 1204930 and 1247181. The revisions effected TS Bases 3.1.4 Rod Group Alignment Limits, SR 3.1.4.2; Bases 3.1.5 Shutdown Bank Inspection Limits, Action A; and Bases 3.1.6 Control Bank Inspection Limits, Action A. CR No. 1204930 identified a condition were cycle specific checks had not been performed for each reload core to ensure that bank insertions of up to 18 steps would not result in power distributions that violate the Departure from Nucleate Boiling criterion for ANS Condition II transients. The cycle specific checks were credited for approval of SQN Units 1 and 2 Amendment Nos. 215 and 205, respectively on August 30, 1995. The amendment addressed conditions during control and shutdown bank rod testing that could result in a rod urgent failure, yet the rod would remain operable if trippable. These Bases revisions added language, concerning cycle specific check, removed during the conversion to improved standard TSs. CR No. 1247181 identified a condition where predicted hot channel factor, $F_{\Delta H}$, future margin may become negative as a result of applied peaking factor margin penalties during SR 3.1.4.2 for control rod testing. Clarifying language is added to the Bases to ensure TS 3.2.2, "Nuclear Enthalpy Rise Hot Channel Factor $F_{\Delta H}$(X,Y)," is met prior to performance of SR 3.1.4.2.

Revisions 56 to the SQN, Units 1 and 2 TS Bases were approved on July 12, 2018, and implemented on August 10, 2018. These Bases revisions were developed to address CR No. 1296530 that identified replacement of the Unit Station Service Transformer and addition of the generator circuit breakers for each unit created 2 separate and independent offsite sources of power. These Bases revisions modified the background section of TS Bases LCO 3.8.9, "Distribution Systems – Operating," to recognize this fact, which make it consistent with the background section of TS Bases LCO 3.8.1.

Revisions 57 to the SQN, Units 1 and 2 TS Bases were approved on August 30, 2018, and implemented on September 26, 2018. These Bases revisions are associated with TS Change 17-02, "TS 3.3.1, Reactor Trip System Instrumentation and TS 3.2.4 Quadrant Power Tilt Ratio (QPTR)," approved for SQN Units 1 and 2, under Amendment Nos. 343 and 336 on August 30,

2018. For TS 3.3.1, Condition D was revised to direct performance of SR 3.2.4.2 if input to QPTR from one or more power range neutron flux channels are inoperable with thermal power greater than 75% rated thermal power. SR 3.2.4.2 was revised to clarify it's note and the frequency for performance.

Revisions 58 to the SQN, Units 1 and 2 TS Bases were approved on February 27, 2019, and implemented on March 19, 2019. The Bases revisions were developed to address CR No. 1450216 that identified the SQN design change for upgrading the Incore Thermocouple Monitoring System revised the indication range from 200 to 2300 degrees Fahrenheit to 0 to 2300 degrees Fahrenheit. TS Bases 3.3.3 PAM Instrumentation, Item No. 14 Incore Thermocouples was revised for this change of the instrument range.

Revisions 59 to the SQN, Units 1 and 2 TS Bases were approved on February 27, 2019, and implemented on March 19, 2019. The Bases revisions were developed to address CR No. 1221911 that identified the turbine driven auxiliary feedwater (TDAFW) pump needs to be considered a redundant required feature when accomplishing TS 3.8.1 Condition B.2 for one or more Train-A DG inoperable or one or more Train-B DG inoperable. TS Bases 3.8.1 Condition B was revised to include information consist with NUREG-1431, "Improved Standard Technical Specifications – Westinghouse Plants," TS 3.8.1 AC Sources – Operating," Bases Action A.2 Reviewer's Note that describes when the TDAFW pump needs to be considered a redundant required feature.

A revised effective page listing for the SQN TSs are provided with the Bases change pages associated with the above revisions.

Attachments:

1. Sequoyah Nuclear Plant, Unit 1, Technical Specification Bases - Changed Pages
2. Sequoyah Nuclear Plant, Unit 2, Technical Specification Bases - Changed Pages

ATTACHMENT 1

SEQUOYAH NUCLEAR PLANT, UNIT 1,
TECHNICAL SPECIFICATION BASES
CHANGED PAGES

TS Bases Affected Pages
EPL-1 through EPL 52
B 3.1.4-8
B 3.1.4-9
B 3.1.5-3
B 3.1.5-4
B 3.1.5-5
B 3.1.6-4
B 3.1.6-5
B 3.1.6-6
B 3.2.4-6
B 3.3.1-34
B 3.3.1-35
B 3.3.3-8
B 3.8.1-9 through B 3.8.1-32
B 3.8.9-1

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

Page	Revision
3.1.1-1	09/30/15
3.1.2-1	09/30/15
3.1.2-2	09/30/15
3.1.3-1	09/30/15
3.1.3-2	09/30/15
3.1.4-1	09/30/15
3.1.4-2	09/30/15
3.1.4-3	09/30/15
3.1.5-1	09/30/15
3.1.5-2	09/30/15
3.1.5-3	09/30/15
3.1.6-1	09/30/15
3.1.6-2	09/30/15
3.1.6-3	09/30/15
3.1.7-1	09/30/15
3.1.7-2	09/30/15
3.1.7-3	09/30/15
3.1.7-4	09/30/15
3.1.8-1	09/30/15
3.1.8-2	09/30/15
3.2.1-1	09/30/15
3.2.1-2	09/30/15
3.2.1-3	09/30/15
3.2.1-4	09/30/15
3.2.1-5	09/30/15
3.2.2-1	09/30/15
3.2.2-2	09/30/15
3.2.2-3	09/30/15
3.2.2-4	09/30/15

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

Page	Revision
3.3.2-4	09/30/15
3.3.2-5	09/30/15
3.3.2-6	09/30/15
3.3.2-7	09/30/15
3.3.2-8	09/30/15
3.3.2-9	09/30/15
3.3.2-10	09/30/15
3.3.2-11	09/30/15
3.3.2-12	09/30/15
3.3.2-13	09/30/15
3.3.2-14	09/30/15
3.3.2-15	09/30/15
3.3.2-16	09/30/15
3.3.2-17	09/30/15
3.3.2-18	09/30/15
3.3.2-19	09/30/15
3.3.3-1	09/30/15
3.3.3-2	09/30/15
3.3.3-3	09/30/15
3.3.3-4	09/30/15
3.3.3-5	09/30/15
3.3.4-1	09/30/15
3.3.4-2	09/30/15
3.3.5-1	09/30/15
3.3.5-2	09/30/15
3.3.5-3	09/30/15
3.3.6-1	09/30/15
3.3.6-2	09/30/15

EFFECTIVE PAGE LISTING

Page	Revision
3.3.6-3	09/30/15
3.3.6-4	09/30/15
3.3.6-5	09/30/15
3.3.6-6	09/30/15
3.3.7-1	09/30/15
3.3.7-2	09/30/15
3.3.7-3	09/30/15
3.3.7-4	09/30/15
3.3.7-5	09/30/15
3.3.8-1	09/30/15
3.3.8-2	09/30/15
3.3.8-3	09/30/15
3.3.9-1	09/30/15
3.3.9-2	09/30/15
3.4.1-1	09/30/15
3.4.1-2	09/30/15
3.4.2-1	09/30/15
3.4.3-1	09/30/15
3.4.3-2	09/30/15
3.4.4-1	09/30/15
3.4.5-1	09/30/15
3.4.5-2	09/30/15
3.4.5-3	09/30/15
3.4.6-1	09/30/15
3.4.6-2	09/30/15
3.4.6-3	09/30/15
3.4.7-1	09/30/15
3.4.7-2	09/30/15
3.4.7-3	09/30/15

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

Page	Revision
3.5.1-1	09/30/15
3.5.1-2	09/30/15
3.5.1-3	09/30/15
3.5.2-1	09/30/15
3.5.2-2	09/30/15
3.5.2-3	09/30/15
3.5.3-1	09/30/15
3.5.3-2	09/30/15
3.5.4-1	09/30/15
3.5.4-2	09/30/15
3.5.5-1	09/30/15
3.5.5-2	09/30/15
3.5.5-3	09/30/15
3.6.1-1	09/30/15
3.6.2-1	09/30/15
3.6.2-2	09/30/15
3.6.2-3	09/30/15
3.6.2-4	09/30/15
3.6.3-1	09/30/15
3.6.3-2	09/30/15
3.6.3-3	09/30/15
3.6.3-4	09/30/15
3.6.3-5	09/30/15
3.6.3-6	09/30/15
3.6.3-7	09/30/15
3.6.4-1	09/30/15
3.6.5-1	09/30/15
3.6.5-2	09/30/15

EFFECTIVE PAGE LISTING

Page	Revision
3.6.6-1	09/30/15
3.6.6-2	09/30/15
3.6.7-1	09/30/15
3.6.7-2	09/30/15
3.6.8-1	09/30/15
3.6.8-2	09/30/15
3.6.9-1	09/30/15
3.6.10-1	09/30/15
3.6.10-2	09/30/15
3.6.11-1	09/30/15
3.6.11-2	09/30/15
3.6.12-1	09/30/15
3.6.12-2	09/30/15
3.6.12-3	09/30/15
3.6.13-1	09/30/15
3.6.13-2	09/30/15
3.6.13-3	09/30/15
3.6.14-1	09/30/15
3.6.14-2	09/30/15
3.6.14-3	09/30/15
3.6.15-1	09/30/15
3.6.15-2	09/30/15
3.7.1-1	09/30/15
3.7.1-2	09/30/15
3.7.1-3	09/30/15
3.7.1-4	09/30/15
3.7.2-1	09/30/15
3.7.2-2	09/30/15

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

Page	Revision
3.8.10-1	09/30/15
3.8.10-2	09/30/15
3.9.1-1	09/30/15
3.9.1-2	09/30/15
3.9.2-1	09/30/15
3.9.3-1	09/30/15
3.9.3-2	09/30/15
3.9.4-1	09/30/15
3.9.4-2	09/30/15
3.9.5-1	09/30/15
3.9.5-2	09/30/15
3.9.6-1	09/30/15
3.9.6-2	09/30/15
3.9.6-3	09/30/15
3.9.7-1	09/30/15
3.9.8-1	09/30/15

EFFECTIVE PAGE LISTING

Page	Revision
4.0-1	09/30/15
4.0-2	09/30/15
4.0-3	09/30/15
5.1-1	09/30/15
5.2-1	09/30/15
5.2-2	09/30/15
5.3-1	03/27/17
5.4-1	09/30/15
5.5-1	09/30/15
5.5-2	09/30/15
5.5-3	09/30/15
5.5-4	09/30/15
5.5-5	09/30/15
5.5-6	09/30/15
5.5-7	09/30/15
5.5-8	09/30/15
5.5-9	09/30/15
5.5-10	09/30/15
5.5-11	09/30/15
5.5-12	09/30/15
5.5-13	11/30/15
5.5-14	09/30/15
5.5-15	09/30/15
5.5-16	09/30/15

EFFECTIVE PAGE LISTING

Page	Revision
5.5-17	09/30/15
5.6-1	09/30/15
5.6-2	09/30/15
5.6-3	09/30/15
5.6-4	09/30/15
5.6-5	09/30/15
5.7-1	09/30/15
5.7-2	09/30/15
5.7-3	09/30/15
5.7-4	09/30/15

Appendix B

Appendix B Cover Sheet	02/29/80
Table of Contents	Original*
1-1	Original*
2-1	Original*
4-1	Original*
4-2	Original*
5-1	03/15/89
5-2	05/10/95
5-3	03/15/89
5-4	03/15/89
5-5	Original*
5-6	Original*
5-7	Original*
5-8	Original*
5-9	Original*

*Original pages are not dated (2/29/80).

EFFECTIVE PAGE LISTING

Page	Revision

Appendix C

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

Page	Revision
B 3.1.5-1	10/23/15
B 3.1.5-2	10/23/15
B 3.1.5-3	02/22/18
B 3.1.5-4	02/22/18
B 3.1.5-5	02/22/18
B 3.1.6-1	10/23/15
B 3.1.6-2	10/23/15
B 3.1.6-3	10/23/15
B 3.1.6-4	02/22/18
B 3.1.6-5	02/22/18
B 3.1.6-6	02/22/18
B 3.1.7-1	10/23/15
B 3.1.7-2	10/23/15
B 3.1.7-3	10/23/15
B 3.1.7-4	10/23/15
B 3.1.7-5	10/23/15
B 3.1.7-6	10/23/15
B 3.1.7-7	10/23/15
B 3.1.8-1	10/23/15
B 3.1.8-2	10/23/15
B 3.1.8-3	10/23/15
B 3.1.8-4	10/23/15
B 3.1.8-5	10/23/15
B 3.1.8-6	10/23/15
B 3.1.8-7	10/23/15
B 3.1.8-8	10/23/15
B 3.2.1-1	10/23/15
B 3.2.1-2	10/23/15
B 3.2.1-3	10/23/15
B 3.2.1-4	10/23/15
B 3.2.1-5	10/23/15

EFFECTIVE PAGE LISTING

Page	Revision
B 3.2.1-6	10/23/15
B 3.2.1-7	10/23/15
B 3.2.1-8	10/23/15
B 3.2.1-9	10/23/15
B 3.2.1-10	10/23/15
B 3.2.1-11	10/23/15
B 3.2.1-12	10/23/15
B 3.2.1-13	10/23/15
B 3.2.2-1	10/23/15
B 3.2.2-2	10/23/15
B 3.2.2-3	07/01/16
B 3.2.2-4	07/01/16
B 3.2.2-5	07/01/16
B 3.2.2-6	07/01/16
B 3.2.2-7	10/23/15
B 3.2.2-8	10/23/15
B 3.2.2-9	10/23/15

EFFECTIVE PAGE LISTING

Page	Revision
B.3.2.3-1	10/23/15
B.3.2.3-2	07/01/16
B.3.2.3-3	10/23/15
B 3.2.4-1	07/01/16
B 3.2.4-2	10/23/15
B 3.2.4-3	10/23/15
B 3.2.4-4	10/23/15
B.3.2.4-5	10/23/15
B.3.2.4-6	08/30/18
B.3.2.4-7	10/23/15
B 3.3.1-1	10/23/15
B 3.3.1-2	10/23/15
B 3.3.1-3	10/23/15
B 3.3.1-4	10/23/15
B.3.3.1-5	10/23/15
B.3.3.1-6	10/23/15
B.3.3.1-7	10/23/15
B 3.3.1-8	10/23/15
B 3.3.1-9	10/23/15
B 3.3.1-10	10/23/15
B 3.3.1-11	10/23/15
B 3.3.1-12	10/23/15
B 3.3.1-13	10/23/15
B 3.3.1-14	10/23/15

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

Page	Revision
B 3.3.2-44	10/23/15
B 3.3.2-45	10/23/15
B 3.3.2-46	10/23/15
B 3.3.2-47	10/23/15
B 3.3.2-48	10/23/15
B 3.3.2-49	10/23/15
B 3.3.2-50	10/23/15
B 3.3.2-51	10/23/15
B 3.3.2-52	10/23/15
B 3.3.2-53	10/23/15
B 3.3.3-1	10/23/15
B 3.3.3-2	10/23/15
B 3.3.3-3	10/23/15
B 3.3.3-4	04/27/16
B.3.3.3-5	10/23/15
B.3.3.3-6	10/23/15
B.3.3.3-7	10/23/15
B 3.3.3-8	02/27/19
B 3.3.3-9	10/23/15
B 3.3.3-10	10/23/15
B 3.3.3-11	10/23/15
B 3.3.3-12	10/23/15
B 3.3.3-13	10/23/15
B 3.3.3-14	10/23/15
B 3.3.4-1	10/23/15
B 3.3.4-2	10/23/15
B 3.3.4-3	10/23/15
B 3.3.4-4	10/23/15
B.3.3.4-5	10/23/15

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

Page	Revision
B 3.8.1-1	10/23/15
B 3.8.1-2	10/23/15
B 3.8.1-3	10/23/15
B 3.8.1-4	10/23/15
B.3.8.1-5	10/23/15
B.3.8.1-6	10/23/15
B.3.8.1-7	10/23/15
B 3.8.1-8	10/23/15
B 3.8.1-9	02/27/19
B 3.8.1-10	02/27/19
B 3.8.1-11	02/27/19
B 3.8.1-12	02/27/19
B 3.8.1-13	02/27/19
B 3.8.1-14	02/27/19
B 3.8.1-15	02/27/19
B 3.8.1-16	02/27/19
B 3.8.1-17	02/27/19
B 3.8.1-18	02/27/19
B 3.8.1-19	02/27/19
B 3.8.1-20	02/27/19
B 3.8.1-21	02/27/19
B 3.8.1-22	02/27/19
B 3.8.1-23	02/27/19
B 3.8.1-24	02/27/19
B 3.8.1-25	02/27/19
B 3.8.1-26	02/27/19
B 3.8.1-27	02/27/19
B 3.8.1-28	02/27/19
B 3.8.1-29	02/27/19

EFFECTIVE PAGE LISTING

Page	Revision
B 3.8.1-30	02/27/19
B 3.8.1-31	02/27/19
B 3.8.1-32	02/27/19
B 3.8.2-1	10/23/15
B 3.8.2-2	10/23/15
B 3.8.2-3	10/23/15
B 3.8.2-4	10/23/15
B.3.8.2-5	10/23/15
B 3.8.3-1	10/23/15
B 3.8.3-2	10/23/15
B 3.8.3-3	10/23/15
B 3.8.3-4	10/23/15
B.3.8.3-5	10/23/15
B.3.8.3-6	10/23/15
B.3.8.3-7	10/23/15
B 3.8.3-8	10/23/15
B 3.8.4-1	10/23/15
B 3.8.4-2	10/23/15
B 3.8.4-3	10/23/15
B 3.8.4-4	10/23/15
B.3.8.4-5	10/23/15
B.3.8.4-6	10/23/15
B.3.8.4-7	10/23/15
B 3.8.4-8	10/23/15
B 3.8.5-1	10/23/15
B 3.8.5-2	10/23/15
B 3.8.5-3	10/23/15
B 3.8.5-4	10/23/15

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

Page	Revision
B 3.8.10-1	10/23/15
B 3.8.10-2	10/23/15
B 3.8.10-3	10/23/15
B 3.8.10-4	10/23/15
B 3.9.1-1	10/23/15
B 3.9.1-2	10/23/15
B 3.9.1-3	10/23/15
B 3.9.1-4	10/23/15
B 3.9.2-1	10/23/15
B 3.9.2-2	10/23/15
B 3.9.2-3	10/23/15
B 3.9.3-1	10/23/15
B 3.9.3-2	10/23/15
B 3.9.3-3	10/23/15
B 3.9.4-1	10/23/15
B 3.9.4-2	10/23/15
B 3.9.4-3	10/23/15
B 3.9.4-4	10/23/15
B 3.9.4-5	10/23/15
B 3.9.5-1	10/23/15
B 3.9.5-2	10/23/15
B 3.9.5-3	10/23/15
B 3.9.5-4	10/23/15
B 3.9.6-1	10/23/15
B 3.9.6-2	10/23/15
B 3.9.6-3	10/23/15
B 3.9.6-4	10/23/15
B 3.9.7-1	10/23/15
B 3.9.7-2	10/23/15
B 3.9.8-1	10/23/15
B 3.9.8-2	10/23/15

AMENDMENT LISTING

Amendments	Date and Revision
Lower Power License and Technical Specifications issued	02/29/80 (Original)
NRC Order issued	04/04/80
Amendment 1 issued by NRC	04/22/80 (R1)
Amendment 2 issued by NRC	07/01/80 (R2)
Amendment 3 issued by NRC	07/01/80 (R2)
Amendment 4 issued by NRC	07/10/80 (R2)
Full Power License and Technical Specifications issued	09/17/80 (R3)
NRC Order issued	11/06/80 (R4)

<u>Amendments to Full Power License</u>

Amendment 1 issued by NRC	12/22/80 (R5)
Amendment 2 issued by NRC	02/09/81 (R6)
Amendment 3 issued by NRC	02/13/81 (R6)
Amendment 4 issued by NRC	03/06/81 (R7)
Amendment 5 issued by NRC	04/15/81 (R8)
Amendment 6 issued by NRC	04/27/81 (R9)
EPL Revised	06/01/81 (R10)
Amendment 7 issued by NRC	06/26/81 (R11)
Amendment 8 issued by NRC	07/15/81 (R12)
Amendment 9 issued by NRC	09/08/81 (R13)
Amendment 10 issued by NRC	12/31/81 (R14)
Amendment 11 issued by NRC	01/29/82 (R15)
Amendment 12 issued by NRC	03/25/82 (R16)
Amendment 13 issued by NRC	05/04/82 (R17)
Amendment 14 issued by NRC	06/18/82 (R18)
Amendment 15 issued by NRC	08/03/82 (R19)
Amendment 16 issued by NRC	10/21/82 (R20)
Amendment 17 issued by NRC	12/23/82 (R21)
Amendment 18 issued by NRC	12/23/82 (R22)
Amendment 19 issued by NRC	12/23/82 (R23)
Amendment 20 issued by NRC	12/23/82 (R24)
Amendment 21 issued by NRC	12/23/82 (R25)
Amendment 22 issued by NRC	12/27/82 (R26)
Amendment 23 issued by NRC	12/27/82 (R27)
Amendment 24 issued by NRC	12/29/82 (R28)
Amendment 25 issued by NRC	12/29/82 (R29)

AMENDMENT LISTING

Amendments	Date and Revision
Amendment 26 issued by NRC	03/14/83 (R30)
Amendment 27 issued by NRC	03/16/83 (R31)
Amendment 28 issued by NRC	05/03/83 (R32)
Amendment 29 issued by NRC	05/05/83 (R33)
Amendment 30 issued by NRC	05/05/83 (R34)
Amendment 31 issued by NRC	09/30/83 (R35)
Amendment 32 issued by NRC	11/10/83 (R36)
Amendment 33 issued by NRC	03/29/84 (R37)
Amendment 34 issued by NRC	04/12/84 (R38)
Amendment 35 issued by NRC	04/24/84 (R39)
NRC Order	06/15/84
Amendment 36 issued by NRC	11/23/84 (R40)
Amendment 37 issued by NRC	01/24/85 (R41)
Amendment 38 issued by NRC	06/11/85 (R42)
Amendment 39 issued by NRC	06/20/85 (R43)
Amendment 40 issued by NRC	06/25/85 (R44)
Amendment 41 issued by NRC	09/03/85 (R45)
Amendment 42 issued by NRC	01/14/86 (R46)
Amendment 43 issued by NRC	01/29/86 (R47)
EPL Revised	07/17/86
Amendment 44 issued by NRC	07/28/86 (R48)
Amendment 45 issued by NRC	09/15/86 (R49)
Amendment 46 issued by NRC	09/16/86 (R50)
Amendment 47 issued by NRC	09/17/86 (R51)
Amendment 48 issued by NRC	10/02/86 (R52)
Amendment 49 issued by NRC	10/28/86 (R53)
Amendment 50 issued by NRC	12/01/86 (R54)
Amendment 51 issued by NRC	12/02/86 (R55)
Special Amendment Authorized by NRC**	01/05/87 (SR)
Amendment 52 issued by NRC	02/03/87 (R56)
Amendment 53 issued by NRC	02/12/87 (R57)
Amendment 54 issued by NRC	03/16/87 (R58)
Amendment 55 issued by NRC	05/12/87 (R59)
Amendment 56 issued by NRC	07/20/87 (R60)
Bases Revision issued by NRC	08/18/87 (BR)
Amendment 57 issued by NRC	09/09/87 (R61)
Amendment 58 issued by NRC	09/10/87 (R62)
Amendment 59 issued by NRC	09/18/87 (R63)
Amendment 60 issued by NRC	10/19/87 (R64)
Amendment 61 issued by NRC	10/22/87 (R65)

** Special Revision authorized by 10 CFR Parts 50 and 51 Final Rule as noted in the Federal Register on November 6, 1986 and effective January 5, 1987.

