

Tier 2 Chapter 8 Revision 4 to Revision 5 Change List

Item	Location (e.g., subsection with paragraph/sentence/item, table with column/row, or figure)	Description of Change
1	S8.1.1, 2 ND para., 4 TH sentence	Added new 4 TH sentence addressing the new ancillary diesel generators in this general introduction.
2	S8.1.3.2, 2 ND para., 1 ST sentence	Deleted “communications, lighting,” as there will be no lighting or communications loads fed directly from the nonsafety-related DC buses. Figure 8.1-2 Sheet 2 has been also been updated for consistency with this editorial clarification.
3	S8.1.5.2.1, 7 TH para.	Added new 7 TH paragraph, which discusses the new ancillary buses and ancillary diesel generators.
4	S8.1.5.2.3	Deleted the description of the Nonsafety-Related I&C Power Supply System. The control loads formally powered from the I&C Power Supply require regulated, diesel-backed, redundant, and uninterruptible power. These loads will be powered from the Nonsafety-Related Uninterruptible AC Power Supply.
5	S8.1.5.2.4, “General Design Criteria,” 4 TH bullet	As clarification, added the following reference to Subsection 3.1.2.8 to the discussion of GDC 17: “Subsection 3.1.2.8, “Criterion 17 – Electric Power Systems,” provides ESBWR electric power source availability requirements and conformance with Regulatory Guide 1.93.”
6	S8.1.5.2.4, “NRC Regulatory Guides,” 7 TH bullet	As editorial clarification, changed “Class 1E safety-related” to only “safety-related.”
7	S8.1.5.2.4, “NRC Regulatory Guides,” 11 TH bullet	Clarified the statement regarding hydrogen release to read, “The ESBWR Valve Regulated Lead Acid (VRLA) batteries’ recombination of hydrogen effectiveness is 99% while battery room temperature and charging voltage are within specified vendor limits during charging evolutions.”
8	S8.1.6, 2 ND and 3 RD sentences	As editorial clarification, changed “diesel-generators and/or (direct) AC power systems” to “diesel-generators and AC power systems.” Also, changed “the two diesel-generators” to “the diesel generators.”

9	Table 8.1-1	Added new Note 8 and showed “8” under the notes for GDC 17.
10	F8.1-1	Performed editorial clarifications to the figure for clarity and ease of utility implementation, including the addition of Note 6, deletion of the electric loads list, and “typical” FMCRD power centers on PIP-A and PIP-B.
11	F8.1-2	As editorial clarification, deleted the DC power panels for emergency lighting. There will be no DC emergency lighting. Also, changed standby battery charger feeds to the Swing Bus C23.
12	F8.1-4	As clarification, showed additional loads fed from the safety-related UPS. Added Note 2 and Note 3 and showed additional detail for new parallel redundant inverter configuration, as well as new ancillary power connections.
13	F8.1-5	As editorial clarification, showed “Standby Diesel Loads” on Load Groups A and B. Also, revised bypass feeds to be from same PIP bus as the normal feeds for the load groups.
14	F8.1-6	Deleted the Figure 8.1-6, which showed the Instrumentation and Control Power Supply System (Nonsafety-Related). The control loads formally powered from the I&C Power Supply require regulated, diesel-backed, redundant, and uninterruptible power. These loads will be powered from the Nonsafety-Related Uninterruptible AC Power Supply.
15	S8.2.2.2, “Applicable Criteria,” 2 ND bullet	As clarification, added the following reference to Subsection 3.1.2.8 to the discussion of GDC 17: “Subsection 3.1.2.8, “Criterion 17 – Electric Power Systems,” provides ESBWR electric power source availability requirements and conformance with Regulatory Guide 1.93.”
16	S8.2.3, 9 TH bullet	Deleted “(See 8.2.4-9-A).” The COLA item 8.2.4-9-A will be addressed fully in subsection 8.2.2.1.
17	S8.3.1.1, 15 TH para., 3 RD sentence	Added, “or the bus may be placed in the automatic transfer mode and remain powered from the alternate preferred power source (RATs),” to further clarify operation following restoration of UAT power.
18	S8.3.1.1, 16 TH para., 5 TH sentence	Added, “or the bus may be placed in the automatic transfer mode and remain powered from the alternate preferred power source (RATs),” to further clarify operation following restoration of UAT power.
19	S8.3.1.1.1, 3 RD para.,	Added the following statement back as the first sentence of

