ABWR DESIGN CERTIFICATION

GENERIC TAAC FOR SEISMIC CATEGORY I STRUCTURES

POSITION PAPER

JANUARY 17, 1992
GE NUCLEAR ENERGY

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ITAAC FOR SEISMIC CATEGORY I STRUCTURES

Purpose

The inspections, tests, analyses and acceptance criteria (ITAAC) material being prepared as part of the GE ABWR design certification process will include generic ITAAC entries covering technical issues affecting multiple systems. As part of the GE/NRC discussions aimed at reaching consensus on the scope and content of ITAAC, it has been suggested that an example generic ITAAC be prepared covering Seismic Category I structures in the plant. GE has evaluated this suggestion and has come to the conclusion that such a generic ITAAC is not required would not be appropriate. GE studies indicate that seismic structural considerations are best addressed in the set of ITAAC entries associated with each of the individual Seismic Category I structures. The purpose of this memorandum is to present the bases for these GE conclusions.

Background

GE is currently preparing ITAAC material to support design certification of the Advanced Boiling Water Reactor (ABWR). The ITAAC concept is an integral part of the new 10CFR Part 52 licensing process and there are extensive ongoing interactions between the nuclear industry and NRC aimed at reaching a consensus on the scope and content of ITAAC. The memorandum "Guidelines for Preparation of Inspections, Tests, Analyses and Acceptance Criteria (ITAAC)," A. J. James, dated December 1991, presents GE's interpretation of the various ITAAC-related issues and defines the scope and content that GE believes is appropriate for the ABWR ITAAC. The following is a brief restatement of the key considerations that form the basis for the GE approach.

The requirements for ITAAC for a certified design are contained in 10 CFR 52.47(a)(vi). In accordance with this section, an application for a design certification must include proposed ITAAC that "are necessary and sufficient to provide reasonable assurance that, if the tests, inspections and analyses are performed and the acceptance criteria met, a plant which references the design is built and will operate in accordance with the design certification."

In the Staff Requirements Memorandum (SRM) dated February 15, 1991, the Commission endorsed a two-tiered concept for design certification rulemaking. Tier 1 is the design certification and may not be changed absent a rulemaking proceeding or an exemption. Tier 2 contains the information in the Safety Analysis Report (SAR) for the certified design and may be changed by a licensee in accordance with 10 CFR 52.63(b)(2).

As indicated in various documents such as SECY-90-241, SECY-90-377, and SECY-91-178, Tier 1 will only contain top level design criteria and performance standards selected from the SSAR. In order for the ITAAC to be sufficient to verify conformance with the design certification (Tier 1),

the scope and content of the ITAAC need only be commensurate with the scope and content of Tier 1. Thus, similar to the Tier 1 design, ITAAC will only reflect top level design criteria and performance standards.

Part 52 does not prescribe any particular form for the ITAAC. In general, it may be expected that there will be ITAAC applicable to the design criteria and performance standards for particular systems. Additionally, because there are some commonalities among systems, it may be possible to have generic ITAAC applicable to several systems rather than repeat the same ITAAC for each system.

The potential usefulness of the generic ITAAC concept has always been recognized. Frequently quoted examples of technical subjects which could potentially be covered by this approach are Environmental Qualification, Seismic Integrity, Instrument Setpoint Methodology and similar issues. During GE/NRC technical meetings in December 1991, the NRC suggested that Seismic Category I structures be considered for generic ITAAC treatment; GE agreed to evaluate this suggestion and to prepare a draft ITAAC for review.

GE has now completed an evaluation of this generic ITAAC proposal and has concluded:

a. A generic Seismic Category I structure ITAAC is not required and would not be appropriate.

b. ITAAC treatment of ABWR Seismic Category I structures is best addressed in the set of ITAAC entries associated with each individual structure.

The following is a discussion of the basis for these conclusions.

ITAAC for ABWR Structures

GE is proposing to have system-specific ITAC applicable to each ABWR system (including each ABWR structure). The level of detail in the ITAAC for a system will be commensurate with the level of detail in the Tier 1 design description for the system. This level of detail will vary from system to system, depending upon the system's importance and safety significance. Nevertheless, it is expected that the Tier 1 design and ITAAC for each Seismic Category I ABWR structure will address, amongst other things, the following types of structure-related information:

- The structure's general arrangement and configuration
- The composition of important walls, ceilings, and floors
- The dimensions of important walls, ceilings, and floors
- The seismic classification of the structure

These attributes are the most important attributes associated with construction of Seismic Category I structures, and conformance with these attributes will provide reasonable assurance that the as-built plant has been constructed in conformance with the design certification for the ABWR.

Generic ITAAC for Seismic Category I Structures

GE does not believe that generic ITAAC are either necessary or appropriate for the ABWR's Seismic Category I structures. Unlike system functional performance tests, there is no test or inspection that can be performed to demonstrate the seismic integrity of an as-built structure. Instead, the ability of a structure to withstand seismic event is a function of numerous individual attributes. Furthermore, although seismic Category I structures do share some common attributes, none of these commonalities rises to the level of importance to be included in the Tier 1 design or ITAAC.

For example, possible common attributes among the structures include: 1) rebar (type, spacing, and splicing); 2) concrete (mixing, placement, and curing); and 3) structural steel (material type, size, configuration, and connections). However, for the reasons expressed below, ITAAC for these attributes would not be appropriate.

1) In some cases, inspection criteria for these attributes will not be the same for all structures, or even for all components within a single structure. For example, criteria governing rebar size and spacing depend upon the stresses within a wall, which differ from wall to wall and from location to location within a wall. Thus, it is not possible to specify generic acceptance criteria for such attributes.

2) In general, the Standard Safety Analysis Report (SSAR) for the ABWR does not identify values for these attributes. For example, Section 3.8.4 of the SSAR addresses the requirements applicable to Seismic Category I structures (other than the containment). However, in accordance with the guidance in NRC Standard Review Plan (SRP) 3.8.4 and NRC Regulatory Guide 1.70 Section 3.8.4, the requirements identified in the SSAR consist largely of 1) criteria governing development of the design of the structures, and 2) references to industry codes and standards. Thus, inspection criteria for these attributes are not, and are not required to be, contained in the SSAR. Since such criteria are not appropriate for the SSAR (i.e., Tier 2), such criteria are certainly not appropriate for Tier 1 or the ITAAC.

