

**NEDO-33201**

**Section 12**

**Fire Analysis**

**Changes from Revision 2 to Revision 3**

Formatting & editorial changes have been made to improve consistency and readability. These changes include changing fonts in tables, removing excess spacing, correcting punctuation & spelling, and correcting grammar. Acronyms have been spelled out where appropriate.

<b>Item</b>	<b>Location</b>	<b>Description of Change</b>
1.	Global	Changed “FDPS” to “F3150”.
2.	S12, 1 <sup>st</sup> para.	Changed “fire analysis of the ESBWR PRA” to “fire PRA analysis for the ESBWR plant”.
3.	S12.1, 2 <sup>nd</sup> para.	Changed “non-significant” to “not significant”.
4.	S12.2, 2 <sup>nd</sup> to last para.	Sentence is revised to clarify that there was no exception for shutdown fire scenarios, which is bounding.
5.	S12.2.1, Assumption #5	In response to RAI 19.1-173, statements for spurious actuation are clarified.
6.	S12.2.2, Assumption #6	In response to RAI 19.1-162, this assumption is deleted since the fire area definitions are revised to reflect the separate fire areas in DCD Tier 2, Revision 5, Section 9A.
7.	S12.2.3, Assumption #8	Changed “actions” to “actuations”.
8.	S12.2.3, Assumption #9	In response to RAI 19.1-150 S01, assumption is modified for clarification.
9.	S12.2.3, Assumption #10, 4 <sup>th</sup> sentence	Changed from “Losses of both RCCWS trains, both instrument air trains, and both PIP buses ...” to “A loss of both RCCWS trains, both instrument air trains, or both PIP buses ...” for clarification.
10.	S12.2.4, Assumption #14, 1 <sup>st</sup> sentence	Changed “assumed” to “postulated”.
11.	S12.2.4, Assumption #15, 1 <sup>st</sup> sentence	Changed “fail one input to the component” to “fail one of multiple inputs to the component”. Changed “operability” to “function”.
12.	S12.2.4, Assumption #16	In response to RAI 19.1-173, statements for spurious actuation are clarified.
13.	S12.2.4, Assumption #18	In response to RAI 19.1-163, “typical” is deleted from the assumption. In bullet (c), changed “Div” to “Train”.
14.	S12.2.5, 4 <sup>th</sup> para.	Changed “valves” to “motors”.
15.	S12.2.5, Assumption #32	Changed “generated” to “postulated”.

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16.	S12.3, 3 <sup>rd</sup> para., 2 <sup>nd</sup> to last sentence	Changed “has” to “have”.
17.	S12.3.1, 2 <sup>nd</sup> para.	In response to RAI 19.1-171, the fire protection statement is revised to be consistent with ESBWR DCD Section 9.5.1.1, Power Generation Design Bases, for an acceptable version of the defense in depth criteria.
18.	S12.3.1, 5 <sup>th</sup> para.	In response to RAI 19.1-172, the fire barrier description is revised to be consistent with DCD Tier 1, Subsection 2.16.3.1.
19.	S12.3.1, last para.	Changed “with the potential to adversely affect safety” to “covered under the RTNSS program” for clarity.
20.	S12.3.2, 1 <sup>st</sup> para., 1 <sup>st</sup> sentence	Rewritten for clarity.
21.	S12.3.2.1, last para.	Deleted the last sentence because it is no longer an assumption.
22.	S12.3.2.3, 1 <sup>st</sup> para., 3 <sup>rd</sup> bullet,	Deleted the statement “the MCR fire will not actuate any DCIS controls other than trip the main generator”.
23.	S12.3.2.3, last para., last sentence	Deleted because DPS fire area is defined as F3150.
24.	S12.3.2.6, 1 <sup>st</sup> para., last sentence	Deleted “conservatively” for clarification.
25.	T12.3.1	Changed F3140 description from “Division VI Electrical” to “Division IV Electrical”.
26.	S12.4.1, 1 <sup>st</sup> para., 1 <sup>st</sup> bullet	Rewritten for clarification.
27.	S12.4.1, 1 <sup>st</sup> para., 2 <sup>nd</sup> bullet	Added “caused by a fire in a single fire area” for clarification.
28.	S12.4.1, 1 <sup>st</sup> para., 3 <sup>rd</sup> bullet	Replaced “any terminal” with “the remote shutdown panels” for clarity in the last sentence.
29.	S12.4.1, 4 <sup>th</sup> para.	Deleted the statements for spurious actuation for clarity. Added “loss of condenser due to the closure of MSIVs” in the 2 <sup>nd</sup> bullet for clarification.
30.	S12.4.1, 5 <sup>th</sup> para.	Deleted “the”.
31.	S12.4.1, 6 <sup>th</sup> para.	Deleted “typically” in the 1 <sup>st</sup> sentence. Changed “not significant contributors” to “low significance contributors” in the 2 <sup>nd</sup> sentence.