AMENDMENT LISTING

Amendments	Date and Revision
Amendment 62 issued by NRC	10/30/87 (R66)
Amendment 63 issued by NRC	12/31/87 (R67)
Amendment 64 issued by NRC	01/07/88 (R68)
Amendment 65 issued by NRC	01/11/88 (R69)
Amendment 66 issued by NRC	01/25/88 (R70)
Additional Exemptions issued by NRC	01/15/88 (AE)
Amendment 67 issued by NRC	02/11/88 (R71)
Amendment 68 issued by NRC	02/17/88 (R72)
Amendment 69 issued by NRC	04/04/88 (R73)
Amendment 70 issued by NRC	05/16/88 (R74)
Amendment 71 issued by NRC	05/18/88 (R75)
Amendment 72 issued by NRC	05/23/88 (R76)
Amendment 73 issued by NRC	06/24/88 (R77)
Amendment 74 issued by NRC	06/30/88 (R78)
Amendment 75 issued by NRC	07/06/88 (R79)
Amendment 76 issued by NRC	07/12/88 (R80)
Amendment 77 issued by NRC	08/05/88 (R81)
Amendment 78 issued by NRC	08/15/88 (R82)
Amendment 79 issued by NRC	08/15/88 (R83)
Amendment 80 issued by NRC	08/16/88 (R84)
Amendment 81 issued by NRC	09/01/88 (R85)
Amendment 82 issued by NRC	09/09/88 (R86)
Amendment 83 issued by NRC	09/21/88 (R87)
Amendment 84 issued by NRC	09/22/88 (R88)
Amendment 85 issued by NRC	09/22/88 (R89)
Amendment 86 issued by NRC	10/14/88 (R90)
Amendment 87 issued by NRC	10/14/88 (R91)
Amendment 88 issued by NRC	10/14/88 (R92)
Amendment 89 issued by NRC	10/14/88 (R93)
Amendment 90 issued by NRC	10/14/88 (R94)
Amendment 91 issued by NRC	12/05/88 (R95)
Amendment 92 issued by NRC	12/29/88 (R96)
Amendment 93 issued by NRC	12/29/88 (R97)
Amendment 94 issued by NRC	12/30/88 (R98)
Amendment 95 issued by NRC	01/23/89 (R99)
Amendment 96 issued by NRC	01/22/89 (R100)
Amendment 97 issued by NRC	01/22/89 (R101)
Amendment 98 issued by NRC	01/30/89 (R102)
Amendment 99 issued by NRC	01/30/89 (R103)
Amendment 100 issued by NRC	01/31/89 (R104)

AMENDMENT LISTING

Amendments	Date and Revision
Amendment 101 issued by NRC	02/28/89 (R105)
Amendment 102 issued by NRC	03/02/89 (R106)
Amendment 103 issued by NRC	03/06/89 (R107)
Amendment 104 issued by NRC	03/09/89 (R108)
Amendment 105 issued by NRC	03/09/89 (R109)
Amendment 106 issued by NRC	03/13/89 (R110)
Amendment 107 issued by NRC	03/15/89 (R111)
Amendment 108 issued by NRC	03/28/89 (R112)
Amendment 109 issued by NRC	04/03/89 (R113)
Amendment 110 issued by NRC	04/03/89 (R114)
Amendment 111 issued by NRC	04/03/89 (R115)
Amendment 112 issued by NRC	04/28/89 (R116)
Amendment 113 issued by NRC	05/04/89 (R117)
Amendment 114 issued by NRC	05/05/89 (R118)
Amendment 115 issued by NRC	05/11/89 (R119)
Amendment 116 issued by NRC	06/01/89 (R120)
Amendment 117 issued by NRC	06/19/89 (R121)
Amendment 118 issued by NRC	06/23/89 (R122)
Amendment 119 issued by NRC	07/05/89 (R123)
Amendment 120 issued by NRC	07/05/89 (R124)
Amendment 121 issued by NRC	07/31/89 (R125)
Amendment 122 issued by NRC	08/03/89 (R126)
Amendment 123 issued by NRC	08/11/89 (R127)
Amendment 124 issued by NRC	08/11/89 (R128)
Amendment 125 issued by NRC	08/14/89 (R129)
Amendment 126 issued by NRC	09/19/89 (R130)
Amendment 127 issued by NRC	09/29/89 (R131)
Amendment 128 issued by NRC	11/01/89 (R132)
Amendment 129 issued by NRC	11/28/89 (R133)
Amendment 130 issued by NRC	02/16/90 (R134)
Amendment 131 issued by NRC	03/02/90 (R135)
Amendment 132 issued by NRC	03/19/90 (R136)
Amendment 133 issued by NRC	03/22/90 (R137)
Bases Revision	03/23/90 (BR 1)
Amendment 134 issued by NRC	04/02/90 (R138)
Amendment 135 issued by NRC	04/27/90 (R139)
Amendment 136 issued by NRC	04/27/90 (R140)
Amendment 137 issued by NRC	04/27/90 (R141)
Bases Revision	05/01/90 (BR 2)
Amendment 138 issued by NRC	05/08/90 (R142)

AMENDMENT LISTING

Amendments	Date and Revision
Amendment 139 issued by NRC	05/09/90 (R143)
Amendment 140 issued by NRC	05/11/90 (R144)
Amendment 141 issued by NRC	05/16/90 (R145)
Amendment 142 issued by NRC	07/27/90 (R146)
Amendment 143 issued by NRC	07/31/90 (R147)
Amendment 144 issued by NRC	08/31/90 (R148)
Amendment 145 issued by NRC	09/20/90 (R149)
Amendment 146 issued by NRC	09/21/90 (R150)
Amendment 147 issued by NRC	11/02/90 (R151)
Amendment 148 issued by NRC	11/16/90 (R152)
Amendment 149 issued by NRC	12/07/90 (R153)
Amendment 150 issued by NRC	03/18/91 (R154)
Amendment 151 issued by NRC	07/24/91 (R155)
Amendment 152 issued by NRC	08/22/91 (R156)
Amendment 153 issued by NRC	09/10/91 (R157)
Amendment 154 issued by NRC	10/18/91 (R158)
Amendment 155 issued by NRC	10/23/91 (R159)
Amendment 156 issued by NRC	12/16/91 (R160)
Amendment 157 issued by NRC	03/30/92 (R161)
Amendment 158 issued by NRC	03/31/92 (R162)
Amendment 159 issued by NRC	07/09/92 (R163)
Amendment 160 issued by NRC	07/24/92 (R164)
Amendment 161 issued by NRC	08/10/92 (R165)
Amendment 162 issued by NRC	08/13/92 (R166)
Amendment 163 issued by NRC	09/28/92 (R167)
Amendment 164 issued by NRC	11/06/92 (R168)
Bases Revision	11/25/92 (BR 3)
Amendment 165 issued by NRC	12/08/92 (R169)
Bases Revision	12/08/92 (BR 4)
Amendment 166 issued by NRC	01/12/93 (R170)
Amendment 167 issued by NRC	04/28/93 (R171)
Amendment 168 issued by NRC	06/25/93 (R172)
Amendment 169 issued by NRC	08/02/93 (R173)
Amendment 170 issued by NRC	08/27/93 (R174)
Amendment 171 issued by NRC	10/26/93 (R175)
Amendment 172 issued by NRC	11/26/93 (R176)
Amendment 173 issued by NRC	11/29/93 (R177)
Amendment 174 issued by NRC	12/09/93 (R178)
Amendment 175 issued by NRC	01/03/94 (R179)
Amendment 176 issued by NRC	02/10/94 (R180)

AMENDMENT LISTING

Amendments	Date and Revision
Amendment 177 issued by NRC	03/15/94 (R181)
Amendment 178 issued by NRC	03/31/94 (R182)
Amendment 179 issued by NRC	04/18/94 (R183)
Amendment 180 issued by NRC	04/18/94 (R184)
Amendment 181 issued by NRC	05/23/94 (R185)
Amendment 182 issued by NRC	05/24/94 (R186)
Amendment 183 issued by NRC	05/27/94 (R187)
Amendment 184 issued by NRC	07/11/94 (R188)
Amendment 185 issued by NRC	07/26/94 (R189)
Amendment 186 issued by NRC	09/13/94 (R190)
Amendment 187 issued by NRC	10/17/94 (R191)
Amendment 188 issued by NRC	10/17/94 (R192)
Amendment 189 issued by NRC	10/20/94 (R193)
Amendment 190 issued by NRC	11/09/94 (R194)
Amendment 191 issued by NRC	11/22/94 (R195)
Amendment 192 issued by NRC	12/27/94 (R196)
Amendment 193 issued by NRC	01/03/95 (R197)
Amendment 194 issued by NRC	01/24/95 (R198)
Amendment 195 issued by NRC	02/09/95 (R199)
Bases Revision	03/02/95 (BR-5)
Amendment 196 issued by NRC	04/04/95 (R200)
Amendment 197 issued by NRC	04/28/95 (R201)
Amendment 198 issued by NRC	05/10/95 (R202)
Amendment 199 issued by NRC	05/30/95 (R203)
Amendment 200 issued by NRC	05/30/95 (R204)
Amendment 201 issued by NRC	06/01/95 (R205)
Amendment 202 issued by NRC	06/13/95 (R206)
Amendment 203 issued by NRC	06/13/95 (R207)
Amendment 204 issued by NRC	06/14/95 (R208)
Amendment 205 issued by NRC	06/29/95 (R209)
Amendment 206 issued by NRC	08/02/95 (R210)
Bases Revision	08/11/95 (BR 6)
Amendment 207 issued by NRC	08/22/95 (R211)
Amendment 208 issued by NRC	08/22/95 (R212)
Amendment 209 issued by NRC	09/06/95 (R213)
Amendment 210 issued by NRC	09/13/95 (R214)
Amendment 211 issued by NRC	09/15/95 (R215)
Amendment 212 issued by NRC	10/02/95 (R216)
Amendment 213 issued by NRC	10/04/95 (R217)
Amendment 214 issued by NRC	10/11/95 (R218)
Bases Revision	10/27/95 (BR-7)
Bases Revision	11/17/95 (BR-8)
Amendment 215 issued by NRC	11/21/95 (R219)

AMENDMENT LISTING

Amendments	Date and Revision
Amendment 216 issued by NRC	12/11/95 (R220)
Amendment 217 issued by NRC	02/05/96 (R221)
Amendment 218 issued by NRC	02/07/96 (R222)
Bases Revision	02/15/96 (BR-9)
Amendment 219 issued by NRC	03/01/96 (R223)
Amendment 220 issued by NRC	03/04/96 (R224)
Amendment 221 issued by NRC	04/26/96 (R225)
Bases Revision	09/13/96 (BR-10)
Bases Revision	01/02/97 (BR-11)
Amendment 222 issued by NRC	04/09/97 (R226)
Amendment 223 issued by NRC	04/21/97 (R227)
Amendment 224 issued by NRC	06/10/97 (R228)
Amendment 225 issued by NRC	07/01/97 (R229)
Amendment 226 issued by NRC	07/14/97 (R230)
Amendment 227 issued by NRC	08/12/97 (R231)
Amendment 228 issued by NRC	09/23/97 (R232)
Amendment 229 issued by NRC	09/29/97 (R233)
Amendment 230 issued by NRC	01/13/98 (R234)
Amendment 231 issued by NRC	02/20/98 (R235)
Amendment 232 issued by NRC	06/08/98 (R236)
NRC Order issued	06/18/1998
Amendment 233 issued by NRC	07/01/98 (R237)
Amendment 234 issued by NRC	07/22/98 (R238)
Amendment 235 issued by NRC	08/28/98 (R239)
Bases Revision	09/09/98 (BR-12)
Amendment 236 issued by NRC	11/17/98 (R240)
Amendment 237 issued by NRC	11/17/98 (R241)
Amendment 238 issued by NRC	11/19/98 (R242)
Amendment 239 issued by NRC	11/19/98 (R243)
Amendment 240 issued by NRC	12/07/98 (R244)
Amendment 241 issued by NRC	12/16/98 (R245)
Bases Revision	01/25/99 (BR-13)
Amendment 242 issued by NRC	02/09/99 (R246)
Amendment 243 issued by NRC	03/16/99 (R247)
Amendment 244 issued by NRC	05/04/99 (R248)
Amendment 245 issued by NRC	09/07/99 (R249)
Amendment 246 issued by NRC	09/23/99 (R250)
Amendment 247 issued by NRC	10/06/99 (R251)
Amendment 248 issued by NRC	10/12/99 (R252)

AMENDMENT LISTING

Amendments	Date and Revision
Amendment 249 issued by NRC	02/11/00 (R253)
Amendment 250 issued by NRC	02/22/00 (R254)
Amendment 251 issued by NRC	02/29/00 (R255)
Amendment 252 issued by NRC	03/08/00 (R256)
Amendment 253 issued by NRC	03/29/00 (R257)
Amendment 254 issued by NRC	03/29/00 (R258)
Amendment 255 issued by NRC	04/14/00 (R259)
Bases Revision	05/25/00 (BR-14)
Bases Revision	05/25/00 (BR-15)
Amendment 256 issued by NRC	05/31/00 (R260)
Amendment 257 issued by NRC	07/18/00 (R261)
Amendment 258 issued by NRC	07/31/00 (R262)
Amendment 259 issued by NRC	08/04/00 (R263)
Amendment 260 issued by NRC	08/28/00 (R264)
Amendment 261 issued by NRC	10/02/00 (R265)
Amendment 262 issued by NRC	10/06/00 (R266)
Amendment 263 issued by NRC	11/02/00 (R267)
Amendment 264 issued by NRC	12/18/00 (R268)
Amendment 265 issued by NRC	12/19/00 (R269)
Amendment 266 issued by NRC	02/16/01 (R270)
Amendment 267 issued by NRC	03/22/01 (R271)
Amendment 268 issued by NRC	05/09/01 (R272)
Bases Revision	06/28/01 (BR-16)
Bases Revision	07/11/01 (BR-17)
Amendment 269 issued by NRC	07/12/01 (R273)
Amendment 270 issued by NRC	07/18/01 (R274)
Bases Revision	07/20/01 (BR-18)
Bases Revision	08/14/01 (BR-19)
Amendment 271 issued by NRC	10/24/01 (R275)
Amendment 272 issued by NRC	01/14/02 (R276)
Bases Revision	02/14/02 (BR-20)
Amendment 273 issued by NRC	02/27/02 (R277)
Amendment 274 issued by NRC	03/08/02 (R278)
Amendment 275 issued by NRC	04/30/02 (R279)
Bases Revision	05/17/02 (BR-21)
Amendment 276 issued by NRC	05/24/02 (R280)
Amendment 277 issued by NRC	09/05/02 (R281)
*Amendment 278	

*Amendment will not be implemented into the Technical Specifications

AMENDMENT LISTING

Amendments	Date and Revision
Amendment 279 issued by NRC	09/30/02 (R283)
Amendment 280 issued by NRC	02/05/03 (R284)
Amendment 281 issued by NRC	02/11/03 (R285)
Amendment 282 issued by NRC	03/04/03 (R286)
Amendment 283 issued by NRC	04/24/03 (R287)
Amendment 284 issued by NRC	04/25/03 (R288)
Amendment 285 issued by NRC	05/22/03 (R289)
Bases Revision	05/22/03 (BR-22)
Amendment 286 issued by NRC	05/27/03 (R290)
Amendment 287 issued by NRC	05/29/03 (R291)
Bases Revision	06/26/03 (BR-23)
Amendment 288 issued by NRC	10/28/03 (R292)
*Amendment 289	
Bases Revision	12/22/03 (BR-24)
Bases Revision	04/19/04 (BR-25)
Amendment 290 issued by NRC	04/21/04 (R294)
Amendment 291 issued by NRC	06/18/04 (R295)
Amendment 292 issued by NRC	05/21/04 (R296)
Amendment 293 issued by NRC	07/08/04 (R297)
Amendment 294 issued by NRC	09/15/04 (R298)
Amendment 295 issued by NRC	09/20/04 (R299)
Amendment 296 issued by NRC	09/20/04 (R300)
License Condition Issued by NRC	10/28/04
Amendment 297 issued by NRC	11/09/04 (R301)
Bases Revision	10/13/04 (BR-26)
Amendment 298 issued by NRC	01/31/05 (R302)
Bases Revision	02/25/05 (BR-27)
Bases Revision	03/04/05 (BR-28)
Amendment 299 issued by NRC	03/09/05 (R303)
Amendment 300 issued by NRC	04/05/05 (R304)
Amendment 301 issued by NRC	04/11/05 (R305)
Amendment 302 issued by NRC	05/24/05 (R306)
Amendment 303 issued by NRC	08/18/05 (R307)
Amendment 304 issued by NRC	09/02/05 (R308)
Amendment 305 issued by NRC	12/28/05 (R309)
Amendment 306 issued by NRC	02/23/06 (R310)
Amendment 307 issued by NRC	04/06/06 (R311)
Bases Revision	05/18/06 (BR-29)
Amendment 308 issued by NRC	06/16/06 (R312)

