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MFN 07-334

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U.S. Nuclear Regulatory Commission
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Washington, D.C. 20555-0001

Subject: **Submittal of "ESBWR DCD Chapter 18, Human Factors Engineering - RAI to DCD Roadmap Document"**

As requested by the NRC in Reference 1, the following ESBWR DCD Chapter 18, Human Factors Engineering - RAI to DCD Roadmap Document is being submitted to the NRC for review and use. Enclosure 1 contains GHNEA's RAI to DCD Roadmap Document.

The information provided in the Roadmap Document are our responses to the subject Chapter 18 RAI's and Supplemental RAI's. These RAI responses (in the Resolution Description column of Enclosure 1) are considered to be GHNEA's formal response to the RAIs. The original responses continue to apply, except as modified by the Resolution Description information in Enclosure 1.

Note that RAIs 18.5-18 S01, 18.8-12 S01, 18.8-43 S01, 18.8-44 S01, and 18.8-45 S01 have not yet been resolved. GHNEA will provide new responses to these RAI Supplements. The responses to these RAIs will be provided to the NRC by July 31, 2007.

If you have any questions or require additional detail regarding the information provided, please contact me.

Sincerely,

/Kathy Sedney for

James C. Kinsey
Project Manager, ESBWR Licensing

D068

NRD

Reference:

1. Email from AE Cubbage to DL Lewis, *List of Chapter 18 RAIs for Roadmap Request*, dated 5/18/07

Enclosures:

1. MFN 07-334– ESBWR DCD Chapter 18, Human Factors Engineering - RAI to DCD Roadmap Document

cc: AE Cubbage USNRC (with enclosures)
RE Brown GHNEA /Wilmington (with enclosures)
GB Stramback GHNEA /San Jose (with enclosures)
eDRF: 0000-0069-6585

Enclosure 1

MFN 07-334

ESBWR DCD Chapter 18, Human Factors Engineering - RAI to DCD Roadmap Document

Chapter 18 RAI to DCD Roadmap Document

The following Chapter 18 Roadmap lists the RAI number and where in the DCD the RAI is addressed. Likewise, a resolution is presented in the "Resolution Discussion" column for the associated RAI.

The following is an explanation of the columns in the RAI roadmap for HFE (chapter 18) RAIs.

COL	Title	Description
A	RAI NO	
B	SEC	The RAI section number used to sort the entries
C	#	The RAI number within the section used to sort entries
D	NRC Supplemental	Y (yes) indicates the item represents a supplemental question from the NRC. N (no) indicates the item represents original RAI question
E	DocName/Question	Document name in question for original RAI items, or the NRC title given to the supplemental question
F	Resolved	RAI status. "From NRC list" indicates that the item was confirmed by NRC as resolved. "From GE response" indicates that the item is resolved with the GE response.
G	Plan	The plan that is referred in the resolution description. There may be more than one document involved in the resolution.
H	Section	The section of the plan referred in the resolution description. The applicable section should be next to the plan or in a list for the plan.
I	Resolution Description	A brief description of the resolution to the question.

The following RAIs are not resolved and GE will provide a new response to follow. These are bolded in the document:
RAIs 18.5-18, 18.8-12, 18.8-43, 18.8-44, 18.8-45.

The following RAIs are listed as resolved by GE response and include documents or other demonstration to be provided at the audit scheduled for July 25, 2007:
RAIs 18.4-8, 18.4-20, 18.5-5, 18.5-25, 18.5-28, 18.8-1, 18.8-2, 18.8-10, 18.8-15, 18.8-35.

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
	3	2	N	LTR NEDO-33262	From NRC list			
	3	4	N		From NRC list			
	3	5	N		From NRC list			
	3	9	N		From NRC list			
	3	10	N		From NRC list			
	3	12	N		From NRC list			
	3	13	N		From NRC list			
	3	17	N		From NRC list			
18.3-18	3	18	N	DCD Tier 2	From NRC list			
	3	18	N		From NRC list			
18.4-2	4	2	N	LTR NEDO-33219	From NRC list			

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.4-2	4	2	N	LTR NEDO-33220	From NRC list			
18.4-14	4	14	N		From GE response			
18.4-14	4	14	Y	Results of Prior Evaluations	From GE response			The documents in question were made available to the NRC in the audit. However, the new approach to operations analysis presented in the audit demonstrated that there is little reliance on the predecessor analysis.
18.4-19	4	19	N	LTR NEDO-33219	From NRC list			
18.4-24	4	24	N	DCD Tier 1	From NRC list			
18.4-24	4	24	Y	DCD Tier 1, ITAAC	From NRC list			Tier 1 Table 3.3-1 has been revised removing the implementation plans and accurately describing results summary reports conforming to guidance in the SRP.
18.6-1	6	1	N	DCD Tier 2	From NRC list			
18.6-1	6	1	N	LTR NEDO-33217	From NRC list			
	6	1	Y	Clarification of Procedure Development Plan	From NRC list			

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
	6	2	N	LTR NEDO-33266	From NRC list			
	6	2	Y	Clarify the scope of the staffing analysis	From NRC list			
	6	3	N	LTR NEDO-33266	From NRC list			
	6	4	N	LTR NEDO-33266	From NRC list			
	6	4	Y	Clarify the screening criteria	From NRC list			
	6	5	N	LTR NEDO-33266	From NRC list			
	6	6	N	LTR NEDO-33266	From NRC list			
18.6-6	6	6	Y	Clarify the methodological details of NEDO-33266	From NRC list			
18.6-10	6	10	N	DCD Tier 1	From NRC list			

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
	6	10	Y	Update of S&Q ITAAC	From NRC list			
18.7-1	7	1	N	LTR NEDO-33267	From NRC list			
18.7-2	7	2	N	LTR NEDO-33267	From NRC list			
18.7-3	7	3	N	LTR NEDO-33267	From NRC list			
18.7-4	7	4	N	LTR NEDO-33267	From NRC list			
18.7-6	7	6	N	LTR NEDO-33267	From NRC list			
18.7-11	7	11	N	LTR NEDO-33267	From NRC list	33267	4.2.3	11.b Modified per RAI
18.7-12	7	12	N	LTR NEDO-33267	From NRC list	33267	4.2.1	Modified per RAI
18.7-13	7	13	N	LTR NEDO-33267	From NRC list	33267	4.2.4	Change per RAI
18.7-14	7	14	N	DCD Tier 1	From NRC list	Tier 1	3.2	Plan deliverables removed. All ITAAC items replaced with results summary reports per RAI enclosure

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.7-14	7	14	Y	RAI on Tier 1	From NRC list	DCD	Tier 1 Table 3.3-1	Tier 1 table 3.3-1 revised to remove LTR plans and include a results summary report for each activity constructed following the guidance in the SRP.
18.7-15	7	15	N	DCD Tier 2	From NRC list	DCD 2	18.7.2	New Tier 2 revision has removed bullets and summarized method. Plan 33267 now contains details of method (implementation 4.0).
18.7-15	7	15	N	LTR NEDO-33267	From NRC list	33267	4	Bullets removed. New method section 4 contains the details.
18.7-15	7	15	Y	Commitments in DCD	From NRC list	DCD	Tier 2 18.7.2 18.7.3	See 18.7.2 for qualitative description of the HRA activities 26A6642 BX.Rev 3. Also 18.7.3 lists the activities which use the risk-important human actions from the HRA
18.0-4	0	4	N	LTR NEDO-33217	From GE response	33217	4.1.6	Role of RG 1.174 described in detail in section 4.1.6.2 and 4.1.6.4. More detail provided in HRA plan 33267. Defense in Depth updated in section 1.1.3(3). Risk important HA described in Fig 4.1.1-2 in 33217 and further detail provided in OER 33262.
18.2-1	2	1	N	LTR NEDO-33217	From GE response			Simple clarification of MMIS and HFE same as HF Engineering Implementation Plan and the plans now reflect this
18.2-3	2	3	N	DCD Tier 2	From GE response	33217	1.2(1)	Addressed in 33217 Section 1.2(1)

