

Chapter 18 Changes From Revision 3 to Revision 4

Item	Location	Description of Change
1.	Global	Made editorial changes in numerous locations to remove excessive spacing, correct punctuation, delete repeated words, correct misspelling, and correct grammar. Spelled out acronyms where appropriate and edited Acronym list where needed. Changed GE to GEH where appropriate.
2.	Global	Changed NEDO-33217 to NEDE-33217 (Proprietary) and added subordinate NEDO plans to applicable sections
3.	Global	The word “reference” and “section” used in regular text was made lower case. Rewritten for clarity.
4.	Global	Revised references to conform to writer’s guide format. Grammar
5.	18.1, 3 rd para	Added “item 7 of DCD” before Tier 1. Make proper reference to DCD
6.	18.1, 4 th para	Removed “COL uses the” and added “are used” Use of term COL removed all activities have results summary reports in ITAAC and program turnover to licensee.
7.	18.1, Applicable Facilities	Removed phrase “High Level” from Task Analysis and corrected “safety-related function” to the plural “safety-related functions”. Term high level no longer used in TA approach
8.	18.1, Assumptions and Constraints (1)	Spelled out Man-Machine Interface System (MMIS) from COL comment. Rewritten for clarity
9.	18.1, Applicable HSIs, Procedures ...	Deleted “those” in front of systems from COL comment. Rewritten for clarity.
10.	18.1, next to last para	Removed “are safety related and”. Added “safety” before limits. Rewritten for clarity.
11.	18.1.1	Added bullet to list reference ABWR and other ABWR plants in response to RAI 18.2-8 S01
12.	18.1.1, bullet 6	Deleted parens around NUREG from COL comment. In response to customer comment.

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13.	18.1.1, bullet 8	Deleted parens around NUREG from COL comment. In response to customer comment.
14.	18.1.1, 2nd para	Deleted “acceptance” from design acceptance criteria in three places from COL comment. Avoid confusion with established DAC
15.	18.1.2	Added “is implemented” – for clarification.
16.	18.1.2, 2 nd Sentence	Added “Reference 18.1-1” before MMIS for proper clarification.
17.	18.1.2.2	Replaced “ESBWR EPGs” with “results from the HFE operations analysis (FRA, AOF, TA)” for consistency with operations analysis approach.
18.	18.1.3	Deleted “as defined by the design acceptance criteria”. Avoid confusion with established DAC
19.	18.1.3	Replaced MMIS and HFE Implementation plan with “Reference 18.1-1”. Comply to DCD Style Guide
20.	18.1.5.1, 1 st para	Replaced “switches” with controls in 2 places. Comply to DCD Style Guide and other guidance
21.	18.1.5.1, 3 rd para	Deleted sentence containing the phrase “mode-oriented master sequence controls”. Sentence unnecessary and phrase is confusing
22.	18.1.5.1, 4 th para	Corrected Section reference from 7.9 to “7”. Subsection deleted. (moved). Referenced section to avoid need to revise due to future changes
23.	18.1.5.1, 5 th para	Rephrased next to last sentence to “Spatially and functionally dedicated controls, which are safety-related qualified and divisionally separated, are available in the control room for selected operator control functions. Define aspects of dedicated
24.	18.1.5.2, 1 st para	Corrected term “non” with “nonsafety-related”. Grammar - Customer comment
25.	18.1.5.2, 2 nd para	Added “related” to “safety”. Proper use of term
26.	18.1.5.2, 2 nd para	Added “through the N-DCIS” after “the computer system” in last sentence. Distinguish nonsafety-related source

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27.	18.1.6, 2nd para	Replaced 1 st sentence with “Design criteria for the HFE activities are highlighted within sections 18.2 through 18.13, and provided in detail in Reference 18.1-1”. Comply to DCD Style Guide and other guidance – Use of references
28.	18.1.6, 2 nd para	Removed “acceptance” from design criteria. Avoid confusion with established DAC
29.	18.1.6, 3 rd para	Deleted “are specified”. Grammar
30.	18.2.1, 1 st para	Replaced “and MMIS and HFE Imp Plan” with “described in Reference 18.2-1”. Comply to DCD Style Guide and other guidance – Use of references
31.	18.2.1, 1 st para	Replaced “These provide” with “The plan provides”. Grammar - Customer comment
32.	18.2.1, 1 st para	Deleted comma. Grammar
33.	18.2.2(1)c	Added “TSC, EOF” to scope list. Correction - Customer comment. Grammar
34.	18.2.2(4)d.iii	Added “Development” before evaluation in 1 st item. Add development of solution to process
35.	18.2.2(4)f iv	Added “that” before are communicated
36.	18.2.2(4)f iv	Replaced “These” with “Personnel and organizations”. Grammar - clarification
37.	18.2.2(4)f iv	Added “TSC, EOF” to scope list. Correction - Customer comment
38.	18.2.2(4)f.iv	Replaced “local panels” with “LCSs”. Consistent use of term
39.	18.2.3(1)	Removed number (1) from first sentence and renumbered remaining list from COL comment. Correction - Customer comment
40.	18.2.3(2)	Changed reference from number (4) to number (3) in old para (2). Correction - Customer comment
41.	18.3	Added “process is conducted in accordance with References 18.3-1 and 18.3-2 and” after OER from COL comment. Comply to DCD Style Guide and other guidance – Use of references
42.	18.3	Added/modified Reference to OER plan. Comply to DCD Style

