Duke Energy
Carolinas

JAMES R. MORRIS, VICE PRESIDENT

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March 24, 2011

U.S. Nuclear Regulatory Commission
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Subject: Duke Energy Carolinas, LLC
Catawba Nuclear Station, Units 1 and 2
Docket Nos. 50-413 and 50-414
Technical Specification Bases Changes

Pursuant to 10CFR 50.4, please find attached changes to the Catawba Nuclear Station Technical Specification Bases. These Bases changes were made according to the provisions of 10CFR 50.59.

Any questions regarding this information should be directed to L. J. Rudy, Regulatory Compliance, at (803)701-3084.

I certify that I am a duly authorized officer of Duke Energy Corporation and that the information contained herein accurately represents changes made to the Technical Specification Bases since the previous submittal.

James R. Morris

Attachment

A001
NRR

xc: V. M. McCree, Regional Administrator
U. S. Nuclear Regulatory Commission
Region II
Marquis One Tower
245 Peachtree Center Ave., NE Suite 1200
Atlanta, GA 30303-1257

J. H. Thompson
NRC Project Manager (CNS)
U.S. Nuclear Regulatory Commission
One White Flint North, Mail Stop 8-G9A
11555 Rockville Pike
Rockville, MD 20852-2738

G. A. Hutto, Senior Resident Inspector
Catawba Nuclear Station

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B 3.1.7-3	Revision 2	1/08/04
B 3.1.7-4	Revision 2	1/08/04
B 3.1.7-5	Revision 2	1/08/04
B 3.1.7-6	Revision 2	1/08/04
B 3.1.8-1	Revision 0	9/30/98
B 3.1.8-2	Revision 0	9/30/98
B 3.1.8-3	Revision 0	9/30/98
B 3.1.8-4	Revision 1	10/06/05
B 3.1.8-5	Revision 0	9/30/98
B 3.1.8-6	Revision 0	9/30/98
B 3.2.1-1	Revision 0	9/30/98
B 3.2.1-2	Revision 1	10/02/00
B 3.2.1-3	Revision 1	10/06/05
B 3.2.1-4	Revision 1	10/06/05
B 3.2.1-5	Revision 1	10/02/00
B 3.2.1-6	Revision 0	9/30/98
B 3.2.1-7	Revision 0	9/30/98
B 3.2.1-8	Revision 0	9/30/98
B 3.2.1-9	Revision 0	9/30/98
B 3.2.1-10	Revision 0	9/30/98
B 3.2.1-11	Revision 3	10/01/02
B 3.2.2-1	Revision 1	3/01/00
B 3.2.2-2	Revision 2	10/02/00
B 3.2.2-3	Revision 1	3/01/00
B 3.2.2-4	Revision 1	3/01/00
B 3.2.2-5	Revision 1	3/01/00
B 3.2.2-6	Revision 1	3/01/00

B 3.2.2-7	Revision 1	3/01/00
B 3.2.2-8	Revision 1	3/01/00
B 3.2.2-9	Revision 2	3/01/00
B 3.2.2-10	Revision 1	3/01/00
B 3.2.3-1	Revision 0	9/30/98
B 3.2.3-2	Revision 0	9/30/98
B 3.2.3-3	Revision 0	9/30/98
B 3.2.3-4	Revision 1	10/01/02
B 3.2.4-1	Revision 1	10/02/00
B 3.2.4-2	Revision 1	2/26/99
B 3.2.4-3	Revision 0	9/30/98
B 3.2.4-4	Revision 0	9/30/98
B 3.2.4-5	Revision 1	2/26/99
B 3.2.4-6	Revision 1	11/5/03
B 3.2.4-7	Revision 1	11/5/03
B 3.3.1-1 thru B.3.3.1-55	Revision 4	8/2/10
B 3.3.2-1	Revision 0	9/30/98
B 3.3.2-2	Revision 1	8/13/99
B 3.3.2-3	Revision 1	8/13/99
B 3.3.2-4	Revision 0	9/30/98
B 3.3.2-5	Revision 0	9/30/98
B 3.3.2-6	Revision 0	9/30/98
B 3.3.2-7	Revision 0	9/30/98
B 3.3.2-8	Revision 0	9/30/98
B 3.3.2-9	Revision 0	9/30/98
B 3.3.2-10	Revision 0	9/30/98
B 3.3.2-11	Revision 0	9/30/98
B 3.3.2-12	Revision 0	9/30/98
B 3.3.2-13	Revision 0	9/30/98
B 3.3.2-14	Revision 1	2/26/99
B 3.3.2-15	Revision 0	9/30/98

B 3.3.2-16	Revision 0	9/30/98
B 3.3.2-17	Revision 0	9/30/98
B 3.3.2-18	Revision 1	11/5/03
B 3.3.2-19	Revision 2	11/5/03
B 3.3.2-20	Revision 2	11/5/03
B 3.3.2-21	Revision 2	11/5/03
B 3.3.2-22	Revision 2	11/5/03
B 3.3.2-23	Revision 3	4/2/09
B 3.3.2-24	Revision 2	4/2/09
B 3.3.2-25	Revision 2	4/2/09
B 3.3.2-26	Revision 2	4/2/09
B 3.3.2-27	Revision 2	4/2/09
B 3.3.2-28	Revision 1	9/10/03
B 3.3.2-29	Revision 1	9/10/03
B 3.3.2-30	Revision 2	5/12/04
B 3.3.2-31	Revision 2	10/10/06
B 3.3.2-32	Revision 2	10/10/06
B 3.3.2-33	Revision 3	2/17/09
B 3.3.2-34	Revision 2	2/17/09
B 3.3.2-35	Revision 2	2/17/09
B 3.3.2-36	Revision 2	10/10/06
B 3.3.2-37	Revision 3	2/17/09
B 3.3.2-38	Revision 3	2/17/09
B 3.3.2-39	Revision 3	2/17/09
B 3.3.2-40	Revision 5	4/2/09
B 3.3.2-41	Revision 7	6/8/09
B 3.3.2-42	Revision 5	2/17/09
B 3.3.2-43	Revision 2	2/17/09
B 3.3.2-44	Revision 2	2/17/09
B 3.3.2-45	Revision 3	2/17/09
B 3.3.2-46	Revision 3	2/17/09
B 3.3.2-47	Revision 4	2/17/09

B 3.3.2-48	Revision 3	2/17/09
B 3.3.2-49	Revision 3	4/2/09
B 3.3.2-50	Revision 0	2/17/09
B 3.3.2-1 thru B 3.3.2.50	Revision 8	6/28/10
B 3.3.3.1	Revision 0	9/30/98
B 3.3.3-2	Revision 0	9/30/98
B 3.3.3-3	Revision 0	9/30/98
B 3.3.3-4	Revision 1	4/11/05
B 3.3.3-5	Revision 0	9/30/98
B 3.3.3-6	Revision 0	9/30/98
B 3.3.3-7	Revision 0	9/30/98
B 3.3.3-8	Revision 1	3/01/05
B 3.3.3-9	Revision 0	9/30/98
B 3.3.3-10	Revision 1	5/19/00
B 3.3.3-11	Revision 0	9/30/98
B 3.3.3-12	Revision 2	3/01/05
B 3.3.3-13	Revision 0	9/30/98
B 3.3.3-14	Revision 2	3/01/05
B 3.3.3-15	Revision 1	3/01/05
B 3.3.3-16	Revision 0	9/30/98
B 3.3.3-1 thru B.3.3.3.16	Revision 3	6/28/10
B 3.3.4-1	Revision 0	9/30/98
B 3.3.4-2	Revision 0	9/30/98
B 3.3.4-3	Revision 1	4/29/04
B 3.3.4-4	Revision 0	9/30/98
B 3.3.4-5	Revision 0	9/30/98
B 3.3.5-1	Revision 0	9/30/98
B 3.3.5-2	Revision 1	8/13/99

B 3.3.5-3	Revision 1	8/13/99
B 3.3.5-4	Revision 1	8/13/99
B 3.3.5-5	Revision 0	9/30/98
B 3.3.5-6	Revision 0	9/30/98
B 3.3.6-1	Revision 2	3/13/08
B 3.3.6-2	Revision 1	3/20/02
B 3.3.6-3	Revision 1	3/20/02
B 3.3.6-4	Revision 2	2/17/09
B 3.3.6-5	Revision 4	2/17/09
B 3.3.9-1	Revision 0	9/30/98
B 3.3.9-2	Revision 1	7/29/03
B 3.3.9-3	Revision 1	7/29/03
B 3.3.9-4	Revision 0	9/30/98
B 3.3.9-5	Revision 1	9/30/98
B 3.4.1-1	Revision 2	12/19/03
B 3.4.1-2	Revision 2	12/19/03
B 3.4.1-3	Revision 2	12/19/03
B 3.4.1-4	Revision 2	12/19/03
B 3.4.1-5	Revision 0	9/30/98
B 3.4.2-1	Revision 0	9/30/98
B 3.4.2-2	Revision 0	9/30/98
B 3.4.2-3	Revision 0	9/30/98
B 3.4.3-1	Revision 1	3/4/04
B 3.4.3-2	Revision 1	3/4/04
B 3.4.3-3	Revision 1	3/4/04
B 3.4.3-4	Revision 1	3/4/04
B 3.4.3-5	Revision 1	3/4/04
B 3.4.3-6	Revision 1	3/4/04
B 3.4.4-1	Revision 0	9/30/98
B 3.4.4-2	Revision 1	1/13/05
B 3.4.4-3	Revision 0	9/30/98
B 3.4.5-1	Revision 0	9/30/98