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.2-6,2-7	2	6	Y	Clarify the amount of time people are part of the HFE Team	From GE response	33217	3.2.3(1) 3.1.4	Since the time of the response, we provided the team member names and backgrounds for full time technical engineers and full time SROs working on the HFE activities at the proprietary session of the audit. Since then we have added personnel and continue to add. Each of the results summary reports will provide names and backgrounds of the team members who worked on the activity. If the staff wants to address the issue further, an update of the team can be provided at the July 25, 2007 audit meeting.
18.2-8	2	8	Y	Update DCD and HFE Program Plan to include this RAI response	From GE response	33217 DCD	3.2.3(1) 18.1.2	The response is added to the MMIS and HFE plan and DCD Rev. 4.
18.2-9	2	9	N	LTR NEDO-33217	From GE response			All plans now reference MMIS and HFE instead of ESBWR Program Management Plan
18.2-10	2	10	Y	Provide detail informatio n or reference specific items regarding the general process	From GE response	33217	3.1.4.2	General process tools are contained in GE internal engineering procedures (EOPs, ESIs,). Some of these titles are provided, the detailed procedures are available for NRC review.

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
				managem ent tools??				
18.2-11	2	11	Y	What HFE requireme nts are passed on to the subcontra ctor.	From GE response	33217	3.1.4.2(14)	Vendor, supplier, and contractor efforts are governed by the GE engineering procedures (see samples list). The specific requirements will be the applicable requirements for the scope of effort for the subcontracted effort. For example, to specify HSI for the operator's console some requirements might be generated from the Task Analysis, many will be contained in the HFE Style Guide based on NUREG-0700 guidance, and some will be established from the operating experience reviews from the project's SRO members. The requirements in this instance are established in the HSI plan [4.1.7.3(2)].
18.2-15	2	15	N	LTR NEDO-33217	From GE response	33217	2	Draft Standard 1574 removed from 33217
18.2-16	2	16	Y	Update HFE Program Plan to include this RAI response.	From GE response	33217	3.2.3(1)(7)(8)	This response incorporated in 3.2.3 (1), (8)
18.2-17	2	17	N	LTR NEDO-33217	From GE response	33217	2.3.1	MMIS and HFE references all the plans and provides summaries of their content

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.2-17	2	17	Y	Update to HFE Program Plan to identify and reference the specific detailed implement ation plan for each HFE activity.	From GE response	33217	2.3.1	Rev 2 has excerpts from the plans (section 4) describing their content and all plans are referenced.
19.2-37	2	37	N	DCD Tier 2	From GE response	DCD 2 33217	18.1 3.2.4.5	DCD Rev 4 states "The standard guidance and EPGs are used to develop and validate site-specific severe accident mitigation guidelines and procedures that satisfy NEI 91-04 Rev 1." A detailed description of this process is addressed in 33217, section 3.2.4.5.
	3	1	Y	Need to audit the ABWR SFRA Report referenced in the response.	From GE response			Report provided and audited during the audit

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
	3	8	Y	Update OER Plan to incorporate RAI response	From GE response	33262	3.2.3.5	The OER response to RAI 18.3-8 has been added to the OER plan in section 3.2.3.5
	3	9	Y	Clarify response to RAI 18.3-9	From GE response			This question was reviewed in audit. While there are possible human actions, no human action was considered in the PRA and PRA results were sufficient. GE will select highest risk HAs as risk-important HAs
	3	11	Y	Update OER Plan to incorporate RAI response	From GE response	33262	5.1	The OER summary report will include the "Results of OER of previous nuclear power plant HSI designs". This statement is added to section 5.1, second paragraph.
	3	14	Y	Address the OER risk-important information as described in DG-1145	From GE response	33262	3.2.4	The DG-1145 write-up has been added to the OER pan section 3.2.4
	3	15	Y	Update OER Plan to incorporate RAI response	From GE response	33262	5.1	The OER response regarding the Events Tracking System has been added to section 5.1 Results Summary Report.

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
	3	16	Y	Update OER Plan to incorporate RAI response	From GE response	33262	3.2.3.4	The response to RAI has been added to section 3.2.3.4 Classification
18.3-20	3	20	N	LTR NEDO-33217	From GE response	33217	3.1.4.3 App A	Admin procedure provided in Appendix A. Details of what will be entered into HFEITS is described in section 3.1.4.3 and Fig 3.1.4-2
	3	20	N	LTR NEDO-33262	From GE response	33262	4.1.3.3	Added the criteria for establishing issues in the HFE Issue Tracking System.
18.3-21	3	21	N	DCD Tier 2	From GE response	DCD 2	18.3	DCD Tier 2 revised. New section 18.3 now consistent with 33262.
	3	18 19	Y	Clarify responses to RAI 18.3-18, 18.3-1.	From GE response	33262	5.1	The words have been added to provide sources and a issue summary. There will be a complete RSR.
18.4-1	4	1	N	LTR NEDO-33219	From GE response	33219		Plan rewritten to illustrate the change to a top-down analysis of plant and system functions (all figures replaced).
18.4-1	4	1	N	LTR NEDO-33220	From GE response	33220		Plan rewritten to illustrate the change to a top-down analysis of plant and system functions (all figures replaced).

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.4-1 item g	4	1	Y	Planned implement ation of Function Allocation	From GE response			The original RAI numbering submitted was revised. The new RAI number that this response refers to is 18.6-7. The BRR was a topic of the audit, and it was also discussed at the audit, that GE would not be relying on the predecessor FRA, AOL, and TA. The new top down approach effectively starts with a fresh analysis for both the plant level and system level approaches. This RAI should be resolved.
18.4-3	4	3	N	LTR NEDO-33219	From GE response	33219	4.1.3.5	Response to RAI not incorporated. The new top down plant FRA is no longer based on this list. Critical Functions have not been identified by the HFE process; however, they will be provided in the results summary report.
18.4-4	4	4	N	LTR NEDO-33219	From GE response	33219	4.1.3.5	Plan rewritten to illustrate that a high-level analysis will be performed to identify critical safety functions and their supporting system functions.
18.4-5 & 18.4-6	4	5	Y	Update or clarify safety goals and sub-goals	From GE response	33219	4.1.3.2	The response concerning the BRR is no longer applicable. With the new operations analysis approach presented at the audit, the plant level safety goals will be the foundation of the plant level analysis. This will establish the functions which support emergency planning activities and availability-related subgoals including AG-4, Shutdown and Refueling.
18.4-7	4	7	N	LTR NEDO-33219	From GE response	33219	Figure 1	Plan rewritten to illustrate the inter-relation with other plans (HRA, OER etc.) and the iterative nature of the Operational Analysis; specifically, the FRA. Reformatted the plan to align with a standard HFE implementation plan template.