	1 ST sentence	the paragraph: “Two 6.9 kV PIP buses (PIP-A and PIP-B) provide power for the nonsafety-related PIP loads.” This statement was removed in Revision 4 and described in the change list as “duplicate information.” The intent of the statement never changed, and it was agreed in the 11/6/07 telecon with the Staff to replace the statement as editorial clarification.
20	S8.3.1.1.2, 1 ST para., 3 RD sentence	Changed “output terminals” to “input terminals” to make statement read, “The low voltage system begins at the input terminals of the medium voltage feeder breakers to the power center transformers.” This clarification will make 8.3.1.1.2 consistent with the boundary given in 8.3.1.1.1 for the boundary between of the medium voltage and low voltage systems.
21	S8.3.1.1.2, 3 RD para., 1 ST and 2 ND sentences	Revised to read, “13.8 kV PG and 6.9 kV PIP power is supplied from the respective switchgear buses with designated secondary voltage as shown in Figure 8.1-1 Sheets 1-3. The power centers supply power to motor loads, MCCs, and the ancillary diesel generator buses (see Figure 8.1-1 Sheets 2 and 3 and Figure 8.3-3).”
22	S8.3.1.1.2, “Motor Control Centers,” 1 ST para., 1 ST sentence	Removed, “99 kW and smaller” to make the statement read, “MCCs supply power to motors, control power transformers, process heaters, motor-operated valves and other small electrically operated auxiliaries, including 480 - 208/120V and 480 - 240/120V transformers.”
23	S8.3.1.1.3, “Safety-Related Uninterruptible AC Power Supply System,” 6 TH para., 4 TH sentence	Added new 4 TH sentence, which describes the parallel redundant operation of the two inverters in one division.
24	S8.3.1.1.3, “Safety-Related Uninterruptible AC Power Supply System,” 6 TH para., 5 TH sentence	Clarified that a static transfer switch is provided “for each inverter.”
25	S8.3.1.1.3, “Safety-Related Uninterruptible AC Power Supply System,” 6 TH para., 5 TH sentence	Changed “an inverter failure” to “failure of the division’s inverters,” which clarifies operation for the parallel redundant inverter configuration.

26	S8.3.1.1.3, “UPS Components,” 3 RD bullet	Changed “inverter failure” to “failure of each of the division’s inverters,” which clarifies operation for the parallel redundant inverter configuration. Also, deleted “and automatically switch to safety-related 480/120 VAC power.”
27	S8.3.1.1.3, “UPS Components,” 4 TH & 5 TH bullets	Clarified that there is one manual bypass switch and added the bullet for one regulating transformer, consistent with the parallel redundant inverter configuration. The addition of the regulating transformer to the list of “UPS Components” was a clarification requested by the Staff in the telecon held 11/6/07.
28	S8.3.1.1.3, “Operating Configuration,” 4 TH sentence	Changed “inverter failure” to “failure of both of the division’s inverters,” which clarifies operation for the parallel redundant inverter configuration.
29	S8.3.1.1.3, “Nonsafety-Related Uninterruptible Power Supply System,” 1 ST para., 2 ND sentence	Revised the statement to read, “UPS loads are divided into five load groups (load groups A, B, C, TSC-A, and TSC-B).” This clarification was requested by the Staff in the telecon held 11/6/07, as there has always been five nonsafety-related UPS load groups.
30	S8.3.1.1.3, “Nonsafety-Related Uninterruptible Power Supply System,” 3 RD para.	Clarified that the third nonsafety-related UPS provides power to loads in load group C. Also clarified the available power sources for UPS load group C. This clarification was requested by the Staff in the telecon held 11/6/07.
31	S8.3.1.1.4	Deleted the description of the Instrumentation and Control Power Supply System. The control loads formally powered from the I&C Power Supply require regulated, diesel-backed, redundant, and uninterruptible power. These loads will be powered from the Nonsafety-Related Uninterruptible AC Power Supply.
32	S8.3.1.1.5, “Safety-Related Electric Equipment Design Bases and Criteria”	As editorial clarification, changed “Class 1E” to “Safety-Related.”
33	S8.3.1.1.7, “Loss of Normal Preferred Power Source During Standby Onsite Power Source Paralleling Test,” 2 ND sentence	Added, “or the bus may be placed in the automatic transfer mode and remain powered from the alternate preferred power source (RATs),” to further clarify operation following restoration of normal preferred power.
34	S8.3.1.1.7, “Loss of Alternate Preferred	Revised the end of the sentence to form a new second sentence, “The affected bus may then be transferred back