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		Guide and other guidance – Use of references
43.	18.3.1	Replaced “past” with “operating”. Scope to include current as well as past OE
44.	18.3.2, bullet 1	Deleted “identifying”. Grammar
45.	18.3.2, bullet 3	Deleted comma after tracking. Grammar
46.	18.3.2.1	Added “A collection of baseline design inputs from the system designs of predecessor plants is established in a ESBWR design baseline review record (BRR).” Then replaced “baseline review record” with “BRR” in last sentence. Describe BRR
47.	18.3.2.2, 1 st sentence	Deleted “to” at end of first sentence. Grammar
48.	18.3.2.2, 3 rd bullet	Deleted comma and added “to” after Has. Grammar
49.	18.3.2.3, 1 st sentence	Added to end “in the OER documentation and summarized in the results summary report”. Reference ITAAC item for Results Summary Report
50.	18.3.2.4, 1 st sentence	Added after includes “consideration of items applicable to the”. Grammar - clarification
51.	18.3.2.4, bullet 4	Made “analysis and evaluation of operational data” uppercase. Grammar - Customer comment
52.	18.3.2.4, bullet 6	Put “OERs” in parens. Grammar - Customer comment
53.	18.3.3, end	Added results summary report ITAAC item number in Table 3.3-1. Reference ITAAC item for Results Summary Report
54.	18.4	Added introduction to references. Comply to DCD Style Guide and other guidance – Use of references
55.	18.4.1	Added “Reference 18.4-2” for plan. Comply to DCD Style Guide and other guidance – Use of references
56.	18.4.1(3), 1 st para	Replaced “a separate report is” with “Reports are”. Grammar – clarification Corrected “Details FRA” with “Detailed FRA” and “economic” with “Economic FRA”. Correction

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57.	18.4.1(3), 1 st para	Added “A report also summarizes the results of the” before System Functional Gap Analysis. Grammar - clarification
58.	18.4.1, end	Added results summary report ITAAC item number in Table 3.3-1. Reference ITAAC item for Results Summary Report
59.	18.4.2(1)	Added Reference 18.4-3 for plan. Comply to DCD Style Guide and other guidance – Use of references
60.	18.4.2(3)	Corrected “Details FRA” with “Detailed FRA” and “economic” with “Economic FRA”. Correction
61.	18.4.2, end	Added results summary report ITAAC item number in Table 3.3-1. Reference ITAAC item for Results Summary Report
62.	18.5	Added introduction to References. Comply to DCD Style Guide and other guidance – Use of references
63.	18.5.1 (1)	Added Reference 18.5-2 for plan. Comply to DCD Style Guide and other guidance – Use of references
64.	18.5.1(1)b	Added “TSC, EOF, and applicable LCS” to scope. Correction - Customer comment
65.	18.5.1(3)	Corrected “Details FRA” with “Detailed FRA” and “economic” with “Economic FRA”. Correction
66.	18.5.1, end	Added results summary report ITAAC item number in Table 3.3-1. Reference ITAAC item for Results Summary Report
67.	18.6.2	Deleted “are addressed” and replaced “and addresses” with “are”. Grammar Added “including non-licensed operators, shift supervisor, shift technical advisor, instrument and control technicians, electrical and mechanical maintenance personnel, radiological protection technicians, chemistry technicians, and engineering support personnel” in response to RAI 18.6-12. RAI response
68.	18.6.3, 1 st sentence	Changed to read “The preliminary staffing assumption for a ESBWR unit is depicted in Table 18.6-1 and consists of the following onsite staffing by operators and senior operators licensed under 10 CFR Part 55.”. Added proper reference to Table
69.	Table 18.6-1	Relocated to end of section. Comply to DCD Style Guide and