*Amendment will not be implemented into the Technical Specifications

AMENDMENT LISTING

Amendments	Date and Revision
Amendment 309 issued by NRC	08/02/06 (R313)
Amendment 310 issued by NRC	09/13/06 (R314)
Amendment 311 issued by NRC	09/14/06 (R315)
Amendment 312 issued by NRC	10/04/06 (R316)
Amendment 313 issued by NRC	11/07/06 (R317)
Amendment 314 issued by NRC	11/16/06 (R318)
Amendment 315 issued by NRC	12/11/06 (R319)
License Condition Issued by NRC	02/08/07
Bases Revision	03/07/07 (BR-30)
License Condition Issued by NRC	08/09/07 (B.5.b)
Amendment 316 issued by NRC	09/20/07 (R320)
Amendment 317 issued by NRC	09/28/07 (R321)
Bases Revision	12/12/07 (BR-31)
Amendment 318 issued by NRC	04/02/08 (R322)
Bases Revision	08/29/08 (BR-32)
Amendment 319 issued by NRC	08/29/08 (R323)
Bases Revision	08/28/08 (BR-33)
Amendment 320 issued by NRC	09/24/08
Amendment 321 issued by NRC	10/28/08
Amendment 322 issued by NRC	12/04/08
NRC Order issued	01/05/09
Amendment 323 issued by NRC	04/13/09
Amendment 324 issued by NRC	06/12/09
Bases Revision	06/12/09 (BR-34)
Amendment 325 issued by NRC	08/14/09
NRC Order issued	12/22/09
Amendment 326 issued by NRC	01/28/10
Amendment 327 issued by NRC	02/02/10
Bases Revision	03/25/10 (BR-35)
Bases Revision	05/27/10 (BR-36)
Amendment 328 issued by NRC	12/21/10
Bases Revision	03/24/12 (BR-38)
Amendment 329 issued by NRC	07/29/11
Amendment 330 issued by NRC	09/06/12
Bases Revision	10/05/12 (BR-39)
Amendment 331 issued by NRC	09/26/12
Bases Revision	10/10/12 (BR-40)
Amendment 332 issued by NRC	10/31/12
Bases Revision	12/21/12 (BR-41)
Bases Revision	03/05/13 (BR-42)
Bases Revision	01/31/14 (BR-43)
Bases Revision	03/04/14 (BR-44)
Amendment 333 issued by NRC	09/29/14

AMENDMENT LISTING

Amendments	Date and Revision
Amendment 334 issued by NRC	09/30/15 (ITS)
Bases Revision	10/23/15 (BR-45)
Bases Revision	10/23/15 (BR-46)
Amendment 335 issued by NRC	11/30/15
Bases Revision	04/27/16 (BR-47)
Bases Revision	05/24/16 (BR-48)
Bases Revision	07/01/16 (BR-49)
Amendment 336 issued by NRC	09/29/16
Bases Revision	09/29/16 (BR-51)
Amendment 337 issued by NRC	10/03/16 (License Only)
Bases Revision	10/07/16 (BR-50)
Bases Revision	11/23/16 (BR-52)
Amendment 338 issued by NRC	03/27/17
Amendment 339 issued by NRC	12/22/17
NRC Order issued	07/27/17
Amendment 340 issued by NRC	02/02/18
Bases Revision	02/02/18 (BR-53)
Amendment 341 issued by NRC	02/12/18
Bases Revision	02/12/18 (BR-54)
Bases Revision	02/22/18 (BR-55)
Bases Revision	07/12/18 (BR-56)
Amendment 342 Issued by NRC	08/06/18
Amendment 343 issued by NRC	08/30/18
Bases Revision	08/30/18 (BR-57)
Bases Revision	02/27/19 (BR-58)
Bases Revision	02/27/19 (BR-59)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.1.4.2

Verifying each control rod is OPERABLE would require that each rod be tripped. However, in MODES 1 and 2, tripping each control rod would result in radial or axial power tilts, or oscillations. Exercising each individual control rod provides increased confidence that all rods continue to be OPERABLE without exceeding the alignment limit, even if they are not regularly tripped. Moving each control rod by greater than or equal to 10 steps in either direction will not cause radial or axial power tilts, or oscillations, to occur.

To ensure minimum $F_{\Delta H}$ peaking factor margins are maintained in accordance with TS 3.2.2 during SR 3.1.4.2 rod testing, margin penalties are typically assigned during the test, as described in the Nuclear Design Report. The minimum predicted $F_{\Delta H}$ future margin, including penalties, should be verified prior to performing the test to ensure adequate margin will be maintained. In the event that a potential negative margin condition exists, compliance with the associated Conditions and Required Actions of TS 3.2.2 should be verified prior to performing rod testing.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

Between required performances of SR 3.1.4.2 (determination of control rod OPERABILITY by movement), if a control rod(s) is discovered to be immovable, but remains trippable, the control rod(s) is considered to be OPERABLE. At any time, if a control rod(s) is immovable, a determination of the trippability (OPERABILITY) of the control rod(s) must be made, and appropriate action taken.

SR 3.1.4.3

Verification of rod drop times allows the operator to determine that the maximum rod drop time permitted is consistent with the assumed rod drop time used in the safety analysis. Measuring rod drop times prior to reactor criticality, after reactor vessel head installation, ensures that the reactor internals and rod drive mechanism will not interfere with rod motion or rod drop time, and that no degradation in these systems has occurred that would adversely affect control rod motion or drop time. This testing is performed with all RCPs operating and the average moderator temperature ≥ 500°F to simulate a reactor trip under actual conditions. Fully withdrawn shall be the condition where shutdown and control banks are at a position within the interval of ≥ 222 and ≤ 231 steps withdrawn, inclusive.

BASES

SURVEILLANCE REQUIREMENTS (continued)

This Surveillance is performed during a plant outage, due to the plant conditions needed to perform the SR and the potential for an unplanned plant transient if the Surveillance were performed with the reactor at power.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 10 and GDC 26.
2. 10 CFR 50.46.
3. UFSAR, Section 15.2.3.
4. UFSAR, Section 15.4.2.
5. UFSAR, Chapter 15.

BASES

LCO

The shutdown banks must be within their insertion limits any time the reactor is critical or approaching criticality. This ensures that a sufficient amount of negative reactivity is available to shut down the reactor and maintain the required SDM following a reactor trip.

The shutdown bank insertion limits are defined in the COLR.

APPLICABILITY

The shutdown banks must be within their insertion limits, with the reactor in MODES 1 and 2. This ensures that a sufficient amount of negative reactivity is available to shut down the reactor and maintain the required SDM following a reactor trip. The shutdown banks do not have to be within their insertion limits in MODE 3, unless an approach to criticality is being made. In MODE 3, 4, 5, or 6, the shutdown banks, except for control rod OPERABILITY testing, are fully inserted in the core and contribute to the SDM. Refer to LCO 3.1.1 for SDM requirements in MODE 2 k_{eff} < 1.0, MODES 3, 4, and 5. LCO 3.9.1, "Boron Concentration," ensures adequate SDM in MODE 6.

The Applicability requirements have been modified by a Note indicating the LCO requirement is suspended during SR 3.1.4.2. This SR verifies the freedom of the rods to move, and requires the shutdown bank to move below the LCO limits, which would normally violate the LCO.

ACTIONS

A.1, A.2, A.3, A.4, A.5, A.6, and A.7

When one shutdown bank is inserted beyond the insertion limit due to performance of trippability testing per SR 3.1.4.2 and is immovable due to a malfunction in the rod control system, 72 hours are provided to restore the shutdown banks to within limits. Additionally, immediate verification is required to prove that the shutdown bank is less than or equal to 18 steps below the insertion limit as measured by the group demand position indicators, the individual control rod alignment limits of LCOs 3.1.4 and 3.1.6 are met, there are no reactor coolant system boron dilution activities, and there are no power level increases taking place. Checks are performed for each reload core to ensure that bank insertions of up to 18 steps will not result in power distributions which violate the DNB criterion for ANS Condition II transients, (moderate frequency transients analyzed in Section 15.2 of the UFSAR). Administrative requirements on the initial controlling bank position will ensure that this insertion and an additional controlling bank insertion of five steps or less will not violate the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 during the repair period. If the controlling bank is inserted more than five steps deeper than its initial position, a calculation will be performed to ensure that the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is met. Since no dilution or power level increases are allowed, shutdown margin will be maintained as long as the controlling bank is far enough above its insertion limit to compensate for the inserted worth of the bank that is beyond its insertion limit. Furthermore, a verification of SDM is

BASES

ACTIONS (continued)

required within 12 hours and when the controlling bank is inserted more than 5 steps from the initial position. The requirement to be in compliance with LCOs 3.1.4 and 3.1.6 ensures that the rods are trippable, and power distribution is acceptable during the time allowed to restore the inserted rod. The 12 hour requirement to verify the SDM is within limits ensures the SDM requirements of LCO 3.1.1 are met during the repair period. Furthermore, the requirement to verify the SDM is within limits when a controlling bank is inserted five steps or more also ensures that SDM requirements of LCO 3.1.1 are met during the repair period. If any of these Required Actions are not met, Condition C must be applied.

The Completion Time of 72 hours is based on operating experience and provides an acceptable time for evaluating and repairing problems with the rod control system, while restricting the probability of a more severe (i.e., ANS Condition III or IV) accident or transient condition occurring concurrently with the insertion limit violation.

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

When one or more shutdown banks is not within insertion limits for reasons other than Condition A, 2 hours is allowed to restore the shutdown banks to within the insertion limits. This is necessary because the available SDM may be significantly reduced, with one or more of the shutdown banks not within their insertion limits. Also, verification of SDM or initiation of boration within 1 hour is required, since the SDM in MODES 1 and 2 is ensured by adhering to the control and shutdown bank insertion limits (see LCO 3.1.1). If shutdown banks are not within their insertion limits, then SDM will be verified by performing a reactivity balance calculation, considering the effects listed in the Bases for SR 3.1.1.1.

The allowed Completion Time of 2 hours provides an acceptable time for evaluating and repairing minor problems without allowing the plant to remain in an unacceptable condition for an extended period of time.

C.1

If the Required Action(s) of Condition A or B are not met within the associated Completion Times, the unit must be brought to a MODE where the LCO is not applicable. The allowed Completion Time of 6 hours is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner and without challenging plant systems.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.5.1

Verification that the shutdown banks are within their insertion limits prior to an approach to criticality ensures that when the reactor is critical, or being taken critical, the shutdown banks will be available to shut down the reactor, and the required SDM will be maintained following a reactor trip. This SR and Frequency ensure that the shutdown banks are withdrawn before the control banks are withdrawn during a unit startup.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 10, GDC 26, and GDC 28.
2. 10 CFR 50.46.
3. UFSAR, Chapter 15.

BASES

ACTIONS

A.1, A.2, A.3, A.4, A.5, A.6, and A.7

When one control bank is inserted beyond the insertion limit due to performance of trippability testing per SR 3.1.4.2 and is immovable due to malfunctions in the rod control system, 72 hours are provided to restore the control banks to within limits. Additionally, immediate verification is required to prove that the control bank is less than or equal to 18 steps below the insertion limit as measured by the group demand position indicators, the individual rod alignment limits of LCOs 3.1.4 and 3.1.5 are met, there are no reactor coolant system boron concentration dilution activities, and there are no power level increases taking place. Checks are performed for each reload core to ensure that bank insertions of up to 18 steps will not result in power distributions which violate the DNB criterion for ANS Condition II transients (moderate frequency transients analyzed in Section 15.2 of the UFSAR). Administrative requirements on the initial controlling bank position will ensure that this insertion and an additional controlling bank insertion of five steps or less will not violate the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 during the repair period. If the controlling bank is inserted more than five steps deeper than its initial position, a calculation will be performed to ensure that the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is met. Since no dilution or power level increases are allowed, shutdown margin will be maintained as long as the controlling bank is far enough above its insertion limit to compensate for the inserted worth of the bank that is beyond its insertion limit. Furthermore, a verification of SDM is required within 12 hours and when the controlling bank is inserted more than 5 steps from the initial position. The requirement to be in compliance with LCOs 3.1.4 and 3.1.5 ensures that the rods are trippable, and power distribution is acceptable during the time allowed to restore the inserted bank. The 12 hour requirement to verify the SDM is within limits ensures the SDM requirements of LCO 3.1.1 are met during the repair period. Furthermore, the requirement to verify the SDM is within limits when a controlling bank is inserted five steps or more also ensures that SDM requirements of LCO 3.1.1 are met during the repair period. If any of these Required Actions are not met, Condition D must be applied.

The Condition is modified by a Note that specifies it only applies to control banks inserted beyond the insertion limit that are not controlling banks. A controlling bank is defined as a control bank that is less than fully withdrawn as defined in the COLR, with the exception of fully withdrawn banks that have been inserted for the performance of SR 3.1.4.2 (rod freedom of movement Surveillance).

The Completion Time of 72 hours is based on operating experience and provides an acceptable time for evaluating and repairing problems with the rod control system, while restricting the probability of a more severe (i.e., ANS Condition III or IV) accident or transient condition occurring concurrently with the insertion limit violation.

BASES

ACTIONS (continued)

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

When the control banks are outside the acceptable insertion limits, they must be restored to within those limits. This restoration can occur in two ways:

a. Reducing power to be consistent with rod position or

b. Moving rods to be consistent with power.

Also, verification of SDM or initiation of boration to regain SDM is required within 1 hour, since the SDM in MODES 1 and 2 normally ensured by adhering to the control and shutdown bank insertion limits (see LCO 3.1.1, "SHUTDOWN MARGIN (SDM)") has been upset. If control banks are not within their insertion limits, then SDM will be verified by performing a reactivity balance calculation, considering the effects listed in the Bases for SR 3.1.1.1.

Similarly, if the control banks are found to be out of sequence or in the wrong overlap configuration, they must be restored to meet the limits.

Operation beyond the LCO limits is allowed for a short time period in order to take conservative action because the simultaneous occurrence of either a LOCA, loss of flow accident, ejected rod accident, or other accident during this short time period, together with an inadequate power distribution or reactivity capability, has an acceptably low probability.

The allowed Completion Time of 2 hours for restoring the banks to within the insertion, sequence, and overlap limits provides an acceptable time for evaluating and repairing minor problems without allowing the plant to remain in an unacceptable condition for an extended period of time.

D.1

If Required Action(s) of Condition A, B, or C are not met within the associated Completion Times, the plant must be brought to at least MODE 2 with $k_{eff} < 1.0$, where the LCO is not applicable. The allowed Completion Time of 6 hours is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner and without challenging plant systems.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.6.1

This Surveillance is required to ensure that the reactor does not achieve criticality with the control banks below their insertion limits.

The estimated critical position (ECP) depends upon a number of factors, one of which is xenon concentration. If the ECP was calculated long before criticality, xenon concentration could change to make the ECP substantially in error. Conversely, determining the ECP immediately before criticality could be an unnecessary burden. There are a number of unit parameters requiring operator attention at that point. Performing the ECP calculation within 4 hours prior to criticality avoids a large error from changes in xenon concentration, but allows the operator some flexibility to schedule the ECP calculation with other startup activities.

SR 3.1.6.2

Verification of the control bank insertion limits is sufficient to detect control banks that may be approaching the insertion limits.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.1.6.3

When control banks are maintained within their insertion limits as checked by SR 3.1.6.2 above, it is unlikely that their sequence and overlap will not be in accordance with requirements provided in the COLR.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 10, GDC 26, GDC 28.

2. 10 CFR 50.46.

3. UFSAR, Chapter 15.

BASES

SURVEILLANCE REQUIREMENTS (continued)

For those causes of QPTR that occur quickly (e.g., a dropped rod), there typically are other indications of abnormality that prompt a verification of core power tilt.

SR 3.2.4.2

This Surveillance is modified by a Note, which states that the surveillance is only required to be performed if input to QPTR from one or more Power Range Neutron Flux channels are inoperable with THERMAL POWER > 75% RTP.

With an NIS power range channel inoperable, tilt monitoring for a portion of the reactor core becomes degraded. Large tilts are likely detected with the remaining channels, but the capability for detection of small power tilts in some quadrants is decreased.

With input to QPTR from one or more Power Range Neutron Flux channels inoperable and with THERMAL POWER >75% RTP, the surveillance is initially performed within 12 hours. Thereafter, the Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

For purposes of monitoring the QPTR when one power range channel is inoperable, the moveable incore detectors are used to confirm that the normalized symmetric power distribution is consistent with the indicated QPTR and any previous data indicating a tilt. The incore detector monitoring is performed with a full incore flux map or two sets of four thimble locations with quarter core symmetry. The two sets of four symmetric thimbles is a set of eight unique detector locations. These locations are C-8, E-5, E-11, H-3, H-13, L-5, L-11, and N-8.

The symmetric thimble flux map can be used to generate symmetric thimble "tilt." This can be compared to a reference symmetric thimble tilt, from the most recent full core flux map, to generate an incore QPTR. Therefore, incore monitoring of QPTR can be used to confirm that QPTR is within limits.

With one NIS channel inoperable, the indicated tilt may be changed from the value indicated with all four channels OPERABLE. To confirm that no change in tilt has actually occurred, which might cause the QPTR limit to be exceeded, the incore result may be compared against previous flux maps either using the symmetric thimbles as described above or a complete flux map. Nominally, quadrant tilt from the Surveillance should be within 2% of the tilt shown by the most recent flux map data.

BASES

ACTIONS (continued)

D.1 and D.2

Condition D applies to the Power Range Neutron Flux - High Function.

The NIS power range detectors provide input to the Rod Control System and therefore, have a two-out-of-four trip logic. A known inoperable channel must be placed in the tripped condition. This results in a partial trip condition requiring only one-out-of-three logic for actuation. The 72 hours allowed by Required Action D.1 to place the inoperable channel in the tripped condition is justified in WCAP-14333-P-A (Ref. 8).

If Required Action D.1 cannot be met within the specified Completion Time, the plant must be placed in a MODE where this Function is no longer required OPERABLE. Seventy-eight hours are allowed to place the plant in MODE 3. The 78 hour Completion Time includes 6 hours for the MODE reduction as required by Required Action D.2. This is a reasonable time, based on operating experience, to reach MODE 3 from full power in an orderly manner and without challenging plant systems.

The Required Actions have been modified by two Notes. Note 1 allows the inoperable channel to be placed in the bypassed condition for up to 12 hours while performing routine surveillance testing of other channels. With one channel inoperable, the Note also allows routine surveillance testing of another channel with the inoperable channel in bypass. The Note also allows placing the inoperable channel in the bypass condition to allow setpoint adjustments of other channels when required to reduce the Power Range Neutron Flux-High setpoint in accordance with other Technical Specifications. The 12 hour time limit is justified in Reference 8.

Note 2 states to perform SR 3.2.4.2 if input to QPTR from one or more Power Range Neutron Flux channels are inoperable with THERMAL POWER >75% RTP.

BASES

ACTIONS (continued)

E.1 and E.2

Condition E applies to the following reactor trip Functions:

- Power Range Neutron Flux - Low,
- Overtemperature ΔT,
- Overpower ΔT,
- Power Range Neutron Flux - High Positive Rate,
- Power Range Neutron Flux - High Negative Rate, and
- Pressurizer Pressure - High.

A known inoperable channel must be placed in the tripped condition within 72 hours. Placing the channel in the tripped condition results in a partial trip condition requiring only one-out-of-two logic for actuation of the two-out-of-three trips and one-out-of-three logic for actuation of the two-out-of-four trips. The 72 hours allowed to place the inoperable channel in the tripped condition is justified in Reference 8.

If the inoperable channel cannot be placed in the trip condition within the specified Completion Time, the unit must be placed in a MODE where these Functions are not required OPERABLE. An additional 6 hours is allowed to place the unit in MODE 3. Six hours is a reasonable time, based on operating experience, to place the unit in MODE 3 from full power in an orderly manner and without challenging unit systems.

The Required Actions have been modified by a Note that allows placing the inoperable channel in the bypassed condition for up to 12 hours while performing routine surveillance testing of the other channels. The 12 hour time limit is justified in Reference 8.

BASES

LCO (continued)

13. Containment Water Level (Wide Range)

Containment Water Level (Wide Range) is provided to verify water source for recirculation mode cooling, determine whether high energy line rupture has occurred inside or outside containment, and determine potential for containment breach caused by very high water levels.

The channels provide indication over a range of 0% to 100%. There are a total of two Containment Water Level (Wide Range) channels. The instrument loops associated with Containment Water Level (Wide Range) are 63-178 and 63-179.

14. Incore Thermocouples

Incore thermocouples are provided to verify that the core is being adequately cooled, verify that RCS remains subcooled, and for monitoring the potential for fuel clad breach.

The channels provide indication over a range of 0°F to 2300°F. There are a total of 65 Incore Thermocouples. Each channel consists of one incore thermocouple. The minimum number of channels required is two channels per quadrant, eight per core, one/core quadrant/train. The two required channels in each quadrant shall be in different trains.

15. Reactor Vessel Level Instrumentation

Reactor Vessel Level indication is provided for determination of core cooling. It is considered to be a more direct and less ambiguous indication of core cooling.

The channels provide indication over a range of 0% to 120% (dynamic range), 0% to 70% (lower range), and 64% to 120% (upper range). There are a total of six Reactor Vessel Level Instrument channels. The instrument loops associated with Reactor Vessel Level Dynamic Range are 68-367 and 68-370. The instrument loops associated with Reactor Vessel Level Lower Range are 68-368 and 68-371. The instrument loops associated with Reactor Vessel Level Upper Range are 68-369 and 68-372.