B 3.4.5-2	Revision 0	9/30/98
B 3.4.5-3	Revision 2	1/13/05
B 3.4.5-4	Revision 1	4/26/00
B 3.4.5-5	Revision 2	7/29/03
B 3.4.5-6	Revision 2	7/29/03
B 3.4.6-1	Revision 0	9/30/98
B 3.4.6-2	Revision 3	1/13/05
B 3.4.6-3	Revision 0	9/30/98
B 3.4.6-4	Revision 1	7/29/03
B 3.4.6-5	Revision 1	7/29/03
B 3.4.7-1	Revision 0	9/30/98
B 3.4.7-2	Revision 1	7/29/03
B 3.4.7-3	Revision 4	1/13/05
B 3.4.7-4	Revision 2	7/29/03
B 3.4.7-5	Revision 2	7/29/03
B 3.4.8-1	Revision 1	7/29/03
B 3.4.8-2	Revision 2	7/29/03
B 3.4.8-3	Revision 2	7/29/03
B 3.4.9-1	Revision 0	9/30/98
B 3.4.9-2	Revision 0	9/30/98
B 3.4.9-3	Revision 0	9/30/98
B 3.4.9-4	Revision 1	4/27/99
B 3.4.10-1	Revision 1	3/4/04
B 3.4.10-2	Revision 0	9/30/98
B 3.4.10-3	Revision 1	3/4/04
B 3.4.10-4	Revision 2	10/30/09
B 3.4.11-1	Revision 0	9/30/98
B 3.4.11-2	Revision 1	11/5/03
B 3.4.11-3	Revision 3	4/29/04
B 3.4.11-4	Revision 1	11/5/03
B 3.4.11-5	Revision 0	9/30/98
B 3.4.11-6	Revision 1	10/30/09

B 3.4.11-7	Revision 1	10/30/09
B 3.4.12-1	Revision 1	3/4/04
B 3.4.12-2	Revision 1	3/4/04
B 3.4.12-3	Revision 1	3/4/04
B 3.4.12-4	Revision 1	3/4/04
B 3.4.12-5	Revision 1	3/4/04
B 3.4.12-6	Revision 1	3/4/04
B 3.4.12-7	Revision 1	3/4/04
B 3.4.12-8	Revision 2	4/29/04
B 3.4.12-9	Revision 2	4/29/04
B 3.4.12-10	Revision 2	4/29/04
B 3.4.12-11	Revision 3	10/30/09
B 3.4.12-12	Revision 1	4/29/04
B 3.4.12-13	Revision 2	10/30/09
B 3.4.13-1	Revision 0	9/30/98
B 3.4.13-2	Revision 2	3/13/08
B 3.4.13-3	Revision 2	8/27/08
B 3.4.13-4	Revision 1	1/13/05
B 3.4.13-5	Revision 3	1/13/05
B 3.4.13-6	Revision 5	8/27/08
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B 3.4.14-1	Revision 0	9/30/98
B 3.4.14-2	Revision 1	2/26/99
B 3.4.14-3	Revision 0	9/30/98
B 3.4.14-4	Revision 1	10/30/09
B 3.4.14-5	Revision 1	10/30/09
B 3.4.14-6	Revision 2	10/30/09
B 3.4.15-1 thru B 3.4.15-10	Revision 5	2/03/11
B 3.4.16-1	Revision 1	3/13/08
B 3.4.16-2	Revision 1	3/13/08
B 3.4.16-3	Revision 2	3/13/08

B 3.4.16-4	Revision 2	3/13/08
B 3.4.16-5	Revision 2	3/13/08
B 3.4.16-6	Revision 1	3/13/08
B 3.4.17-1	Revision 0	9/30/98
B 3.4.17-2	Revision 0	9/30/98
B 3.4.17-3	Revision 1	5/19/00
B 3.4.18-1	Revision 0	1/13/05
B 3.4.18-2	Revision 0	1/13/05
B 3.4.18-3	Revision 1	3/18/08
B 3.4.18-4	Revision 0	1/13/05
B 3.4.18-5	Revision 0	1/13/05
B 3.4.18-6	Revision 0	1/13/05
B 3.4.18-7	Revision 0	1/13/05
B 3.4.18-8	Revision 1	3/18/08
B3.5.1-1	Revision 0	9/30/98
B 3.5.1-2	Revision 0	9/30/98
B 3.5.1-3	Revision 2	10/06/05
B 3.5.1-4	Revision 3	10/06/05
B 3.5.1-5	Revision 3	10/06/05
B 3.5.1-6	Revision 2	10/06/05
B 3.5.1-7	Revision 2	10/06/05
B 3.5.1-8	Revision 2	10/06/05
B 3.5.2-1	Revision 0	9/30/98
B 3.5.2-2	Revision 0	9/30/98
B 3.5.2-3	Revision 1	10/02/00
B 3.5.2-4	Revision 0	9/30/98
B 3.5.2-5	Revision 0	9/30/98
B 3.5.2-6	Revision 0	9/30/98
B 3.5.2-7	Revision 0	9/30/98
B 3.5.2-8	Revision 2	10/30/09
B 3.5.2-9	Revision 2	11/08/07
B 3.5.2-10	Revision 1	11/08/07

B 3.5.3-1	Revision 0	9/30/98
B 3.5.3-2	Revision 1	4/29/04
B 3.5.3-3	Revision 1	4/29/04
B 3.5.4-1	Revision 0	9/30/98
B 3.5.4-2	Revision 0	9/30/98
B 3.5.4-3	Revision 2	10/06/05
B 3.5.4-4	Revision 2	10/06/05
B 3.5.4-5	Revision 2	10/06/05
B 3.5.4-6	Revision 0	10/06/05
B 3.5.4-1 thru B.3.5.4-6	Revision 3	6/28/10
B 3.5.5-1	Revision 0	9/30/98
B 3.5.5-2	Revision 0	9/30/98
B 3.5.5-3	Revision 0	9/30/98
B 3.5.5-4	Revision 0	9/30/98
B 3.6.1-1	Revision 1	7/31/01
B 3.6.1-2	Revision 1	7/31/01
B 3.6.1-3	Revision 1	7/31/01
B 3.6.1-4	Revision 1	7/31/01
B 3.6.1-5	Revision 1	7/31/01
B 3.6.2-1	Revision 0	9/30/98
B 3.6.2-2	Revision 1	7/31/01
B 3.6.2-3	Revision 1	7/31/01
B 3.6.2-4	Revision 1	7/31/01
B 3.6.2-5	Revision 1	7/31/01
B 3.6.2-6	Revision 1	7/31/01
B 3.6.2-7	Revision 1	7/31/01
B 3.6.2-8	Revision 1	7/31/01
B 3.6.3-1	Revision 1	3/20/02
B 3.6.3-2	Revision 1	3/20/02
B 3.6.3-3	Revision 1	3/20/02
B 3.6.3-4	Revision 1	3/20/02

B 3.6.3-5	Revision 0	9/30/98
B 3.6.3-6	Revision 0	9/30/98
B 3.6.3-7	Revision 0	9/30/98
B 3.6.3-8	Revision 0	9/30/98
B 3.6.3-9	Revision 0	9/30/98
B 3.6.3-10	Revision 0	9/30/98
B 3.6.3-11	Revision 0	9/30/98
B 3.6.3-12	Revision 0	9/30/98
B 3.6.3-13	Revision 3	12/05/05
B 3.6.3-14	Revision 1	7/31/01
B 3.6.4-1	Revision 0	9/30/98
B 3.6.4-2	Revision 1	2/26/01
B 3.6.4-3	Revision 0	9/30/98
B 3.6.4-4	Revision 0	9/30/98
B 3.6.5-1	Revision 0	9/30/98
B 3.6.5-2	Revision 1	4/26/00
B 3.6.5-3	Revision 1	4/26/00
B 3.6.5-4	Revision 0	9/30/98
B 3.6.6-1 thru B 3.6.6-7	Revision 4	8/24/10
B 3.6.6-1 thru B 3.6.6-7	Revision 5	8/24/10
B 3.6.8-1	Revision 1	4/26/00
B 3.6.8-2	Revision 0	9/30/98
B 3.6.8-3	Revision 2	3/01/05
B 3.6.8-4	Revision 2	4/29/04
B 3.6.8-5	Revision 1	8/27/08
B 3.6.9-1	Revision 2	10/30/09
B 3.6.9-2	Revision 3	10/30/09
B 3.6.9-3	Revision 2	10/30/09
B 3.6.9-4	Revision 2	10/30/09
B 3.6.9-5	Revision 5	10/30/09
B 3.6.10-1	Revision 1	9/30/05