3) In general, acceptance criteria for these attributes will be developed as part of the generation of detailed design drawings and specifications. These drawings and specifications have not yet been prepared, are not necessary for the NRC to make its safety determinations for design certification for the ABWR, and will not be prepared until necessary for construction of a specific plant. In fact, with respect to some of these attributes (rebar type and spacing), the NRC Draft Safety Evaluation Report (DSER) Section 3.8.4 explicitly acknowledges this fact and finds it acceptable. Thus, acceptance criteria for these attributes are not available and need not be available at the design certification stage.

4) Even if the applicable design drawings and specifications were available, it would not be appropriate to include this level of detail in Tier 1 or the ITAAC. Inclusion of this information in Tier 1 would

essentially transform the detailed construction inspection procedures under 10 CFR 50 Appendix B into ITAAC, would have the effect of elevating relatively less significant design information into a Tier 1 requirement, and would be inconsistent with the intent of Part 52 and the two-tiered concept for design certification.

5) Nonconformances with design drawings and specifications governing these attributes typically are not safety-significant and often can be accepted as-is. For example, nonconformances in rebar spacing usually are not safety-significant because the overall rebar density will generally be sufficient to ensure the performance of reinforced concrete walls. Similarly, deviations in concrete mix requirements usually can be demonstrated to be insignificant based upon compressive strength tests. However, if these attributes were transformed into generic ITAAC, the licensee would be required either to scrap and rework the concrete installation in question, or to request a license amendment and exemption from the ITAAC. Neither course is necessary to ensure the safety of the plant, and both are unduly expensive and time-consuming.

5) Installation of rebar, concrete and structural steel are governed by well-established and widely understood and utilized industry codes (e.g., the codes and standards of the American Concrete Institute (ACI), American Institute of Steel Construction (AISC), and American Society for Testing and Materials (ASTM)). In the past, quality assurance (QA) programs established under Appendix B of 10 CFR Part 50 have proven more than adequate to ensure the acceptability of these types of routine construction activities. Therefore, generic ITAAC are not necessary to ensure the acceptability of these types of activities.

For all of the above reasons, generic ITAAC for Seismic Category I structures are not needed and would be inappropriate.

Conclusion

The Tier 1 design description and the associated ITAAC for Seismic Category I structures should focus on the more important, top-level design criteria. GE is proposing ITAAC for each ABWR Seismic Category I structure that will accomplish this purpose. Generic ITAAC for Seismic Category I structures are neither necessary nor appropriate, and generic acceptance criteria for such structures are best addressed through the QA program.

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ABWR DESIGN CERTIFICATION

ITAAC PILOT SET RESPONSE TO NRC COMMENTS

JANUARY 17, 1992

GE NUCLEAR ENERGY

GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
Cover letter, second paragraph	In general, the staff believes that the pilot ITAAC lack the level of detail and specific acceptance criteria appropriate for inclusion in Tier 1 design certification material. Section 52.103(c) of Title 10 of the Code of Federal Regulations (10 CFR 52.103(c) requires that the Commission must be able to find that "the acceptance criteria have been met and that, accordingly, the facility has been constructed and will operate in conformity with the Atomic Energy Act and the Commission's regulations." The level of detail in the pilot ITAAC will not permit the Commission to make that finding.	10 CFR 52.103(c) applies to combined operating licenses. 10 CFR 52.47(a)(vi) applies to applicants for a design certification. Section 52.47(a)(vi) states that the ITAAC must be "sufficient to provide reasonable assurance that, if the tests, inspections and analyses are performed and the acceptance criteria met, a plant which references the design is built and will operate in accordance with the design certification (emphasis added)." As discussed in the December 1991 GE memorandum on ITAAC guidelines, GE believes the design certification ITAAC derive directly from the certified design defined in the top level Tier 1 design description and that the pilot ITAAC scope and content is compatible with this regulation.
Cover letter, third paragraph	The review of the pilot ITAAC has been restricted since GE has not yet submitted proposed "construction-related" or "generic" ITAAC. The detailed comments point out several areas where the staff believes these generic requirements are applicable. The staff's review has also been hampered by the lack of a written description of the methodology used to develop the pilot ITAAC.	Informal discussions of generic ITAAC have taken place (EQ and Software Development). GE continues to believe generic/discipline ITAAC have only a limited role to play. GE provided a description of the methodology in viewgraphs presented to the NRC staff during the meeting on October 16, 1991. GE provided a formal submittal describing its methodology in a memorandum dated December 1991. Section 4.5 of this memorandum presents the GE assessment of the limited role of the generic ITAAC concept.
Cover letter, fifth paragraph	As stated in our letter of October 23, 1991, if General Electric does not submit its complete pilot ITAAC submittal (defined as the nine system ITAAC, the generic ITAAC, and the development methodology) by the end of 1991, then the projected staff completion of the ITAAC review will not meet the schedules established in SECY-91-161, "Schedules for the Advanced Reactor Reviews and Regulatory Guidance Revision." Please advise me if you cannot meet this schedule.	As discussed during the meeting on October 16-17, 1991, GE determined that it would not be fruitful to begin preparation of the remaining ITAAC until it received NRC's comments on the nine pilot ITAAC. GE received NRC's comments on December 9, 1991. GE estimates that the revised pilots together with selected generic ITAAC will be resubmitted by 1/17/92. Assuming GE/NRC reach agreement in principle on ITAAC scope [illegible], full submittal of ABWR ITAAC by March or April 1992 is feasible.

* Location in the NRC letter, Pierson to Marriott, 12/5/91, "Detailed Comments on Pilot ITAAC Submittal for the ABWR."

GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
DEF comments, general comments (1)	The nine examples of ITAAC do not provide any examples of generic ITAAC (i.e., piping, welding, equipment qualification, inservice testing design requirements, materials compatibility, castings, concrete, soils and foundation, major equipment and mechanical components). (Page 7/13)	Generic ITAAC have some potential drawbacks that might limit the extent to which they can realistically be used for the Tier 1 ITAAC entries. This issue is discussed in Section 4.5 of the GE ITAAC methodology memorandum dated December 1991. The following are key passages from this memorandum. 1. Given the intended scope of the Tier 1 material, only a limited subset of the construction-related disciplines can be addressed by the Tier 1 design descriptions and ITAACs. This subset of construction disciplines would address the processes that are of particular significance to one or more of the systems; any treatment of design details or the details of construction processes beyond this would rapidly escalate the generic ITAAC scope into the comprehensive Part 50 construction verification procedures. This is not consistent with the scope of the Tier 1 design certification material. 2. The level of design detail associated with the design certification application (FSAR) does not support development at this time of numerical acceptance criteria for construction-related processes. The SSAR contains the full complement of commitments to the regulatory requirements and industrial standards governing these processes but provides little or no details of compliance criteria; i.e., does not contain design drawings or specifications that would be necessary to develop generic/discipline ITAAC with extensive numerical entries. Furthermore, many of the codes and standards referenced in the SSAR define methodology rather than numerical standards. This situation is not viewed as a deficiency in the certification application but rather is a direct consequence of the basic relationship between Parts 50and 52. Nonetheless, the result is that detailed verification procedures and acceptance criteria for most plant construction processes will be developed later by the actual plant combine license applicant. This results in there being little need or opportunity for the use of generic ITAAC as part of the design certification process.

* Location in the NRC letter, Pierson to Marriott, 12/5/91, "Detailed Comments on Pilot ITAAC Submittal for the ABWR."

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
		3. As mentioned above, generic/discipline ITAAC would usually have to be based upon design drawings and specifications and other information that is not contained in the SSAR or in the Tier 1 design description. Even if these documents are available for referencing, inclusion of generic/discipline aspects within the Tier 1 ITAAC would have the effect of elevating relatively less significant design information from these documents to Tier 1 status. Such a result would be inconsistent with the intent of Part 52 and the two-tiered concept for design certification. 4. By their very nature, generic/discipline design requirements and specifications tend to be of lesser importance than system-based requirements, and it is often possible to accept as-is some of the non-conformances with generic/discipline requirements contained in design drawings and specifications. For example, nonconformances involving support dimensions, rebar spacing, and weld length often are not significant to the safety function of the structure or system in questions, and such nonconformances usually may be accepted without rework or repair. However, if such generic/discipline requirements were to be embodied in ITAAC, the licensee would be forced either to rework or to repair the nonconformances or obtain an exemption from and/or amendment to the ITAAC. Such a result is unnecessary from a safety standpoint and would impose additional costs and administrative burdens. As a result of these observations, the current GE approach is to prepare a very limited set of generic/discipline ITAAC and to cover critically important construction-related issues in the individual system ITAAC for which the issue is important. GE is still considering whether selected generic/discipline ITAAC for issues such as EQ, seismic design, etc., might be appropriate and feasible. All other generic/discipline issues (such as welding, concrete, cables, and painting) are deferred to the time when the Part 50 verification procedures are defined for a particular license application.

* Location in the NRC letter, Pierson to Marriott, 12/5/91, "Detailed Comments on Pilot ITAAC Submittal for the ABWR."

GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
DET comments, general comment (2), first part	General Electric should develop and include ITAAC for the verification of the design of certain generic components (design acceptance criteria). The commitment to complete the structural design of certain generic components (e.g., piping, cable tray, conduit, and HVAC systems) during the combined license phase should be a certified design commitment.	GE has agreed to develop design acceptance criteria (DAC) for piping. GE does not believe that DAC are necessary for other suspended components. Such acceptance criteria are not typically included in Final Safety Analyses Reports (FSARs), and this level of detail is not appropriate for Tier 1. Instead, verification of the adequacy of such designs would be accomplished in accordance with the existing Part 50 processes.
DET comments, general comment (2), second part	The detailed design criteria, design procedures, and analytical methodologies should be specified (consistent with the SSAR) and be available for staff review and approval prior to final design approval. These criteria and methods should be used by the combined license (COL) applicant to complete the design of the ABWR components as part of the ITAAC design verification activity.	GE does not believe that it is appropriate to include "detailed design criteria, design procedures, and analytical methodologies" in the Tier 1 DAC. For example, at some plants, the design procedures for pipe stress analyses have contained on the order of 100 pages. This level of detail far exceeds the level of detail typically contained in FSARs. GE believes that it is appropriate for Tier 2 (i.e., the SSAR) to contain a summary of the design criteria and analytical methodologies. Absent rulemaking or an exemption, the COL licensee would be required to comply with these criteria and methodologies or perform a 50.59-type evaluation to justify any deviations.
DET comments, general comment (2), third part	The design acceptance criteria should specify the critical requirements of codes and standards as well as the important vendor equipment allowable values that need to be verified as part of ITAAC design verification.	The scope and content of DAC type ITAAC is currently being discussed by GE/NRC. However, GE agrees that in the limited number of design areas for which DAC will be used, this NRC comment is a valid interpretation of the DAC concept.
DET comments, general comment (3)	Generic ITAAC are also needed to verify the overall ABWR seismic design adequacy. As discussed in your letter from A. Rogers to USNRC dated August 19, 1991, there are a few sites where the site-enveloping parameters for soil properties and seismology might be exceeded for the ABWR standard plant design. The procedures outlined by you that future applicants shall perform to confirm the seismic adequacy of the ABWR seismic design should be part of the ITAAC verification activities. The ITAAC for seismic design adequacy should include the design acceptance criteria for verifying the adequacy of the safety-related functions of the ABWR buildings and structures (including tanks). Similar to (2) above, the detailed design criteria and analysis methods should be available for staff review and approval prior to FDA.	GE intends to provide ITAAC for interface requirements. Such ITAAC would require the COL applicant to confirm that the ABWR's seismic response spectrum is appropriate for the site in question. For the reasons discussed above, GE does not believe it is appropriate to included DAC for seismic design adequacy for all other buildings and structures. To the extent necessary for the staff to make a safety finding, discussion of design criteria and analysis methods should be a part of the SSAR review process.