BASES

ACTIONS (continued)

DG will not result in a complete loss of safety function of critical redundant required features. These features are powered from the redundant AC electrical power train. This includes motor driven auxiliary feedwater pumps. However, due to flow requirements of accident scenarios such as Feedwater Line Break (FWLB) and Small Break Loss of Coolant Accident (SBLOCA), the Turbine Driven Auxiliary Feedwater Pump should also be considered a required redundant feature.

The Completion Time for Required Action A.2 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

a. 6.9 kV Shutdown Board 1A-A or 1B-B has no offsite power supplying it loads and

b. A required feature on the other train is inoperable.

If at any time during the existence of Condition A a redundant required feature subsequently becomes inoperable, this Completion Time begins to be tracked.

Discovering no offsite power to a Unit 1 6.9 kV Shutdown Board coincident with one or more inoperable required support or supported features, or both, that are associated with the other train that has offsite power, results in starting the Completion Times for the Required Action. Twenty-four hours is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

The remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to the onsite Class 1E Distribution System. The 24 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 24 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

BASES

ACTIONS (continued)

A.3

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition A for a period that should not exceed 72 hours. With one offsite circuit inoperable, the reliability of the offsite system is degraded, and the potential for a loss of offsite power is increased, with attendant potential for a challenge to the unit safety systems. In this Condition, however, the remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to the onsite Class 1E AC Electrical Power Distribution System.

The 72 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

B.1

To ensure a highly reliable power source remains with one or more Train A DGs, or one or more Train B DGs inoperable, it is necessary to verify the availability of the offsite circuits on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action being not met. However, if a circuit fails to pass SR 3.8.1.1, it is inoperable. Upon offsite circuit inoperability, additional Conditions and Required Actions must then be entered.

B.2

Required Action B.2 is intended to provide assurance that a loss of offsite power, during the period that a DG(s) is inoperable, does not result in a complete loss of safety function of critical systems. These features are designed with redundant safety related trains. This includes motor driven auxiliary feedwater pumps. However, due to flow requirements of accident scenarios such as Feedwater Line Break (FWLB) and Small Break Loss of Coolant Accident (SBLOCA), the Turbine Driven Auxiliary Feedwater Pump should also be considered a required redundant feature. Redundant required feature failures consist of inoperable features associated with a train, redundant to the train that has an inoperable DG(s).

The Completion Time for Required Action B.2 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero"

BASES

ACTIONS (continued)

for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

a. An inoperable DG exists and

b. A required feature on the other train is inoperable.

If at any time during the existence of this Condition (one or more DGs in a train inoperable) a required feature subsequently becomes inoperable, this Completion Time would begin to be tracked.

Discovering one or more DGs in a train inoperable coincident with one or more inoperable required support or supported features, or both, that are associated with the OPERABLE DG, results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

In this Condition, the remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E AC Electrical Power Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

<u>B.3.1 and B.3.2</u>

Required Action B.3.1 provides an allowance to avoid unnecessary testing of OPERABLE DG(s). If it can be determined that the cause of the inoperable DG does not exist on the OPERABLE DG, SR 3.8.1.2 does not have to be performed. If the cause of inoperability exists on other DGs, the other DGs would be declared inoperable upon discovery and Condition F of LCO 3.8.1 would be entered if one or more DG(s) in Train A and Train B are inoperable. Once the failure is repaired, the common cause failure no longer exists, and Required Action B.3.1 is satisfied. If the cause of the initial inoperable DG cannot be confirmed not to exist on the remaining DGs, performance of SR 3.8.1.2 suffices to provide assurance of continued OPERABILITY of that DG.

BASES

ACTIONS (continued)

In the event the inoperable DG(s) is restored to OPERABLE status prior to completing either B.3.1 or B.3.2, the corrective action program will continue to evaluate the common cause possibility. This continued evaluation, however, is no longer under the 24 hour constraint imposed while in Condition B.

According to Generic Letter 84-15 (Ref. 7), 24 hours is reasonable to confirm that the OPERABLE DG(s) is not affected by the same problem as the inoperable DG.

B.4

In Condition B, the remaining OPERABLE DG(s) and offsite circuits are adequate to supply electrical power to the onsite Class 1E AC Electrical Power Distribution System. The 7 day Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

C.1, C.2, and C.3

Condition C is entered for an offsite circuit inoperable solely due to an inoperable power source to 6.9 kV Shutdown Board 2A-A or 2B-B. Required Action C.1 verifies the OPERABILITY of the remaining offsite circuit within an hour of the inoperability and every 8 hours thereafter. Since the Required Action only specifies "perform," a failure of the SR 3.8.1.1 acceptance criteria does not result in a Required Action not met.

The Completion Time for Required Action C.2 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

a. 6.9 kV Shutdown Board 2A-A or 2B-B has no offsite power; and

b. A required feature on the other train is inoperable.

BASES

ACTIONS (continued)

If at any time during the existence of Condition C a redundant required feature subsequently becomes inoperable, this Completion Time begins to be tracked.

A Completion Time of 24 hours is acceptable, because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown. The remaining OPERABLE offsite circuit and DGs are adequate to support these functions. The Completion Time takes into account the component OPERABILITY of the remaining redundant feature(s), a reasonable time for repairs, and the low probability of a DBA occurring during this period.

Operation may continue in Condition C for a period of 7 days. With one offsite circuit inoperable, the reliability of the functions is degraded. The potential for the loss of offsite power to the redundant feature(s) is increased, with the attendant potential for a challenge to their safety functions.

The required offsite circuit must be returned to OPERABLE status within 7 days. The 7 days Completion Time takes into account the capacity and capability of the remaining AC sources providing electrical power to the required feature(s), a reasonable time for repairs and the low probability of a DBA occurring during this period of time.

D.1 and D.2

Required Action D.1, which applies when two offsite circuits are inoperable, is intended to provide assurance that an event with a coincident single failure will not result in a complete loss of redundant required safety functions. The Completion Time for this failure of redundant required features is reduced to 12 hours from that allowed for one train without offsite power (Required Action A.2). The rationale for the reduction to 12 hours is that Regulatory Guide 1.93 (Ref. 6) allows a Completion Time of 24 hours for two required offsite circuits inoperable, based upon the assumption that two complete safety trains are OPERABLE. When a concurrent redundant required feature failure exists, this assumption is not the case, and a shorter Completion Time of 12 hours is appropriate. These features are powered from redundant AC safety trains. This includes motor driven auxiliary feedwater pumps. Single train features, such as turbine driven auxiliary pumps, are not included in the list.

BASES

ACTIONS (continued)

The Completion Time for Required Action D.1 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action the Completion Time only begins on discovery that both:

a. All required offsite circuits are inoperable and

b. A required feature is inoperable.

If at any time during the existence of Condition D (two offsite circuits inoperable) a required feature becomes inoperable, this Completion Time begins to be tracked.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition D for a period that should not exceed 24 hours. This level of degradation means that the offsite electrical power system does not have the capability to effect a safe shutdown and to mitigate the effects of an accident; however, the onsite AC sources have not been degraded. This level of degradation generally corresponds to a total loss of the immediately accessible offsite power sources.

Because of the normally high availability of the offsite sources, this level of degradation may appear to be more severe than other combinations of two AC sources inoperable that involve one or more DGs inoperable. However, two factors tend to decrease the severity of this level of degradation:

a. The configuration of the redundant AC electrical power system that remains available is not susceptible to a single bus or switching failure and

b. The time required to detect and restore an unavailable offsite power source is generally much less than that required to detect and restore an unavailable onsite AC source.

BASES

ACTIONS (continued)

With both offsite circuits inoperable, sufficient onsite AC sources are available to maintain the unit in a safe shutdown condition in the event of a DBA or transient. In fact, a simultaneous loss of offsite AC sources, a LOCA, and a worst case single failure were postulated as a part of the design basis in the safety analysis. Thus, the 24 hour Completion Time provides a period of time to effect restoration of one of the offsite circuits commensurate with the importance of maintaining an AC electrical power system capable of meeting its design criteria.

According to Reference 6, with the available offsite AC sources, two less than required by the LCO, operation may continue for 24 hours. If two offsite sources are restored within 24 hours, unrestricted operation may continue. If only one offsite source is restored within 24 hours, power operation continues in accordance with Condition A or Condition C, as applicable.

E.1 and E.2

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition E for a period that should not exceed 12 hours.

In Condition E, individual redundancy is lost in both the offsite electrical power system and the onsite AC electrical power system. Since power system redundancy is provided by two diverse sources of power, however, the reliability of the power systems in this Condition may appear higher than that in Condition D (loss of both offsite circuits). This difference in reliability is offset by the susceptibility of this power system configuration to a single bus or switching failure. The 12 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

BASES

ACTIONS (continued)

F.1

With one or more Train A DG(s) and one or more Train B DG(s) inoperable, there are insufficient standby AC sources available to power an entire load group. Thus, with an assumed loss of offsite electrical power, insufficient standby AC sources are available to power the minimum required ESF functions. Since the offsite electrical power system is the only source of AC power for this level of degradation, the risk associated with continued operation for a very short time could be less than that associated with an immediate controlled shutdown (the immediate shutdown could cause grid instability, which could result in a total loss of AC power). Since any inadvertent generator trip could also result in a total loss of offsite AC power, however, the time allowed for continued operation is severely restricted. The intent here is to avoid the risk associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

In this Condition, operation may continue for a period that should not exceed 2 hours, consistent with the guidance provided in Reference 6.

G.1 and G.2

If the inoperable AC electric power sources cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

H.1 and I.1

Conditions H and I correspond to a level of degradation in which redundancy in the AC electrical power supplies cannot be assured. At this severely degraded level, any further losses in the AC electrical power system will cause a loss of function. Therefore, no additional time is justified for continued operation. The unit is required by LCO 3.0.3 to commence a controlled shutdown.

BASES

SURVEILLANCE REQUIREMENTS

The AC sources are designed to permit inspection and testing of all important areas and features, especially those that have a standby function, in accordance with 10 CFR 50, Appendix A, GDC 18 (Ref. 8). Periodic component tests are supplemented by extensive functional tests during refueling outages (under simulated accident conditions). The SRs for demonstrating the OPERABILITY of the DGs are in accordance with the recommendations of Regulatory Guide 1.9 (Ref. 3) and Regulatory Guide 1.108 (Ref. 9).

Where the SRs discussed herein specify voltage and frequency tolerances, the following is applicable. The minimum steady state output voltage of 6210 V is 90% of the nominal 6900 V output voltage. This value, which is specified in ANSI C84.1 (Ref. 10), allows for voltage drop to the terminals of 6600 V motors whose minimum operating voltage is specified as 90% or 5940 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 7260 V is equal to the maximum operating voltage specified for 6600 V motors. It ensures that for a lightly loaded distribution system, the voltage at the terminals of 6600 V motors is no more than the maximum rated operating voltages. The steady state minimum and maximum frequency values are 59.8 Hz and 60.2 Hz, which are consistent with the recommendations in Regulatory Guide 1.9 (Ref. 3). These values ensure that the safety related plant equipment powered from the DGs is capable of performing its safety functions.

<u>SR 3.8.1.1</u>

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 Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.2 and SR 3.8.1.7

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 1 for SR 3.8.1.2 and Note for SR 3.8.1.7) 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 3.8.1.7 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, the manufacturer recommends 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 2.

SR 3.8.1.7 requires that 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 UFSAR, Chapter 15 (Ref. 5).

The 10 second start requirement is not applicable to SR 3.8.1.2 (see Note 2) when a modified start procedure as described above is used. During this testing, the diesel is not in an accident mode and the frequency is controlled by the operator instead of the governor's accident speed reference. If a modified start is not used, the 10 second start requirement of SR 3.8.1.7 applies.

Since SR 3.8.1.7 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.

In addition to the SR requirements, the time for the DG to reach steady state operation, unless the modified DG start method is employed, is periodically monitored and the trend evaluated to identify degradation of governor and voltage regulator performance.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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, 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 has an allowable power factor rating between 0.8 lagging and 1.0. The 0.8 value is the design rating of the machine, while the 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.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

This SR is modified by four Notes. Note 1 indicates 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 states that momentary transients, because of changing board 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 engine-mounted “day” 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 Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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 engine-mounted “day” tank 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 Frequency is controlled under the Surveillance Frequency Control Program.

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

This Surveillance demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from the storage system to the engine-mounted “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 Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.8.1.7

See SR 3.8.1.2.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.8

Transfer of the power supply to each 6.9 kV Unit Board from the normal supply to the alternate supply demonstrates the OPERABILITY of the alternate supply to power the shutdown loads. This SR is modified by two Notes.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

This SR is modified by two Notes. The reason for Note 1 is that, during operation with the reactor critical, performance of this SR for the 1A, 1B, 1C, and 1D Unit Boards could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g., post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed Surveillance, a successful Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when the Surveillance is performed in MODE 1 or 2. Risk insights or deterministic methods may be used for this assessment. Credit may be taken for unplanned events that satisfy this SR.

Note 2 specifies that transfer capability is only required to be met for 6.9 kV Unit Boards that require normal and alternate power supplies. When both load groups are being supplied power by the USSTs, only the 6.9 kV Unit Boards associated with one load group are required to have normal and alternate power supplies. Therefore, only one CSST is required to be OPERABLE and available as an alternate power supply. Manual transfers between the normal supply and the alternate supply are also required to meet the SR. However, delayed access to an offsite circuit is not credited in the accident analysis.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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 (600 kW) without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. 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 board, or

b. Tripping its associated single largest post-accident load with the DG solely supplying the board.

Consistent with Regulatory Guide 1.9 (Ref. 3), 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 and voltage 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 maximum transient 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 Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

This SR is modified by a Note. The Note ensures that the DG is tested under load conditions that are as close to design basis conditions as possible. When synchronized with offsite power, testing should be performed at a power factor of ≤ 0.89. This power factor is representative of the actual inductive loading a DG would see under design basis accident conditions. Under certain conditions, however, the Note allows the Surveillance to be conducted at a power factor other than ≤ 0.89. These conditions occur when grid voltage is high, and the additional field excitation needed to get the power factor to ≤ 0.89 results in voltages on the emergency boards that are too high.

BASES

SURVEILLANCE REQUIREMENTS (continued)

Under these conditions, the power factor should be maintained as close as practicable to 0.89 while still maintaining acceptable voltage limits on the emergency boards. In other circumstances, the grid voltage may be such that the DG excitation levels needed to obtain a power factor of 0.89 may not cause unacceptable voltages on the emergency boards, but the excitation levels are in excess of those recommended for the DG. In such cases, the power factor shall be maintained as close as practicable to 0.89 without exceeding the DG excitation limits.

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 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 board if the trip initiator can be corrected or isolated.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

This SR has been modified by a Note. The Note ensures that the DG is tested under load conditions that are as close to design basis conditions as possible. When synchronized with offsite power, testing should be performed at a power factor of ≤ 0.89. This power factor is representative of the actual inductive loading a DG would see under design basis accident conditions. Under certain conditions, however, the Note allows the Surveillance to be conducted at a power factor other than ≤ 0.89. These conditions occur when grid voltage is high, and the additional field excitation needed to get the power factor to ≤ 0.89 results in voltages on the emergency boards that are too high. Under these conditions, the power factor should be maintained as close as practicable to 0.89 while still maintaining acceptable voltage limits on the emergency boards. In other circumstances, the grid voltage may be such that the DG excitation levels needed to obtain a power factor of 0.89 may not cause unacceptable voltages on the emergency boards, but the excitation levels are in excess of those recommended for the DG. In such cases, the power factor shall be maintained as close as practicable to 0.89 without exceeding the DG excitation limits.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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 encountered from the loss of offsite power, including shedding of the nonessential loads and energization of the emergency boards 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 Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

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. This restriction from normally performing the Surveillance for DGs 1A-A and 1B-B in MODE 1 or 2 is further amplified to allow portions of the Surveillance to be performed for the purpose of

BASES

SURVEILLANCE REQUIREMENTS (continued)

reestablishing OPERABILITY (e.g., post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed partial Surveillance, a successful partial Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the partial Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when portions of the Surveillance are performed in MODE 1 or 2. Risk insights or deterministic methods may be used for the assessment. Credit may be taken for unplanned events that satisfy this SR.

<u>SR 3.8.1.12</u>

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 ≥ 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 Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (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. This restriction from normally performing the Surveillance for DGs 1A-A and 1B-B in MODE 1 or 2 is further amplified to allow portions of the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g., post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed partial Surveillance, a successful partial Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the partial Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when portions of the Surveillance are performed in MODE 1 or 2. Risk insights or deterministic methods may be used for the assessment. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.13

This Surveillance demonstrates that DG noncritical protective functions (e.g., high jacket water temperature) are bypassed on a loss of voltage signal, an ESF actuation test signal, or both. Noncritical automatic trips are all automatic trips except:

a. Engine overspeed; and

b. Generator differential current.

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.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

The SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required DG from service. This restriction from normally performing the Surveillance for DGs 1A-A and 1B-B in MODE 1 or 2 is further amplified to allow the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g., post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed Surveillance, a successful Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when the Surveillance is performed in MODE 1 or 2. Risk insights or deterministic methods may be used for this assessment. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.14

Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(3), requires demonstration that the DGs can start and run continuously at full load capability for an interval of not less than 24 hours, ≥ 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.

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 Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (continued)

This Surveillance is modified by two Notes. Note 1 states that momentary transients due to changing board loads do not invalidate this test. Similarly, momentary power factor transients above the power factor limit will not invalidate the test. Note 2 ensures that the DG is tested under load conditions that are as close to design basis conditions as possible. When synchronized with offsite power, testing should be performed at a power factor of ≤ 0.89. This power factor is representative of the actual inductive loading a DG would see under design basis accident conditions. Under certain conditions, however, Note 2 allows the Surveillance to be conducted at a power factor other than ≤ 0.89. These conditions occur when grid voltage is high, and the additional field excitation needed to get the power factor to ≤ 0.89 results in voltages on the emergency boards that are too high. Under these conditions, the power factor should be maintained as close as practicable to 0.89 while still maintaining acceptable voltage limits on the emergency boards. In other circumstances, the grid voltage may be such that the DG excitation levels needed to obtain a power factor of 0.89 may not cause unacceptable voltages on the emergency boards, but the excitation levels are in excess of those recommended for the DG. In such cases, the power factor shall be maintained close as practicable to 0.89 without exceeding the DG excitation limits.

SR 3.8.1.15

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 Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

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 board 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.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.16

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 board undervoltage, and the load sequence timers are reset.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

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. This restriction from normally performing the Surveillance for DGs 1A-A and 1B-B in MODE 1 or 2 is further amplified to allow the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g., post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed Surveillance, a successful Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when the Surveillance is performed in MODE 1 or 2. Risk insights or deterministic methods may be used for this assessment. Credit may be taken for unplanned events that satisfy this SR.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.17

Under accident and loss of offsite power conditions loads are sequentially connected to the board by the load sequence timers. 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 5% 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 Shutdown Boards.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.8.1.18

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 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 Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (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 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. This restriction from normally performing the Surveillance for DGs 1A-A and 1B-B in MODE 1 or 2 is further amplified to allow portions of the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g., post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed partial Surveillance, a successful partial Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the partial Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when portions of the Surveillance are performed in MODE 1 or 2. Risk insights or deterministic methods may be used for the assessment. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.19

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 Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

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.

BASES

REFERENCES

1. 10 CFR 50, Appendix A, GDC 17.
2. UFSAR, Chapter 8.
3. Regulatory Guide 1.9, Rev. 0.
4. UFSAR, Chapter 6.
5. UFSAR, Chapter 15.
6. Regulatory Guide 1.93, Rev. 0, December 1974.
7. Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability," July 2, 1984.
8. 10 CFR 50, Appendix A, GDC 18.
9. Regulatory Guide 1.108, Rev. 1, August 1977.
10. ANSI C84.1, Voltage Ratings for Electric Power Systems and Equipment (60 Hz).
11. UFSAR Chapter 10.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.9 Distribution Systems - Operating

BASES

BACKGROUND

The two units share several structures and systems including the preferred and emergency (standby) electric power systems (UFSAR, Chapter 8.0). The vital DC Power System is shared to the extent that a few loads (e.g., the vital inverters) in one nuclear unit are energized by the DC power channels assigned primarily to power loads of the other unit. In no case does the sharing inhibit the safe shutdown of one unit while the other unit is experiencing an accident. The Standby Power System serving each unit is divided into two redundant load groups (power trains). These power trains (Train A and Train B for each unit) supply power to safety-related equipment. Generally, the Engineered Safety Feature (ESF) loads assigned to a unit are supplied by the unit designated trains. For example, Safety Injection (SI) pump 1A-A (associated with Unit 1) is supplied by Shutdown Board 1A-A (also associated with Unit 1) while SI pump 2A-A (associated with Unit 2) is supplied by Shutdown Board 2A-A (also associated with Unit 2).

Separate and similar systems and equipment are provided for each unit when required. In certain instances, both units share systems or some components of a system. Shared systems are the exception to the unit/power system association. Because both units share the power system, one unit's power system(s) supports certain components required by the other unit (e.g., emergency gas treatment system).