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.4-7	4	7	Y	Clarify the details of the functional analysis methodology	From GE response	33220 33219	a. Fig2 c. 4.1 a. Fig 3 c. 1.2	The statements questioned in the RAI have been omitted and the inconsistencies removed in subsequent revisions, but the response is still valid. a. The PRA as an input to the process is included in numerous sections of the AOF (3.1.1.5, 3.1.1.6, 3.1.1.7, 4.1.2, and Fig 2) and the FRA (1.2, 3.3.3, 4.1.2, 4.2.2, Fig 3) b. Task analysis will address staff assignments, workload, and task coordination. c. Events list referred to in RAI is deleted, but top down plant analysis will address plant level safety functions which will encompass the events and the PRA will provide input as stated before for major events.
18.4-8	4	8	N	LTR NEDO-33220	From GE response			Appendix with process for one system not provided - Flow charts provided which detail process. An example will be provided in the NRC audit scheduled for July 07
18.4-8	4	8	Y	Appendix to NEDO 33220	From GE response			A separate example was not included in the plan. An example will be provided in the NRC audit scheduled for July 07
18.4-9	4	9	Y	Commitment to the Methodology	From GE response	33220	3.1.1.2 4.1	Plan is re-written with a defined process and a commitment to the process as exampled in 3.1.1.2 and 4.1

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.4-10	4	10	N	LTR NEDO-33220	From GE response	33220 33221	3.1.1.5 4.2.2 4.2, 4.2.6 4.2.3.5	The revised plan incorporates the basis of the response, but because of the new approach, the specific references in the document are changed/deleted. Allocation of function at both plant and system level is included (33220:3.1.1, 3.1.1.5) and the allocation is carried into the task analysis (33221: 4.2.2) and reviewed in the context of task needs and workload (33221: 4.2, 4.2.3.6), and verified in the context of simulated scenarios (33221: 4.2.3.5(2))
18.4-11	4	11	N	LTR NEDO-33220	From GE response	33220	3.1.1(1) 4.1.3	This is resolved in the revision.
18.4-12	4	12	N	LTR NEDO-33220	From GE response	33220	2.3(4)	NUREG-0711 Rev 2 is the source document for the plan
18.4-12	4	12	Y	Agreement with NUREG-0711, Rev. 2	From GE response	33220	2.3(4)	Revision takes guidance from NUREG-0711 Rev 2. Previous references to figures and guidelines from old revision are omitted.
18.4-13	4	13	N	LTR NEDO-33220	From GE response	33276 33220	3.4(2) Figure 1	The revised plans are integrated into an operational analysis (Figure 1), so that the allocation (as well as the FRA) is revisited as the task analysis proceeds. Changes to anyone of these plans affects the other. The V&V will confirm the final allocation in simulated scenarios (33276:3.4(2))
18.4-15	4	15	N	LTR NEDO-33220	From GE response	33220		This table is omitted in the revision and the criteria to which it referred is not used in the allocation process.

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.4-16	4	16	N	LTR NEDO-33220	From GE response	33220		Figure 21 deleted
18.4-16	4	16	Y	Function Allocation Process Clarifications	From GE response	33220		The statement has been removed from the revised plan.
18.4-17	4	17	N	LTR NEDO-33219	From GE response	33217	3.1.4.2(15)	Life cycle maintenance provided. (see 33217:3.1.4.2(15)). Plans re-written with a consistent operations analysis approach.
18.4-17	4	17	N	LTR NEDO-33220	From GE response	33220		Plans re-written with a consistent operations analysis approach.
18.4-17	4	17	Y	Clarify inconsistencies between FRA and FA	From GE response	33220 33219		An integrated top down approach termed operations analysis was presented at the audit. The operations analysis is a combination of the FRA, AOF, and TA. As pointed out in the RAI, these activities are interrelated, and the plan revisions were accomplished with this guidance in mind. The COL responsibility for maintaining the HFE infrastructure remains in the DCD, NEDO-33217, and NEDO-33278
18.4-18	4	18	N	LTR NEDO-33219	From GE response	MFN 06-401	Enclosure 2	The referenced section was omitted in the revision. The plant goals included in the plant level analysis is defined as a process in section 4.1.3, was provided in the Task Analysis RAI response enclosure 2 (MFN 06-401), and was presented in the audit.
18.4-18	4	18	Y	Complete details regarding safety	From GE response	33220	4.1.3	

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
				related sub-goals				
18.4-20	4	20	N	LTR NEDO-33220	From GE response			New revision deleted this section and statement, however the results will be documented in an electronic database. The database is the XML product demonstrated to the NRC in the last audit. In the July07 audit, a database example for a system will be provided.
18.4-20	4	20	Y	Content of Function Allocation	From GE response			No mention is made in the revised NEDO 33220 of the database. However, the FRA database uses an XML format, and the AOF will add its elements to the database. Likewise the task analysis will continue to add elements onto the database. The database was demonstrated and explained at the audit. In the July 07 audit, a database example for a system will be provided.
18.4-21	4	21	N	LTR NEDO-33220	From GE response	33220	5	The statement in the revised plan is deleted.
18.4-23	4	23-1	N	LTR NEDO-33220	From GE response	33220		Figure 20 is deleted for the approach in the revised plan
	4	21-2			From GE response	33220	5	Operations personnel are employed in the new approach. A chart with team personnel vs. activity involvement was provided in the audit. There is no equivalent position of a "chairperson" in the new plan. The team members and their backgrounds will be provided in the results summary report.

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
	4	21-3			From GE response	33220	4.1.3.1	The procedure for the allocation decisions is provided in 4.1.3.1 and the flow chart Figures 3 and 4.
	4	21-4			From GE response	33220		These considerations are deleted in the revised plan. Whereas these are important factors in job design and satisfaction, they are beyond the scope of the ESBWR standard plant design allocation of function activity. The physical environment will be a design consideration, but not in allocation of function.
	4	21-5			From GE response	33220		These steps have been deleted in the revised plan. Cognitive support will be determined and evaluated in the task analysis. As stated in 18.4-21(4), the job satisfaction is beyond the scope of the ESBWR standard plant design allocation of function activity.
	4	21-6			From GE response	33220		The tradeoff studies have been deleted from the revised plan.
	4	21-7			From GE response	33221	4.2.3.5	Dynamic evaluations will be performed as soon as the training process begins with the simulator. The task analysis plan section 4.2.3.5 provides for task validations on the simulator.
18.5-1	5	1	N	LTR NEDO-33221	From GE response	33221	1.2	New scope stated and does not include screening or use of ABWR analyses

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.5-1	5	1	Y	Integration of Addendum into NEDO 33221	From GE response	33221	4.1.2 3.2.4	The DCD has been revised to incorporate the top down operations analysis described in the NRC audit. The audit answered all of these clarifying questions, but each is briefly addressed: The NEDO 33221 is completely revised along with 33219 and 3320 to provide a consistent approach to FRA including a plant level function analysis addressing the ESBWR safety functions and a system level addressing the functions of the system designs. The BRR continues to establish the baseline for the system design, and serves as a resource to the design engineers for source documents and information. The PRA/HRA provides a key input into the process providing the risk significant HAs and event sequences of concern to enter into the analysis. Based on the plant level analysis exercising all critical safety functions, all functions and tasks associated with the transient and abnormal operating conditions will be addressed.
18.5-2	5	2	N	LTR NEDO-33221	From GE response	33221	1.2, 3	New scope statement provided that is consistent with top down approach. The new approach is described in section 3.
18.5-3	5	3	N	LTR NEDO-33221	From GE response	33221	3.2.4	The term Critical tasks is dropped in new approach. Critical safety functions will be established from FRA

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.5-5	5	5	N	LTR NEDO-33221	From GE response	33221	3.2.4 Figure 2 4.1, 4.2	Approach selected and described Fig 2 revised Step by step process established in new revision Example not provided, but a sample was delivered in audit. A full system example will be presented in the July 07 audit.
18.5-5	5	5	Y	Clarification of Methodology Selection (Subquestion A)	From GE response	33221	3.1.4 4.1.3	Operational sequence diagrams are not a chief product of the revised analysis. The primary use of these diagrams was to analyze the sequential elements of the tasks. This will be accomplished by providing time and workload estimates to the tasks and examining the serial tasks assigned to a particular operator for a specific event. In this way the task database can be used to analyze any event by serially linking the tasks associated with the mitigation response and the staffing assignments from the S&Q and AOF activities. To complete the event analysis, the informational tasks (decisions which will link the combinations of functions), and their time and workload assessment will be defined in the task analysis. The results are then analyzed to ensure that there is sufficient time and capacity (physical and cognitive workload) for the operator to complete assignments.
18.5-5	5	5	Y	Clarification of Figure 2 of NEDO 33221 (Subquestion B)	From GE response	33221	Figure 2, 3	Figure was removed and replaced with figures describing the step-by-step analysis.