* Location in the NRC letter, Pierson to Marriott, 12/5/91, "Detailed Comments on Pilot ITAAC Submittal for the ABWR."

GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
DET comments, general comment (3)	In the engineering discipline (particularly for structural and mechanical design of generic components discussed in (2) above), the ITAAC construction verification activity associated with the above level of detail that we would expect to see is straightforward -- to ensure that the approved plant design drawings are adequately being followed as the plant is being built. Inspections should be performed to verify that the plant is in conformance with the final design drawings and should involve construction verification activities similar to those used to address IE Bulletin 79-14, "Seismic Analysis for As-Built Safety-Related Piping Systems." IE Bulletin 79-14 required that as-built piping system installations should be consistent with the piping analytical and modeling assumptions used in design. When the as-built attributes deviated from the design, then a verification (or as-built) analysis was usually performed to reconcile the deviations and confirm that the acceptance criteria (i.e., ASME Boiler and Pressure Vessel Code stress limits) were still satisfied. Construction ITAAC can be similarly developed, although the number of inspection attributes to be verified in ITAAC will likely be greater than those addressed in IE Bulletin 79-14.	It is the function of the quality assurance (QA) program established under 10 CFR Part 50 Appendix B to confirm that the as-built plant conforms with final design drawings for safety-related system. Under 10 CFR 52.47(a)(vi), the purpose of ITAAC is to ensure that the plant "is built and will operate in accordance with the design certification." The level of detail in final design drawings is not typically contained in FSARs and is not appropriate for inclusion in a Tier 1 ITAAC.

* Location in the NRC letter, Pierson to Marriott, 12/5/91, "Detailed Comments on Pilot ITAAC Submittal for the ABWR."

GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
DET specific comments (1)	The GE certified design commitments do not (but should) include a commitment that all components in the Standby Liquid Control System (SLCS) necessary for injection of the neutron absorber into the reactor be classified as Seismic Category I. The acceptance criteria for the SLCS components should then refer to the generic ITAAC for Seismic Category 1 piping, equipment, and supports.	This commitment is already a part of the Design Description and has been added as a new item to the certified design items in Table 2.2.4. References have been added to the generic EQ ITAAC.
DET specific comments (2)	There needs to be a clear cross-reference between system ITAAC and generic ITAAC. Also, the system ITAAC should identify any aspect of generic ITAAC that are unique to that system.	GE agrees, and several of the system ITAAC have had references to generic ITAAC added.
DET specific comments (3)(a)	A certified design commitment should be included to ensure that the control building is a Seismic Category 1 structure. The ITAAC should then refer to the generic ITAAC for major structures.	GE's proposed Tier 1 design description for the control building contains such a commitment. At this time, GE does not believe a generic ITAAC for concrete structures is required or would be meaningful and is preparing a position paper that will provide the bases for these conclusions. To support the approach proposed in the position paper, selected additional control building dimensional data will be added to the existing Tier 1 material (DD and ITAAC).
DET specific comments (3)(b)	A certified design commitment is needed to ensure that the subcompartment pressurization of the control building walls and floors will withstand the dynamic effects of high-energy leakage cracks and pipe breaks. The acceptance criteria should specify the wall and floor thicknesses needed to ensure that the subcompartment pressurization effects are adequately mitigated.	This comment will be addressed by 1) adding additional wall thickness information to the control building material and 2) modifying ITAAC #3 to be a more comprehensive check of CB wall dimensions.

* Location in the NRC letter, Pierson to Marriott, 12/5/91, "Detailed Comments on Pilot ITAAC Submittal for the ABWR."

GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
DET specific comments (3)(c)	The acceptance criteria for flooding should clearly indicate what criteria are necessary for external floods and what criteria are necessary for internal floods. Acceptance criteria are needed to ensure that the computer and main control areas below the steam tunnel are adequately protected from pipe breaks in the main feedwater piping.	First sentence: GE will clarify the internal/external flood control features in the DD and ITAAC. Second sentence: A discussion of feedwater pipe break flood protection features will be added to the design description and included in the ITAAC.
DET specific comments (4)(a)	A certified design commitment is needed to ensure that the system design configuration necessary for inservice testability of safety-related pumps and valves will be adequately implemented during plant construction.	Individual safety system designs incorporate design features needed to support inservice testing on pumps and valves. In the event these system design features are sufficiently important to warrant Tier 1 treatment, this treatment will be accomplished in individual system design descriptions and ITAAC entries.
DET specific comments (4)(b)	Inspections should be conducted during system installation to ensure that sufficient instrumentation and test connections are provided for the testability of safety-related pumps and valves during operation.	See response to Comment 4(a) above. Most (but not all) system ITAAC include an item aimed at confirmation all key system components are in place; important items related to equipment testability will be included.
DET specific comments (4)(c)	Tests should be conducted after system installation to confirm the adequacy of the minimum flow bypass lines for safety-related pumps. Specifically, the adequacy of the minimum flow bypass lines for safety-related pumps. Specifically, the adequacy of the minimum recirculation flow line size should be confirmed through tests to ensure that degradation will not result from pump mini-flow operation or testing. The acceptance criteria should include consideration of the effects of cumulative operating and testing hours in the minimum flow mode over the lifetime of the plant and during this postulated accident scenario as addressed in NRC Bulletin 88-04.	Confirmation of adequate system minimum flow performance will be achieved as part of the routine preoperational tests committed to in Chapter 14 of the ESAR. GE does not believe Tier 1 treatment of this issue is necessary for all systems; selected ITAAC entries for key safety related pumps will be decided on a case-by-case basis and included in the individual system Tier 1 material.

* Location in the NRC letter, Pierson to Marriott, 12/5/91, "Detailed Comments on Pilot ITAAC Submittal for the ABWR."