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32.	S12.5, 1 <sup>st</sup> para, last sentence	In response to RAI 19.1-173, statements for spurious actuation are clarified.
33.	S12.5, 2 <sup>nd</sup> para.	Changed “assumed” to “postulated” in the 2 <sup>nd</sup> to last sentence. Changed “Slight” to “Reasonable” in the last sentence.
34.	S12.5, 3 <sup>rd</sup> para	Added a note for cable types for clarification.
35.	S12.6.1.1, 1 <sup>st</sup> para.	Added “and failure of check valve” after “Spurious actuation of one GDCS Squib” to be consistent with Section 2 changes.
36.	S12.6.1.1, 2 <sup>nd</sup> para.	Removed “typically” in the 6 <sup>th</sup> and 9 <sup>th</sup> sentences. Changed “spurious actuation” to “spurious actuations of all load drivers” in the last sentence.
37.	S12.6.1.1, 3 <sup>rd</sup> para., last sentence	Rewritten for clarification.
38.	S12.6.1.1, last para., last sentence	Changed “no possibility” to “negligible possibility” for clarification.
39.	S12.6.1.3, 1 <sup>st</sup> para., 3 <sup>rd</sup> sentence	Deleted “Typically” for clarification.
40.	S12.6.1.4	In response to RAI 19.1-75, this section is updated with GEH response to address the smoke damage issues.
41.	S12.6.2, 4 <sup>th</sup> para., 2 <sup>nd</sup> sentence	Replaced “reach RCS boiling” with “uncover the core” for clarity.
42.	S12.6.2, 6 <sup>th</sup> para., 2 <sup>nd</sup> to last sentence	Changed “is assumed to” to “will” for clarification.
43.	S12.6.2, 2 <sup>nd</sup> to last para., last sentence	Deleted for clarification.
44.	S12.7.1, 1 <sup>st</sup> para.	Added reference number for NUREG/CR-6850.
45.	S12.7.1, 4 <sup>th</sup> para., 3 <sup>rd</sup> bullet, 1 <sup>st</sup> sentence	Rewritten for clarification.
46.	S12.7.1, 4 <sup>th</sup> para., 2 <sup>nd</sup> to last bullet	Rewritten for clarification.
47.	S12.7.2, 5 <sup>th</sup> para., 2 <sup>nd</sup> sentence	Changed “establish a correspondence in order to assign” to “map”.
48.	S12.7.2, 5 <sup>th</sup> para., 3 <sup>rd</sup> sentence	Changed “for” to “from”.