The onsite Class 1E AC, vital DC, DG DC, and AC vital instrument electrical power distribution systems are divided into two redundant and independent trains. Each electrical power distribution train consists of:

a. an AC electrical power distribution subsystem,

b. an AC vital instrument power distribution subsystem,

c. a vital DC electrical power distribution subsystem, and

d. a diesel generator (DG) DC electrical power distribution subsystem.

Each AC electrical power subsystem consists of two 6.9 kV Shutdown Boards and four 480 V Shutdown Boards. Each train of 6.9 kV Shutdown Boards has two separate and independent offsite sources of power as well as a dedicated onsite diesel generator (DG) source for each 6.9 kV Shutdown Board. Each 6.9 kV Shutdown Board is normally connected to a preferred offsite source. If the offsite sources are unavailable, the onsite emergency DGs supply power to the affected 6.9 kV Shutdown Boards.

ATTACHMENT 2

SEQUOYAH NUCLEAR PLANT, UNIT 2,
TECHNICAL SPECIFICATION BASES
CHANGED PAGES

TS Bases Affected Pages

EPL-1 through EPL 51
B 3.8.1-29
B 3.8.1-16
B 3.8.1-17
B 3.8.1-21
B 3.1.4-8
B 3.1.4-9
B 3.1.5-3
B 3.1.5-4
B 3.1.5-5
B 3.1.6-4
B 3.1.6-5
B 3.1.6-6
B 3.2.4-6
B 3.3.1-34
B 3.3.1-35
B 3.3.3-8
B 3.8.1-9 through B 3.8.1-32
B 3.8.9-1

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

Page	Revision
3.7.3-1	09/30/15
3.7.3-2	09/30/15
3.7.4-1	09/30/15
3.7.4-2	09/30/15
3.7.5-1	09/30/15
3.7.5-2	09/30/15
3.7.5-3	09/30/15
3.7.5-4	09/30/15
3.7.6-1	09/30/15
3.7.6-2	09/30/15
3.7.7-1	09/30/15
3.7.7-2	09/30/15
3.7.8-1	09/29/16
3.7.8-2	09/29/16
3.7.8-3	09/29/16
3.7.9-1	09/30/15
3.7.10-1	09/30/15
3.7.10-2	09/30/15
3.7.10-3	09/30/15
3.7.11-1	09/30/15
3.7.11-2	09/30/15
3.7.12-1	09/30/15
3.7.12-2	09/30/15
3.7.12-3	09/30/15
3.7.13-1	09/30/15
3.7.14-1	09/30/15
3.7.14-2	09/30/15

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

Page	Revision
3.8.1-14	02/02/18
3.8.1-15	02/12/18
3.8.1-16	09/30/15
3.8.2-1	09/30/15
3.8.2-2	09/30/15
3.8.2-3	09/30/15
3.8.3-1	09/30/15
3.8.3-2	09/30/15
3.8.3-3	09/30/15
3.8.4-1	09/30/15
3.8.4-2	09/30/15
3.8.4-3	09/30/15
3.8.5-1	09/30/15
3.8.5-2	09/30/15
3.8.6-1	09/30/15
3.8.6-2	09/30/15
3.8.6-3	09/30/15
3.8.6-4	09/30/15
3.8.6-5	09/30/15
3.8.6-6	09/30/15
3.8.7-1	09/30/15
3.8.7-2	09/30/15
3.8.8-1	09/30/15
3.8.8-2	09/30/15
3.8.9-1	09/30/15
3.8.9-2	09/30/15
3.8.9-3	09/30/15

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

Page	Revision
5.5-17	09/30/15
5.6-1	09/30/15
5.6-2	09/30/15
5.6-3	09/30/15
5.6-4	09/30/15
5.6-5	09/30/15
5.7-1	09/30/15
5.7-2	09/30/15
5.7-3	09/30/15
5.7-4	09/30/15

Appendix B

Page	Revision
Appendix B Cover Sheet	Original
Table of Contents	Original
1-1	Original
2-1	Original
4-1	Original
4-2	Original
5-1	03/15/89
5-2	05/10/95
5-3	03/15/89
5-4	03/15/89
5-5	Original
5-6	Original
5-7	Original
5-8	Original
5-9	Original

EFFECTIVE PAGE LISTING

Page	Revision
Table of Contents, page i	10/23/15
Table of Contents, page ii	10/23/15
Table of Contents, page iii	10/23/15
B 2.1.1-1	10/23/15
B 2.1.1-2	07/01/16
B 2.1.1-3	10/23/15
B 2.1.1-4	10/23/15
B 2.1.1-5	10/23/15
B 2.1.2-1	10/23/15
B 2.1.2-2	10/23/15
B 2.1.2-3	10/23/15
B 3.0-1	10/23/15
B 3.0-2	10/23/15
B 3.0-3	10/23/15
B 3.0-4	10/23/15
B 3.0-5	10/23/15
B 3.0-6	10/23/15
B 3.0-7	10/23/15
B 3.0-8	10/23/15
B 3.0-9	10/23/15
B 3.0-10	10/23/15
B 3.0-11	10/23/15
B 3.0-12	10/23/15
B 3.0-13	10/23/15
B 3.0-14	10/23/15
B 3.0-15	10/23/15
B 3.0-16	10/23/15
B 3.0-17	10/23/15

EFFECTIVE PAGE LISTING

Page	Revision
B 3.0-18	10/23/15
B 3.0-19	10/23/15
B 3.0-20	10/23/15
B 3.1.1-1	10/23/15
B 3.1.1-2	10/23/15
B 3.1.1-3	10/23/15
B 3.1.1-4	10/23/15
B 3.1.1-5	10/23/15
B 3.1.2-1	10/23/15
B 3.1.2-2	10/23/15
B 3.1.2-3	10/23/15
B 3.1.2-4	10/23/15
B 3.1.2-5	10/23/15
B 3.1.3-1	10/23/15
B 3.1.3-2	10/23/15
B 3.1.3-3	10/23/15
B 3.1.3-4	10/23/15
B 3.1.3-5	10/23/15
B 3.1.3-6	07/01/16
B 3.1.4-1	10/23/15
B 3.1.4-2	10/23/15
B 3.1.4-3	10/23/15
B 3.1.4-4	10/23/15
B 3.1.4-5	10/23/15
B 3.1.4-6	10/23/15
B 3.1.4-7	10/23/15
B 3.1.4-8	02/22/18
B 3.1.4-9	02/22/18

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

Page	Revision
B 3.3.1-15	10/23/15
B 3.3.1-16	10/23/15
B 3.3.1-17	10/23/15
B 3.3.1-18	10/23/15
B 3.3.1-19	10/23/15
B 3.3.1-20	10/23/15
B 3.3.1-21	10/23/15
B 3.3.1-22	10/23/15
B 3.3.1-23	10/23/15
B 3.3.1-24	10/23/15
B 3.3.1-25	10/23/15
B 3.3.1-26	10/23/15
B 3.3.1-27	10/23/15
B 3.3.1-28	10/23/15
B 3.3.1-29	10/23/15
B 3.3.1-30	10/23/15
B 3.3.1-31	10/23/15
B 3.3.1-32	10/23/15
B 3.3.1-33	10/23/15
B 3.3.1-34	08/30/18
B 3.3.1-35	08/30/18
B 3.3.1-36	10/23/15
B 3.3.1-37	10/23/15
B 3.3.1-38	10/23/15
B 3.3.1-39	10/23/15
B 3.3.1-40	10/23/15
B 3.3.1-41	10/23/15

EFFECTIVE PAGE LISTING

Page	Revision
B 3.3.1-42	10/23/15
B 3.3.1-43	10/23/15
B 3.3.1-44	10/23/15
B 3.3.1-45	10/23/15
B 3.3.1-46	10/23/15
B 3.3.1-47	10/23/15
B 3.3.1-48	10/23/15
B 3.3.1-49	10/23/15
B 3.3.1-50	10/23/15
B 3.3.1-51	10/23/15
B 3.3.1-52	10/23/15
B 3.3.1-53	10/23/15
B 3.3.1-54	10/23/15
B 3.3.1-55	10/23/15
B 3.3.2-1	10/23/15
B 3.3.2-2	10/23/15
B 3.3.2-3	10/23/15
B 3.3.2-4	10/23/15
B.3.3.2-5	10/23/15
B.3.3.2-6	10/23/15
B.3.3.2-7	10/23/15
B 3.3.2-8	10/23/15
B 3.3.2-9	10/23/15
B 3.3.2-10	10/23/15
B 3.3.2-11	10/23/15
B 3.3.2-12	10/23/15
B 3.3.2-13	10/23/15
B 3.3.2-14	10/23/15

EFFECTIVE PAGE LISTING

Page	Revision
B 3.3.2-15	10/23/15
B 3.3.2-16	10/23/15
B 3.3.2-17	10/23/15
B 3.3.2-18	10/23/15
B 3.3.2-19	10/23/15
B 3.3.2-20	10/23/15
B 3.3.2-21	10/23/15
B 3.3.2-22	10/23/15
B 3.3.2-23	10/23/15
B 3.3.2-24	10/23/15
B 3.3.2-25	10/23/15
B 3.3.2-26	10/23/15
B 3.3.2-27	10/23/15
B 3.3.2-28	10/23/15
B 3.3.2-29	10/23/15
B 3.3.2-30	10/23/15
B 3.3.2-31	10/23/15
B 3.3.2-32	10/23/15
B 3.3.2-33	10/23/15
B 3.3.2-34	10/23/15
B 3.3.2-35	10/23/15
B 3.3.2-36	10/23/15
B 3.3.2-37	10/23/15
B 3.3.2-38	10/23/15
B 3.3.2-39	10/23/15
B 3.3.2-40	10/23/15
B 3.3.2-41	10/23/15
B 3.3.2-42	10/23/15
B 3.3.2-43	10/23/15

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

Page	Revision
B 3.3.5-1	10/23/15
B 3.3.5-2	10/23/15
B 3.3.5-3	10/23/15
B 3.3.5-4	10/23/15
B.3.3.5-5	10/23/15
B.3.3.5-6	10/23/15
B.3.3.5-7	10/23/15
B 3.3.6-1	10/23/15
B 3.3.6-2	10/23/15
B 3.3.6-3	10/23/15
B 3.3.6-4	10/23/15
B.3.3.6-5	10/23/15
B.3.3.6-6	10/23/15
B.3.3.6-7	10/23/15
B 3.3.6-8	10/23/15
B 3.3.6-9	10/23/15
B 3.3.7-1	10/23/15
B 3.3.7-2	10/23/15
B 3.3.7-3	10/23/15
B 3.3.7-4	10/23/15
B.3.3.7-5	10/23/15
B.3.3.7-6	10/23/15
B 3.3.8-1	10/23/15
B 3.3.8-2	10/23/15
B 3.3.8-3	10/23/15
B 3.3.8-4	10/23/15
B.3.3.8-5	10/23/15

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

Page	Revision
B.3.4.6-5	10/23/15
B 3.4.7-1	10/23/15
B 3.4.7-2	10/23/15
B 3.4.7-3	10/23/15
B 3.4.7-4	10/23/15
B.3.4.7-5	10/23/15
B 3.4.8-1	10/23/15
B 3.4.8-2	10/23/15
B 3.4.8-3	10/23/15
B 3.4.9-1	10/23/15
B 3.4.9-2	10/23/15
B 3.4.9-3	10/23/15
B 3.4.9-4	10/23/15
B 3.4.10-1	10/23/15
B 3.4.10-2	10/23/15
B 3.4.10-3	10/23/15
B 3.4.10-4	10/23/15
B 3.4.11-1	10/23/15
B 3.4.11-2	10/23/15
B 3.4.11-3	10/23/15
B 3.4.11-4	10/23/15
B.3.4.11-5	10/23/15
B.3.4.11-6	10/23/15
B.3.4.11-7	10/23/15
B 3.4.12-1	10/23/15
B 3.4.12-2	10/23/15
B 3.4.12-3	10/23/15
B 3.4.12-4	10/23/15
B.3.4.12-5	10/23/15

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

Page	Revision
B.3.4.15-5	10/23/15
B.3.4.15-6	10/23/15
B 3.4.16-1	10/23/15
B 3.4.16-2	10/23/15
B 3.4.16-3	10/23/15
B 3.4.16-4	10/23/15
B.3.4.16-5	10/23/15
B 3.4.17-1	10/23/15
B 3.4.17-2	10/23/15
B 3.4.17-3	10/23/15
B 3.4.17-4	10/23/15
B.3.4.17-5	10/23/15
B.3.4.17-6	10/23/15
B.3.4.17-7	10/23/15
B 3.5.1-1	10/23/15
B 3.5.1-2	10/23/15
B 3.5.1-3	10/23/15
B 3.5.1-4	10/23/15
B.3.5.1-5	10/23/15
B.3.5.1-6	10/23/15
B.3.5.1-7	10/23/15
B 3.5.2-1	10/23/15
B 3.5.2-2	10/23/15
B 3.5.2-3	10/23/15
B 3.5.2-4	10/23/15
B.3.5.2-5	10/23/15
B.3.5.2-6	10/23/15
B.3.5.2-7	10/23/15

EFFECTIVE PAGE LISTING

Page	Revision
B 3.5.2-8	05/24/16
B 3.5.2-9	10/23/15
B 3.5.2-10	10/23/15
B 3.5.3-1	10/23/15
B 3.5.3-2	10/23/15
B 3.5.3-3	10/23/15
B 3.5.4-1	10/23/15
B 3.5.4-2	10/23/15
B 3.5.4-3	10/23/15
B 3.5.4-4	10/23/15
B.3.5.4-5	10/23/15
B 3.5.5-1	10/23/15
B 3.5.5-2	10/23/15
B 3.5.5-3	10/23/15
B 3.5.5-4	10/23/15
B 3.6.1-1	10/23/15
B 3.6.1-2	10/23/15
B 3.6.1-3	10/23/15
B 3.6.1-4	10/23/15
B 3.6.2-1	10/23/15
B 3.6.2-2	10/23/15
B 3.6.2-3	10/23/15
B 3.6.2-4	10/23/15
B.3.6.2-5	10/23/15
B.3.6.2-6	10/23/15
B 3.6.3-1	10/23/15
B 3.6.3-2	10/23/15
B 3.6.3-3	10/23/15
B 3.6.3-4	10/23/15

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

Page	Revision
B 3.7.1-4	10/23/15
B 3.7.1-5	10/23/15
B 3.7.2-1	10/23/15
B 3.7.2-2	10/23/15
B 3.7.2-3	10/23/15
B 3.7.2-4	10/23/15
B 3.7.2-5	10/23/15
B 3.7.3-1	10/23/15
B 3.7.3-2	10/23/15
B 3.7.3-3	10/23/15
B 3.7.3-4	10/23/15
B 3.7.3-5	10/23/15
B 3.7.3-6	10/23/15
B 3.7.4-1	10/23/15
B 3.7.4-2	10/23/15
B 3.7.4-3	10/23/15
B 3.7.5-1	10/23/15
B 3.7.5-2	10/23/15
B 3.7.5-3	10/23/15
B 3.7.5-4	11/23/16
B 3.7.5-5	11/23/16
B 3.7.5-6	11/23/16
B 3.7.5-7	11/23/16
B 3.7.5-8	11/23/16
B 3.7.5-9	11/23/16
B 3.7.5-10	11/23/16
B 3.7.6-1	10/23/15
B 3.7.6-2	10/23/15
B 3.7.6-3	10/23/15

EFFECTIVE PAGE LISTING

Page	Revision
B 3.7.7-1	10/23/15
B 3.7.7-2	10/23/15
B 3.7.7-3	10/23/15
B 3.7.7-4	10/23/15
B 3.7.8-1	10/23/15
B 3.7.8-2	09/29/16
B 3.7.8-3	09/29/16
B 3.7.8-4	09/29/16
B 3.7.8-5	09/29/16
B 3.7.9-1	10/23/15
B 3.7.9-2	10/23/15
B 3.7.9-3	10/23/15
B 3.7.10-1	10/23/15
B 3.7.10-2	10/23/15
B 3.7.10-3	10/23/15
B 3.7.10-4	10/23/15
B 3.7.10-5	10/23/15
B 3.7.10-6	10/23/15
B 3.7.10-7	10/23/15
B 3.7.10-8	10/23/15

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

EFFECTIVE PAGE LISTING

AMENDMENT LISTING

Amendments	Date and Revision
Lower Power Operating License and License and Technical Specifications issued by NRC	06/25/81 (Original)
Amendment 1 issued by NRC	09/08/81 (R1)
Amendment 2 issued by NRC	09/15/81 (R2)*
Amendment 3 Issued by NRC	12/31/81 (R3)
Amendment 4 Issued by NRC	05/04/82 (R4)
Amendment 5 Issued by NRC	06/18/82 (R5)
Amendment 6 Issued by NRC	08/03/82 (R6)
Amendment 7 Issued by NRC	10/21/82 (R7)
Amendment 8 Issued by NRC	12/23/82 (R8)
Amendment 9 Issued by NRC	12/23/82 (R9)
Amendment 10 Issued by NRC	12/23/82 (R10)
Amendment 11 Issued by NRC	12/23/82 (R11)
Amendment 12 Issued by NRC	12/27/82 (R12)
Amendment 13 Issued by NRC	12/29/82 (R13)
Amendment 14 Issued by NRC	02/16/83 (R14)
Amendment 15 Issued by NRC	03/14/83 (R15)
Amendment 16 Issued by NRC	03/16/83 (R16)
Amendment 17 Issued by NRC	05/03/83 (R17)
Amendment 18 Issued by NRC	05/05/83 (R18)
Amendment 19 Issued by NRC	05/05/83 (R19)
Amendment 20 Issued by NRC	07/15/83 (R20)
Amendment 21 Issued by NRC	09/29/83 (R21)
Amendment 22 Issued by NRC	09/30/83 (R22)
Amendment 23 Issued by NRC	09/30/83 (R23)
Amendment 24 Issued by NRC	11/10/83 (R24)
Amendment 25 Issued by NRC	03/29/84 (R25)
Amendment 26 Issued by NRC	04/24/84 (R26)
NRC Order Issued	06/15/84
Amendment 27 Issued by NRC	08/23/84 (R27)
Amendment 28 Issued by NRC	11/23/84 (R28)
Amendment 29 Issued by NRC	01/24/85 (R29)
Amendment 30 Issued by NRC	06/11/85 (R30)
Amendment 31 Issued by NRC	06/20/85 (R31)
Amendment 32 Issued by NRC	06/25/85 (R32)
Amendment 33 Issued by NRC	09/03/85 (R33)
Amendment 34 Issued by NRC	01/14/86 (R34)
Amendment 35 Issued by NRC	01/29/86 (R35)

*Full Power Operating License

AMENDMENT LISTING

Amendments	Date and Revision
EPL Revised	07/17/86
Amendment 36 Issued by NRC	07/28/86 (R36)
Amendment 37 Issued by NRC	09/15/86 (R37)
Amendment 38 Issued by NRC	09/16/86 (R38)
Amendment 39 Issued by NRC	09/17/86 (R39)
Amendment 40 Issued by NRC	10/02/86 (R40)
Amendment 41 Issued by NRC	10/28/86 (R41)
Amendment 42 Issued by NRC	12/01/86 (R42)
Amendment 43 Issued by NRC	12/02/86 (R43)
Special Revision Authorized by NRC**	01/05/87 (SR)
Amendment 44 Issued by NRC	02/03/87 (R44
Amendment 45 Issued by NRC	02/12/87 (R45)
Amendment 46 Issued by NRC	03/16/87 (R46)
Amendment 47 Issued by NRC	05/12/87 (R47)
Amendment 48 Issued by NRC	07/20/87 (R48)
Bases Revision Issued by NRC	08/18/87 (BR)
Amendment 49 Issued by NRC	09/09/87 (R49)
Amendment 50 Issued by NRC	09/10/87 (R50)
Amendment 51 Issued by NRC	09/18/87 (R51)
Amendment 52 Issued by NRC	10/19/87 (R52)
Amendment 53 Issued by NRC	10/22/87 (R53)
Amendment 54 Issued by NRC	10/30/87 (R54)
Approved correction for Amendment 53 by NRC	11/27/87 ***
Amendment 55 Issued by NRC	12/31/87 (R55)
Amendment 56 Issued by NRC	01/07/88 (R56)
Amendment 57 Issued by NRC	01/11/88 (R57)
Amendment 58 Issued by NRC	01/25/88 (R58)
Additional Exemptions issued by NRC	01/15/88 (AE)
Amendment 59 Issued by NRC	02/11/88 (R59)
Amendment 60 Issued by NRC	02/17/88 (R60)
Amendment 61 Issued by NRC	04/04/88 (R61)
Amendment 62 Issued by NRC	05/16/88 (R62)
Amendment 63 Issued by NRC	05/18/88 (R63)
Amendment 64 Issued by NRC	05/23/88 (R64)
Amendment 65 Issued by NRC	06/24/88 (R65)

**Special Revision Authorized by 10 CFR Parts 50 and 51 Final Rule As Noted in the Federal Register on November 6, 1986 and Effective January 5, 1987.