	Power Source During Standby Onsite Power Source Paralleling Test,” 1 ST sentence	to the normal preferred power supply manually or the normal preferred power source automatically accepts the selected bus loads, if the bus was placed in the automatic transfer mode,” to further clarify operation on loss of alternate preferred power.
35	S8.3.1.1.8, “Ratings and Capability,” 3 RD bullet	Changed “1 minute” to “2 minutes.” This will allow for approximately 1 minute of pre-lube once the start signal is received, then 1 minute to start the engine and reach full speed.
36	S8.3.1.1.9	Added new Subsection 8.3.1.1.9, which describes the nonsafety-related ancillary diesel generators.
37	S8.3.1.2.1, “GDC 17, Electric Power Systems”	As clarification, added the following reference to Subsection 3.1.2.8 to the discussion of GDC 17: “Subsection 3.1.2.8, “Criterion 17 – Electric Power Systems,” provides ESBWR electric power source availability requirements and conformance with Regulatory Guide 1.93.”
38	S8.3.1.4.1, “Primary containment electrical penetration assemblies,” 2 ND para., 1 ST sentence	Revised to delete “including failure of upstream devices,” which was not technically accurate.
39	S8.3.1.4.1, “Reactor Protection System (RPS),” Item (8)	As editorial clarification, added “and Local Power Range Monitor (LPRM).” LPRM cables will be treated the same as SRNM cables, as was previously described.
40	S8.3.2.1, 2 ND para., 1 ST sentence	As editorial clarification, clarified that there are eight safety-related 250 VDC batteries, rather than battery systems.
41	S8.3.2.1, 3 RD para., 1 ST sentence	As editorial clarification, clarified that there are seven nonsafety-related batteries (five 250 VDC batteries and two 125 VDC batteries). The original statement describing the number of “DC systems” was not accurate.
42	S8.3.2.1.1, “Safety-Related Batteries,” 1 ST para., 1 ST sentence	Clarified “are each rated to exceed 72-hour station blackout conditions” to “ are together sized so that their total rated capacity will exceed the required battery capacity per division for 72-hour station blackout conditions.”
43	S8.3.2.1.2, “Safety-Related Batteries,” 2 ND para., 3 RD sentence	In accordance with the response to RAI 16.2-55 S01, added that battery sizing will include margin to compensate for uncertainty in determining the battery state of charge.

44	S8.3.2.1.1, “Safety-Related Battery Chargers,” 1 ST para., 1 ST sentence	Removed “silicon-controlled” to make the statement read, “The safety-related battery chargers are full-wave rectifiers.” This change will not alter the intent of the statement but will allow the flexibility to include the best technology available.
45	S8.3.2.1.1, “Safety-Related Battery Chargers,” 3 RD para., 1 ST sentence	Clarified the capabilities of each safety-related battery charger to be consistent with the requirements of IEEE 308 as well as design basis requirements.
46	S8.3.2.1.1, “125V and 250V Nonsafety-Related DC Systems Configuration,” 3 RD para., 1 ST sentence	Deleted “standby lighting,” as there will be no lighting fed directly from the nonsafety-related DC buses. Figure 8.1-2 Sheet 2 has been also been updated for consistency with this editorial clarification.
47	S8.3.2.1.2, “Nonsafety-Related Battery Chargers,” 1 ST para., 1 ST sentence	Removed “silicon-controlled” to make the statement read, “The safety-related battery chargers are full-wave rectifiers or an acceptable alternate design.” This change will not alter the intent of the statement but will allow the flexibility to include the best technology available.
48	S8.3.2.2.2, “Regulatory Guides,” 9 TH bullet	Clarified the statement regarding hydrogen release to read, “The ESBWR Valve Regulated Lead Acid (VRLA) batteries’ recombination of hydrogen effectiveness is 99% while battery room temperature and charging voltage are within specified vendor limits during charging evolutions.”
49	T8.3-3	Added Table 8.3-3, “250VDC Safety-Related Battery Nominal Load Requirements” and the associated notes. The loads assumed for each divisional battery are estimated nominal values. This change is in accordance with RAI 8.3-52 S03. Note that since the submittal of RAI 8.3-52 S03 and the attachment showing the DCD mark-up, the nominal loads given in the table have been updated to reflect more accurate estimated data, as previously discussed with the Staff.
50	T8.3-4	Added Table 8.3-4, “Safety-Related DC and UPS Nominal Component Data.” The data for the components, including sizing, is nominal and based on the preliminary nominal loads of Table 8.3-3. This change is in accordance with RAI 8.3-52 S04. Note that since the submittal of RAI 8.3-52 S04 and the attachment showing the DCD mark-up, the inverter output has been corrected to remain 1-phase 120 VAC and the battery charger size has been increased to reflect the more conservative guidance of IEEE 946-1992, as previously discussed with the Staff.

51	F8.3-1	Deleted one regulating transformer feed from each Isolation Power Center, as the new parallel redundant inverter configuration has only one regulating transformer per division.
52	F8.3-2	Revised the feeds for regulating transformers and standby battery chargers to match the changes on Figures 8.1-2 and 8.1-5.
53	F8.3-3	Added new Figure 8.3-3, which shows a functional configuration for the nonsafety-related ancillary diesel generators.
54	S8A.1.1, 4 TH para., 2 ND sentence	Removed the “500 kmil” value.
55	S8A.3.2, 2 ND sentence	Deleted the statement that there is no safety-related heat tracing, as it was technically inaccurate as of Revision 5.
56	S8A.3.2, 2 ND bullet, and Reference 8A-7	Deleted IEEE-622A, “Recommended Practice for the Design and Installation of Electric Pipe Heating Control and Alarm Systems for Power Generating Stations.” The standard has been withdrawn by the IEEE.
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