B 3.6.10-2	Revision 1	9/30/05
B 3.6.10-3	Revision 1	9/30/05
B 3.6.10-4	Revision 1	9/30/05
B 3.6.10-5	Revision 1	9/30/05
B 3.6.10-6	Revision 1	9/30/05
B 3.6.11-1	Revision 1	9/25/06
B 3.6.11-2	Revision 1	9/25/06
B 3.6.11-3	Revision 1	9/25/06
B 3.6.11-4	Revision 2	9/25/06
B 3.6.11-5	Revision 3	9/25/06
B 3.6.11-6	Revision 0	9/25/06
B 3.6.11-1 thru B 3.6.11-6	Revision 4	6/28/10
B 3.6.12-1	Revision 3	5/10/05
B 3.6.12-2	Revision 2	5/10/05
B 3.6.12-3	Revision 3	5/10/05
B 3.6.12-4	Revision 3	5/10/05
B 3.6.12-5	Revision 2	5/10/05
B 3.6.12-6	Revision 4	5/10/05
B 3.6.12-7	Revision 3	5/10/05
B 3.6.12-8	Revision 2	5/10/05
B 3.6.12-9	Revision 3	5/10/05
B 3.6.12-10	Revision 2	5/10/05
B 3.6.12-11	Revision 1	5/10/05
B 3.6.13-1 thru B 3.6.13-9	Revision 3	6/28/10
B 3.6.14-1	Revision 0	9/30/98
B 3.6.14-2	Revision 0	9/30/98
B 3.6.14-3	Revision 0	9/30/98
B 3.6.14-4	Revision 0	9/30/98
B 3.6.14-5	Revision 0	9/30/98
B 3.6.14-6	Revision 0	9/30/98

B 3.6.15-1	Revision 0	9/30/98
B 3.6.15-2	Revision 0	9/30/98
B 3.6.15-3	Revision 0	9/30/98
B 3.6.15-4	Revision 0	9/30/98
B 3.6.16-1	Revision 1	4/09/99
B 3.6.16-2	Revision 2	9/30/05
B 3.6.16-3	Revision 2	9/30/05
B 3.6.16-4	Revision 0	9/30/05
B 3.6.17-1	Revision 1	3/13/08
B 3.6.17-2	Revision 0	9/30/98
B 3.6.17-3	Revision 0	9/30/98
B 3.6.17-4	Revision 0	9/30/98
B 3.6.17-5	Revision 1	3/13/08
B 3.7.1-1	Revision 0	9/30/98
B 3.7.1-2	Revision 0	9/30/98
B 3.7.1-3	Revision 0	9/30/98
B 3.7.1-4	Revision 1	10/30/09
B 3.7.1-5	Revision 1	10/30/09
B 3.7.2-1	Revision 0	9/30/98
B 3.7.2-2	Revision 0	9/30/98
B 3.7.2-3	Revision 2	6/23/10
B 3.7.2-4	Revision 1	9/08/08
B 3.7.2-5	Revision 3	10/30/09
B 3.7.3-1	Revision 0	9/30/98
B 3.7.3-2	Revision 0	9/30/98
B 3.7.3-3	Revision 0	9/30/98
B 3.7.3-4	Revision 0	9/30/98
B 3.7.3-5	Revision 1	9/08/08
B 3.7.3-6	Revision 2	10/30/09
B 3.7.4-1	Revision 0	9/30/98
B 3.7.4-2	Revision 0	9/30/98

B 3.7.4-3	Revision 1	4/29/04
B 3.7.4-4	Revision 0	9/30/98
B 3.7.5-1	Revision 0	9/30/98
B 3.7.5-2	Revision 0	9/30/98
B 3.7.5-3	Revision 0	9/30/98
B 3.7.5-4	Revision 2	4/29/04
B 3.7.5-5	Revision 1	4/29/04
B 3.7.5-6	Revision 1	4/29/04
B 3.7.5-7	Revision 2	10/30/09
B 3.7.5-8	Revision 2	10/30/09
B 3.7.5-9	Revision 2	10/30/09
B 3.7.6-1	Revision 2	5/10/05
B 3.7.6-2	Revision 1	5/10/05
B 3.7.6-3	Revision 2	3/19/08
B 3.7.7-1	Revision 1	5/10/05
B 3.7.7-2	Revision 0	9/30/98
B 3.7.7-3	Revision 0	9/30/98
B 3.7.7-4	Revision 0	9/30/98
B 3.7.7-5	Revision 0	9/30/98
B 3.7.8-1	Revision 1	7/30/08
B 3.7.8-2	Revision 1	7/30/08
B 3.7.8-3	Revision 2	7/30/08
B 3.7.8-4	Revision 2	7/30/08
B 3.7.8-5	Revision 2	7/30/08
B 3.7.8-6	Revision 0	7/30/08
B 3.7.8-7	Revision 0	7/30/08
B 3.7.9-1	Revision 2	9/25/06
B 3.7.9-2	Revision 2	9/25/06
B 3.7.9-3	Revision 1	9/25/06
B 3.7.9-4	Revision 1	9/25/06
B 3.7.10-1 thru B 3.7.10-9	Revision 4	8/9/10

B 3.7.11-1	Revision 0	9/30/98
B 3.7.11-2	Revision 1	4/23/02
B 3.7.11-3	Revision 1	4/23/02
B 3.7.11-4	Revision 1	4/23/02
B 3.7.12-1	Revision 3	9/30/05
B 3.7.12-2	Revision 2	9/30/05
B 3.7.12-3	Revision 2	9/30/05
B 3.7.12-4	Revision 2	9/30/05
B 3.7.12-5	Revision 2	9/30/05
B 3.7.12-6	Revision 1	9/30/05
B 3.7.12-7	Revision 0	9/30/05
B 3.7.13-1	Revision 3	9/30/05
B 3.7.13-2	Revision 3	9/30/05
B 3.7.13-3	Revision 2	9/30/05
B 3.7.13-4	Revision 2	9/30/05
B 3.7.13-5	Revision 2	9/30/05
B 3.7.14-1	Revision 1	3/13/08
B 3.7.14-2	Revision 0	9/30/98
B 3.7.14-3	Revision 1	3/13/08
B 3.7.15-1	Revision 1	9/27/06
B 3.7.15-2	Revision 1	9/27/06
B 3.7.15-3	Revision 1	9/27/06
B 3.7.15-4	Revision 0	9/27/06
B 3.7.16-1	Revision 2	9/27/06
B 3.7.16-2	Revision 2	9/27/06
B 3.7.16-3	Revision 2	9/27/06
B 3.7.16-4	Revision 0	9/27/06
B 3.7.17-1	Revision 1	3/13/08
B 3.7.17-2	Revision 1	3/13/08
B 3.7.17-3	Revision 1	3/13/08
B 3.8.1-1 thru B.3.8.1-29	Revision 3	2/03/11

B 3.8.2-1	Revision 0	9/30/98
B 3.8.2-2	Revision 0	9/30/98
B 3.8.2-3	Revision 0	9/30/98
B 3.8.2-4	Revision 1	5/10/05
B 3.8.2-5	Revision 2	5/10/05
B 3.8.2-6	Revision 1	5/10/05
B 3.8.3-1	Revision 1	1/15/99
B 3.8.3-2	Revision 0	9/30/98
B 3.8.3-3	Revision 1	1/15/99
B 3.8.3-4	Revision 0	9/30/98
B 3.8.3-5	Revision 1	1/15/99
B 3.8.3-6	Revision 2	3/11/09
B 3.8.3-7	Revision 1	7/10/03
B 3.8.3-8	Revision 3	3/11/09
B 3.8.4-1 thru B3.8.4.10	Revision 9	12/20/10
B 3.8.5-1	Revision 0	9/30/98
B 3.8.5-2	Revision 2	7/29/03
B 3.8.5-3	Revision 1	7/29/03
B 3.8.6-1	Revision 3	10/30/09
B 3.8.6-2	Revision 2	10/30/09
B 3.8.6-3	Revision 3	10/30/09
B 3.8.6-4	Revision 3	10/30/09
B 3.8.6-5	Revision 2	10/30/09
B 3.8.6-6	Revision 2	10/30/09
B 3.8.6-7	Revision 2	10/30/09
B 3.8.7-1	Revision 0	9/30/98
B 3.8.7-2	Revision 1	3/15/04
B 3.8.7-3	Revision 2	3/15/04
B 3.8.7-4	Revision 0	3/15/04
B 3.8.8-1	Revision 0	9/30/98
B 3.8.8-2	Revision 2	10/10/06

B 3.8.8-3	Revision 2	7/29/03
B 3.8.8-4	Revision 0	7/29/03
B 3.8.9-1	Revision 0	9/30/98
B 3.8.9-2	Revision 0	9/30/98
B 3.8.9-3	Revision 0	9/30/98
B 3.8.9-4	Revision 0	9/30/98
B 3.8.9-5	Revision 0	9/30/98
B 3.8.9-6	Revision 0	9/30/98
B 3.8.9-7	Revision 0	9/30/98
B 3.8.9-8	Revision 0	9/30/98
B 3.8.9-9	Revision 1	2/26/99
B 3.8.9-10	Revision 1	2/26/99
B 3.8.10-1	Revision 0	9/30/98
B 3.8.10-2	Revision 0	9/30/98
B 3.8.10-3	Revision 2	7/29/03
B 3.8.10-4	Revision 1	7/29/03
B 3.9.1-1	Revision 1	9/1/05
B 3.9.1-2	Revision 2	9/1/05
B 3.9.1-3	Revision 2	8/27/08
B 3.9.1-4	Revision 0	9/1/05
B 3.9.2-1 thru B 3.9.2.4	Revision 3	8/2/10
B 3.9.3-1	Revision 3	3/13/08
B 3.9.3-2	Revision 2	3/13/08
B 3.9.3-3	Revision 3	3/13/08
B 3.9.3-4	Revision 3	3/13/08
B 3.9.3-5	Revision 3	3/13/08
B 3.9.4-1	Revision 0	9/30/98
B 3.9.4-2	Revision 3	11/24/04
B 3.9.4-3	Revision 2	11/24/04
B 3.9.4-4	Revision 2	11/24/04
B 3.9.5-1	Revision 0	9/30/98

B 3.9.5-2	Revision 2	7/29/03
B 3.9.5-3	Revision 1	7/29/03
B 3.9.5-4	Revision 1	7/29/03
B 3.9.6-1	Revision 1	3/13/08
B 3.9.6-2	Revision 0	9/30/98
B 3.9.6-3	Revision 1	3/13/08
B 3.9.7-1	Revision 0	6/21/04
B 3.9.7-2	Revision 0	6/21/04
B 3.9.7-3	Revision 0	6/21/04

B 3.4 REACTOR COOLANT SYSTEM (RCS)

B 3.4.15 RCS Leakage Detection Instrumentation

BASES

BACKGROUND

GDC 30 of Appendix A to 10 CFR 50 (Ref. 1) requires means for detecting and, to the extent practical, identifying the location of the source of RCS LEAKAGE. Regulatory Guide 1.45 (Ref. 2) describes acceptable methods for selecting leakage detection systems.