***NRC corrected typographical error for Amendment 53 (page 3/4 8 34) on November 27, 1987.

AMENDMENT LISTING

Amendments	Date and Revision
Amendment 66 Issued by NRC	06/30/88 (R66)
Amendment 67 Issued by NRC	07/12/88 (R67)
Amendment 68 Issued by NRC	08/05/88 (R68)
Amendment 69 Issued by NRC	08/15/88 (R69)
Amendment 70 Issued by NRC	08/15/88 (R70)
Amendment 71 Issued by NRC	08/16/88 (R71)
Amendment 72 Issued by NRC	09/01/88 (R72)
Amendment 73 Issued by NRC	09/09/88 (R73)
Amendment 74 Issued by NRC	09/21/88 (R74)
Amendment 75 Issued by NRC	09/22/88 (R75)
Amendment 76 Issued by NRC	09/22/88 (R76)
Amendment 77 Issued by NRC	10/14/88 (R77)
Amendment 78 Issued by NRC	10/14/88 (R78)
Amendment 79 Issued by NRC	10/14/88 (R79)
Amendment 80 Issued by NRC	11/28/88 (R80)
Amendment 81 Issued by NRC	12/05/88 (R81)
Amendment 82 Issued by NRC	12/29/88 (R82)
Amendment 83 Issued by NRC	12/29/88 (R83)
Amendment 84 Issued by NRC	12/30/88 (R84)
Amendment 85 Issued by NRC	01/22/89 (R85)
Amendment 86 Issued by NRC	01/22/89 (R86)
Amendment 87 Issued by NRC	01/30/89 (R87)
Amendment 88 Issued by NRC	01/30/89 (R88)
Amendment 89 Issued by NRC	01/31/89 (R89)
Amendment 90 Issued by NRC	02/28/89 (R90)
Amendment 91 Issued by NRC	03/02/89 (R91)
Amendment 92 Issued by NRC	03/06/89 (R92)
Amendment 93 Issued by NRC	03/09/89 (R93)
Amendment 94 Issued by NRC	03/09/89 (R94)
Amendment 95 Issued by NRC	03/10/89 (R95)
Amendment 96 Issued by NRC	03/13/89 (R96)
Amendment 97 Issued by NRC	03/15/89 (R97)
Amendment 98 Issued by NRC	03/28/89 (R98)
Amendment 99 Issued by NRC	04/03/89 (R99)
Amendment 100 Issued by NRC	04/03/89 (R100)
Amendment 101 Issued by NRC	04/03/89 (R101)
Amendment 102 Issued by NRC	04/28/89 (R102)
Amendment 103 Issued by NRC	05/04/89 (R103)
Amendment 104 Issued by NRC	05/05/89 (R104)
Amendment 105 Issued by NRC	05/11/89 (R105)
Amendment 106 Issued by NRC	06/01/89 (R106)

AMENDMENT LISTING

Amendments	Date and Revision
Amendment 107 Issued by NRC	06/19/89 (R107)
Amendment 108 Issued by NRC	07/05/89 (R108)
Amendment 109 Issued by NRC	07/05/89 (R109)
Amendment 110 Issued by NRC	07/31/89 (R110)
Amendment 111 Issued by NRC	08/03/89 (R111)
Amendment 112 Issued by NRC	08/11/89 (R112)
Amendment 113 Issued by NRC	08/11/89 (R113)
Amendment 114 Issued by NRC	08/14/89 (R114)
Amendment 115 Issued by NRC	11/01/89 (R115)
Amendment 116 Issued by NRC	11/28/89 (R116)
Amendment 117 Issued by NRC	02/16/90 (R117)
Amendment 118 Issued by NRC	03/02/90 (R118)
Amendment 119 Issued by NRC	03/19/90 (R119)
Amendment 120 Issued by NRC	03/22/90 (R120)
Bases Revision	03/23/90 (BR 1)
Amendment 121 Issued by NRC	04/02/90 (R121)
Amendment 122 Issued by NRC	04/27/90 (R122)
Amendment 123 Issued by NRC	04/27/90 (R123)
Bases Revision	05/01/90 (BR 2)
Amendment 124 Issued by NRC	07/31/90 (R124)
Amendment 125 Issued by NRC	08/01/90 (R125)
Amendment 126 Issued by NRC	08/27/90 (R126)
Amendment 127 Issued by NRC	09/21/90 (R127)
Amendment 128 Issued by NRC	10/01/90 (R128)
Amendment 129 Issued by NRC	10/02/90 (R129)
Amendment 130 Issued by NRC	10/02/90 (R130)
Amendment 131 Issued by NRC	10/29/90 (R131)
Amendment 132 Issued by NRC	10/31/90 (R132)
Amendment 133 Issued by NRC	11/02/90 (R133)
Amendment 134 issued by NRC	11/16/90 (R134)
Amendment 135 issued by NRC	12/07/90 (R135)
Amendment 136 issued by NRC	12/10/90 (R136)
Amendment 137 issued by NRC	12/10/90 (R137)
Amendment 138 issued by NRC	12/17/90 (R138)
Amendment 139 issued by NRC	01/29/91 (R139)
Amendment 140 issued by NRC	03/18/91 (R140)
Amendment 141 issued by NRC	04/24/91 (R141)
Amendment 142 issued by NRC	08/22/91 (R142)
Amendment 143 issued by NRC	09/10/91 (R143)
Amendment 144 issued by NRC	10/18/91 (R144)
Bases Revision	10/25/91 (BR 3)
Amendment 145 issued by NRC	12/16/91 (R145)
Amendment 146 issued by NRC	03/30/92 (R146)

AMENDMENT LISTING

Amendments	Date and Revision
Amendment 147 issued by NRC	03/30/92 (R147)
Amendment 148 issued by NRC	03/31/92 (R148)
Amendment 149 issued by NRC	07/09/92 (R149)
Amendment 150 issued by NRC	07/24/92 (R150)
Amendment 151 issued by NRC	08/10/92 (R151)
Amendment 152 issued by NRC	08/13/92 (R152)
Amendment 153 issued by NRC	09/23/92 (R153)
Amendment 154 issued by NRC	11/06/92 (R154)
Bases Revision	11/25/92 (BR 4)
Amendment 155 issued by NRC	12/08/92 (R155)
Bases Revision	12/08/92 (BR 5)
Amendment 156 Issued by NRC	01/12/93 (R156)
Amendment 157 Issued by NRC	04/28/93 (R157)
Amendment 158 Issued by NRC	06/25/93 (R158)
Amendment 159 Issued by NRC	08/02/93 (R159)
Amendment 160 Issued by NRC	08/27/93 (R160)
Amendment 161 Issued by NRC	10/26/93 (R161)
Amendment 162 Issued by NRC	11/09/93 (R162)
Amendment 163 Issued by NRC	11/26/93 (R163)
Amendment 164 Issued by NRC	11/29/93 (R164)
Amendment 165 Issued by NRC	12/09/93 (R165)
Amendment 166 Issued by NRC	01/03/94 (R166)
Amendment 167 Issued by NRC	02/10/94 (R167)
Amendment 168 Issued by NRC	03/15/94 (R168)
Amendment 169 Issued by NRC	03/31/94 (R169)
Amendment 170 Issued by NRC	03/31/94 (R170)
Amendment 171 Issued by NRC	04/18/94 (R171)
Amendment 172 Issued by NRC	04/18/94 (R172)
Amendment 173 Issued by NRC	05/23/94 (R173)
Amendment 174 Issued by NRC	05/24/94 (R174)
Amendment 175 Issued by NRC	05/27/94 (R175)
Amendment 176 Issued by NRC	07/11/94 (R176)
Amendment 177 Issued by NRC	07/26/94 (R177)
Amendment 178 Issued by NRC	09/13/94 (R178)
Amendment 179 Issued by NRC	10/17/94 (R179)
Amendment 180 Issued by NRC	10/17/94 (R180)
Amendment 181 Issued by NRC	10/20/94 (R181)
Amendment 182 Issued by NRC	11/09/94 (R182)
Amendment 183 Issued by NRC	11/22/94 (R183)
Amendment 184 Issued by NRC	12/27/94 (R184)
Amendment 185 Issued by NRC	01/24/95 (R185)
Amendment 186 Issued by NRC	02/09/95 (R186)

AMENDMENT LISTING

Amendments	Date and Revision
Bases Revision	03/02/95 (BR-6)
Amendment 187 Issued by NRC	04/04/95 (R187)
Amendment 188 Issued by NRC	04/28/95 (R188)
Amendment 189 Issued by NRC	05/10/95 (R189)
Bases Revision	05/25/95 (BR-7)
Amendment 190 Issued by NRC	05/30/95 (R190)
Amendment 191 Issued by NRC	06/01/95 (R191)
Amendment 192 Issued by NRC	06/13/95 (R192)
Amendment 193 Issued by NRC	06/13/95 (R193)
Amendment 194 Issued by NRC	06/14/95 (R194)
Amendment 195 Issued by NRC	06/29/95 (R195)
Amendment 196 Issued by NRC	08/02/95 (R196)
Bases Revision	08/11/95 (BR-8)
Amendment 197Issued by NRC	08/22/95 (R197)
Amendment 198 Issued by NRC	08/22/95 (R198)
Amendment 199 Issued by NRC	09/06/95 (R199)
Amendment 200 Issued by NRC	09/13/95 (R200)
Amendment 201 Issued by NRC	09/15/95 (R201)
Amendment 202 Issued by NRC	10/02/95 (R202)
Amendment 203 Issued by NRC	10/04/95 (R203)
Amendment 204 Issued by NRC	10/30/95 (R204)
Bases Revision	11/17/95 (BR-9)
Amendment 205 Issued by NRC	11/21/95 (R205)
Amendment 206 Issued by NRC	12/11/95 (R206)
Amendment 207 Issued by NRC	02/05/96 (R207)
Amendment 208 Issued by NRC	02/07/96 (R208)
Bases Revision	02/15/96 (BR-10)
Amendment 209 Issued by NRC	03/01/96 (R209)
Amendment 210 Issued by NRC	03/04/96 (R210)
Amendment 211 Issued by NRC	04/03/96 (R211)
Amendment 212 Issued by NRC	04/26/96 (R212)
Bases Revision	09/13/96 (BR-11)
Bases Revision	01/02/97 (BR-12)
Amendment 213 Issued by NRC	04/09/97 (R213)
Amendment 214 Issued by NRC	04/21/97 (R214)
Amendment 215 Issued by NRC	06/10/97 (R215)
Amendment 216 Issued by NRC	07/01/97 (R216)
Amendment 217 Issued by NRC	07/14/97 (R217)
Amendment 218 Issued by NRC	08/12/97 (R218)
Amendment 219 Issued by NRC	09/23/97 (R219)
Amendment 220 Issued by NRC	09/29/97 (R220)
Amendment 221 Issued by NRC	02/20/98 (R221)

AMENDMENT LISTING

Amendments	Date and Revision
Amendment 222 Issued by NRC	06/08/98 (R222)
NRC Order Issued	06/18/98
Amendment 223 Issued by NRC	07/01/98 (R223)
Amendment 224 Issued by NRC	07/22/98 (R224)
Amendment 225 Issued by NRC	08/28/98 (R225)
Bases Revision	09/09/98 (BR-13)
Amendment 226 Issued by NRC	11/17/98 (R226)
Amendment 227 Issued by NRC	11/17/98 (R227)
Amendment 228 Issued by NRC	11/19/98 (R228)
Amendment 229 Issued by NRC	11/19/98 (R229)
Amendment 230 Issued by NRC	12/07/98 (R230)
Amendment 231 Issued by NRC	12/16/98 (R231)
Bases Revision	01/25/99 (BR-14)
Amendment 232 Issued by NRC	02/09/99 (R232)
Amendment 233 Issued by NRC	03/16/99 (R233)
Amendment 234 Issued by NRC	04/12/99 (R234)
Amendment 235 Issued by NRC	05/04/99 (R235)
Amendment 236 Issued by NRC	09/07/99 (R236)
Amendment 237 Issued by NRC	09/23/99 (R237)
Amendment 238 Issued by NRC	10/06/99 (R238)
Amendment 239 Issued by NRC	10/12/99 (R239)
Amendment 240 Issued by NRC	02/11/00 (R240)
Amendment 241 Issued by NRC	02/22/00 (R241)
Amendment 242 Issued by NRC	02/29/00 (R242)
Amendment 243 Issued by NRC	03/08/00 (R243)
Amendment 244 Issued by NRC	03/29/00 (R244)
Amendment 245 Issued by NRC	03/29/00 (R245)
Amendment 246 Issued by NRC	04/14/00 (R246)
Bases Revision	05/25/00 (BR-15)
Bases Revision	05/25/00 (BR-16)
Amendment 247 Issued by NRC	05/31/00 (R247)
Amendment 248 Issued by NRC	07/18/00 (R248)
Amendment 249 Issued by NRC	07/31/00 (R249)
Amendment 250 Issued by NRC	08/04/00 (R250)
Amendment 251 Issued by NRC	08/28/00 (R251)
Amendment 252 Issued by NRC	10/02/00 (R252)
Amendment 253 Issued by NRC	10/06/00 (R253)
Amendment 254 Issued by NRC	11/02/00 (R254)
Amendment 255 Issued by NRC	12/18/00 (R255)
Amendment 256 Issued by NRC	12/19/00 (R256)
Amendment 257 Issued by NRC	02/16/01 (R257)
Amendment 258 Issued by NRC	03/22/01 (R258)

AMENDMENT LISTING

Amendments	Date and Revision
Bases Revision	06/28/01 (BR-17)
Amendment 259 Issued by NRC	07/12/01 (R259)
Bases Revision	07/20/01 (BR-18)
Bases Revision	08/14/01 (BR-19)
Amendment 260 Issued by NRC	10/24/01 (R260)
Amendment 261 Issued by NRC	01/14/02 (R261)
Bases Revision	02/14/02 (BR-20)
Amendment 262 Issued by NRC	02/27/02 (R262)
Amendment 263 Issued by NRC	03/08/02 (R263)
Amendment 264 Issued by NRC	04/30/02 (R264)
Amendment 265 Issued by NRC	05/07/02 (R265)
Amendment 266 Issued by NRC	05/10/02 (R266)
Bases Revision	05/17/02 (BR-21)
Amendment 267 Issued by NRC	05/24/02 (R267)
Amendment 268 Issued by NRC	09/05/02 (R268)
*Amendment 269	
Amendment 270 Issued by NRC	09/30/02 (R270)
Amendment 271 Issued by NRC	02/05/03 (R271)
Amendment 272 Issued by NRC	02/11/03 (R272)
Amendment 273 Issued by NRC	03/26/03 (R273)
Amendment 274 Issued by NRC	05/22/03 (R274)
Amendment 275 Issued by NRC	05/27/03 (R275)
Amendment 276 Issued by NRC	05/29/03 (R276)
Bases Revision	06/26/03 (BR-22)
Amendment 277 Issued by NRC	07/31/03 (R277)
Amendment 278 Issued by NRC	10/28/03 (R278)
*Amendment 279	
Bases Revision	12/22/03 (BR-23)
Bases Revision	04/19/04 (BR-24)

*Amendment will not be implemented into the Technical Specifications

AMENDMENT LISTING

Amendments	Date and Revision
Amendment 280 Issued by NRC	04/21/04 (R280)
Amendment 281 Issued by NRC	06/18/04 (R281)
Amendment 282 Issued by NRC	05/21/04 (R282)
Amendment 283 Issued by NRC	07/08/04 (R283)
Amendment 284 Issued by NRC	09/15/04 (R284)
Amendment 285 Issued by NRC	09/20/04 (R285)
Amendment 286 Issued by NRC	09/20/04 (R286)
Bases Revision	10/13/04 (BR-25)
License Condition Issued by NRC	10/28/04
Amendment 287 Issued by NRC	01/31/05 (R287)
Bases Revision	02/25/05 (BR-26)
Bases Revision	03/04/05 (BR-27)
Amendment 288 Issued by NRC	03/09/05 (R288)
Amendment 289 Issued by NRC	04/05/05 (R289)
Amendment 290 Issued by NRC	04/11/05 (R290)
Amendment 291 Issued by NRC	05/03/05 (R291)
Amendment 292 Issued by NRC	05/24/05 (R292)
Amendment 293 Issued by NRC	08/18/05 (R293)
Amendment 294 Issued by NRC	09/02/05 (R294)
Bases Revision	09/11/03 (BR-28)
Amendment 295 Issued by NRC	12/28/05 (R295)
Amendment 296 Issued by NRC	04/06/06 (R296)
Amendment 297 Issued by NRC	06/16/06 (R297)
Amendment 298 Issued by NRC	08/02/06 (R298)
Amendment 299 Issued by NRC	09/13/06 (R299)
Amendment 300 Issued by NRC	09/14/06 (R300)
Amendment 301 Issued by NRC	10/04/06 (R301)
Amendment 302 Issued by NRC	11/07/06 (R302)
Amendment 303 Issued by NRC	11/16/06 (R303)
Amendment 304 Issued by NRC	12/11/06 (R304)
License Condition Issued by NRC	02/08/07
Bases Revision	03/07/07 (BR-29)
Amendment 305 Issued by NRC	05/22/07 (R305)
EPL Revised	05/22/07
License Condition Issued by NRC	08/09/07 (B.5.b)
Amendment 306 Issued by NRC	09/20/07 (R306)
Amendment 307 Issued by NRC	09/28/07 (R307)
Amendment 308 Issued by NRC	10/11/07 (R308)

AMENDMENT LISTING

Amendments	Date and Revision
Bases Revision	12/12/07 (BR-30)
Amendment 309 Issued by NRC	03/24/08 (R309)
Amendment 310 Issued by NRC	04/02/08 (R310)
Amendment 311 Issued by NRC	04/04/08 (R311)
Amendment 312 Issued by NRC	08/29/08 (R312)
Bases Revision	08/29/08 (BR-31)
Bases Revision	08/28/08 (BR-32)
Amendment 313 Issued by NRC	10/28/08
Amendment 314 Issued by NRC	12/04/08
NRC Order Issued	01/05/09
Amendment 315 Issued by NRC	04/13/09
Amendment 316 Issued by NRC	06/12/09
Bases Revision	06/12/09 (BR-33)
Amendment 317 Issued by NRC	08/14/09
Amendment 318 Issued by NRC	10/19/09
Bases Revision	10/19/09 (BR-34)
NRC Order Issued	12/22/09
Amendment 319 Issued by NRC	01/28/10
Amendment 320 Issued by NRC	02/02/10
Bases Revision	03/25/10 (BR-35)
Bases Revision	05/27/10 (BR-36)
Amendment 321 Issued by NRC	12/21/10
Bases Revision	03/24/12 (BR-38)
Amendment 322 Issued by NRC	07/29/11
Amendment 323 Issued by NRC	07/10/12
Bases Revision	10/05/12 (BR-40)
Amendment 324 Issued by NRC	09/26/12
Bases Revision	10/10/12 (BR-39)
Amendment 325 Issued by NRC	10/31/12
Bases Revision	12/21/12 (BR-41)
Bases Revision	03/05/13 (BR-42)
Bases Revision	01/31/14 (BR-43)
Bases Revision	03/04/14 (BR-44)
Amendment 326 Issued by NRC	09/29/14
Amendment 327 Issued by NRC	09/30/15 (ITS)
Bases Revision	10/23/15 (BR-45)
Bases Revision	10/23/15 (BR-46)
Amendment 328 Issued by NRC	11/30/15
Bases Revision	04/27/16 (BR-47)

AMENDMENT LISTING

Amendments	Date and Revision
Bases Revision	05/24/16 (BR-48)
Bases Revision	07/01/16 (BR-49)
Amendment 329 Issued by NRC	09/29/16
Bases Revision	09/29/16 (BR-51)
Amendment 330 Issued by NRC	10/03/16 (License Only)
Bases Revision	10/07/16 (BR-50)
Bases Revision	11/23/16 (BR-52)
Amendment 331 Issued by NRC	03/27/17
NRC Order Issued	07/27/17
Amendment 332 Issued by NRC	12/22/17
Amendment 333 Issued by NRC	02/02/18
Bases Revision	02/02/18 (BR-53)
Amendment 334 Issued by NRC	02/12/18
Bases Revision	02/12/18 (BR-54)
Bases Revision	02/22/18 (BR-55)
Bases Revision	07/12/18 (BR-56)
Amendment 335 Issued by NRC	08/06/18
Amendment 336 Issued by NRC	08/30/18
Bases Revision	08/30/18 (BR-57)
Bases Revision	02/27/19 (BR-58)
Bases Revision	02/27/19 (BR-59)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.1.4.2

Verifying each control rod is OPERABLE would require that each rod be tripped. However, in MODES 1 and 2, tripping each control rod would result in radial or axial power tilts, or oscillations. Exercising each individual control rod provides increased confidence that all rods continue to be OPERABLE without exceeding the alignment limit, even if they are not regularly tripped. Moving each control rod by greater than or equal to 10 steps in either direction will not cause radial or axial power tilts, or oscillations, to occur.