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.5-5	5	5	Y	Provision of a step-by-step process (Subquestion C)	From GE response	33221	3.1.4, 3.2.4 4.1, 4.2	Revised approach provides the step-by-step process that was presented and discussed in the NRC audit.
18.5-6	5	6	N	LTR NEDO-33221	From GE response	33221	2	References and methods updated in revision
18.5-6	5	6	Y	Clarification of References	From GE response	33221	2	This question of references is resolved in the new revision.
18.5-7	5	7	N	LTR NEDO-33221	From GE response		4.1.2	Revised section is clear that data is from analyses
18.5-8	5	8	N	LTR NEDO-33221	From GE response	33221	4.1.3.1	Screening not used in new approach Task description not used as an approach in revision
18.5-9	5	9	N	LTR NEDO-33221	From GE response	33221		New approach does not use the "statements", eliminating the issue
18.5-10	5	10	N	LTR NEDO-33221	From GE response	33221	4.2	New top down approach using a plant level analysis and system analysis which assesses the RAI issue
18.5-13	5	13	N	LTR NEDO-33221	From GE response	33221		Redundancy does not exist in new revision
18.5-14	5	14	N	LTR NEDO-33221	From GE response	33221	3.1.4 4.1.3.6	Activity and figure referenced was deleted in revision New approach is to identify error in simulator use (latent) and workload assessment (active).

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.5-15	5	15	N	LTR NEDO-33221	From GE response			Approach has been revised and paragraph deleted, but response that these (table top, walk through, simulator) are not mandatory is still applicable.
18.5-16	5	16	N	LTR NEDO-33221	From GE response			B. New approach does not begin with objectives of display system C. Table deleted
18.5-16	5	16	Y	Clarification on the use of task analysis results by HSI designers (Subquestion A)	From GE response	33221	3.1.4, 4.1.2	The system design does not proceed independently from the HFE analysis. In fact, in the revised top down operations analysis, the system designers are the owners of the system functional requirements analysis. The designers work in cooperation with the HFE team, chiefly the team SROs, to establish the system functions and needs including the parameters and their characteristics. The task analysis then uses the system functions to describe tasks and the informational and control needs to accomplish the tasks. The specific needs are then compared to the system designs to ensure they will support the task needs. Since the HSI are digital, the list of parameters displayed and their characteristics are very flexible and easily revised. If a key parameter were to be missing, it would be added to the system design.
18.5-17	5	17	N	LTR NEDO-33221	From GE response	33221	5.1	Names and background of team to be provided in RSR as per 0711 guidance
18.5-18	**5**	**18**	**N**	**LTR NEDO-33221**				**The response to the original RAI will be modified and provided in a subsequent letter.**

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.5-18	**5**	**18**	**Y**	**Clarification on the use of workload analysis**				**The response to the original RAI will be modified and provided in a subsequent letter.**
18.5-19	5	19	N	LTR NEDO-33221	From GE response	33221 33267	1.2 3.1.4 4.1 4.1	Risk important HAs are input to the TA from the HRA/PRA and used to establish priority. Answer to RAI is addressed in HRA (33267:4.1)
	5	20	N	LTR NEDO-33221	From GE response	33221 33267	1.2 3.1.4 4.1 4.1	New approach does not use the term critical tasks. Critical actions to plant safety will be developed in top down approach
18.5-20	5	20	Y	Identification of Critical Tasks	From GE response	33221 33267	1.2 3.1.4 4.1 4.1	The reference to critical task identification is deleted from the revised Task Analysis Implementation plan. The proper use of this concept should be risk important Human Actions (HA) which are identified in the HRA/PRA to the response and communicated to SFRA, AOF, Task Analysis, HSI, and all activities for special emphasis as identified in the individual plans.
	5	21	N	LTR NEDO-33221	From GE response			Critical tasks not used in new approach. Error in figure reference deleted.
	5	22	N	LTR NEDO-	From GE response	33221	4.2.4	These outputs are described in revised section

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
				33221				
18.5-22	5	22	Y	Identification of task requirements	From GE response	33221	4.1.4 4.2.4 5.1	The revised plan discusses the output of the high-level task analysis and the detailed task descriptions, and the results summary report that will describe these.
	5	23	N	LTR NEDO-33221	From GE response	33221	3.1.5	Reference to "define system design goals" has been changed. New approach states "identify and document requirements for tasks performance"
	5	24	N	LTR NEDO-33221	From GE response	33221	4	Revision consistency applies top down approach and task analysis results rather than HSI design is the focus
18.5-24	5	24	Y	Evaluation of Task Analysis Results	From GE response	33221	4.1.3	The elements in question are not included in the new revision. The revised plan focuses on the process to be applied in the analysis of the tasks. This was presented and discussed at the audit.
	5	25	N	LTR NEDO-33221	From GE response	33217	3.1.4.2(4)(6)	Task data form deleted in new approach. New form to be established in work plan per (33217:3.1.4.2(4)(6)). Work plans will be available for review in July 07 audit.
	5	26	N	LTR NEDO-33221	From GE response			New approach does not use a subset of tasks so that all tasks associated with the functions defined are identified and analyzed
	5	27	N	LTR NEDO-33221	From GE response		3.2.4	Minimum inventory is not defined, but information and control needs will be established in the operations analysis for the actions necessary to perform crew tasks

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.5-27	5	27	Y	Identification of Minimum Inventory	From GE response		Tier 1 Table 3.3-1, item 6d	Given the uncertainty about the term "minimum inventory", GE has committed to adding the "list of instruments that complies with RG 1.97" in ITAAC, with the intent that this satisfies "minimum inventory" . GE will abide by the definitions currently under NRC and industry discussions. The GE minimum inventory will be established by task analysis output.
	5	28	N	LTR NEDO-33221	From GE response	33217	3.1.4.2(4)(6)	Data form for TA has yet to be developed, but will include the elements of the form in the old appendix A. Alarm information will be included. New form to be established in work plan per (33217:3.1.4.2(4)(6)).
	5	29	N	LTR NEDO-33221	From GE response	33221	4.1.4 Figure 1	Description in response is correct. Figure 1 shows relationships.
18.5-30	5	30	Y	Clarification of changes to the DCD Tier 2 material	From GE response	DCD	DCD Tier 2 18.5.1(2) b and c	DCD Tier 2 Rev 3 does address the top-down approach. At the time of the response, the DCD revision was complete including the revised task analysis approach.
18.5-31	5	31	N	DCD Tier 1	From GE response	DCD Tier 1	3.2	Table updated to specify a results summary report
18.5-31	5	31	Y	Clarification of changes to the DCD Tier 1 material	From GE response	DCD Tier 1	Tier 1 Table 3.3-1, item 6	Since the time of the question, response and the supplemental question, the Tier 1 ITAAC table has been revised to comply with guidance provided, and was described in the audit.