Leakage detection systems must have the capability to detect significant reactor coolant pressure boundary (RCPB) degradation as soon after occurrence as practical to minimize the potential for propagation to a gross failure. Thus, an early indication or warning signal is necessary to permit proper evaluation of all unidentified LEAKAGE.

One method of detecting leakage into the containment is the level instrumentation in containment floor and equipment (CFAE) sump A and CFAE sump B (Ref 3 and 5) and in the incore instrument sump (Ref 3). The CFAE sumps are small sumps located on opposite sides of the containment and outside of the crane wall. Any leakage in the lower containment inside the crane wall would fall to the floor and run via embedded floor drains to one of the two CFAE sumps. Any leakage outside the crane wall would fall to the floor and gravity drain to these sumps. The sump level rate of change, as calculated by the plant computer, would indicate the input rate. This method of detection would indicate in the Control Room a leak from any liquid system including the Reactor Coolant System and the Main Steam and Feedwater Systems. As leakage may go to either or both of the two CFAE sumps, a 1 gpm sump input (cumulative between sumps A and B) is detectable in 1 hour after leakage has reached the sumps. During periods of pump down of the CFAE sumps, the CFAE level instrumentation remains OPERABLE since operating experience has shown that this process typically takes only minutes to complete. The incore instrument sump level alarm offers another means of detecting leakage into the containment (Ref 3 and 5). The incore instrument sump level instrumentation provides an alarm on the plant computer when the sump level increases to the Hi level. The incore instrument sump level instrumentation is capable of detecting 1 gpm input within four hours after leakage has reached the sump.

BASES

BACKGROUND (continued)

The environmental conditions during plant power operations and the physical configuration of lower containment will delay the total reactor coolant system leakage (including steam) from directly entering the CFAE sump and subsequently, will lengthen the sump's level response time. Therefore, leakage detection by the CFAE sump will typically occur following other means of leakage detection. Operating experience with high enthalpy primary and secondary water leaks indicates that flashing of high temperature liquid produces steam and hot water mist that is readily absorbed in the containment air. Much of the hot water that initially hits the containment floor will evaporate in a low relative humidity environment as it migrates towards a sump. Local low points along the containment floor provide areas for water to form shallow pools that increase transport time to one or more building sumps. The net effect is that only a fraction of any high enthalpy water leakage will eventually collect in a sump and early leak detection may rely on alternate methods.

The containment ventilation unit condensate drain tank (CVUCDT) level monitor offers another means of detecting leakage into the containment. An abnormal level increase would indicate removal of moisture from the containment by the containment air coolers. The plant computer calculates the rate of change in level to detect a tank input of 1 gpm after condensate has reached the tank.

The reactor coolant contains radioactivity that, when released to the containment, can be detected by radiation monitoring instrumentation. U.S. NRC Regulatory Guide (RG) 1.45, "Reactor Coolant Pressure boundary Leakage Detection Systems," describes acceptable methods of implementing the requirements for leakage detection systems. Although RG 1.45 is not a license condition, it is generally accepted for use to support licensing basis. RG 1.45 states that instrument sensitivities of 10^{-9} μCi/cc radioactivity for air particulate monitoring are practical for leakage detection systems. The particulate monitor at Catawba meets or exceeds this accepted sensitivity.

RG 1.45 also states that detector systems should be able to respond to a one gpm, or its equivalent, leakage increase in one hour or less. The particulate monitor at Catawba has demonstrated the capability of detecting a 1.0 gpm leak within one hour at the sensitivity recommended in Regulatory Guide 1.45 using the RCS corrosion product activities from the UFSAR. Lower RCS activities will result in an increased detection time. Since the particulate monitor meets the specified 10^{-9} μCi/cc sensitivity, they are designed in accordance with RG 1.45.

BACKGROUND (continued)

The plant computer (Operator Aid Computer (OAC)) is used to provide the alarm for RCS Leakage Detection. The actual OAC alarm setpoints are set as low as practicable, considering the actual concentration of radioactivity in the RCS and the containment background radiation concentration. The OAC alarm setpoint (for detector OPERABILITY) will be less than or equal to the projected containment activity indication following a one gpm leak from steady state conditions. An OAC alarm setpoint administrative limit will be established based on RCS activity at 5% Reactor Power. The OAC setpoint is established as both a background threshold and a rate of change threshold. Both thresholds must be met to receive the OAC alarm. The administrative limit for background setting is 2000 counts per minute (cpm) and the administrative limit for rate of change setting is 20 counts per minute per minute (cmm). The administrative limit may be increased based on operating history and the number of spurious alarms but must be maintained less than the OPERABILITY limit. The OPERABILITY limit (i.e., highest allowable setting) of the OAC alarm setpoint is based on the present Reactor Power. The background setting limit is equal to 400 times Reactor Power (cpm setpoint). The rate of change setting limit is equal to 4 times Reactor Power (cmm setpoint). If both settings are equal to or less than the setting limit for the present Reactor Power, the OAC alarm should be considered OPERABLE.

The OPERABILITY of the particulate monitor and OAC alarm is based upon an instrument sensitivity $\geq 10^{-9}$ μCi/cc, a Channel Check performed at a frequency of every 12 hours, a Channel Operational Test performed at a frequency of every 92 days, a Channel Calibration performed at a frequency of every 18 months, and both settings of the OAC alarm equal to or less than the prescribed setting limit for the present Reactor Power.

An increase in humidity of the containment atmosphere would indicate release of water vapor to the containment. Dew point temperature measurements can thus be used to monitor humidity levels of the containment atmosphere as an indicator of potential RCS LEAKAGE. A 1°F increase in dew point is well within the sensitivity range of available instruments. Since the humidity level is influenced by several factors, a quantitative evaluation of an indicated leakage rate by this means may be questionable and should be compared to observed increases in liquid level into the CFAE and condensate level from air coolers. Humidity level monitoring is considered most useful as an indirect alarm or indication to alert the operator to a potential problem. Humidity monitors are not required by this LCO.

BASES

BACKGROUND (continued)

Air temperature and pressure monitoring methods may also be used to infer unidentified LEAKAGE to the containment. Containment temperature and pressure fluctuate slightly during plant operation, but a rise above the normally indicated range of values may indicate RCS leakage into the containment. The relevance of temperature and pressure measurements are affected by containment free volume and, for temperature, detector location. Alarm signals from these instruments can be valuable in recognizing rapid and sizable leakage to the containment. Temperature and pressure monitors are not required by this LCO.

The volume control tank (VCT) level change offers another means of detecting leakage into containment (Ref 3). This enhances the diversity of the leakage detection function as recommended in Regulatory Guide 1.45 (Ref 2). The VCT level instrumentation is not required by, nor can be credited for, this LCO.

Once any alarm or indication of leakage is received from the RCS leakage detection instrumentation, control room operators quickly evaluate all available system parameters to assess RCS pressure boundary integrity. These include VCT and pressurizer level indications and, if appropriate, the RCS mass balance calculation. Response to RCS leakage is addressed by LCO 3.4.13, "RCS Operational LEAKAGE."

APPLICABLE SAFETY ANALYSES

The need to evaluate the severity of an alarm or an indication is important to the operators, and the ability to compare and verify with indications from other systems is necessary. The system response times and sensitivities are described in the UFSAR (Ref. 3 and 6). Multiple instrument locations are utilized, if needed, to ensure that the transport delay time of the leakage from its source to an instrument location yields an acceptable overall response time.

The safety significance of RCS LEAKAGE varies widely depending on its source, rate, and duration. Therefore, detecting and monitoring RCS LEAKAGE into the containment area is necessary. Quickly separating the identified LEAKAGE from the unidentified LEAKAGE provides quantitative information to the operators, allowing them to take corrective action should a leakage occur detrimental to the safety of the unit and the public.

RCS leakage detection instrumentation satisfies Criterion 1 of 10 CFR 50.36 (Ref. 4).

BASES

LCO

One method of protecting against large RCS leakage derives from the ability of instruments to rapidly detect extremely small leaks. This LCO requires instruments of diverse monitoring principles to be OPERABLE to provide a high degree of confidence that extremely small leaks are detected in time to allow actions to place the plant in a safe condition, when RCS LEAKAGE indicates possible RCPB degradation.

The LCO is satisfied when monitors of diverse measurement means are available. Thus, the containment floor and equipment sump level monitors and the incore instrument sump level alarm, the particulate radioactivity monitor, and the CVUCDT level monitor provide an acceptable minimum.

APPLICABILITY

Because of elevated RCS temperature and pressure in MODES 1, 2, 3, and 4, RCS leakage detection instrumentation is required to be OPERABLE.