To ensure minimum $F_{\Delta H}$ peaking factor margins are maintained in accordance with TS 3.2.2 during SR 3.1.4.2 rod testing, margin penalties are typically assigned during the test, as described in the Nuclear Design Report. The minimum predicted $F_{\Delta H}$ future margin, including penalties, should be verified prior to performing the test to ensure adequate margin will be maintained. In the event that a potential negative margin condition exists, compliance with the associated Conditions and Required Actions of TS 3.2.2 should be verified prior to performing rod testing.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

Between required performances of SR 3.1.4.2 (determination of control rod OPERABILITY by movement), if a control rod(s) is discovered to be immovable, but remains trippable, the control rod(s) is considered to be OPERABLE. At any time, if a control rod(s) is immovable, a determination of the trippability (OPERABILITY) of the control rod(s) must be made, and appropriate action taken.

SR 3.1.4.3

Verification of rod drop times allows the operator to determine that the maximum rod drop time permitted is consistent with the assumed rod drop time used in the safety analysis. Measuring rod drop times prior to reactor criticality, after reactor vessel head installation, ensures that the reactor internals and rod drive mechanism will not interfere with rod motion or rod drop time, and that no degradation in these systems has occurred that would adversely affect control rod motion or drop time. This testing is performed with all RCPs operating and the average moderator temperature ≥ 500°F to simulate a reactor trip under actual conditions. Fully withdrawn shall be the condition where shutdown and control banks are at a position within the interval of ≥ 222 and ≤ 231 steps withdrawn, inclusive.

BASES

SURVEILLANCE REQUIREMENTS (continued)

This Surveillance is performed during a plant outage, due to the plant conditions needed to perform the SR and the potential for an unplanned plant transient if the Surveillance were performed with the reactor at power.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 10 and GDC 26.
2. 10 CFR 50.46.
3. UFSAR, Section 15.2.3.
4. UFSAR, Section 15.4.2.
5. UFSAR, Chapter 15.

BASES

LCO

The shutdown banks must be within their insertion limits any time the reactor is critical or approaching criticality. This ensures that a sufficient amount of negative reactivity is available to shut down the reactor and maintain the required SDM following a reactor trip.

The shutdown bank insertion limits are defined in the COLR.

APPLICABILITY

The shutdown banks must be within their insertion limits, with the reactor in MODES 1 and 2. This ensures that a sufficient amount of negative reactivity is available to shut down the reactor and maintain the required SDM following a reactor trip. The shutdown banks do not have to be within their insertion limits in MODE 3, unless an approach to criticality is being made. In MODE 3, 4, 5, or 6, the shutdown banks, except for control rod OPERABILITY testing, are fully inserted in the core and contribute to the SDM. Refer to LCO 3.1.1 for SDM requirements in MODE 2 k_{eff} < 1.0, MODES 3, 4, and 5. LCO 3.9.1, "Boron Concentration," ensures adequate SDM in MODE 6.

The Applicability requirements have been modified by a Note indicating the LCO requirement is suspended during SR 3.1.4.2. This SR verifies the freedom of the rods to move, and requires the shutdown bank to move below the LCO limits, which would normally violate the LCO.

ACTIONS

A.1, A.2, A.3, A.4, A.5, A.6, and A.7

When one shutdown bank is inserted beyond the insertion limit due to performance of trippability testing per SR 3.1.4.2 and is immovable due to a malfunction in the rod control system, 72 hours are provided to restore the shutdown banks to within limits. Additionally, immediate verification is required to prove that the shutdown bank is less than or equal to 18 steps below the insertion limit as measured by the group demand position indicators, the individual control rod alignment limits of LCOs 3.1.4 and 3.1.6 are met, there are no reactor coolant system boron dilution activities, and there are no power level increases taking place. Checks are performed for each reload core to ensure that bank insertions of up to 18 steps will not result in power distributions which violate the DNB criterion for ANS Condition II transients (moderate frequency transients analyzed in Section 15.2 of the UFSAR). Administrative requirements on the initial controlling bank position will ensure that this insertion and an additional controlling bank insertion of five steps or less will not violate the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 during the repair period. If the controlling bank is inserted more than five steps deeper than its initial position, a calculation will be performed to ensure that the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is met. Since no dilution or power level increases are allowed, shutdown margin will be maintained as long as the controlling bank is far enough above its insertion limit to compensate for the inserted worth of the bank that is beyond its insertion limit. Furthermore, a verification of SDM is

BASES

ACTIONS (continued)

required within 12 hours and when the controlling bank is inserted more than 5 steps from the initial position. The requirement to be in compliance with LCOs 3.1.4 and 3.1.6 ensures that the rods are trippable, and power distribution is acceptable during the time allowed to restore the inserted rod. The 12 hour requirement to verify the SDM is within limits ensures the SDM requirements of LCO 3.1.1 are met during the repair period. Furthermore, the requirement to verify the SDM is within limits when a controlling bank is inserted five steps or more also ensures that SDM requirements of LCO 3.1.1 are met during the repair period. If any of these Required Actions are not met, Condition C must be applied.

The Completion Time of 72 hours is based on operating experience and provides an acceptable time for evaluating and repairing problems with the rod control system, while restricting the probability of a more severe (i.e., ANS Condition III or IV) accident or transient condition occurring concurrently with the insertion limit violation.

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

When one or more shutdown banks is not within insertion limits for reasons other than Condition A, 2 hours is allowed to restore the shutdown banks to within the insertion limits. This is necessary because the available SDM may be significantly reduced, with one or more of the shutdown banks not within their insertion limits. Also, verification of SDM or initiation of boration within 1 hour is required, since the SDM in MODES 1 and 2 is ensured by adhering to the control and shutdown bank insertion limits (see LCO 3.1.1). If shutdown banks are not within their insertion limits, then SDM will be verified by performing a reactivity balance calculation, considering the effects listed in the Bases for SR 3.1.1.1.

The allowed Completion Time of 2 hours provides an acceptable time for evaluating and repairing minor problems without allowing the plant to remain in an unacceptable condition for an extended period of time.

C.1

If the Required Action(s) of Condition A or B are not met within the associated Completion Times, the unit must be brought to a MODE where the LCO is not applicable. The allowed Completion Time of 6 hours is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner and without challenging plant systems.

BASES

SURVEILLANCE REQUIREMENTS	SR 3.1.5.1 Verification that the shutdown banks are within their insertion limits prior to an approach to criticality ensures that when the reactor is critical, or being taken critical, the shutdown banks will be available to shut down the reactor, and the required SDM will be maintained following a reactor trip. This SR and Frequency ensure that the shutdown banks are withdrawn before the control banks are withdrawn during a unit startup. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.
REFERENCES	1. 10 CFR 50, Appendix A, GDC 10, GDC 26, and GDC 28. 2. 10 CFR 50.46. 3. UFSAR, Chapter 15.

BASES

ACTIONS

A.1, A.2, A.3, A.4, A.5, A.6, and A.7

When one control bank is inserted beyond the insertion limit due to performance of trippability testing per SR 3.1.4.2 and is immovable due to malfunctions in the rod control system, 72 hours are provided to restore the control banks to within limits. Additionally, immediate verification is required to prove that the control bank is less than or equal to 18 steps below the insertion limit as measured by the group demand position indicators, the individual rod alignment limits of LCOs 3.1.4 and 3.1.5 are met, there are no reactor coolant system boron concentration dilution activities, and there are no power level increases taking place. Checks are performed for each reload core to ensure that bank insertions of up to 18 steps will not result in power distributions which violate the DNB criterion for ANS Condition II transients (moderate frequency transients analyzed in Section 15.2 of the UFSAR). Administrative requirements on the initial controlling bank position will ensure that this insertion and an additional controlling bank insertion of five steps or less will not violate the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 during the repair period. If the controlling bank is inserted more than five steps deeper than its initial position, a calculation will be performed to ensure that the SHUTDOWN MARGIN requirement of Specification 3.1.1.1 is met. Since no dilution or power level increases are allowed, shutdown margin will be maintained as long as the controlling bank is far enough above its insertion limit to compensate for the inserted worth of the bank that is beyond its insertion limit. Furthermore, a verification of SDM is required within 12 hours and when the controlling bank is inserted more than 5 steps from the initial position. The requirement to be in compliance with LCOs 3.1.4 and 3.1.5 ensures that the rods are trippable, and power distribution is acceptable during the time allowed to restore the inserted bank. The 12 hour requirement to verify the SDM is within limits ensures the SDM requirements of LCO 3.1.1 are met during the repair period. Furthermore, the requirement to verify the SDM is within limits when a controlling bank is inserted five steps or more also ensures that SDM requirements of LCO 3.1.1 are met during the repair period. If any of these Required Actions are not met, Condition D must be applied.

The Condition is modified by a Note that specifies it only applies to control banks inserted beyond the insertion limit that are not controlling banks. A controlling bank is defined as a control bank that is less than fully withdrawn as defined in the COLR, with the exception of fully withdrawn banks that have been inserted for the performance of SR 3.1.4.2 (rod freedom of movement Surveillance).

The Completion Time of 72 hours is based on operating experience and provides an acceptable time for evaluating and repairing problems with the rod control system, while restricting the probability of a more severe (i.e., ANS Condition III or IV) accident or transient condition occurring concurrently with the insertion limit violation.

BASES

ACTIONS (continued)

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

When the control banks are outside the acceptable insertion limits, they must be restored to within those limits. This restoration can occur in two ways:

a. Reducing power to be consistent with rod position or

b. Moving rods to be consistent with power.

Also, verification of SDM or initiation of boration to regain SDM is required within 1 hour, since the SDM in MODES 1 and 2 normally ensured by adhering to the control and shutdown bank insertion limits (see LCO 3.1.1, "SHUTDOWN MARGIN (SDM)") has been upset. If control banks are not within their insertion limits, then SDM will be verified by performing a reactivity balance calculation, considering the effects listed in the Bases for SR 3.1.1.1.

Similarly, if the control banks are found to be out of sequence or in the wrong overlap configuration, they must be restored to meet the limits.

Operation beyond the LCO limits is allowed for a short time period in order to take conservative action because the simultaneous occurrence of either a LOCA, loss of flow accident, ejected rod accident, or other accident during this short time period, together with an inadequate power distribution or reactivity capability, has an acceptably low probability.

The allowed Completion Time of 2 hours for restoring the banks to within the insertion, sequence, and overlap limits provides an acceptable time for evaluating and repairing minor problems without allowing the plant to remain in an unacceptable condition for an extended period of time.

D.1

If Required Action(s) of Condition A, B, or C are not met within the associated Completion Times, the plant must be brought to at least MODE 2 with $k_{eff} < 1.0$, where the LCO is not applicable. The allowed Completion Time of 6 hours is reasonable, based on operating experience, for reaching the required MODE from full power conditions in an orderly manner and without challenging plant systems.

BASES

SURVEILLANCE REQUIREMENTS

SR 3.1.6.1

This Surveillance is required to ensure that the reactor does not achieve criticality with the control banks below their insertion limits.

The estimated critical position (ECP) depends upon a number of factors, one of which is xenon concentration. If the ECP was calculated long before criticality, xenon concentration could change to make the ECP substantially in error. Conversely, determining the ECP immediately before criticality could be an unnecessary burden. There are a number of unit parameters requiring operator attention at that point. Performing the ECP calculation within 4 hours prior to criticality avoids a large error from changes in xenon concentration, but allows the operator some flexibility to schedule the ECP calculation with other startup activities.

SR 3.1.6.2

Verification of the control bank insertion limits is sufficient to detect control banks that may be approaching the insertion limits.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.1.6.3

When control banks are maintained within their insertion limits as checked by SR 3.1.6.2 above, it is unlikely that their sequence and overlap will not be in accordance with requirements provided in the COLR.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 10, GDC 26, GDC 28.
2. 10 CFR 50.46.
3. UFSAR, Chapter 15.

BASES

SURVEILLANCE REQUIREMENTS (continued)

For those causes of QPTR that occur quickly (e.g., a dropped rod), there typically are other indications of abnormality that prompt a verification of core power tilt.

SR 3.2.4.2

This Surveillance is modified by a Note, which states that the surveillance is only required to be performed if input to QPTR from one or more Power Range Neutron Flux channels are inoperable with THERMAL POWER > 75% RTP.

With an NIS power range channel inoperable, tilt monitoring for a portion of the reactor core becomes degraded. Large tilts are likely detected with the remaining channels, but the capability for detection of small power tilts in some quadrants is decreased.

With input to QPTR from one or more Power Range Neutron Flux channels inoperable and with THERMAL POWER > 75% RTP, the surveillance is initially performed within 12 hours. Thereafter, the Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

For purposes of monitoring the QPTR when one power range channel is inoperable, the moveable incore detectors are used to confirm that the normalized symmetric power distribution is consistent with the indicated QPTR and any previous data indicating a tilt. The incore detector monitoring is performed with a full incore flux map or two sets of four thimble locations with quarter core symmetry. The two sets of four symmetric thimbles is a set of eight unique detector locations. These locations are C-8, E-5, E-11, H-3, H-13, L-5, L-11, and N-8.

The symmetric thimble flux map can be used to generate symmetric thimble "tilt." This can be compared to a reference symmetric thimble tilt, from the most recent full core flux map, to generate an incore QPTR. Therefore, incore monitoring of QPTR can be used to confirm that QPTR is within limits.

With one NIS channel inoperable, the indicated tilt may be changed from the value indicated with all four channels OPERABLE. To confirm that no change in tilt has actually occurred, which might cause the QPTR limit to be exceeded, the incore result may be compared against previous flux maps either using the symmetric thimbles as described above or a complete flux map. Nominally, quadrant tilt from the Surveillance should be within 2% of the tilt shown by the most recent flux map data.

BASES

ACTIONS (continued)

D.1 and D.2

Condition D applies to the Power Range Neutron Flux - High Function.

The NIS power range detectors provide input to the Rod Control System and therefore, have a two-out-of-four trip logic. A known inoperable channel must be placed in the tripped condition. This results in a partial trip condition requiring only one-out-of-three logic for actuation. The 72 hours allowed by Required Action D.1 to place the inoperable channel in the tripped condition is justified in WCAP-14333-P-A (Ref. 8).

If Required Action D.1 cannot be met within the specified Completion Time, the plant must be placed in a MODE where this Function is no longer required OPERABLE. Seventy-eight hours are allowed to place the plant in MODE 3. The 78 hour Completion Time includes 6 hours for the MODE reduction as required by Required Action D.2. This is a reasonable time, based on operating experience, to reach MODE 3 from full power in an orderly manner and without challenging plant systems.

The Required Actions have been modified by two Notes. Note 1 allows the inoperable channel to be placed in the bypassed condition for up to 12 hours while performing routine surveillance testing of other channels. With one channel inoperable, the Note also allows routine surveillance testing of another channel with the inoperable channel in bypass. The Note also allows placing the inoperable channel in the bypass condition to allow setpoint adjustments of other channels when required to reduce the Power Range Neutron Flux-High setpoint in accordance with other Technical Specifications. The 12 hour time limit is justified in Reference 8.

Note 2 states to perform SR 3.2.4.2 if input to QPTR from one or more Power Range Neutron Flux channels are inoperable with THERMAL POWER > 75% RTP.

BASES

ACTIONS (continued)

E.1 and E.2

Condition E applies to the following reactor trip Functions:

- Power Range Neutron Flux - Low,
- Overtemperature ΔT,
- Overpower ΔT,
- Power Range Neutron Flux - High Positive Rate,
- Power Range Neutron Flux - High Negative Rate, and
- Pressurizer Pressure - High.

A known inoperable channel must be placed in the tripped condition within 72 hours. Placing the channel in the tripped condition results in a partial trip condition requiring only one-out-of-two logic for actuation of the two-out-of-three trips and one-out-of-three logic for actuation of the two-out-of-four trips. The 72 hours allowed to place the inoperable channel in the tripped condition is justified in Reference 8.

If the inoperable channel cannot be placed in the trip condition within the specified Completion Time, the unit must be placed in a MODE where these Functions are not required OPERABLE. An additional 6 hours is allowed to place the unit in MODE 3. Six hours is a reasonable time, based on operating experience, to place the unit in MODE 3 from full power in an orderly manner and without challenging unit systems.

The Required Actions have been modified by a Note that allows placing the inoperable channel in the bypassed condition for up to 12 hours while performing routine surveillance testing of the other channels. The 12 hour time limit is justified in Reference 8.

BASES

LCO (continued)

13. Containment Water Level (Wide Range)

Containment Water Level (Wide Range) is provided to verify water source for recirculation mode cooling, determine whether high energy line rupture has occurred inside or outside containment, and determine potential for containment breach caused by very high water levels.

The channels provide indication over a range of 0% to 100%. There are a total of two Containment Water Level (Wide Range) channels. The instrument loops associated with Containment Water Level (Wide Range) are 63-178 and 63-179.

14. Incore Thermocouples

Incore thermocouples are provided to verify that the core is being adequately cooled, verify that RCS remains subcooled, and for monitoring the potential for fuel clad breach.

The channels provide indication over a range of 0°F to 2300°F. There are a total of 65 Incore Thermocouples. Each channel consists of one incore thermocouple. The minimum number of channels required is two channels per quadrant, eight per core, one/core quadrant/train. The two required channels in each quadrant shall be in different trains.

15. Reactor Vessel Level Instrumentation

Reactor Vessel Level indication is provided for determination of core cooling. It is considered to be a more direct and less ambiguous indication of core cooling.

The channels provide indication over a range of 0% to 120% (dynamic range), 0% to 70% (lower range), and 64% to 120% (upper range). There are a total of six Reactor Vessel Level Instrument channels. The instrument loops associated with Reactor Vessel Level Dynamic Range are 68-367 and 68-370. The instrument loops associated with Reactor Vessel Level Lower Range are 68-368 and 68-371. The instrument loops associated with Reactor Vessel Level Upper Range are 68-369 and 68-372.

BASES

ACTIONS (continued)

DG will not result in a complete loss of safety function of critical redundant required features. These features are powered from the redundant AC electrical power train. This includes motor driven auxiliary feedwater pumps. However, due to flow requirements of accident scenarios such as Feedwater Line Break (FWLB) and Small Break Loss of Coolant Accident (SBLOCA), the Turbine Driven Auxiliary Feedwater Pump should also be considered a required redundant feature.

The Completion Time for Required Action A.2 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

a. 6.9 kV Shutdown Board 2A-A or 2B-B has no offsite power supplying it loads and

b. A required feature on the other train is inoperable.

If at any time during the existence of Condition A a redundant required feature subsequently becomes inoperable, this Completion Time begins to be tracked.

Discovering no offsite power to a Unit 2 6.9 kV Shutdown Board coincident with one or more inoperable required support or supported features, or both, that are associated with the other train that has offsite power, results in starting the Completion Times for the Required Action. Twenty-four hours is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

The remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to the onsite Class 1E Distribution System. The 24 hour Completion Time takes into account the component OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 24 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

BASES

ACTIONS (continued)

A.3

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition A for a period that should not exceed 72 hours. With one offsite circuit inoperable, the reliability of the offsite system is degraded, and the potential for a loss of offsite power is increased, with attendant potential for a challenge to the unit safety systems. In this Condition, however, the remaining OPERABLE offsite circuit and DGs are adequate to supply electrical power to the onsite Class 1E AC Electrical Power Distribution System.

The 72 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

B.1

To ensure a highly reliable power source remains with one or more Train A DGs, or one or more Train B DGs inoperable, it is necessary to verify the availability of the offsite circuits on a more frequent basis. Since the Required Action only specifies "perform," a failure of SR 3.8.1.1 acceptance criteria does not result in a Required Action being not met. However, if a circuit fails to pass SR 3.8.1.1, it is inoperable. Upon offsite circuit inoperability, additional Conditions and Required Actions must then be entered.

B.2

Required Action B.2 is intended to provide assurance that a loss of offsite power, during the period that a DG(s) is inoperable, does not result in a complete loss of safety function of critical systems. These features are designed with redundant safety related trains. This includes motor driven auxiliary feedwater pumps. However, due to flow requirements of accident scenarios such as Feedwater Line Break (FWLB) and Small Break Loss of Coolant Accident (SBLOCA), the Turbine Driven Auxiliary Feedwater Pump should also be considered a required redundant feature. Redundant required feature failures consist of inoperable features associated with a train, redundant to the train that has an inoperable DG(s).

The Completion Time for Required Action B.2 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero"

BASES

ACTIONS (continued)

for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

a. An inoperable DG exists and

b. A required feature on the other train is inoperable.