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49.	S12.8, 2 <sup>nd</sup> to last para.	Changed “CDF” to “CDF and LRF”.
50.	S12.8.1, 1 <sup>st</sup> para., last sentence	Changed “CDF” to “results”.
51.	S12.8.1, last para., last sentence	Changed “assumed to be” to “assigned a screening value of” for clarification.
52.	S12.8.2, 1 <sup>st</sup> para.	Deleted “the revision 2 of” in all bullets to remove references to Revision 2. Added “and Appendix 8A” in the 2 <sup>nd</sup> bullet for clarification.
53.	S12.8.2, 3 <sup>rd</sup> para.	Changed “The failures of cables” to “Cable failures” in the 1 <sup>st</sup> sentence. Changed “the particular signal” to “the particular division of signal” in the last sentence.
54.	S12.8.3.1, 1 <sup>st</sup> para., 1 <sup>st</sup> sentence	Added “for a fire in a single fire area” for clarification.
55.	S12.8.3.2, 2 <sup>nd</sup> para., last sentence	Changed “a backup to safety-related Q-DCIS and RPS” to “a backup to various safety-related Q-DCIS and RPS functions” for clarification.
56.	S12.8.3.3, 1 <sup>st</sup> para., last 3 sentences	In response to RAI 19.1-151 Supplement No. 1, the first paragraph is revised for clarification on remote shutdown panels.
57.	S12.8.3.3, 2 <sup>nd</sup> para., 4 <sup>th</sup> bullet	Editorial change.
58.	S12.8.3.3, 2 <sup>nd</sup> para., last bullet	Deleted the first sentence and last two sentences for clarification.
59.	S12.8.3.4, 1 <sup>st</sup> para., 1 <sup>st</sup> sentence	In response to RAI 19.1-173, statements for spurious actuation are clarified.
60.	S12.8.3.4, 2 <sup>nd</sup> para., last sentence	Deleted because it adds no value.
61.	S12.8.3.6, last para., last sentence	Changed “inter-division” to “inter-area” for clarification.
62.	S12.8.3.7, 1 <sup>st</sup> para., 1 <sup>st</sup> sentence	Added “unscreened areas of the” for clarification.
63.	S12.8.3.8, 2 <sup>nd</sup> para., last sentence	Deleted “offsite”.
64.	S12.8.4, 1 <sup>st</sup> para.	Added statement “Although success criteria for some systems may be changed for the shutdown model, no new components are added in the shutdown model.” for clarification.

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65.	S12.8.4, 3 <sup>rd</sup> para., 2 <sup>nd</sup> sentence	Added “that some of” for clarification.
66.	S12.8.4, last para.	Changed “as follows” to “below”.
67.	S12.8.4.1, 1 <sup>st</sup> para., last sentence	Deleted for clarification.
68.	S12.8.4.1, 2 <sup>nd</sup> para., last sentence	Changed “All these” to “These”.
69.	S12.8.4.5	In response to RAI 19.1-129 Supplement No. 1, this section is updated for clarification on main control room fire under shutdown conditions.
70.	S12.8.5, 1 <sup>st</sup> para., 1 <sup>st</sup> sentence	Changed “Level 2 fault tree models” to “Level 2 event trees, fault tree models”.
71.	S12.9.1, 1 <sup>st</sup> para.	Changed “of” to “for”.
72.	S12.10.1, heading	Deleted “Key” for clarification.
73.	S12.10.1, 1 <sup>st</sup> para., 1 <sup>st</sup> bullet, 2 <sup>nd</sup> sentence	Changed “or defense-in-depth (DCD) system redundancy” to “or only one system of defense-in-depth (DID) redundancy”.
74.	S12.10.1, 1 <sup>st</sup> para., 3 <sup>rd</sup> bullet, 1 <sup>st</sup> sentence	Rewritten for clarification.
75.	S12.10.2, heading	Deleted “Key” for clarification.
76.	S12.10.2, 1 <sup>st</sup> para., 1 <sup>st</sup> bullet, last sentence	Deleted “especially”.
77.	S12.10.2, 1 <sup>st</sup> para., 4 <sup>th</sup> bullet, 1 <sup>st</sup> sentence	Deleted “GDCS system (E50)”. Changed “significant” to “significantly” in the last sentence of sub-bullet b.
78.	S12.10.3, 1 <sup>st</sup> para	Added the links to sub-sections in NEDO-33201 section 11 for fire-related sensitivity studies.
79.	S12.10.3.1	In response to RAI 19.1-126 Supplement No. 1, new risk insights are added.
80.	S12.10.4	Added a new section on key insights and assumptions.