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		other guidance
70.	18.6.3, last para	Replaced “The” with “A” and added “at the controls” after operator in 2 locations from COL comment. Grammar – Customer comment
71.	18.6.4	Added Reference 18.6-2 for plan and added “the” before staffing. Comply to DCD Style Guide and other guidance – Use of references
72.	18.6.4.1	Added “Operating experience review addresses the following issues”. Grammar – Customer comment
73.	18.6.4.2	Added “Functional requirements analysis addresses the following issues”. Grammar – Customer comment
74.	18.6.4.2	Deleted “Mismatches between” and “and their qualifications”. Consistency between AOF, TA, and S&Q plans and DCD – AOF allocates to man/machine, TA assigns tasks to specific staff, S&Q assesses assigned roles with respect to qualifications
75.	18.6.4.2, bullet 2	Added “in” after changes. Grammar – Customer comment
76.	18.6.4.3	Added “Task analysis addresses the following issues”. Grammar – Customer comment
77.	18.6.4.4	Added “HRA addresses the following issues”. Grammar – Customer comment
78.	18.6.4.5	Added “HSI Design addresses the following issues”. Grammar – Customer comment
79.	18.6.4.6	Added “Procedures development addresses the following issues”. Grammar – Customer comment
80.	18.6.5, 1 st sentence	Deleted “This section addresses how”. Grammar – Customer comment
81.	18.6.5, 2 nd sentence	Deleted “iterative nature of the” and added “is iterative”. Deleted “how” and “are addressed”. Grammar – Customer comment
82.	18.6.5, 3 rd sentence	Deleted “subsection discusses the” and replaced “to address compliance” with “supports Section 13.1”. Consistency with RAI response 18.6-11

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83.	18.6.5, last sentence	Added “described in Reference 18.6-1” to end. Comply to DCD Style Guide and other guidance – Use of references
84.	18.6.6	Added “analysis” after S&Q. Grammar – Customer comment
85.	18.6.6, end	Added results summary report ITAAC item number in Table 3.3-1. Reference ITAAC item for Results Summary Report
86.	Table 18.6-1	Modified table to be consistent with Table1 in S&Q Implementation Plan - Replaced “Provides overall supervision of plant operations” with “Acts as manager of and relief for shift supervisor” -Replaced “SRO” with “Senior Reactor Operator (SRO)”. Consistency with S&Q plan
87.	18.7	Modified sentence to read “HRA is performed in accordance with the project guidance described in Reference 18.7-1 and as a part of a PRA for both pre- and post-initiator human actions. The HRA activity is conducted in accordance with the HRA Implementation Plan, Reference 18.7-2.” Comply to DCD Style Guide and other guidance – Use of references
88.	18.7.1	Replaced “This section” with “Reference 18.7-1”. Comply to DCD Style Guide and other guidance – Use of references
89.	18.7.2, sentence 1	Added “are” after Has. Grammar – Customer comment
90.	18.7.2, 4th para	Added “, are valid” after sequences. Grammar - clarification
91.	18.7.2, 5th para	Added “the HRA” before quantification. Grammar – Customer comment Added space between “throughthe”. Grammar-Verifier comment Added “Of particular interest, the HRA assesses any manual actions operators are required to take for the Emergency Core Cooling system (ECCS) to operate properly” to address SRP requirement. SRP requirement Added “through the HRA model updates” after model. Deleted rest of para. Grammar - clarification
92.	18.7.2, para 7	Deleted 1 st sentence. Added “updates” after model. Removed comma after errors and added “with elements for”. Added

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		comma before as well as. Grammar - clarification
93.	18.7.3, end	Added results summary report ITAAC item number in Table 3.3-1. Reference ITAAC item for Results Summary Report
94.	18.7.4	Added COL Information section with “none”. Comply to DCD Style Guide and other guidance
95.	18.7.5	Added Reference section and references. Comply to DCD Style Guide and other guidance – Use of references
96.	18.8	Replaced “This section describes” with “References 18.8-1 and 18.8-2 describe”. Comply to DCD Style Guide and other guidance – Use of references Added “TSC, EOF” to scope. Correction - Customer comment Added “of HSI efforts are summarized in the HSI results summary report and are” after results. Added reference to RSR for clarification
97.	18.8 last sentence	Added “described in” before Reference. Grammar
98.	18.8.1	Added Reference 18.8-2 for plan. Comply to DCD Style Guide and other guidance – Use of references
99.	18.8.1(1)	Deleted (See Subsection 18.8.1(2) d). Unnecessary internal reference (avoid problems in future numbering changes)
100.	18.8.1(3)	Deleted “is identified” added “;”. Grammar – Customer comment
101.	18.8.1(3)	Deleted “are described”. Grammar – Customer comment
102.	18.8.1(3)b	Added new b “Final HSI design” with subitems i and ii. Added to address RG 1.206 content
103.	18.8.1(3), end	Added results summary report ITAAC item number in Table 3.3-1. Reference ITAAC item for Results Summary Report
104.	18.8.1(4) old b	Added “The Human Performance Monitoring (HPM) activity described in section 18.13 addresses the HSI change process”. Added reference to operational program in HPM
105.	18.9, 2nd para	Added Reference 18.9-2 for plan and Reference 18.9-1 for MMIS plan. Comply to DCD Style Guide and other guidance – Use of references