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
	5	32	N	LTR NEDO-33221	From GE response	33221		Title includes Implementation Plan
	6	8	Y	Effect of overall staffing levels on plant safety and reliability	From GE response	Fig 2 4.3 4.4c 4.2.1 4.2.2 4.2.3 4.3.3		Revised Fig 2 provided in the new plan shows the relationship between the HRA and S&Q and this was discussed in the audit. The revised S&Q describes the interactions with the HRA in sections (33266:4.3) and (33266:4.4c). The specific question of the HRA importance is described in the HRA (33267:4.2.1). Other HRA qualitative methods are described in (33267:4.2.2). The iterative character of the process is described in (33267:4.2.3). The final look from the HRA perspective of the staff performance is described in (33267:4.3.3).
18.7-5	7	5	N	LTR NEDO-33267	From GE response	33267	2.5(7)	The reference has been changed to the IEEE conference.
18.7-7	7	7	N	LTR NEDO-33267	From GE response	33267	4.2	Para change per RAI
18.7-7	7	7.0	Y	Risk-important (R-I) Human Actions (HAs)	From GE response	33267	3.2.1 4.2	The initial list of human actions with a potential for risk contribution will be in the phase 0 HRA summary report. The criteria and approach for determining risk important human actions are provided in section 3.2.1 and the process for identifying additional actions through interaction with the HFE tasks is addressed in the third paragraph of section 4.2.

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
	7	7.1	Y	Issue 1- manual v. auto actions	From GE response	33267	3.1, 4.2	The allocation of functions activity in the operations analysis will establish the manual actions. In the case of the ESBWR the passive features and automation of the safety-related systems virtually eliminate the need for the safety-related human actions required for design basis events (e.g., manually start a safety system). These design features reduce the CDF to a mean value much lower than the plants used as the basis for the NRC risk regions in RG 1.174. As a result the risk boundaries associated with the risk regions in RG 1.174 are far above the ESBWR baseline risk. Hence, the ESBWR basic events representing HIs do not become important contributors to plant risk on an absolute basis.

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
	7	7.2	Y	Issue 2- Table 19.1-3 is not discussed and does not list values or criteria	From GE response	33267	3.2	These will be provided in the HRA initial results summary report for rev 1 of the PRA. Summary: To evaluate the risk impact of the HIs for the beyond design basis events a relative risk approach is used. First, risk sensitive actions that support ESBWR safety for beyond design basis events are identified in both the PRA and through the top down HFE operational analysis. Sensitivity analyses using the FV, RAW and RRW described above on the to basic events related to HIs human action tasks in are used to create a listing of the top risk contributors on a relative basis. This listing is generated in the PRA and is compared with the top down operational analysis to identify gaps and support requantification for the PRA. On a relative scale the HIs with a FV greater than 0.1 and RAW of 2.0 for CDF and LERF are subjected to the greatest detail in the HFE tasks, even though the absolute risk values are far below regions I and II described in NUREG-1764 (NRC, 2004).
	7	7.3	Y	Issue 3- operator actions not clearly identified in Table 19.1-3	From GE response	33267	3.2 4.2	The operating assumption is that these will be automated actions with the operator in a monitoring role with manual backup in the case of automation failure. The allocation of function will complete the determination of manual actions. The approach described in issue 2 is followed for these actions

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
	7	7.4	Y	Issue 4- with justifying incomplete PRA status, insights related to functional allocation may be lost	From GE response	33267	Figure 3 4.2.2 4.2.3 4.2.4	The functional allocation and detailed task information from the operation analysis are key inputs to the refinement of both the HRA and the PRA. After the initial listing of risk-important human actions from the PRA (labeled PRA/HRA probabilistic importance evaluation in Fig 3), the allocation and task details are used to expand the risk important actions (HRA qualitative evaluation for HFE tasks in Fig 3). This re-analysis is used to update the HRA and PRA (iteration loop).
	7	7.5		It is not clear if actions are manual or automatic in CD sequences in 19.2.3.1.1	From GE response	33267	3.2 4.2	See answer to issues 1, 3, and 4.

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
	7	7.6	Y	It is not clear from Table 19.2-3 which items are risk-important Human Actions and it seems not to include all activities called for in the HRA implement ation plan	From GE response	33267	4.2	The Risk Important actions modeled in the PRA are listed and screened in the HRA initial results summary report. From the ESBWR PRA model as described in DCD Tier 2 Chapter 19 Rev 1, September 2006, Tables 19.1-3, 19.2-1 and 19.2-3 list important components, systems functions, tasks and event initiators considered in the ESBWR PRA model and PRA models of previous BWR designs. Table 19.1-3 lists hardware elements that are important. The human interactions for these hardware elements including manual operation (if assigned in the allocation of functions), maintenance, repair, and backup to automatic functions are defined during the operational analysis by the HFE team. These results are then employed as described in item 18.7-7(4).
	7	7.7		Table 19.2-3 incomplet e	From GE response	33267	4.2	The human actions in these events will be identified in the operations analysis. See response to 18.7-7(4).

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
	7	7.8	Y	No operator actions for first 72 hrs - Is this from PRA? Are human actions in PRA from the pre-72 hrs	From GE response	33267	4.2	The initial baseline ESBWR PRA study is used as the starting point for defining risk-important HA tasks. The ESBWR design objective is to avoid the need for operator actions for the first 72 hours following an initiating event for the design basis events. The types of human actions from the initial PRA are actions such as misposition valve (either latent Type A, or commission type C). These are addressed in initial HRA and are described in the HRA results summary report. The operations analysis will identify and analyze human actions supporting these events. See response for 18.7-7(4).
	7	7.9	Y	Was error of commissio n modeled in PRA?	From GE response	33267	3.2.3	Errors of commission are addressed as follows: The Risk Important actions modeled in the PRA, are compared with other PRA studies and with important OER events. Data from the OER provide error modes, including potential examples of errors of commission (EOC). The results are listed and screened In the HRA and documented in the HRA results summary report. Errors of commission from the initial results include premature depressurization.
18.7-8	7	8	N	LTR NEDO-33267	From GE response	33267	3.2	Para change per RAI
18.7-8	7	8	Y	Use of Risk Measures	From GE response	33267	3.2.1	Addressed in last paragraph of 3.2.1
18.7-9	7	9	N	LTR NEDO-33267	From GE response	33267	1.2	Bullets Change per RAI

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.7-9	7	9	Y	Level 2 and External Events PRA	From GE response	33267	4.2	Committed to in 4.2 paragraph 6
18.7-10	7	10	N	LTR NEDO-33267	From GE response	33267	1.1 A1.2 4.2.3 4.3	Change per RAI Editorial change per RAI Modified per RAI
18.7-10	7	10.2	Y	Methodology Clarification	From GE response	33267	4.2.1	Language changed to indicate that we will develop a PRA/HRA suitable for risk monitoring. (Last line in 4.2.1)
18.7-10	7	10.6	Y	Methodology Clarification	From GE response	33267	4.3	All assumptions were reviewed and GE commits in the NEDO to the process assumptions. Assumptions are verified during the early part task simulations or the final V&V .(see last paragraph of 4.3)
18.8-1	8	1	N	LTR NEDO-33268	From GE response	33268	general	Present tense used - Style Guide not complete. Process in new revision makes clear what is complete and what is not. References updated.
18.8-1	8	1	Y	Revisions to NEDO-33268	From GE response	DCD 2	18.1.2 18.8.1	The HF Style Guide (HF Manual) draft will be delivered to the NRC in July. The style guide is in the revised DCD. GE is aware of the NRC sensitivity to guidance vs requirements in the guidelines documents and will in the future use the proper terminology. However, some of the plans are issued with term requirements when it should be guidelines.