Since RCS radioactivity level is significantly lower in MODES 2, 3, and 4, the containment atmosphere particulate monitor is not a reliable means of detecting RCS leakage in these MODES. Thus the LCO applies to this monitor in MODE 1 only and leakage detection capability in MODES 2, 3, and 4 is accomplished by the diverse means provided by the CFAE sump level monitors, the incore instrument sump level alarm, and the CVUCDT level monitor.

In MODE 5 or 6, the temperature is to be ≤ 200°F and pressure is maintained low or at atmospheric pressure. Since the temperatures and pressures are far lower than those for MODES 1, 2, 3, and 4, the likelihood of leakage and crack propagation are much smaller. Therefore, the requirements of this LCO are not applicable in MODES 5 and 6.

ACTIONS

A Note has been added to the ACTIONS to clarify the application of Completion Time rules. Separate Condition entry is allowed for each instrument. The Completion Time of the inoperable instrument will be tracked separately for each instrument starting from the time the Condition was entered for that instrument.

BASES

ACTIONS (continued)

A.1 and A.2

With the required containment floor and equipment sump level monitor inoperable, no other form of sampling can provide the equivalent information; however, the containment atmosphere particulate radioactivity monitor will provide indications of changes in leakage. Together with the atmosphere monitor, the periodic surveillance for RCS water inventory balance, SR 3.4.13.1, must be performed at an increased frequency of 24 hours to provide information that is adequate to detect leakage.

Required Action A.1 is modified by a Note that states the RCS water inventory balance is not required to be performed until 12 hours after establishment of steady state operation in accordance with SR 3.4.13.1. This Note allows exceeding the 24-hour completion time during non-steady state operation.

Restoration of the required containment floor and equipment sump level monitor to OPERABLE status within a Completion Time of 30 days is required to regain the function after the monitor's failure. This time is acceptable, considering the Frequency and adequacy of the RCS water inventory balance required by Required Action A.1.

B.1 and B.2

With the containment atmosphere particulate radioactivity monitor inoperable, alternative action is required. Either water inventory balances, in accordance with SR 3.4.13.1, must be performed or grab samples of the containment atmosphere must be taken and analyzed to provide alternate periodic information.

Required Action B.1 is modified by a Note that states the RCS water inventory balance is not required to be performed until 12 hours after establishment of steady state operation in accordance with SR 3.4.13.1. This Note allows exceeding the 24 hour Completion Time during non-steady state operation.

With a water inventory balance performed or grab samples obtained and analyzed every 24 hours, continued operation is allowed since diverse indications of RCS LEAKAGE remains OPERABLE. The 24 hour interval provides periodic information that is adequate to detect leakage.

BASES

ACTIONS (continued)

C.1.1, C.1.2, C.1.3, and C.2

With the CVUCDT level monitor inoperable, alternative action is again required. Either a water inventory balance, in accordance with SR 3.4.13.1; or grab samples obtained and analyzed at a frequency of 24 hours; or SR 3.4.15.1, CHANNEL CHECK, of the containment atmosphere particulate radioactivity monitor at 8-hour intervals, must be performed to provide alternate periodic information. Required Action C.1.1 is modified by a Note that states the RCS water inventory balance is not required to be performed until 12 hours after establishment of steady state operation in accordance with SR 3.4.13.1. This Note allows exceeding the 24-hour completion time during non-steady state operation.

Provided a water inventory balance is performed every 24 hours; or grab samples taken and analyzed every 24 hours; or a CHANNEL CHECK of the containment atmosphere particulate radioactivity monitor is performed every 8 hours, reactor operation may continue while awaiting restoration of the CVUCDT level monitor to OPERABLE status. The 24 and 8 hour intervals provide periodic information that is adequate to detect RCS LEAKAGE.

During Modes 2, 3, and 4, restoration of the CVUCDT level monitor to OPERABLE status within a Completion Time of 30 days is required to regain the function after the monitor's failure. This time is acceptable, considering the Frequency and adequacy of the alternative actions required by Actions C.1.1, C.1.2, or C.1.3.

During Modes 2, 3, and 4, the two required leakage detection instrumentation systems are the CVUCDT level monitor and the CFAE sump level monitors. When the CVUCDT level monitor is inoperable, a plant shutdown after 30 days will ensure the plant will not operate with less than two leakage detection systems OPERABLE for an extended period of time. During Mode 1, the addition of the third leakage monitoring system from the containment atmosphere particulate radioactivity monitor provides additional leakage detection capability and no longer requires plant shutdown except as described in Condition D.

BASES

ACTIONS (continued)

D.1 and D.2

With the containment atmosphere particulate radioactivity monitor inoperable in MODE 1 and the containment ventilation unit condensate drain tank level monitor inoperable in MODE 1, the only means of detecting leakage is the containment floor and equipment sump level monitor and incore instrument sump level alarm. This Condition does not provide the required diverse means of leakage detection. The Required Action is to restore either of the inoperable required monitors to OPERABLE status within 30 days to regain the intended leakage detection diversity. The 30 day Completion Time ensures that the plant will not be operated in a reduced configuration for a lengthy time period.

E.1

With the incore sump level alarm inoperable, a water inventory balance, in accordance with SR 3.4.13.1, must be performed at an increased frequency of 24 hours to provide alternate periodic information that is adequate to detect leakage. Required Action E.1 is modified by a Note that states the RCS water inventory balance is not required to be performed until 12 hours after establishment of steady state operation in accordance with SR 3.4.13.1. This Note allows exceeding the 24-hour completion time during non-steady state operation.

F.1 and F.2

If a Required Action of Condition A, B, C, or D cannot be met, the plant must be brought to a MODE in which the requirement does not apply. To achieve this status, the plant 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 plant conditions from full power conditions in an orderly manner and without challenging plant systems.

ACTIONS (continued)

G.1

With all required monitors inoperable, no automatic means of monitoring leakage are available, and immediate plant shutdown in accordance with LCO 3.0.3 is required. The required monitors during MODE 1 for LCO 3.0.3 entry are defined as the simultaneous inoperability of one CFAE level monitor, the containment atmosphere particulate radioactivity monitor, and the CVUCDT level monitor. The required monitors during MODES 2, 3, and 4 for LCO 3.0.3 entry are defined as the simultaneous inoperability of one CFAE level monitor and the CVUCDT level monitor. This condition does not apply to the incore instrument sump level alarm.

SURVEILLANCE REQUIREMENTS

SR 3.4.15.1

SR 3.4.15.1 requires the performance of a CHANNEL CHECK of the containment atmosphere particulate radioactivity monitor. The check gives reasonable confidence that the channel is operating properly. The Frequency of 12 hours is based on instrument reliability and is reasonable for detecting off normal conditions.

SR 3.4.15.2

SR 3.4.15.2 requires the performance of a COT on the containment atmosphere particulate radioactivity monitor. The test ensures that a signal from the monitor can generate the appropriate alarm associated with the detection of a minimum 1 gpm RCS leak. The desired alarm is derived from a digital database. Database manipulation concurrent with a signal supplied from the detector verifies the OPERABILITY of the required alarm. The Frequency of 92 days considers instrument reliability, and operating experience has shown that it is proper for detecting degradation.

SR 3.4.15.3, SR 3.4.15.4, SR 3.4.15.5, and SR 3.4.15.6

These SRs require the performance of a CHANNEL CALIBRATION for each of the RCS leakage detection instrumentation channels. The calibration verifies the accuracy of the instrument string, including the instruments located inside containment. The Frequency of 18 months is a typical refueling cycle and considers channel reliability. Again, operating experience has proven that this Frequency is acceptable.

BASES

REFERENCES

1. 10 CFR 50, Appendix A, Section IV, GDC 30.
2. Regulatory Guide 1.45.
3. UFSAR, Section 5.2.5.
4. 10 CFR 50.36, Technical Specifications, (c)(2)(ii).
5. Catawba Safety Evaluation Report, Section 5.2.5.
6. UFSAR, Table 5-10.
7. UFSAR, Section 18, Table 18-1.
8. Catawba License Renewal Commitments, CNS-1274.00-00-0016, Section 4.27.

B 3.8 ELECTRICAL POWER SYSTEMS

B 3.8.1 AC Sources—Operating

BASES

BACKGROUND

The unit Essential Auxiliary Power Distribution System AC sources consist of the offsite power sources (preferred power sources, normal and alternate(s)), and the onsite standby power sources (Train A and Train B diesel generators (DGs)). As required by 10 CFR 50, Appendix A, GDC 17 (Ref. 1), the design of the AC electrical power system provides independence and redundancy to ensure an available source of power to the Engineered Safety Feature (ESF) systems.

The onsite Class 1E AC Distribution System is divided into redundant load groups (trains) so that the loss of any one group does not prevent the minimum safety functions from being performed. Each train has connections to two preferred offsite power sources and a single DG.

From the transmission network, two electrically and physically separated circuits provide AC power, through step down station auxiliary transformers, to the 4.16 kV ESF buses. A detailed description of the offsite power network and the circuits to the Class 1E ESF buses is found in the UFSAR, Chapter 8 (Ref. 2).

A qualified offsite circuit consists of all breakers, transformers, switches, interrupting devices, cabling, and controls required to transmit power from the offsite transmission network to the onsite Class 1E ESF bus(es).

Certain required unit loads are returned to service in a predetermined sequence in order to prevent overloading the transformer supplying offsite power to the onsite Class 1E Distribution System. Within 1 minute after the initiating signal is received, all automatic and permanently connected loads needed to recover the unit or maintain it in a safe condition are returned to service via the load sequencer.