GE RESPONSE* NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
DET specific comments (5)	A certified design commitment is needed to ensure the capability of MOVs to operate under all design-basis conditions. A justifiable demonstration (e.g., test) should be specified to verify [illegible]ility of the MOVs to function as intended in design. The justification should include consideration of the concerns and issues identified in Generic Letter 89-10 and its supplements. Acceptance criteria should be specified to address the ability of the MOVs to meet functional performance requirements as well as any leakage requirements.	GE agrees this is an important technical issue, and the SSAR should contain a full complement of commitments needed to ensure the ability of MOVs to operate under all design basis conditions. However, GE believes implementation of these commitments should be addressed by the COL licensees' testing and QA programs. Depending upon the valve this may involve shop and/or field testing. To the extent that valves are performe particularly important safety functions, system tests included in ITAAC will be sufficient to confirm satisfactory operation of those MOVs.
DET specific comments (6)	Item 1 of Table 2.1.1 states that visual field inspections will be conducted of the installed reactor pressure vessel system (RPVS) key components identified in Section 2.1.1 and Figure 2.1.1. The purpose is to verify that the installed configuration of RPVS complies with the description and drawing in Section 2.1.1 and Figure 2.1.1. Figure 2.1.1 does not contain adequate design details to be used as acceptance criteria in field inspections. No dimensions and clear views of key components are given. The acceptance criteria should utilize a detailed, dimensional drawing of reactor vessel and its internal components and specify those dimensions that need to be verified.	The intent of this ITAAC entry is to provide an overview confirmation that all key components are in place. In addition to (and separate from) ITAAC activities, more detailed verification of reactor component dimensions will occur in accordance with 10 CFR Part 50 Appendix B QAP execution. These detailed inspections will be aimed at confirming all appropriate dimensional requirements have been met. GE does not believe it is appropriate to include "detailed dimensional drawing of reactor and its internal components" in the Tier 1 ITAAC since this would be incompatible with the tiered approach to design certification. [It is noteworthy that this level of detail is not even included in an FSAR submitted under the Part 50 licensing - further evidence that Part 52 Tier 1 treatment would be inappropriate.]

* Location in the NRC letter, Pierson to Marriott, 12/5/91, "Detailed Comments on Pilot ITAAC Submittal for the ABWR."

GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
GET specific comments (7) (last paragraph only)	Provide a commitment to perform vibration prediction analysis of reactor internals for the certified design prior to final design approval, including the basis used for specifying instrumentation that will be installed for monitoring vibrations during the flow tests.	This is an interface issue which is addressed in Paragraph 3.9.7.1 of the SSAR and DSER (SECY-91-155, pages 3-81 through 3-83). The vibration prediction analysis and the basis for specifying instrumentation will be a part of the results of the vibration assessment program that will be submitted to the NRC for review and approval by the first applicant, who will reference the standard ABWR design and designate the reactor and internals as a prototype. The analysis and instrument specifications, which have been prepared preliminarily, can be better based on an experience with a foreign reactor which will be built after the scheduled FOA. Acceptance criteria of Item 7 of Table 2.1.1 is revised to include vibration analysis together with vibration measurement testing and inspection.
DET specific comments (8) (last sentence only)	Provide a commitment to perform the analyses of the reactor internals under faulted conditions (i.e., LOCA and SSE) prior to final design approval and the ITAAC that will be used during the combined license phase that will verify the ability of the reactor internals to withstand these loads.	The analyses of the reactor internals under faulted conditions (i.e., LOCA and SSE) have been performed together with analyses for other operating conditions to assure their integrity as required by the ASME Code and U.S. Laws and Regulations and as identified in Paragraph 3.9.5.3.3 of the SSAR. Item 2 of Table 2.1.1 assures that the identified analyses have been performed together with other necessary analyses.
Div. of Licensee Performance and Quality Evaluation (first paragraph)	The programmatic interface between the GE ABWR ITAAC and the Reliability Assurance Program (Chapter 19, Appendix 19K) is not adequately addressed. It is essential that GE clearly delineate the major programmatic interfaces between the various phases of the program, including the design, construction, startup testing, operations, maintenance, engineering, etc.	There is no interface between ITAAC and programmatic issues such as reliability assurance, startup testing, operations, maintenance, etc. Under 10 CFR 50.47(a)(1)(i), the purpose of ITAAC is to assure that the plant complies with the design certification. Programmatic issues involving operations are addressed by other means, such as the technical specifications, license conditions, etc.
(second paragraph)	It is not clear how GE derived the acceptance criteria and the validation attributes. We believe that the basis for the selection of these criteria and attributes should be clearly derived from the design and have a quantitative (where possible) relationship to the PRA.	GE does not believe that it is appropriate or possible to select ITAAC based upon a quantitative probabilistic threshold derived from the PRA. PRAs are not designed (and do not have the necessary information) to select particular attributes for verification or to select acceptance criteria for such attributes. As discussed in the December 1991 GE memorandum on ITAAC, selection of entries for the Tier 1 design description and ITAAC is based on engineering judgment.

* Location in the NRC letter: Pierson to Marriott, 12/5/91, "Detailed Comments on Pilot ITAAC Submittal for the ABWR."

GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
Div. of Reactor Inspections and Safeguards	The pilot ITAAC for the design certification addresses only safety-related considerations. We note that for the equipment used in the examples there are also safeguards design commitments in the SSAR, which are not site specific, that will need to be verified. For example, the design description of the control building mentions that it is designed to provide missile and tornado protection. Table 2.15.12 of the submittal lists ITAAC to verify construction of required radiation shielding and flood control features, but does not list ITAAC for verifying that the bullet resistance feature of walls and doors and the penetration resistant feature of barriers in HVAC ducting and exhausts, committed to in ABWR SSAR Section 13.6.3.6, have been installed in all locations required by the commitment. Similarly, the ITAAC discussion for the reactor cooling water system does not mention any walkdown to verify that no portion of this system's piping, valves, and motor control centers that are required for performance of its safe reactor shutdown cooling function, or to isolate those portions from the nonsafety-related portions, are located outside of the vital areas identified in the SSAR.	The intent of ITAAC is to cover important safety and nonsafety aspects of the plant, and the pilot ITAAC do, in fact, address some nonsafety items. However, it is not the intent of ITAAC to address all commitments in the SSAR. The ITAAC are reserved for verification of Tier 1 commitments which are intended to be important top level features of the plant; the remaining (and much larger) body of commitments in the SSAR (such as those mentioned in the NRC Comment) will be verified through the processes deriving from 10 CFR Part 50. No ITAAC changes are proposed in response to this NRC comment.
ICSB, DST comments on RPS (third paragraph)	In our opinion, the most obvious shortcoming in the ITAAC is in the Inspections, Tests, Analyses section. There is only a vague reference to any actions with no description or associated acceptance criteria that would allow for staff inspection or review.	The pilot RPS ITAAC include acceptance criteria for each inspection, test, and analysis.
(fourth paragraph)	It is not possible for the I&C acceptance criteria to be established in the ITAAC (without design detail) to the detail which would allow confirmatory inspections after design certification.	It is not the intent of ITAAC to confirm design details. Instead, the purpose of ITAAC is to confirm that the plant has been built and will operate in accordance with the certified design. The ITAAC acceptance criteria for the RPS are sufficient to confirm that the RPS has been built and will operate in accordance with the certified design.
(fifth paragraph)	The ITAAC process will require several stages of development. At each stage, the staff will verify that the requirements of the previous stage have been successfully completed and the more detailed acceptance criteria for the next stage staff will be developed and accepted by both the staff and the applicant before proceeding to the next stage.	Development of the ITAAC will be complete upon design certification. Subsequently, the design details will be developed in stages in accordance with the design acceptance criteria (DAC) in the ITAAC. GE does not believe that NRC hold points are necessary for verification that the DAC for a particular stage have been satisfied, and the licensee should be permitted to proceed with design activities at its own risk pending NRC verification of successful completion of the DAC for the stage.

* Location in the NRC letter, Pierson to Marriott, 12/5/91, "Detailed Comments on Pilot ITAAC Submittal for the ABWR."

GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
ICSB, DST comments on RPS (cont) (fifth paragraph)	It is our understanding that the COL will not be issued until the necessary ITAAC hold points have been completed and accepted by the NRC.	Such a limitation is unwarranted. Although it may be desirable for the design details to be completed prior to issuance of the COL, such details are not necessary for issuance of the COL. The design certification cannot be issued unless the NRC is able to make a final safety determination regarding the RPS. Development of the design details is a compliance issue that can be verified during construction.
(sixth paragraph)	The RPS ITAAC requires substantially more revision to make it acceptable to us even at a general level of information... The purpose of the revisions will be to provide acceptance criteria that is both measurable and observable and that will allow for the development of more detailed acceptance criteria when the level of design detail is available.	The pilot ITAAC includes measurable and observable acceptance criteria and validation attributes.
(seventh paragraph)	GE should also be encouraged to develop, on a timely basis, the ITAACs for the I&C systems like the multiplexors and the microprocessors. This is needed because we expect many sections of the RPS ITAAC to refer to generic ITAAC.	GE does not believe that generic ITAAC for multiplexors and microprocessors are warranted. GE will develop ITAAC for the Multiplexing System. Additionally, system level ITAAC will include tests of those multiplexors and microprocessors necessary to demonstrate overall system function.
(seventh paragraph)	We also request that GE submit a more detailed description of their intent to refer to ITAAC for part of the verification activities but refer to Part 50 for other aspects.	GE has provided such a description as part of the description of its methodology for preparing the ITAAC. (See December 1991 GE ITAAC memorandum.)
SRXB comments SLCS, design description (1)	In the first sentence of design section, change "control blades" to "control rods" for more clarity.	GE agrees and the change has been incorporated.
(2)	In the second paragraph, "minimum control and rod inventory" is given. This statement is confusing. Add "at all conditions" instead of "minimum control rod inventory (which is defined to be at the peak of the xenon transient)."	GE agrees and has incorporated the requested change.
(3)	It is stated that SLCS is manually initiated. But in GE letter dated October 9, 1991, (Letter No. MFN. No. 119-91), GE has elected to automate SLCS. The SLCS ITAAC should be corrected to state that.	The design description has been updated to reflect automatic SLCS initiation for the ATWS condition. Manual initiation capability has been retained to cover non-ATWS conditions which would require SLCS operation.

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GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
SRXB comments SLCS, design description (cont) (4)	The design conditions pressure and temperature for piping inboard of injection valves are given as 1250 psig and 575°F. Since the SLCS is connected to the HPCF system, SLCS also should be designed to the dual design conditions specified in the HPCF process diagram. The dual design conditions should be 1560 psig, 150°F and 1250 psig, 575°F. Since the SLCS discharge piping inboard of injection valves will be subjected to a pressure higher than 1250 psig during SLCS pump operation, design pressure of 1250 psig is not justified.	GE does not agree that changes in the SLCS pilot material are required. This is because: a. The quoted HPCF design condition of 1560 psig/150°F only applies outboard of the HPCF injection valve. Inboard, the design conditions are 1250 psig/575°F. b. The 1250 psig design pressure is acceptable because operation at higher values occurs during conditions which are considered to be in the emergency/faulted category. Under these circumstances, the Code permits pressures in excess of the design value.
(5)	ASME Code Class-2 is specified for the SLCS pump motor. The ASME Code Class-2 is not pertinent to the electric motors.	GE agrees and has deleted the motor from the table.
(6)	The design requirement of adequate NPSH of the SLCS pumps is not in the SLCS ITAAC.	GE has added NPSH test condition requirements to ITAAC entry #3.
(7)	Separation criteria of SLCS both physically and electrically from the control rod drive system is not in the SLCS ITAAC.	GE agrees and has included a statement to this effect in the design description.
(8)	SLCS equipment qualification requirement should be included in the ITAAC.	GE is preparing a generic ITAAC that addresses equipment qualification; a reference to this ITAAC has been added.
(9)	The simplified SLCS P&ID shown in Figure 2.2.4 is oversimplified. This figure should at least identify certain important MOVs. The acceptance criteria cannot be based on an oversimplified figure. The SSAR P&ID, which is a simplified version of the system flow diagram, should be the acceptance criteria.	Tier 1 is reserved for top level design criteria and design features. GE does not believe that the level of detail in the SSAR P&ID is appropriate for Tier 1. In a separate informal transmittal, GE has received an SSAR SLCS P&ID (Figure 9.3-1) marked up with the NRC's proposal as to which elements of the SSAR P&ID should be included in the Tier 1 P&ID. A summary characterization of the NRC's proposal is that only minor features of the SSAR figure should be deleted with all remaining items transcribed directly into the Tier 1 P&ID. (In the case of SLCS, the deleted minor features include drawing notes, vent lines and valves, drain lines and valves, pneumatic supply lines to the tank air header, etc.) GE has reviewed the NRC's SLCS markup and believes the proposed approach to Tier 1 P&ID content to be too inclusive and incompatible with the intent of Tier 1. Furthermore, agreement reached on SLCS will be considered generic and applied to other ABWR safety related systems. Some of these other systems are considerably more complex than the SLCS; application of the NRC's proposed approach could cause real difficulties if