If at any time during the existence of this Condition (one or more DGs in a train inoperable) a required feature subsequently becomes inoperable, this Completion Time would begin to be tracked.

Discovering one or more DGs in a train inoperable coincident with one or more inoperable required support or supported features, or both, that are associated with the OPERABLE DG, results in starting the Completion Time for the Required Action. Four hours from the discovery of these events existing concurrently is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

In this Condition, the remaining OPERABLE DGs and offsite circuits are adequate to supply electrical power to the onsite Class 1E AC Electrical Power Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not been lost. The 4 hour Completion Time takes into account the OPERABILITY of the redundant counterpart to the inoperable required feature. Additionally, the 4 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

B.3.1 and B.3.2

Required Action B.3.1 provides an allowance to avoid unnecessary testing of OPERABLE DG(s). If it can be determined that the cause of the inoperable DG does not exist on the OPERABLE DG, SR 3.8.1.2 does not have to be performed. If the cause of inoperability exists on other DGs, the other DGs would be declared inoperable upon discovery and Condition F of LCO 3.8.1 would be entered if one or more DG(s) in Train A and Train B are inoperable. Once the failure is repaired, the common cause failure no longer exists, and Required Action B.3.1 is satisfied. If the cause of the initial inoperable DG cannot be confirmed not to exist on the remaining DGs, performance of SR 3.8.1.2 suffices to provide assurance of continued OPERABILITY of that DG.

BASES

ACTIONS (continued)

In the event the inoperable DG(s) is restored to OPERABLE status prior to completing either B.3.1 or B.3.2, the corrective action program will continue to evaluate the common cause possibility. This continued evaluation, however, is no longer under the 24 hour constraint imposed while in Condition B.

According to Generic Letter 84-15 (Ref. 7), 24 hours is reasonable to confirm that the OPERABLE DG(s) is not affected by the same problem as the inoperable DG.

B.4

In Condition B, the remaining OPERABLE DG(s) and offsite circuits are adequate to supply electrical power to the onsite Class 1E AC Electrical Power Distribution System. The 7 day Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

C.1, C.2, and C.3

Condition C is entered for an offsite circuit inoperable solely due to an inoperable power source to 6.9 kV Shutdown Board 1A-A or 1B-B. Required Action C.1 verifies the OPERABILITY of the remaining offsite circuit within an hour of the inoperability and every 8 hours thereafter. Since the Required Action only specifies "perform," a failure of the SR 3.8.1.1 acceptance criteria does not result in a Required Action not met.

The Completion Time for Required Action C.2 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action, the Completion Time only begins on discovery that both:

a. 6.9 kV Shutdown Board 1A-A or 1B-B has no offsite power; and

b. A required feature on the other train is inoperable.

BASES

ACTIONS (continued)

If at any time during the existence of Condition C a redundant required feature subsequently becomes inoperable, this Completion Time begins to be tracked.

A Completion Time of 24 hours is acceptable, because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown. The remaining OPERABLE offsite circuit and DGs are adequate to support these functions. The Completion Time takes into account the component OPERABILITY of the remaining redundant feature(s), a reasonable time for repairs, and the low probability of a DBA occurring during this period.

Operation may continue in Condition C for a period of 7 days. With one offsite circuit inoperable, the reliability of the functions is degraded. The potential for the loss of offsite power to the redundant feature(s) is increased, with the attendant potential for a challenge to their safety functions.

The required offsite circuit must be returned to OPERABLE status within 7 days. The 7 days Completion Time takes into account the capacity and capability of the remaining AC sources providing electrical power to the required feature(s), a reasonable time for repairs and the low probability of a DBA occurring during this period of time.

D.1 and D.2

Required Action D.1, which applies when two offsite circuits are inoperable, is intended to provide assurance that an event with a coincident single failure will not result in a complete loss of redundant required safety functions. The Completion Time for this failure of redundant required features is reduced to 12 hours from that allowed for one train without offsite power (Required Action A.2). The rationale for the reduction to 12 hours is that Regulatory Guide 1.93 (Ref. 6) allows a Completion Time of 24 hours for two required offsite circuits inoperable, based upon the assumption that two complete safety trains are OPERABLE. When a concurrent redundant required feature failure exists, this assumption is not the case, and a shorter Completion Time of 12 hours is appropriate. These features are powered from redundant AC safety trains. This includes motor driven auxiliary feedwater pumps. Single train features, such as turbine driven auxiliary pumps, are not included in the list.

BASES

ACTIONS (continued)

The Completion Time for Required Action D.1 is intended to allow the operator time to evaluate and repair any discovered inoperabilities. This Completion Time also allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." In this Required Action the Completion Time only begins on discovery that both:

a. All required offsite circuits are inoperable and

b. A required feature is inoperable.

If at any time during the existence of Condition D (two offsite circuits inoperable) a required feature becomes inoperable, this Completion Time begins to be tracked.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition D for a period that should not exceed 24 hours. This level of degradation means that the offsite electrical power system does not have the capability to effect a safe shutdown and to mitigate the effects of an accident; however, the onsite AC sources have not been degraded. This level of degradation generally corresponds to a total loss of the immediately accessible offsite power sources.

Because of the normally high availability of the offsite sources, this level of degradation may appear to be more severe than other combinations of two AC sources inoperable that involve one or more DGs inoperable. However, two factors tend to decrease the severity of this level of degradation:

a. The configuration of the redundant AC electrical power system that remains available is not susceptible to a single bus or switching failure and

b. The time required to detect and restore an unavailable offsite power source is generally much less than that required to detect and restore an unavailable onsite AC source.

BASES

ACTIONS (continued)

With both offsite circuits inoperable, sufficient onsite AC sources are available to maintain the unit in a safe shutdown condition in the event of a DBA or transient. In fact, a simultaneous loss of offsite AC sources, a LOCA, and a worst case single failure were postulated as a part of the design basis in the safety analysis. Thus, the 24 hour Completion Time provides a period of time to effect restoration of one of the offsite circuits commensurate with the importance of maintaining an AC electrical power system capable of meeting its design criteria.

According to Reference 6, with the available offsite AC sources, two less than required by the LCO, operation may continue for 24 hours. If two offsite sources are restored within 24 hours, unrestricted operation may continue. If only one offsite source is restored within 24 hours, power operation continues in accordance with Condition A or Condition C, as applicable.

E.1 and E.2

According to Regulatory Guide 1.93 (Ref. 6), operation may continue in Condition E for a period that should not exceed 12 hours.

In Condition E, individual redundancy is lost in both the offsite electrical power system and the onsite AC electrical power system. Since power system redundancy is provided by two diverse sources of power, however, the reliability of the power systems in this Condition may appear higher than that in Condition D (loss of both offsite circuits). This difference in reliability is offset by the susceptibility of this power system configuration to a single bus or switching failure. The 12 hour Completion Time takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

BASES

ACTIONS (continued)

F.1

With one or more Train A DG(s) and one or more Train B DG(s) inoperable, there are insufficient standby AC sources available to power an entire load group. Thus, with an assumed loss of offsite electrical power, insufficient standby AC sources are available to power the minimum required ESF functions. Since the offsite electrical power system is the only source of AC power for this level of degradation, the risk associated with continued operation for a very short time could be less than that associated with an immediate controlled shutdown (the immediate shutdown could cause grid instability, which could result in a total loss of AC power). Since any inadvertent generator trip could also result in a total loss of offsite AC power, however, the time allowed for continued operation is severely restricted. The intent here is to avoid the risk associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

In this Condition, operation may continue for a period that should not exceed 2 hours, consistent with the guidance provided in Reference 6.

G.1 and G.2

If the inoperable AC electric power sources cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

H.1 and I.1

Conditions H and I correspond to a level of degradation in which redundancy in the AC electrical power supplies cannot be assured. At this severely degraded level, any further losses in the AC electrical power system will cause a loss of function. Therefore, no additional time is justified for continued operation. The unit is required by LCO 3.0.3 to commence a controlled shutdown.

BASES

SURVEILLANCE REQUIREMENTS

The AC sources are designed to permit inspection and testing of all important areas and features, especially those that have a standby function, in accordance with 10 CFR 50, Appendix A, GDC 18 (Ref. 8). Periodic component tests are supplemented by extensive functional tests during refueling outages (under simulated accident conditions). The SRs for demonstrating the OPERABILITY of the DGs are in accordance with the recommendations of Regulatory Guide 1.9 (Ref. 3) and Regulatory Guide 1.108 (Ref. 9).

Where the SRs discussed herein specify voltage and frequency tolerances, the following is applicable. The minimum steady state output voltage of 6210 V is 90% of the nominal 6900 V output voltage. This value, which is specified in ANSI C84.1 (Ref. 10), allows for voltage drop to the terminals of 6600 V motors whose minimum operating voltage is specified as 90% or 5940 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 7260 V is equal to the maximum operating voltage specified for 6600 V motors. It ensures that for a lightly loaded distribution system, the voltage at the terminals of 6600 V motors is no more than the maximum rated operating voltages. The steady state minimum and maximum frequency values are 59.8 Hz and 60.2 Hz, which are consistent with the recommendations in Regulatory Guide 1.9 (Ref. 3). These values ensure that the safety related plant equipment powered from the DGs is capable of performing its safety functions.

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 Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.2 and SR 3.8.1.7

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 1 for SR 3.8.1.2 and Note for SR 3.8.1.7) 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 3.8.1.7 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, the manufacturer recommends 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 2.

SR 3.8.1.7 requires that 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 UFSAR, Chapter 15 (Ref. 5).

The 10 second start requirement is not applicable to SR 3.8.1.2 (see Note 2) when a modified start procedure as described above is used. During this testing, the diesel is not in an accident mode and the frequency is controlled by the operator instead of the governor's accident speed reference. If a modified start is not used, the 10 second start requirement of SR 3.8.1.7 applies.

Since SR 3.8.1.7 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.

In addition to the SR requirements, the time for the DG to reach steady state operation, unless the modified DG start method is employed, is periodically monitored and the trend evaluated to identify degradation of governor and voltage regulator performance.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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, 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 has an allowable power factor rating between 0.8 lagging and 1.0. The 0.8 value is the design rating of the machine, while the 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.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

This SR is modified by four Notes. Note 1 indicates 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 states that momentary transients, because of changing board 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 engine-mounted "day" 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 Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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 engine-mounted “day” tank 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 Frequency is controlled under the Surveillance Frequency Control Program.

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

This Surveillance demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from the storage system to the engine-mounted “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 Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.8.1.7

See SR 3.8.1.2.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.8

Transfer of the power supply to each 6.9 kV Unit Board from the normal supply to the alternate supply demonstrates the OPERABILITY of the alternate supply to power the shutdown loads. This SR is modified by two Notes.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

This SR is modified by two Notes. The reason for Note 1 is that, during operation with the reactor critical, performance of this SR for the 2A, 2B, 2C, and 2D Unit Boards could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems. This restriction from normally performing the Surveillance in MODE 1 or 2 is further amplified to allow the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g., post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed Surveillance, a successful Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when the Surveillance is performed in MODE 1 or 2. Risk insights or deterministic methods may be used for this assessment. Credit may be taken for unplanned events that satisfy this SR.

Note 2 specifies that transfer capability is only required to be met for 6.9 kV Unit Boards that require normal and alternate power supplies. When both load groups are being supplied power by the USSTs, only the 6.9 kV Unit Boards associated with one load group are required to have normal and alternate power supplies. Therefore, only one CSST is required to be OPERABLE and available as an alternate power supply. Manual transfers between the normal supply and the alternate supply are also required to meet the SR. However, delayed access to an offsite circuit is not credited in the accident analysis.

BASES

SURVEILLANCE REQUIREMENTS (continued)

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 (600 kW) without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. 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 board, or

b. Tripping its associated single largest post-accident load with the DG solely supplying the board.

Consistent with Regulatory Guide 1.9 (Ref. 3), 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 and voltage 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 maximum transient 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 Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

This SR is modified by a Note. The Note ensures that the DG is tested under load conditions that are as close to design basis conditions as possible. When synchronized with offsite power, testing should be performed at a power factor of ≤ 0.89. This power factor is representative of the actual inductive loading a DG would see under design basis accident conditions. Under certain conditions, however, the Note allows the Surveillance to be conducted at a power factor other than ≤ 0.89. These conditions occur when grid voltage is high, and the additional field excitation needed to get the power factor to ≤ 0.89 results in voltages on the emergency boards that are too high.

BASES

SURVEILLANCE REQUIREMENTS (continued)

Under these conditions, the power factor should be maintained as close as practicable to 0.89 while still maintaining acceptable voltage limits on the emergency boards. In other circumstances, the grid voltage may be such that the DG excitation levels needed to obtain a power factor of 0.89 may not cause unacceptable voltages on the emergency boards, but the excitation levels are in excess of those recommended for the DG. In such cases, the power factor shall be maintained as close as practicable to 0.89 without exceeding the DG excitation limits.

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 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 board if the trip initiator can be corrected or isolated.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

This SR has been modified by a Note. The Note ensures that the DG is tested under load conditions that are as close to design basis conditions as possible. When synchronized with offsite power, testing should be performed at a power factor of ≤ 0.89. This power factor is representative of the actual inductive loading a DG would see under design basis accident conditions. Under certain conditions, however, the Note allows the Surveillance to be conducted at a power factor other than ≤ 0.89. These conditions occur when grid voltage is high, and the additional field excitation needed to get the power factor to ≤ 0.89 results in voltages on the emergency boards that are too high. Under these conditions, the power factor should be maintained as close as practicable to 0.89 while still maintaining acceptable voltage limits on the emergency boards. In other circumstances, the grid voltage may be such that the DG excitation levels needed to obtain a power factor of 0.89 may not cause unacceptable voltages on the emergency boards, but the excitation levels are in excess of those recommended for the DG. In such cases, the power factor shall be maintained as close as practicable to 0.89 without exceeding the DG excitation limits.

SURVEILLANCE REQUIREMENTS (continued)

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 encountered from the loss of offsite power, including shedding of the nonessential loads and energization of the emergency boards 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 Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

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. This restriction from normally performing the Surveillance for DGs 2A-A and 2B-B in MODE 1 or 2 is further amplified to allow portions of the Surveillance to be performed for the purpose of

BASES

SURVEILLANCE REQUIREMENTS (continued)

reestablishing OPERABILITY (e.g., post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed partial Surveillance, a successful partial Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the partial Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when portions of the Surveillance are performed in MODE 1 or 2. Risk insights or deterministic methods may be used for the assessment. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.12

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 ≥ 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 Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (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. This restriction from normally performing the Surveillance for DGs 2A-A and 2B-B in MODE 1 or 2 is further amplified to allow portions of the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g., post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed partial Surveillance, a successful partial Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the partial Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when portions of the Surveillance are performed in MODE 1 or 2. Risk insights or deterministic methods may be used for the assessment. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.13

This Surveillance demonstrates that DG noncritical protective functions (e.g., high jacket water temperature) are bypassed on a loss of voltage signal, an ESF actuation test signal, or both. Noncritical automatic trips are all automatic trips except:

a. Engine overspeed; and

b. Generator differential current.

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.

BASES

SURVEILLANCE REQUIREMENTS (continued)

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

The SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required DG from service. This restriction from normally performing the Surveillance for DGs 2A-A and 2B-B in MODE 1 or 2 is further amplified to allow the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g., post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed Surveillance, a successful Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when the Surveillance is performed in MODE 1 or 2. Risk insights or deterministic methods may be used for this assessment. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.14

Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(3), requires demonstration that the DGs can start and run continuously at full load capability for an interval of not less than 24 hours, ≥ 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.

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 Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (continued)

This Surveillance is modified by two Notes. Note 1 states that momentary transients due to changing board loads do not invalidate this test. Similarly, momentary power factor transients above the power factor limit will not invalidate the test. Note 2 ensures that the DG is tested under load conditions that are as close to design basis conditions as possible. When synchronized with offsite power, testing should be performed at a power factor of ≤ 0.89. This power factor is representative of the actual inductive loading a DG would see under design basis accident conditions. Under certain conditions, however, Note 2 allows the Surveillance to be conducted at a power factor other than ≤ 0.89. These conditions occur when grid voltage is high, and the additional field excitation needed to get the power factor to ≤ 0.89 results in voltages on the emergency boards that are too high. Under these conditions, the power factor should be maintained as close as practicable to 0.89 while still maintaining acceptable voltage limits on the emergency boards. In other circumstances, the grid voltage may be such that the DG excitation levels needed to obtain a power factor of 0.89 may not cause unacceptable voltages on the emergency boards, but the excitation levels are in excess of those recommended for the DG. In such cases, the power factor shall be maintained close as practicable to 0.89 without exceeding the DG excitation limits.

SR 3.8.1.15

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 Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

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 board 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.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.16

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 board undervoltage, and the load sequence timers are reset.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

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. This restriction from normally performing the Surveillance for DGs 2A-A and 2B-B in MODE 1 or 2 is further amplified to allow the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g., post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed Surveillance, a successful Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when the Surveillance is performed in MODE 1 or 2. Risk insights or deterministic methods may be used for this assessment. Credit may be taken for unplanned events that satisfy this SR.

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.17

Under accident and loss of offsite power conditions loads are sequentially connected to the board by the load sequence timers. 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 5% 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 Shutdown Boards.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.8.1.18

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 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 Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

BASES

SURVEILLANCE REQUIREMENTS (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 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. This restriction from normally performing the Surveillance for DGs 2A-A and 2B-B in MODE 1 or 2 is further amplified to allow portions of the Surveillance to be performed for the purpose of reestablishing OPERABILITY (e.g., post work testing following corrective maintenance, corrective modification, deficient or incomplete surveillance testing, and other unanticipated OPERABILITY concerns) provided an assessment determines plant safety is maintained or enhanced. This assessment shall, as a minimum, consider the potential outcomes and transients associated with a failed partial Surveillance, a successful partial Surveillance, and a perturbation of the offsite or onsite system when they are tied together or operated independently for the partial Surveillance; as well as the operator procedures available to cope with these outcomes. These shall be measured against the avoided risk of a plant shutdown and startup to determine that plant safety is maintained or enhanced when portions of the Surveillance are performed in MODE 1 or 2. Risk insights or deterministic methods may be used for the assessment. Credit may be taken for unplanned events that satisfy this SR.

SR 3.8.1.19

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 Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

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.

BASES

REFERENCES

1. 10 CFR 50, Appendix A, GDC 17.
2. UFSAR, Chapter 8.
3. Regulatory Guide 1.9, Rev. 0.
4. UFSAR, Chapter 6.
5. UFSAR, Chapter 15.
6. Regulatory Guide 1.93, Rev. 0, December 1974.
7. Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability," July 2, 1984.
8. 10 CFR 50, Appendix A, GDC 18.
9. Regulatory Guide 1.108, Rev. 1, August 1977.
10. ANSI C84.1, Voltage Ratings for Electric Power Systems and Equipment (60 Hz).
11. UFSAR Chapter 10.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.9 Distribution Systems - Operating

BASES

BACKGROUND

The two units share several structures and systems including the preferred and emergency (standby) electric power systems (UFSAR, Chapter 8.0). The vital DC Power System is shared to the extent that a few loads (e.g., the vital inverters) in one nuclear unit are energized by the DC power channels assigned primarily to power loads of the other unit. In no case does the sharing inhibit the safe shutdown of one unit while the other unit is experiencing an accident. The Standby Power System serving each unit is divided into two redundant load groups (power trains). These power trains (Train A and Train B for each unit) supply power to safety-related equipment. Generally, the Engineered Safety Feature (ESF) loads assigned to a unit are supplied by the unit designated trains. For example, Safety Injection (SI) pump 1A-A (associated with Unit 1) is supplied by Shutdown Board 1A-A (also associated with Unit 1) while SI pump 2A-A (associated with Unit 2) is supplied by Shutdown Board 2A-A (also associated with Unit 2).

Separate and similar systems and equipment are provided for each unit when required. In certain instances, both units share systems or some components of a system. Shared systems are the exception to the unit/power system association. Because both units share the power system, one unit's power system(s) supports certain components required by the other unit (e.g., emergency gas treatment system).

The onsite Class 1E AC, vital DC, DG DC, and AC vital instrument electrical power distribution systems are divided into two redundant and independent trains. Each electrical power distribution train consists of:

a. an AC electrical power distribution subsystem,

b. an AC vital instrument power distribution subsystem,

c. a vital DC electrical power distribution subsystem, and

d. a diesel generator (DG) DC electrical power distribution subsystem.

Each AC electrical power subsystem consists of two 6.9 kV Shutdown Boards and four 480 V Shutdown Boards. Each train of 6.9 kV Shutdown Boards has two separate and independent offsite sources of power as well as a dedicated onsite diesel generator (DG) source for each 6.9 kV Shutdown Board. Each 6.9 kV Shutdown Board is normally connected to a preferred offsite source. If the offsite sources are unavailable, the onsite emergency DGs supply power to the affected 6.9 kV Shutdown Boards.