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.8-2	8	2	N	LTR NEDO-33268	From GE response	33268 33217	3.2 1.4.2(4)	The style guide providing specific criteria will be provided in July. Plan provides a process. Step by step is developed in a work plan for each activity per guidance in MMIS and HFE Imp plan (33217:1.4.2(4))
18.8-3	8	3	N	LTR NEDO-33268	From GE response	32368	3.2	Commitment to NUREG 0700 and support documents
18.8-4	8	4	N	LTR NEDO-33268	From GE response	32368	3.2	Style guide to provide specifics
18.8-6	8	6	N	LTR NEDO-33268	From GE response	32368	5.1	Results Summary Report specifies compliance
18.8-6	8	6	Y	Use of RG criteria	From GE response	32368	3.3.5.14 5.1	Revised plan includes criteria from RG 1.97 and IEEE 497
18.8-7	8	7	N	LTR NEDO-33268	From GE response	32368	4.1.3	Process committed to TSC, EOF and LSC with safety-related function
18.8-8	8	8	N	LTR NEDO-33268	From GE response	32368	2	References updated
18.8-8	8	8	Y	Use of industry standards	From GE response	32368	Section 2	Reference list has been revised and updated. New list contains all documents referenced in RAI 18.8-1
18.8-9	8	9	N	LTR NEDO-33268	From GE response	32368	3.1.1 3.1.4 3.3.1 4.1.2	Sections modified to demonstrate use of OER in HSI design process

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.8-9	8	9	Y	Use of other control room experienc e	From GE response	32368	3.1, 3.1.1, 3.2.1, 3.3.1, 3.3.5.6, 3.3.5.8 4.1.2, 4.3.2	Commitment to and integration of the OER data and information from predecessor plants including ABWRs is established in the revised plan. The specific sources are established in the OER plan.
18.8-10	8	10	N	LTR NEDO-33268	From GE response	32368	3.2	Appendix maintained as a reference for operating experience. Commitment to style guide for criteria
18.8-10	8	10	Y	Use of HF principles	From GE response	DCD 2	18.1.2 18.8.1	The HF Style Guide (HF Manual) draft will be delivered to the NRC in July. The style guide is in the revised DCD.
18.8-12	**8**	**12**	**N**	**LTR NEDO-33268**			**4.3.4.16**	**The response to the original RAI will be modified and provided in a subsequent letter.**
18.8-12	**8**	**12**	**Y**	**Clarificatio n of implicit data**				**The response to the original RAI will be modified and provided in a subsequent letter.**
18.8-13	8	13	N	LTR NEDO-33268	From GE response	33268	4.1.2	Inputs from operations analysis which includes task analysis is defined. As to the minimum inventory see response 18.8-47.
18.8-13	8	13	Y	Specificati on of min inventory	From GE response			See first response
18.8-14	8	14	N	LTR NEDO-33268	From GE response	33268 33219	4.1.2 4.1.4	Process has been revised to get input of the parameters to be displayed from the operations analysis. The list of parameters is established in the FRA (33219:4.1.4).

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.8-14	8	14	Y	Identification of displayed parameters	From GE response			See first response
18.8-15	8	15	N	LTR NEDO-33268	From GE response	33268	3.2	The style guide providing specific criteria will be provided in July. Plan provides a process.
18.8-15	8	15	Y	Style guide status	From GE response			See first response
18.8-16	8	16	N	LTR NEDO-33268	From GE response	33268	4.1.4	Guidance for Computer-based procedures is included in style guide and the output from concept
18.8-16	8	16	Y	Alarm design	From GE response			See first response
18.8-17	8	17	N	LTR NEDO-33268	From GE response	33268	4.1.3 4.3.4.8 4.3.4.10 4.3.4.12 3.2	Anthropometric considerations added and style guide added to establish criteria
18.8-17	8	17	Y	Use of an anthropometric database	From GE response			See first response
18.8-18	8	18	N	LTR NEDO-33268	From GE response	33268	3.3.5.1	Style guide provides placement and form of control principles

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.8-18	8	18	Y	Design of Controls	From GE response			See first response
18.8-19	8	19	N	LTR NEDO-33268	From GE response	33268	4 3.2	MCC removed from text. WDP will be in the Main Control Room and control and display requirements (minimum inventory) is established by operations analysis input. Guidance for placement of controls in style guide.
18.8-19	8	19	Y	Fixed position controls and displays	From GE response			See first response
18.8-20	8	20	N	LTR NEDO-33268	From GE response			No LTR change
18.8-21	8	21	N	LTR NEDO-33268	From GE response			same response to 18.8-13. Any list provided is only for example. Parameter list established in operations analysis.
18.8-21	8	21	Y	Display of critical parameters	From GE response			See first response
	8	22	N	LTR NEDO-33268	From GE response	33268	3.2	Style guide will include guidance on alarms
18.8-22	8	22	Y	Alarm suppression	From GE response			See first response
18.8-23	8	23	N	LTR NEDO-33268	From GE response			see RAI 18.8-13

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.8-23	8	23	Y	Parameters displayed in MCR and RSS	From GE response	33268	4.1.2 4.1.3	Inputs and process describe how parameters are selected for display.
18.8-24	8	24	N	LTR NEDO-33268	From GE response	33268		Present tense maintained. Task analysis not complete.
18.8-24	8	24	Y	MCC profiles	From GE response	33268	4.1.3	Process for input of operations analysis information is described in revised plan
18.8-25	8	25	Y	Allocation of function	From GE response			This appears resolved in the response. No change to LTR.
18.8-26	8	26	N	LTR NEDO-33268	From GE response	33268		Reference to annunciator philosophy contained in DCD is deleted from 33268
18.8-27	8	27	N	LTR NEDO-33268	From GE response	33268	4.3.4.3	33268 revised throughout to properly use allocation with respect to allocation of function in 33220.
18.8-28	8	28	N	LTR NEDO-33268	From GE response	33268		Phrase concerning plant-specific design constraints is removed from 33268
18.8-28	8	28	Y	Display design constraints	From GE response			See first response
18.8-29	8	29	N	LTR NEDO-33268	From GE response			No Ltr change
18.8-30	8	30	N	LTR NEDO-	From GE response			No Ltr change

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
				33268				
18.8-31	8	31	N	LTR NEDO-33268	From GE response	33268	4.3.4.6	The term techniques is used to refer to HFE tools instead of procedures
18.8-31	8	31	Y	Clarification of terms	From GE response			See first response
18.8-32	8	32	Y	Use of Criteria in selecting design and evaluation methods	From GE response	33268	4.3.4.6	The statement in the original plan was in error and should have referred to the previous section 4.7.1. Section 4.3.4.6 in the revised plan describes the design evaluation, which includes the list of evaluation methods and a revised list of criteria for selecting the techniques. The statement with the error has been removed and the plan is clear on evaluation methods and criteria for selection.
18.8-33	8	33	N	LTR NEDO-33268	From GE response	33268	Figure 5 3.3.5.6	Figure is still included, because it has basic methods.
18.8-33	8	33	Y	Display design constraints	From GE response	33217	1.4.2(4)	Additional description of evaluation methods will be established in teamwork plans per MMIS and HFE Implementation plan guidance (33217:1.4.2(4)) and will be input to the style guide.
18.8-34	8	34	N	LTR NEDO-33268	From GE response	33268		Figure removed
18.8-34	8	34	Y	Methods of evaluation 1	From GE response	33217	1.4.2(4)	Additional description of evaluation methods will be established in teamwork plans per MMIS and HFE Implementation plan guidance (33217:1.4.2(4)) and will be input to the style guide.