The onsite standby power source for each 4.16 kV ESF bus is a dedicated DG. DGs A and B are dedicated to ESF buses ETA and ETB, respectively. A DG starts automatically on a safety injection (SI) signal

BACKGROUND (continued)

(i.e., low pressurizer pressure or high containment pressure signals) or on an ESF bus degraded voltage or undervoltage signal (refer to LCO 3.3.5, "Loss of Power (LOP) Diesel Generator (DG) Start Instrumentation"). After the DG has started, it will automatically tie to its respective bus after offsite power is tripped as a consequence of ESF bus undervoltage or degraded voltage, independent of or coincident with an SI signal. With no SI signal, there is a 10 minute delay between degraded voltage signal and the DG start signal. The DGs will also start and operate in the standby mode without tying to the ESF bus on an SI signal alone. Following the trip of offsite power, a sequencer strips loads from the ESF bus. When the DG is tied to the ESF bus, loads are then sequentially connected to its respective ESF bus by the automatic load sequencer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading the DG by automatic load application.

In the event of a loss of preferred power, the ESF electrical loads are automatically connected to the DGs in sufficient time to provide for safe reactor shutdown and to mitigate the consequences of a Design Basis Accident (DBA) such as a loss of coolant accident (LOCA).

Certain required unit loads are returned to service in a predetermined sequence in order to prevent overloading the DG in the process. Approximately 1 minute after the initiating signal is received, all loads needed to recover the unit or maintain it in a safe condition are returned to service.

Ratings for Train A and Train B DGs satisfy the requirements of Regulatory Guide 1.9 (Ref. 3). The continuous service rating of each DG is 7000 kW with 10% overload permissible for up to 2 hours in any 24 hour period. The ESF loads that are powered from the 4.16 kV ESF buses are listed in Reference 2.

APPLICABLE SAFETY ANALYSES

The initial conditions of DBA and transient analyses in the UFSAR, Chapter 6 (Ref. 4) and Chapter 15 (Ref. 5), assume ESF systems are OPERABLE. The AC electrical power sources are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System (RCS), and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

APPLICABLE SAFETY ANALYSES (continued)

The OPERABILITY of the AC electrical power sources is consistent with the initial assumptions of the Accident analyses and is based upon meeting the design basis of the unit. This results in maintaining at least one train of the onsite or offsite AC sources OPERABLE during Accident conditions in the event of:

a. An assumed loss of all offsite power or all onsite AC power; and

b. A worst case single failure.

The AC sources satisfy Criterion 3 of 10 CFR 50.36 (Ref. 6).

LCO

Two qualified circuits between the offsite transmission network and the onsite Essential Auxiliary Power System and separate and independent DGs for each train ensure availability of the required power to shut down the reactor and maintain it in a safe shutdown condition after an anticipated operational occurrence (AOO) or a postulated DBA.

Qualified offsite circuits are those that are described in the UFSAR and are part of the licensing basis for the unit.

In addition, one required automatic load sequencer per train must be OPERABLE.

Each offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the ESF buses.

The 4.16 kV essential system is divided into two completely redundant and independent trains designated A and B, each consisting of one 4.16 kV switchgear assembly, three 4.16 kV/600 V transformers, two 600 V load centers, and associated loads.

Normally, each Class 1E 4.16 kV switchgear is powered from its associated non-Class 1E train of the 6.9 kV Normal Auxiliary Power System as discussed in "6.9 kV Normal Auxiliary Power System" in Chapter 8 of the UFSAR (Ref. 2). Additionally, a standby source of power to each 4.16 kV essential switchgear, not required by General Design Criterion 17, is provided from the 6.9 kV system via two separate and independent 6.9/4.16 kV transformers. These transformers are shared between units and provide the capability to supply a standby

LCO (continued)

source of preferred power to each unit's 4.16 kV essential switchgear from either unit's 6.9 kV system. A key interlock scheme is provided to preclude the possibility of connecting the two units together at either the 6.9 or 4.16 kV level.

Each train of the 4.16 kV Essential Auxiliary Power System is also provided with a separate and independent emergency diesel generator to supply the Class 1E loads required to safely shut down the unit following a design basis accident. Additionally, each diesel generator is capable of supplying its associated 4.16 kV blackout switchgear through a connection with the 4.16 kV essential switchgear.

Each DG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on detection of bus undervoltage. This will be accomplished within 11 seconds. Each DG must also be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions such as DG in standby with the engine hot and DG in standby with the engine at ambient conditions. Additional DG capabilities must be demonstrated to meet required Surveillance, e.g., capability of the DG to revert to standby status on an ECCS signal while operating in parallel test mode.

Proper sequencing of loads, including tripping of nonessential loads, is a required function for DG OPERABILITY.

The AC sources in one train must be separate and independent (to the extent possible) of the AC sources in the other train. For the DGs, separation and independence are complete.

For the offsite AC sources, separation and independence are provided to the extent practical.

APPLICABILITY

The AC sources and sequencers are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs or abnormal transients; and

APPLICABILITY (continued)

b. Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

The AC power requirements for MODES 5 and 6 are covered in LCO 3.8.2, "AC Sources—Shutdown."

ACTIONS

A Note prohibits the application of LCO 3.0.4.b to an inoperable DG. There is an increased risk associated with entering a MODE or other specified condition in the Applicability with an inoperable DG and the provisions of LCO 3.0.4.b, which allow entry into a MODE or other specified condition in the Applicability with the LCO not met after performance of a risk assessment addressing inoperable systems and components, should not be applied in this circumstance.

When entering Required Actions for inoperable offsite circuit(s) and/or DG(s), it is also necessary to enter the applicable Required Actions of any shared systems LCOs when either normal or emergency power to shared components governed by these LCOs becomes inoperable. These LCOs include 3.7.8, "Nuclear Service Water System (NSWS)"; 3.7.10, "Control Room Area Ventilation System (CRAVS)"; 3.7.11, "Control Room Area Chilled Water System (CRACWS)"; and 3.7.12, "Auxiliary Building Filtered Ventilation Exhaust System (ABFVES)".

A.1

To ensure a highly reliable power source remains with one offsite circuit inoperable, it is necessary to verify the OPERABILITY of the remaining required offsite circuit 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 not met. However, if a second required circuit fails SR 3.8.1.1, the second offsite circuit is inoperable, and Condition C, for two offsite circuits inoperable, is entered.

A.2

Required Action A.2, which only applies if the train cannot be powered from an offsite source, is intended to provide assurance that an event coincident with a single failure of the associated 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

ACTIONS (continued)

train. This includes motor driven auxiliary feedwater pumps. The turbine driven auxiliary feedwater pump is required to be considered a redundant required feature, and, therefore, required to be determined OPERABLE by this Required Action. Three independent AFW pumps are required to ensure the availability of decay heat removal capability for all events accompanied by a loss of offsite power and a single failure. System design is such that the remaining OPERABLE motor driven auxiliary feedwater pump is not by itself capable of providing 100% of the auxiliary feedwater flow assumed in the safety analysis.

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. The train 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 (one offsite circuit inoperable) a redundant required feature subsequently becomes inoperable, this Completion Time begins to be tracked.

Discovering no offsite power to one train of the onsite Class 1E Electrical Power Distribution System 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 Train A and Train B of 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.

A.3

According to Regulatory Guide 1.93 (Ref. 7), operation may continue in

ACTIONS (continued)

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 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.

The second Completion Time for Required Action A.3 establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition A is entered while, for instance, a DG is inoperable and that DG is subsequently returned OPERABLE, the LCO may already have been not met for up to 72 hours. This could lead to a total of 144 hours, since initial failure to meet the LCO, to restore the offsite circuit. At this time, a DG could again become inoperable, the circuit restored OPERABLE, and an additional 72 hours (for a total of 9 days) allowed prior to complete restoration of the LCO. The 6 day Completion Time provides a limit on the time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "<u>AND</u>" connector between the 72 hour and 6 day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

As in Required Action A.2, the Completion Time allows for an exception to the normal "time zero" for beginning the allowed outage time "clock." This will result in establishing the "time zero" at the time that the LCO was initially not met, instead of at the time Condition A was entered.

<u>B.1</u>

To ensure a highly reliable power source remains with an inoperable DG, 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.

ACTIONS (continued)

B.2

Required Action B.2 is intended to provide assurance that a loss of offsite power, during the period that a DG 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. The turbine driven auxiliary feedwater pump is required to be considered a redundant required feature, and, therefore, required to be determined OPERABLE by this Required Action. Three independent AFW pumps are required to ensure the availability of decay heat removal capability for all events accompanied by a loss of offsite power and a single failure. System design is such that the remaining OPERABLE motor driven auxiliary feedwater pump is not by itself capable of providing 100% of the auxiliary feedwater flow assumed in the safety analysis. Redundant required feature failures consist of inoperable features associated with a train, redundant to the train that has an inoperable DG.

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" 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 (Train A or Train B) is inoperable.

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

Discovering one required DG 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 DG and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may have been lost; however, function has not

ACTIONS (continued)

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 DG(s), the other DG(s) would be declared inoperable upon discovery and Condition E of LCO 3.8.1 would be entered. 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 DG(s), performance of SR 3.8.1.2 suffices to provide assurance of continued OPERABILITY of that DG.

In the event the inoperable DG is restored to OPERABLE status prior to completing either B.3.1 or B.3.2, the problem investigation process 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.