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		applied to systems as complex as, say, the Nuclear Boiler System and the Reactor Building Cooling Water System. To assist in resolution of this issue, GE has prepared the following table which addresses in a generic way the various types of information included on an SSAR P&ID. It includes a recommended disposition in terms of Tier 1/2 treatment. These recommendations are (in GE's view) compatible with the intended tiered approach to design certification.
SRXB comments, SLCS, acceptance criteria (1)	Individual SLCS flow rates of 50 GPM per pump are provided as acceptance criteria. This criteria should be for a 1336 psig assumed ATWS pressure and also require a total 100 GPM injection flow with both pumps running.	GE agrees that the SLCS material should be modified to reflect two-pump operation at a total flow of 100 gpm. GE does not agree that this flow should be at 1336 psig vessel pressure. Pressures in excess of 1250 psig only occur for brief initial time during at ATWS event and are reduced below 1250 psig by the time the SLCS pumps are in operation.
(2)	The storage tank pumpable volume range 6100-6800 gals should be in the acceptance criteria. RPV water inventory and RCP shutdown cooling system inventory should also be given as acceptance criteria.	GE agrees and has made the necessary changes.
(3)	Duration of SLC pump injection tests and relevant pump and motor instrumentation parameters for monitoring during testing should be considered for acceptance criteria and testing guidance.	ITAAC #3 has been modified to require pump operation for sufficient time to inject the entire SLCS tank pumpable volume. Further details on test procedures are not considered appropriate for Tier 1.
(4)	Criteria and tests should be identified for electric resistance heater systems capabilities with automatic operation and automatic shutoff to maintain the sodium pentaborate solution temperature between 75 and 85°F, as specified in Figure 9.3-3 of SSAR.	GE believes the current ITAAC #2 will confirm that heaters and controls have been provided. In addition, the design description text has been clarified. The ability of the heaters to control solution temperatures will be confirmed during startup tests and plant operation and are thus not within ITAAC scope.
(5)	Instrumentation systems (to test) which provide indication and alarm in the control room for high or low temperature, or high or low boron concentration or liquid level in the boron solution tank.	GE has modified Figure 2.2.4 to include control room features for temperature and level. ITAAC #2 will confirm that equipment is in place. Concentration monitoring is via local sampling and lab analysis and is thus not an ITAAC entry.

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Guiding Principles for Inclusion of Traditional Design Drawing Type Information in the Tier 1 Design Description (DD) and P&ID

Type of Information	Example	Proposed Treatment			Comments
		Tier 1		Tier 2	
		DD	P&ID	SSAR	
1. Logic	RWCS Isolation on SLC Initiation	✓	-	✓	DD to describe important logic including key variables and actions; including this type of information on the Tier 1 P&ID would involve a level of detail incompatible with the tiered approach, especially for the many ABWR systems with more complexity than the relatively simple SLCS.
2. Line Sizing		✓	-	✓	Tier 1 DD treatment of pipe size is only necessary for those systems where line size is particularly critical to design basis performance (e.g. main steam and feedwater lines).
3. Materials	Stainless vs. Carbon Steel, Impurity Content	✓	-	✓	Tier 1 DD discussions of material issues is only required when it is particularly critical to design basis performance considerations.
4. Major Components		✓	✓	✓	Primary intent of Tier 1.
5. Instrumentation	Temperature Elements, Pressure Transmitters, etc.	✓	✓	✓	For critical instruments, P&ID to indicate existence and relative location only; DD will include more specific info where pertinent (e.g. type or control functions).
6. CR Indication (Alarm/Status)	Low Level Alarm, Valve Position Status, Pump On/Off Status, etc.	✓	-	✓	All components/instruments shown on simplified P&ID assumed to have some accompanying CR function (indication, alarm, etc.) although typically it will not be shown; DD may include more detailed info.such as a particular check valve having CR status indication; In very limited cases the Tier 1 P&ID may show CR indication (such as SLC tank H/L level alarms)
7. Valve/Pump Operator Information	MOV/AOV/Manual, Remote/Local, etc.	✓	✓	✓	Tier 1 P&IDs to be revised to show valve operators (i.e. MOV, AOVs). Pumps and valves with operators that are shown on simplified P&ID are assumed to be remotely operated; Manual valves assumed to be locally operated; DD will describe any special considerations.
8. Design Conditions	Numerical Ratings for Pressure/Temperature.	✓	-	✓	DD will specify design conditions for major components, including boundaries and transition points as appropriate. Including this info on the simplified P&ID is not compatible with Tier 1.
9. Component/Piping Classification	Code Class, Quality Group, Seismic Category	✓	✓	✓	DD will include all pertinent classification information for major components (incl. piping). Simplified P&IDs will only show ASME Code Class info.