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.8-35	8	35	N	LTR NEDO-33268	From GE response	33217 33268	1.4.2(4) 3.3.5.6	Additional description of evaluation methods will be established in teamwork plans per MMIS and HFE Implementation plan guidance (33217:1.4.2(4)) and will be input to the style guide.
18.8-35	8	35	Y	Methods of evaluation 2	From GE response			See previous response
18.8-36	8	36	N	LTR NEDO-33268	From GE response	33268	3.2 4.2	Style guide added to address criteria
18.8-36	8	36	Y	NEDO guidance and style guide	From GE response			See previous response
18.8-37	8	37	Y	Clarification of "HSI Report"	From GE response	33268	5.1	A separate section 5.1 titled Results Summary Report describes the content of the HSI final report. This report is placed in Tier 1 ITAAC.
18.8-38	8	38	N	LTR NEDO-33268	From GE response	33268	3.2	Statement referred has been removed, but section 3.2 also implies 0700 guidance as requirements
18.8-39	8	39	N	LTR NEDO-33268	From GE response			See 18.8-1, style guide
18.8-39	8	39	Y	Style guide level of detail	From GE response			See previous response
18.8-40	8	40	N	LTR NEDO-33268	From GE response	33268	Fig 1	Use of these terms eliminated in new revision to eliminate confusion. Simulator added to Figure 1

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.8-40	8	40	Y	HSI Verificatio n	From GE response			See previous response
18.8-41	8	41	N	LTR NEDO-33268	From GE response	33268	3.2	Element added was the style guide see 18.8-1
18.8-41	8	41	Y	Design inputs	From GE response	33268	2.3	Guidance is appreciated and adopted. NUREG/CR-6635 was not referenced in the new revision.
18.8-43	8	43	N	LTR NEDO-33268				The response to the original RAI will be modified and provided in a subsequent letter.
18.8-43	8	43	Y	Treatment of specific HSI issues				The response to the original RAI will be modified and provided in a subsequent letter.
18.8-44	8	44	N	LTR NEDO-33268				The response to the original RAI will be modified and provided in a subsequent letter.
18.8-44	8	44	Y	SPDS				The response to the original RAI will be modified and provided in a subsequent letter.
18.8-45	8	45	N	LTR NEDO-33268		33268	4.3.4.18	The response to the original RAI will be modified and provided in a subsequent letter.
18.8-45	8	45	Y	SPDS in TSC and EOF				The response to the original RAI will be modified and provided in a subsequent letter.
18.8-46	8	46	Y	IEEE 497 variables	From GE response			Response clarified the question and no NEDO change was proposed.

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.8-47	8	47	Y	Minimum Inventory	From GE response	33268 DCD 2	5.1 18.1.3.2	The NEDO plan commits to "a list of instruments that complies with RG 1.97 and supporting analysis". The DCD chap 18 states that the operations analysis defines a minimum set of controls, displays, and alarms that allow the operators to perform the actions specified in the EOPs and the important operator actions identified in the PRA. As the staff is aware, the concept of "minimum inventory" is a question the industry is still trying to define. GE will comply with the guidance from the outcomes of the NRC and NEI on-going discussions.
18.8-48	8	48	Y	ITAAC	From GE response	DCD Tier 1	Table 3.3-1	ITAAC items have been revised and the planning documents removed.
18.8-49	8	49	N	LTR NEDO-33268	From GE response	33268 DCD 2	3.3.5.1 18.1.3.1	DCD Tier 2 and 33268 documents are consistent on the topic of standard design features
18.8-49	8	49	Y	Standard features descriptio n	From GE response			See previous response

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.9-1	9	1	Y	Clarification of Procedure Development Plan	From GE response	33274	3.1.3 3.1.5(2) 4.1.2(4) Fig 2 3.1.3 it 6 4.1.4.4 Fig 1	RAI 18.9-1a RAI 18.9-1b Changed to reflect both BWR and ABWR EOP procedures and OE input into ESBWR EOPs RAI 19.9-1c RAI 19.9-1d RAI 19.9-1e Clarified that the specifics of 'continuously updated' would be defined by the Operational Analysis and HSI Design portions of the HFE process. RAI 18.9-1g RAI 18.9-1h Added Procedure development with inputs from system engineer, HRA/PRA, and task analysis. Removed HFE guideline statement from HSI task verification header
18.9-1	9	1a	N	LTR NEDO-33274	From GE response	33274	3.1.3 3.1.5(2) 4.1.2(4) Fig 2	3.1.1 deleted, 3.3 para 1 deleted. Added analysis of ESBWR EOP deviations from those of previous BWRs and ABWR RAI 18.9.1a Added EPG/SAG Rev 2 as an input to the HFE program during HSI procedure development
18.9-1	9	1b	N	LTR NEDO-33274	From GE response	33274	3.1.3	Incorporated analysis of differences in content between the ESBWR and generic BWROG guidance
18.9-1	9	1c	Y	LTR NEDO-33274	From GE response	33274	4.1.2(4)	Process for adapting EPGs described

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.9-1	9	1d	Y	LTR NEDO-33274	From GE response	33274	4.1.2(4)	Process for adapting EPGs described
18.9-1	9	1e	Y	LTR NEDO-33274	From GE response	33274	3.1.3(6)	Term continuously updated is qualified to how it is determined
18.9-1	9	1f	Y	LTR NEDO-33274	From GE response	33274	4.1.3.4	Section revised to clarify an EOP place-keeping system and the reference to HFEITS is not present to remove confusion
18.9-1	9	1g	Y	LTR NEDO-33274	From GE response	33274	4.1.4.4	Clarified that ARPs will be developed for all control room annunciators
18.9-2	9	2	N	DCD Tier 2 13	From GE response	DCD 2	13.5.3.3	Requirements that the procedures developed shall include, as necessary, the elements described in American National Standards Institute (ANSI)/American Nuclear Society (ANS)-3.2 1994: R1999, as endorsed by Regulatory Guide 1.33 Rev. 2.
18.9-2	9	2	N	LTR NEDO-33274	From GE response	33274	4.1.4.8 4,1,3 4.1.4	Added description of Radiation Control procedures Added maintenance procedures to population to which HFE program requirements will apply.

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.9-3	9	3	N	LTR NEDO-33274	From GE response	33274	1.2 1a 4.1.3 4.1.4 2.3 it12 4.1.4.2	Removed reference to representative procedures 18.9-3a Added maintenance procedures to population to which HFE program requirements will apply. RAI 18.9-2b & 3b Added NUREG 13.5.2.2 Maintenance and Other Operating Procedures (NRC 1996) to regulatory guide listing RAI 18.9-3b Added statement that only those systems called out in Reg guide 1.33 are addressed in this plan. RAI 18.9-3
	9	3	Y	Clarification of Scope	From GE response	33274	4.1.4.2	Added statement to scope systems called out in RG 1.33 applicable to ESBWR
18.9-4	9	4	N	LTR NEDO-33274	From GE response	33274	4.1.3.1	Reworded description of Writer's Guide content for clarity and broader applicability RAI 18.9-4
18.9-5	9	5	N	LTR NEDO-33274	From GE response	33274	2.2 it1 1.2.2 it2 3.1.3 it7	Added clarifying version/revision numbers to documents referenced RAI 18.9-5a,b,c Clarified commitment to requirements of NUREG 0700 regarding the display of CBPs RAI 18.9-5b
18.9-6	9	6	Y	V & V of procedures	From GE response	33274	4.1.3.5 4.1.3.3 4.1.4	Clarified that all appropriate procedure enhancements will be incorporated, not just those that are risk significant RAI 18.9-6a Clarified that all normal and emergency operating procedures will be validated.RAI18.9-6b
	9	6	Y	V & V of procedures	From GE response			
18.9-7	9	7	Y	Computer-Based Procedures	From GE response	33274	4.1.4.6	Removed qualifier "if adapted" from computer based procedure items. RAI 18.9-7b