These Conditions are not required to be entered if the inoperability of the DG is due to an inoperable support system, an independently testable component, or preplanned testing or maintenance. If required, these Required Actions are to be completed regardless of when the inoperable DG is restored to OPERABLE status.

According to Generic Letter 84-15 (Ref. 8), 24 hours is reasonable to confirm that the OPERABLE DG(s) is not affected by the same problem as the inoperable DG.

B.4

According to Regulatory Guide 1.93 (Ref. 7), operation may continue in Condition B for a period that should not exceed 72 hours.

In Condition B, the remaining OPERABLE DG and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution

ACTIONS (continued)

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.

The second Completion Time for Required Action B.4 establishes a limit on the maximum time allowed for any combination of required AC power sources to be inoperable during any single contiguous occurrence of failing to meet the LCO. If Condition B is entered while, for instance, an offsite circuit is inoperable and that circuit is subsequently restored OPERABLE, the LCO may already have been not met for up to 72 hours. This could lead to a total of 144 hours, since initial failure to meet the LCO, to restore the DG. At this time, an offsite circuit could again become inoperable, the DG restored OPERABLE, and an additional 72 hours (for a total of 9 days) allowed prior to complete restoration of the LCO. The 6 day Completion Time provides a limit on time allowed in a specified condition after discovery of failure to meet the LCO. This limit is considered reasonable for situations in which Conditions A and B are entered concurrently. The "<u>AND</u>" connector between the 72 hour and 6 day Completion Times means that both Completion Times apply simultaneously, and the more restrictive Completion Time must be met.

As in Required Action B.2, the Completion Time allows for an exception to the normal "time zero" for beginning the allowed time "clock." This will result in establishing the "time zero" at the time that the LCO was initially not met, instead of at the time Condition B was entered.

<u>C.1 and C.2</u>

Required Action C.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. 7) 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.

ACTIONS (continued)

The Completion Time for Required Action C.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 C (two offsite circuits inoperable) a required feature becomes inoperable, this Completion Time begins to be tracked.

According to Regulatory Guide 1.93 (Ref. 7), operation may continue in Condition C 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.

With both of the required 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

ACTIONS (continued)

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.

D.1 and D.2

Pursuant to LCO 3.0.6, the Distribution System ACTIONS would not be entered even if all AC sources to it were inoperable, resulting in de-energization. Therefore, the Required Actions of Condition D are modified by a Note to indicate that when Condition D is entered with no AC source to any train, the Conditions and Required Actions for LCO 3.8.9, "Distribution Systems—Operating," must be immediately entered. This allows Condition D to provide requirements for the loss of one offsite circuit and one DG, without regard to whether a train is de-energized. LCO 3.8.9 provides the appropriate restrictions for a de-energized train.

According to Regulatory Guide 1.93 (Ref. 7), operation may continue in Condition D for a period that should not exceed 12 hours.

In Condition D, 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 C (loss of both required 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.

E.1

With Train A and Train B DGs inoperable, there are no remaining standby AC sources. Thus, with an assumed loss of offsite electrical power, insufficient standby AC sources are available to power the

ACTIONS (continued)

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.

According to Reference 7, with both DGs inoperable, operation may continue for a period that should not exceed 2 hours.

F.1

The sequencer(s) is an essential support system to both the offsite circuit and the DG associated with a given ESF bus. Furthermore, the sequencer is on the primary success path for most major AC electrically powered safety systems powered from the associated ESF bus. Therefore, loss of an ESF bus sequencer affects every major ESF system in the train. When a sequencer is inoperable, its associated unit and train related offsite circuit and DG must also be declared inoperable and their corresponding Conditions must also be entered. The 12 hour Completion Time provides a period of time to correct the problem commensurate with the importance of maintaining sequencer OPERABILITY. This time period also ensures that the probability of an accident (requiring sequencer OPERABILITY) occurring during periods when the sequencer is inoperable is minimal.

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.

ACTIONS (continued)

H.1

Condition H corresponds to a level of degradation in which all redundancy in the AC electrical power supplies has been lost. 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.

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. 9). 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), Regulatory Guide 1.108 (Ref. 10), and Regulatory Guide 1.137 (Ref. 11), as addressed in the UFSAR.

Where the SRs discussed herein specify voltage and frequency tolerances, the following is applicable. The minimum steady state output voltage of 3950 V is 95% of the nominal 4160 V output voltage. This value allows for voltage drop to the terminals of 4000 V motors whose minimum operating voltage is specified as 90% or 3600 V. It also allows for voltage drops to motors and other equipment down through the 120 V level where minimum operating voltage is also usually specified as 90% of name plate rating.

The specified maximum steady state output voltage of 4580 V is equal to the maximum operating voltage specified for 4000 V motors. It ensures that for a lightly loaded distribution system, the voltage at the terminals of 4000 V motors is no more than the maximum rated operating voltages. The specified minimum and maximum frequencies of the DG are 58.8 Hz and 61.2 Hz, respectively. These values are equal to ± 2% of the 60 Hz nominal frequency and are derived from the recommendations given in Regulatory Guide 1.9 (Ref. 3).

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.1

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

SR 3.8.1.2 and SR 3.8.1.7

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 2 for SR 3.8.1.2) to indicate that all DG starts for these Surveillances may be preceded by an engine prelube period and followed by a warmup period prior to loading.

For the purposes of SR 3.8.1.2 and SR 3.8.1.7 testing, the DGs are started from standby conditions using a manual start, loss of offsite power signal, safety injection signal, or loss of offsite power coincident with a safety injection signal. 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 3, which is only applicable when such modified start procedures are recommended by the manufacturer.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.7 requires that, at a 184 day Frequency, the DG starts from standby conditions and achieves required voltage and frequency within 11 seconds. The 11 second start requirement supports the assumptions of the design basis LOCA analysis in the UFSAR, Chapter 15 (Ref. 5).

The 11 second start requirement is not applicable to SR 3.8.1.2 (see Note 3) when a modified start procedure as described above is used. If a modified start is not used, the 11 second start requirement of SR 3.8.1.7 applies.

Since SR 3.8.1.7 requires a 11 second start, it is more restrictive than SR 3.8.1.2, and it may be performed in lieu of SR 3.8.1.2. This is the intent of Note 1 of SR 3.8.1.2.

The normal 31 day Frequency for SR 3.8.1.2 is consistent with Regulatory Guide 1.9 (Ref. 3). The 184 day Frequency for SR 3.8.1.7 is a reduction in cold testing consistent with Generic Letter 84-15 (Ref. 8). These Frequencies provide adequate assurance of DG OPERABILITY, while minimizing degradation resulting from testing.

<u>SR 3.8.1.3</u>

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 is normally operated at a power factor between 0.8 lagging and 1.0. The 0.8 value is the design rating of the machine, while 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 31 day Frequency for this Surveillance is consistent with Regulatory Guide 1.9 (Ref. 3).

This SR is modified by four Notes. Note 1 indicates that diesel engine runs for this Surveillance may include gradual loading, as recommended

SURVEILLANCE REQUIREMENTS (continued)

by the manufacturer, so that mechanical stress and wear on the diesel engine are minimized. Note 2 states that momentary transients, because of changing bus loads, do not invalidate this test. Similarly, momentary power factor transients above the limit do not invalidate the test. Note 3 indicates that this Surveillance should be conducted on only one DG at a time in order to avoid common cause failures that might result from offsite circuit or grid perturbations. Note 4 stipulates a prerequisite requirement for performance of this SR. A successful DG start must precede this test to credit satisfactory performance.

SR 3.8.1.4

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

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

SR 3.8.1.5

Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water from the fuel oil day tanks once every 31 days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance Frequencies are established by Regulatory Guide 1.137 (Ref. 11). This SR is for preventative maintenance. The presence of water does not necessarily represent failure of this SR, provided the accumulated water is removed during the performance of this Surveillance.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.6

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

The design of fuel transfer systems is such that the transfer valve operates automatically or the transfer valve bypass valve may be opened manually in order to maintain an adequate volume of fuel oil in the day tanks during or following DG testing. Therefore, a 31 day Frequency is appropriate.

SR 3.8.1.7

See SR 3.8.1.2.

SR 3.8.1.8

Transfer of each 4.16 kV ESF bus power supply from the normal offsite circuit to the alternate offsite circuit demonstrates the capability of the alternate circuit distribution network to power the shutdown loads. The alternate circuit distribution network consists of an offsite power source through a 6.9 kV bus incoming breaker, its associated 6.9 kV bus tie breaker and the aligned 6.9/4.16 kV transformer to the essential bus. The requirement of this SR is the transfer from the normal offsite circuit to the alternate offsite circuit via the automatic and manual actuation of the 6.9 kV bus tie breaker and 6.9 kV bus incoming breakers upon loss of the normal offsite source that is being credited. The 6.9 kV bus tie breaker provides a means for each of the offsite circuits to act as a backup in the event power is not available from one of the circuits. The Catawba power system design, without the tie breaker, meets all GDC 17 requirements as well as all other standards to which Catawba is committed. If the tie breaker is incapable of closing manually or automatically during its required MODE of applicability, then the Surveillance is not met and the normal offsite circuit that supplies that Class 1E ESF bus is inoperable and the applicable Condition shall be entered and the Required Actions shall be performed. Table B 3.8.1-1 identifies the offsite circuit affected by a non-functioning tie breaker.