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106.	18.9, 2nd para	Correct “address” to “addresses”. Grammar – Customer comment
107.	18.9, 3rd para	Rephrased to “Reference 18.9-1 describes the process to verify that all functions and tasks linked to the plant procedures in the task analysis are properly addressed in the operating procedures. Clarify sentence
108.	18.9, 3rd para	Replaced “The MMIS implementation includes steps which provide” with “Reference 18.9-1 describes the process for”. Comply to DCD Style Guide and other guidance – Use of references
109.	18.9, 3rd para	Deleted “MMIS implementation” before process. Grammar - clarification
110.	18.9, 4 th para	Add period after copy. New sentence with “Procedures are written to HFE best practices to establish the following attributes”. Grammar – Customer comment
111.	18.9, 4 th para	Deleted last bullet. Moved with previous change – Customer comment
112.	18.9.1	Replaced first sentence with the objective “The objective of the procedure development activity is to provide the process, methods, and criteria for generating procedures and verifying that the integrated plant procedures are consistent with accepted HFE practices and principles.” Added activity objective – Customer comment
113.	18.9.1	Deleted “COL applicant’s”. Use of term COL removed; all activities have Results Summary Reports in ITAAC and program turnover to licensee
114.	18.9.2, 1 st sentence	Replaced “This” with “Activities under”. Ended sentence after Section 13.5. New sentence “Reference 18.9-1 describes the ..” Comply to DCD Style Guide and other guidance – Use of references
115.	18.9.2, 1 st para	Replaced “aspects” with “development described”. Clarify sentence
116.	18.9.2, bullets	Added new bullet “· Initiating events to be considered in EOPs, including those events in the design basis; and”. Added bullet to comply with all items contained in RG 1.206 section – Customer comment

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117.	18.9.2, 2nd para	Replaced “The subsection” with “ESBWR HFE Procedures Development Implementation Plan, Reference 18.9-2”. Comply to DCD Style Guide and other guidance – Use of references
118.	18.9.2, 2nd para, last sentence	Replaced “this section references ..” with “ the plan provides”. Grammar – support plan reference
119.	18.9.2, 2 nd set of bullets, bullet 6, Procedures Maintenance	Added after updates “after the plant is in operation is addressed in programs established in the Human Performance Monitoring (HPM) activity described in section 18.13. This process” . “How the COL” deleted. Added reference to operational program in HPM
120.	18.9.3	Added “TSC, EOF” to scope. Correction - Customer comment
121.	18.9.3, end	Added results summary report ITAAC item number in Table 3.3-1. Reference ITAAC item for Results Summary Report
122.	18.9.5	Added references. Comply to DCD Style Guide and other guidance – Use of references
123.	18.10	Added introduction for references. v
124.	18.10, 1 st para	Deleted “is coordinated”. Grammar-Verifier comment
125.	18.10.3, 1 st para	Replaced “This” with “The activities under this”, “is” with “are” and “describes” with “address. Deleted “training and how it”. Grammar - clarification
126.	18.10.3, 3 rd par	Removed comma after “objectives” and replace “include” with “includes”. Grammar-Verifier comment
127.	18.10.3, 4 th para	Replaced “including” with “include”. Grammar - Correction
128.	18.10.4	Deleted the stray colon in the sentence: :.....team to develop the: general approach.....” Grammar - Correction
129.	18.10.4.1, bullet 4	Added TSC to scope. Correction - Customer comment
130.	18.10.4.1, 2 nd bullets last bullet	Added TSC, EOF to scope. Correction - Customer comment
131.	18.10.4.4, 1 st	Changed sentence to read “The training program follows a