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
	9	7	Y	Computer-Based Procedures	From GE response			
18.9-9	9	9	Y	Minimum Inventory	From GE response	33274	4.1.2	Removed mention of minimum inventory and added operational analysis steps as inputs to HSI requirements RAI 18.9-9
	9	9	Y	Minimum Inventory	From GE response			
18.9-10	9	10	N	LTR NEDE-33233P	From GE response	33274		33274 revision has removed statement that SPDS will not necessarily be in the TSC and EOF
18.9-10	9	10	N	LTR NEDO-33274	From GE response	33274 33268	3.2.3 4.1.1	Deleted the statement in question at previous 3.2.3 paragraph 3. Discussion of SPDS is addressed in HSI plan (33268:4.1.1)
18.10-1	10	1	Y	Clarify scope of training program to be certified	From GE response	33275	3.1.4.3 4.1.3.2 4.1.4.2 4.1.4.4 4.1.4.5	COL responsibility for training is removed. Additional information provided about training lesson plans and training design and development Information provided about training program guidelines and course materials Simulators described in context of training facility requirements- As described in audit, GE has tried to remove confusion with the use of part-task and full-scope simulators

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
	10	2	N	LTR NEDO-33275	From GE response	33275	1.1 2.2	Removed wording that appeared to limit the scope of the training program to operators only. All plant employees shown in Table 1 will receive some level of training as determined by needs analysis. (RAI 18.10-2a) Deleted reference to ANS-3.2. This deletion resolves the issue regarding referencing of an out of date revision (RAI 18.10-2b) Added reference to Reg Guide 1.149 to reference section (RAI 18.10-2c)
18.11-1	11	1	N	LTR NEDO-33276	From GE response	33276	1.2.1	Added per RAI D
18.11-2	11	2	N	LTR NEDO-33276	From GE response			No changes
18.11-3	11	3	N	LTR NEDO-33276	From GE response	33276	3.1	Added per RAI
18.11-4	11	4	N	LTR NEDO-33276	From GE response	33276	4.1.4.2(3)	Added per RAI
18.11-5	11	5	N	LTR NEDO-33276	From GE response	33276	4.2.1	Added per RAI
18.11-7	11	7	N	LTR NEDO-33276	From GE response	33276	4.2.2	Added per RAI
18.11-10	11	10	N	LTR NEDO-33276	From GE response	33276	3.3, 4.2.4, 4.3.1, 4.3.2, 4.3.4, 4.3.6,	Style guide per RAI

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
							4.4.6.8.	
18.11-11	11	11	N	LTR NEDO-33276	From GE response	33276	4.3.2	Added per RAI
18.11-12	11	12	N	LTR NEDO-33276	From GE response	33276	4.3.5.1, 4.3.5.2, 4.3.5.3, 4.3.5.4	Added per RAI
18.11-13	11	13	N	LTR NEDO-33276	From GE response	33276	4.3.4.1 4.3.4.2 4.3.4.3 4.4.1 3.6	Per RAI A Per RAI B Per RAI C Per RAI C Per RAI D
18.11-14	11	14	N	LTR NEDO-33276	From GE response	33276	4.3.9	Added per RAI
18.11-15	11	15	N	LTR NEDO-33276	From GE response	33276	1.2.1	Added per RAI
18.11-18	11	18	N	LTR NEDO-33276	From GE response	33276	4.4.4.1, 4.3.4.2	Added per RAI
18.11-19	11	19	N	LTR NEDO-33276	From GE response	33276	4.3.5, 4.3.4.1	Added per RAI

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.11-20	11	20	N	LTR NEDO-33276	From GE response	33276	4.3.5.5	Added per RAI
18.11-21	11	21	N	LTR NEDO-33276	From GE response	33276	4.4.3	Added per RAI
18.11-22	11	22	N	LTR NEDO-33276	From GE response	33276	4.4.5	Added per RAI
18.11-24	11	24	N	LTR NEDO-33276	From GE response	33276	4.4.1 4.4.7.3 4.4.4.5	Per RAI B Per RAI C Per RAI E
18.11-25	11	25	N	LTR NEDO-33276	From GE response	33276	4.4.7.7 4.4.7.9	Per RAI A Per RAI C
18.11-26	11	26	N	LTR NEDO-33276	From GE response	33276	4.4.6.1	Added per RAI
18.11-27	11	27	N	LTR NEDO-33276	From GE response	33276	4.4.9	Added per RAI
18.11-28	11	28	N	LTR NEDO-33276	From GE response	33276	4.4.4.1	Added per RAI
18.11-29	11	29	N	LTR NEDO-33276	From GE response	33276	4.4.8 2.5(4)	Added per RAI
18.11-30	11	30	N	LTR NEDO-33276	From GE response	33276	4.4.10	Added per RAI

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.11-31	11	31	N	LTR NEDO-33276	From GE response	33276	4.5.1	Added per RAI
18.11-32	11	32	N	LTR NEDO-33276	From GE response	33276	Fig4 4.6	Modified per RAI Added further description
18.11-33	11	33	N	LTR NEDO-33276	From GE response			no LTR changes
18.12-1	12	1	N	DCD Tier 2	From GE response			No changes to DCD
18.12-1	12	1	N	LTR NEDO-33276	From GE response	33276	4.3.4.2	Plant specific procedures from plant specific technical guidelines specified in 33276
18.12-1	12	1	N	LTR NEDO-33278	From GE response	33278	All 3.2.1	Changed plant-specific and/or baseline documents to standard plant to accommodate response to 18.12-1 Removed that COL may choose to adapt procedures and training, in accordance with RAI response 18.12-1 and replaced with changes to standard plant procedures and training may result from the HFE V&V

Chapter 18 RAI to DCD Roadmap Document

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.12-2	12	2	N	LTR NEDO-33278	From GE response	33278	4.3.2.1 4.3.2.3 4.3.2.3	Added criteria 3 that a verification review is conducted in accordance to RAI response 18.12-2 Revised step 1 to include sources of verification criteria (e.g., style guide) to comply in RAI response 18.12-2 Added step 3 to conduct review of verification criteria in accordance with RAI response 18.12-2 Style guide could not be added to supporting documents to comply with RAI response 18.12-2 because it is not yet numbered for reference purposes.
18.12-5	12	5	N	LTR NEDO-33278	From GE response	33278	3.1.1 3.2.1	Deleted specific guidance (Style Guide) and replaced with applicable guidance documents in accordance with RAI response 18.12-5 Deleted specific guidance (Writers Guide) and replaced with applicable guidance documents in accordance with RAI response 18.12-5
18.12-6	12	6	N	LTR NEDO-33217	From GE response	33217 33276	4.1.10.4(5) 4.1.10.4(3) 3.2, 4.3	TOC now updated to comply with sections. Issue resolution 4.1.10.4(5) updated to resolve conflict. Design Verification in 33276 and 33217 revised and conflict with 33278 is resolved.
18.13-1	13	1	N	DCD Tier 2	From GE response			No DCD changes
18.13-1	13	1	N	LTR NEDO-33277	From GE response	33277	1.2	The revised section 1.2 describes the roles and responsibilities of each of the participating organizations in the plan.

Chapter 18 Roadmap Document								
RAI NO	SEC	#	NRC Supplemental	DocName/ Question	Resolved	Plan	Section	Resolution Description
18.13-1	13	1	Y	Clarify certain aspects of NEDO-33277 the Human Performance Monitoring (HPM) Plan	From GE response	33277		This question was clarified in the audit. The project has dropped the term RTS. There will be a full scope simulator for the standard plant design that can be adapted to reflect plant specific conditions used to initially train personnel. Long term, there may be others, but this is not determined.
	13	2	N	LTR NEDO-33277	From GE response	33277	1.2	Section 1.2 text per RAI
	13	3	N					No specific supplemental question and no change to documents
	13	4	N	LTR NEDO-33277	From GE response	33277	4.1.2	Section 3.3.1 Item 4 split per RAI
	13	5	Y	Acceptable	From GE response	33277	4.2, 4.3 4.4	Although no LTR change was in RAI response, the operational phase of the HPM is described and charter is referenced
	13	All	Y	All responses	From GE response			see individual responses