SURVEILLANCE REQUIREMENTS (continued)

The intent of the tie breaker is to provide an alternate means of power to a Class 1E ESF bus; this assumes there are two available offsite circuits. In the event an offsite circuit is lost for any reason, the function of the tie breaker is to close, and the offsite circuit that is supplying its normally connected Class 1E ESF bus is fully OPERABLE. With the tie breaker closed, then both Class 1E ESF buses are provided power from a single offsite circuit. The normally connected offsite circuit of the Class 1E ESF bus that is being supplied through the tie breaker shall be declared inoperable and the applicable Condition shall be entered and the Required Actions shall be performed. If the tie breaker does not close, then the associated Class 1E ESF bus will be supplied power from its associated DG. In this event, the associated offsite circuit is inoperable and the applicable Condition shall be entered and the Required Actions shall be performed. Capability of manually swapping to a standby transformer is not required to satisfy this SR. The 18 month Frequency of the Surveillance is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the 18 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SURVEILLANCE REQUIREMENTS (continued)

Table B 3.8.1-1 (page 1 of 1)
Relationship between Tie Breakers and Offsite Circuits

OFFSITE CIRCUIT	TRANSFORMER SUPPLYING POWER TO ESF BUS	TIE BREAKER	OFFSITE CIRCUIT AFFECTED BY TIE BREAKER
1A	Normal to 1ATC/1ETA	N/A	
	Normal to SATA/1ETA or 2ETA	N/A	
	Alternate to 1ATD/1ETB	1TD-7	1B
	Alternate to SATB/1ETB or 2ETB	1TB-7	1B
1B	Normal to 1ATD/1ETB	N/A	
	Normal to SATB/1ETB or 2ETB	N/A	
	Alternate to 1ATC/1ETA	1TA-7	1A
	Alternate to SATA/1ETA or 2ETA	1TC-7	1A
2A	Normal to 2ATC/2ETA	N/A	
	Normal to SATA/1ETA or 2ETA	N/A	
	Alternate to 2ATD/2ETB	2TD-7	2B
	Alternate to SATB/1ETB or 2ETB	2TB-7	2B
2B	Normal to 2ATD/2ETB	N/A	
	Normal to SATB/1ETB or 2ETB	N/A	
	Alternate to 2ATC/2ETA	2TA-7	2A
	Alternate to SATA/1ETA or 2ETA	2TC-7	2A

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 without exceeding predetermined voltage and frequency and while maintaining a specified margin to the overspeed trip. For this unit, the single load for each DG and its horsepower rating is as follows: Nuclear Service Water pump which is a 1000 H.P. motor. This Surveillance may be accomplished by:

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

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

As required by 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. The value of 63 Hz has been selected for the frequency limit for the load rejection and it is a more conservative limit than required by Reference 3.

The time, voltage, and frequency tolerances specified in this SR are derived from Regulatory Guide 1.9 (Ref. 3) recommendations for response during load sequence intervals. The 3 seconds specified is equal to 60% of a typical 5 second load sequence interval associated with sequencing of the largest load. The voltage and frequency specified are consistent with the design range of the equipment powered by the DG. SR 3.8.1.9.a corresponds to the maximum frequency excursion, while SR 3.8.1.9.b and SR 3.8.1.9.c are steady state voltage and frequency values to which the system must recover following load rejection. The 18 month Frequency is consistent with the recommendation of Regulatory Guide 1.108 (Ref. 10).

This SR is modified by a Note. In order to ensure that the DG is tested under load conditions that are as close to design basis conditions as possible, the Note requires that, if synchronized to offsite power, testing must be performed using a power factor ≤ 0.9. This power factor is chosen to be representative of the actual design basis inductive loading that the DG would experience.

SURVEILLANCE REQUIREMENTS (continued)

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 bus if the trip initiator can be corrected or isolated.

Although not representative of the design basis inductive loading that the DG would experience, a power factor of approximately unity (1.0) is used for testing. This power factor is chosen in accordance with manufacturer's recommendations to minimize DG overvoltage damage during testing.

The 18 month Frequency is consistent with the recommendation of Regulatory Guide 1.108 (Ref. 10) and is intended to be consistent with expected fuel cycle lengths.

SR 3.8.1.11

As required by Regulatory Guide 1.108 (Ref. 10), paragraph 2.a.(1), this Surveillance demonstrates the as designed operation of the standby power sources during loss of the offsite source. This test verifies all actions encountered from the loss of offsite power, including shedding of the nonessential loads and energization of the emergency buses and respective loads from the DG. It further demonstrates the capability of the DG to automatically achieve the required voltage and frequency within the specified time.

The DG autostart time of 11 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.

SURVEILLANCE REQUIREMENTS (continued)

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

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 10), paragraph 2.a.(1), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

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

SR 3.8.1.12

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

SURVEILLANCE REQUIREMENTS (continued)

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

SR 3.8.1.13

This Surveillance demonstrates that DG non-emergency protective functions (e.g., high jacket water temperature) are bypassed on a loss of voltage signal concurrent with an ESF actuation test signal. Non-emergency automatic trips are all automatic trips except:

a. Engine overspeed;
b. Generator differential current;
c. Low - low lube oil pressure; and
d. Voltage control overcurrent relay scheme.

The non-emergency 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. Currently, DG emergency automatic trips are tested periodically per the station periodic maintenance program.

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

SR 3.8.1.14

Regulatory Guide 1.108 (Ref. 10), paragraph 2.a.(3), requires demonstration once per 18 months that the DGs can start and run

SURVEILLANCE REQUIREMENTS (continued)

continuously at full load capability for an interval of not less than 24 hours. The DG starts for this Surveillance can be performed either from standby or hot conditions. The provisions for prelubricating and warmup, discussed in SR 3.8.1.2, and for gradual loading, discussed in SR 3.8.1.3, are applicable to this SR.

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

The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 10), paragraph 2.a.(3), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This Surveillance is modified by a Note. The Note states that momentary transients due to changing bus loads do not invalidate this test. Similarly, momentary power factor transients above the power factor limit will not invalidate the test.

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 11 seconds. The 11 second time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 10), paragraph 2.a.(5).

This SR is modified by two Notes. Note 1 ensures that the test is performed with the diesel sufficiently hot. The load band is provided to

SURVEILLANCE REQUIREMENTS (continued)

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 an hour at full load conditions prior to performance of this Surveillance is based on manufacturer recommendations for achieving hot conditions. Momentary transients due to changing bus loads do not invalidate this test. Note 2 allows all DG starts to be preceded by an engine prelube period to minimize wear and tear on the diesel during testing.

SR 3.8.1.16

As required by Regulatory Guide 1.108 (Ref. 10), 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 standby operation 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 standby operation when the DG is at rated speed and voltage, the output breaker is open and can receive an autoclose signal on bus undervoltage, and the load sequence timers are reset.

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 10), paragraph 2.a.(6), and takes into consideration unit conditions required to perform the Surveillance.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems.

SR 3.8.1.17

Demonstration of the test mode override ensures that the DG availability under accident conditions will not be compromised as the result of testing and the DG will automatically reset to standby operation if a LOCA actuation signal is received during operation in the test mode. Standby operation is defined as the DG running at rated speed and voltage with the DG output breaker open. These provisions for automatic switchover are required by Regulatory Guide 1.9 (Ref. 3).

SURVEILLANCE REQUIREMENTS (continued)

The requirement to automatically energize the emergency loads with offsite power is essentially identical to that of SR 3.8.1.12. The intent in the requirement associated with SR 3.8.1.17.b is to show that the emergency loading was not affected by the DG operation in test mode. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the emergency loads to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 10), paragraph 2.a.(8), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by a Note. The reason for the Note is that performing the Surveillance would remove a required offsite circuit from service, perturb the electrical distribution system, and challenge safety systems.

SR 3.8.1.18

Under accident and loss of offsite power conditions loads are sequentially connected to the bus by the automatic load sequencer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading of the DGs due to high motor starting currents. The load sequence time interval tolerance in Table 8-6 of Reference 2 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. Table 8-6 of Reference 2 provides a summary of the automatic loading of ESF buses.

The Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 10), paragraph 2.a.(2), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

SURVEILLANCE REQUIREMENTS (continued)

SR 3.8.1.19

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

This Surveillance demonstrates the DG operation, as discussed in the Bases for SR 3.8.1.11, 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 Frequency of 18 months takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with an expected fuel cycle length of 18 months.

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

SR 3.8.1.20

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

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

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

BASES

SURVEILLANCE REQUIREMENTS (continued)

must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations.

REFERENCES

1. 10 CFR 50, Appendix A, GDC 17.
2. UFSAR, Chapter 8.
3. Regulatory Guide 1.9, Rev. 2, December 1979.
4. UFSAR, Chapter 6.
5. UFSAR, Chapter 15.
6. 10 CFR 50.36, Technical Specifications, (c)(2)(ii).
7. Regulatory Guide 1.93, Rev. 0, December 1974.
8. Generic Letter 84-15, "Proposed Staff Actions to Improve and Maintain Diesel Generator Reliability," July 2, 1984.
9. 10 CFR 50, Appendix A, GDC 18.
10. Regulatory Guide 1.108, Rev. 1, August 1977 (Supplement September 1977).
11. Regulatory Guide 1.137, Rev. 1, October 1979.
12. ASME, Boiler and Pressure Vessel Code, Section XI.
13. Response to a Request for Additional Information (RAI) concerning the June 5, 2006 License Amendment Request (LAR) Applicable to Technical Specification (TS) 3.8.1, "AC Sources-Operating," Surveillance Requirement (SR) 3.8.1.13, (TAC NOS. MD3217, MD3218, MD3219, and MD3220), April 4, 2007.