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	sentence	systematic approach described in the training development implementation plan, Reference 18.10-2.” Comply to DCD Style Guide and other guidance – Use of references
132.	18.10.4.4, 2nd sentence	Added “development” before implementation. Correction - Customer comment
133.	18.10.4.5, last para	Added to end of 1 st sentence “in collaboration with the programs established in the HPM for maintenance and update of the training program after the plant is in operation”. Added reference to operational program in HPM
134.	18.10.5, end	Added results summary report ITAAC item number in Table 3.3-1. Reference ITAAC item for Results Summary Report
135.	18.10.7	Added references. Comply to DCD Style Guide and other guidance – Use of references
136.	18.11, 1 st bullet (2)c	Replaced “EE” with “HFE”. Correction
137.	18.11.1	Replaced “NEDO-33217” with “Reference 18.11-1”. Comply to DCD Style Guide and other guidance – Use of references
138.	18.11.1(1)	Deleted “that are”. Grammar - clarification
139.	18.11.1(2)	Deleted “That” and replaced “includes” with “including”. Grammar - clarification
140.	18.11.1(2)a	Replaced “including” with “addressing”. Grammar - clarification
141.	18.11.1(3)	Replaced “That” with “The process for” and deleted “are conducted”. Grammar - clarification
142.	18.11.1(4)	Deleted “are evaluated”. Grammar - clarification
143.	18.11.1(4)	Corrected HIS to “HSI”. Correction
144.	18.11.1(5)	Added “Process by which” to beginning. Grammar - clarification
145.	18.11.1(6)	Deleted “completion is”. Reference ITAAC item for Results Summary Report. Grammar - clarification
146.	18.11.2, end	Added results summary report ITAAC item number in Table 3.3-1.

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147.	18.12	Added Reference 18.12-2 for plan. Comply to DCD Style Guide and other guidance – Use of references
148.	18.12, 1 st para	Deleted 2 nd and last sentences containing COL applicant. Replaced “implementing organizations” with “implementation team” in 3 rd sentence. Use of term COL removed; all activities have Results Summary Reports in ITAAC and program turnover to licensee
149.	18.12, 1 st para	Replaced NEDO-33217 with “Reference 18.12-1”. Comply to DCD Style Guide and other guidance – Use of references
150.	18.12, 1 st para	Added space in “inreference”. Grammar-Verifier comment
151.	18.12, 2 nd para	Deleted last sentence with COL applicant. Comply to DCD Style Guide and other guidance – Use of references
152.	18.12.1	Added scope statement “The “as-built” confirmations, verifications, and validations described in the Design Implementation plan apply to the COL plants constructed using the ESBWR standard plant design. The ESBWR standard plant design against which the “as-built” comparison is made is derived from the revised HSI design and the standard plant procedures and training documents. These include the corrections and improvements from the HF V&V process.” Added scope statement – Customer comment
153.	18.12.2.2	Deleted “training to incorporate plant-specific reference information into the body of the documents. Replaced “plant specific” with “standard plant” in response to RAI 18.12-1. RAI response
154.	18.12.3, last bullet	Replaced “COL applicant” with “licensee” and deleted text after licensee. Added proper reference to licensee
155.	18.12.3, end	Added results summary report ITAAC item number in Table 3.3-1. Reference ITAAC item for Results Summary Report
156.	18.13	Added statement to introduce references “The HPM program and the planned activities to establish it are provided in the HPM implementation plan, Reference 18.13-2.” Comply to DCD Style Guide and other guidance – Use of references
157.	18.13.1	Deleted “for MMIS designer or the COL applicant”. Use of term COL removed; all activities have Results Summary Reports in

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		ITAAC and program turnover to licensee
158.	18.13.2. bullet 1, 2 nd -	Replaced “Accidental” with “Abnormal”. Grammar – Customer comment
159.	18.13.3, 3rd para	Last sentence, removed comma after corrective action and replaced “license” with “licensed”. Grammar – Customer comment
160.	18.13.3, 5th para &6	Added “process” after HPM. Grammar – Customer comment
161.	18.13.3, 1 st list of bullets	<p>Add to list of bullets</p> <ul style="list-style-type: none"> o Maintenance and control of updates for: <ul style="list-style-type: none"> - HRA/PRA - Function Requirements Analysis (FRA) - Function Allocation (FA) - Staffing and Qualifications - HSI changes - Procedures - Training program - Personnel retraining <p>Added to clarify operational programs to be addressed by HPM</p>
162.	18.13.4, end	Added results summary report ITAAC item number in Table 3.3-1. Reference ITAAC item for Results Summary Report
163.	18.13.6	Added references. Comply to DCD Style Guide and other guidance – Use of references