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GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
SRXB comments, SLCS testing		These NRC comments are covered by Items (3), (4), (5) above.
SRXB comments, SLCS safety analysis		
(1)	In Section 2.2.4.b and Table 2.2.4 Item 7 maximum reactor pressure is listed as 1250 psig during SLCS operation. Since SLCS operability is required per 10 CFR 50.62, ATWS response conditions need to be considered in the system ITAACs. In the SSAR Appendix 15E ATWS analysis, the maximum reactor pressure calculated is about 1336 psig. Correct the maximum reactor pressure to the calculated values given in SSAR Appendix 15E to demonstrate SLCS functional performance in responding to postulated ATWS event.	GE does not agree that any changes are necessary. See response to acceptance criteria item 1 above.
(2)	Reference to the calculational bases for poison concentration of 850 ppm, storage tank pumpable volume range 6100-6800 gal, RPV water inventory 1.00×10^6 lbs, RHR shutdown cooling system inventory $.287 \times 10^6$ lbs should be included as a safety analysis criteria.	GE interprets this comment as requesting there be separate entries (identified in SECY-91-178 as Safety Analysis Verification) aimed specifically at confirming the as-built facility has the parameters used in the plant safety analyses. GE does not believe such separate entries are either required or necessary. Critical plant parameters will be identified in the individual system material and any separate, special treatment would be redundant (and potentially confusing).

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GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
SRX comments, RHR, design description (1)	In the second paragraph, drywell spray cooling and ac independent water addition modes are designated as nonsafety-related modes of operation. Clarify why they are classified as nonsafety-related modes.	The RHR system is designed to safety-related standards, however, drywell spray cooling and ac independent water addition are nonsafety related modes because: a. Drywell spray has no identified safety function, and b. ac independent water addition relates only to severe accident conditions and thus is not subject to the requirements associated with design basis accidents. The Tier 1 design description has been modified to help clarify this distinction.
(2)	Add to the third paragraph the following: "RHR will have provisions for maintenance of the long-term coolant recirculation and decay heat removal systems, e.g., pump or valve overhaul, in the post-LOCA environment (including consideration of radioactivity."	This comment appears to be based on a misunderstanding of ABWR RHR system. Pump or valve overhaul in the post-LOCA environment is not part of the RHR design basis requirements and is not included in the ABWR Sections 5.4.7 and 6.3. GE proposes no ITAAC changes on this item.
(3)	In the last paragraph of page 2 it is stated that the low pressure portions of the shutdown cooling piping are diversely interlocked with reactor pressure. This is in conflict with SSAR Section 5.4.7.1.1.7 which states that "the ABWR RHR design does not explicitly meet this requirement for diversity."	The word "diversely" has been deleted from the DD in order to avoid confusion. The explanation in SSAR Section 5.4.7.1.1.7 is correct.
(4)	The Figures 2.4.1.a, b and c are oversimplified. This figure should at least identify certain important MOVs. The acceptance criteria cannot be based on an oversimplified figure. The SSAR P&ID which is a simplified version of the system flow diagram should be the acceptance criteria.	The level of detail provided in the RHR diagrams has been modified to reflect the SLCS precedent discussed on Page 12, Item 9.
(5)	In Table 2.4.1.-1, add the following certified design commitment: "The RHR long term cooling capacity is adequate in the event of failure of any single active or passive component of the RHR."	GE agrees and the DD has been modified accordingly. No change to Table 2.4.1-1 has been made since this aspect of the design has already been resolved as part of the NRC's safety review. Existing performance related ITAAC in Table 2.4.1-1 will confirm this safety assessment remains valid.
(6)	In Table 2.4.1.1, add the following certified design commitment: (a) The power requirements of the RHR system, including the timing of electrical loads, are compatible with the design of on-site emergency power systems, both ac and dc. (b) The instrumentation and control requirements of the RHR system to provide adequate instrumentation and control in control room to assist in post-LOCA conditions.	a) ITAAC regarding the adequacy of normal and emergency power sources, including load sequencing and timing will be included with those systems. b) RHR instrumentation and control already present in the main control room for normal operations includes that necessary for assisting in post-LOCA conditions and is qualified for such conditions, as appropriate.

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(7)	In Table 2.4.1.1 add the following certified design commitment: (a) "The three separate loops of the RHR system are mechanically and electrically separated from each other." (b) "The RHR pumps are protected from pump run-out."	(a) This provision is included in the design description. (b) This commitment is not contained in ABWR Sections 5.4.7 and 6.3, applicable to the RHR. However, it is a condition recognized in the design process and is controlled by selection of the size of the restricting orifices shown on the simplified P&IDs. GE does not believe that any further level of detail is appropriate for tier 1 treatment
(8)	Figures 2.4.1.a, b, c - Most of the RHR piping is classified as ASME Class-3. This is in conflict with the SSAR. In Section 5.4.7.2.4 applicable codes and classifications, process side piping, pumps and valves are all given as ASME III, Class 1 and 2 only. Correct the pipe classification as ASME Class-2 for all RHR piping except for the piping interface with RCPB which is correctly classified as ASME Class-1.	The appropriate modifications have been made to assure Figures 2.4.1a, b and c are consistent with ABWR SSAR Sections 5.4.7.2.4 and Table 3.2-1.
SRXB comments, RHR, acceptance criteria (1)	In No. 2 of the acceptance criteria, only the PCT is given. The LOCA acceptance criteria includes 5 items: PCT, maximum cladding oxidation, maximum hydrogen generation, coolable geometry and long-term cooling. Include all five items of the acceptance criteria as given in 10 CFR 50.46. Ensure that critical performance parameters used in the analysis are identified as acceptance criteria.	The intent is to include in Tier 1 measurable system performance characteristics. GE has provided detailed analyses to show that the acceptance criteria of 10 CFR 50.46 are met assuming minimum ECCS performance requirements are met. For RHR the important performance requirements are flow and time-to-rated-flow which are included in Table 2.4.1-1. Information presented in Chapter 15 of the SSAR describes more specifically how LOCA-related regulatory requirements are met.
(2)	The RHR pump flow 4200 gpm, time to rated flow 36 sec and RHR heat exchanger design parameters should not be categorized as validation attributes. They are Tier -1 acceptance criteria and should be classified as such.	The RHR pump flow of >4200 gpm and the RHR heat removal capability of >195 Btu/sec °F are already contained in the Tier 1 design description. GE agrees to raise these items from validation attributes to acceptance criteria and to include the time-to-rated flow of 36 seconds.
(3)	In Item #3, add the following in the acceptance criteria: "RHR Heat Exchanger ... demonstrates the capability to prevent the bulk suppression pool temperature from exceeding 207°F with only two RHR heat exchangers out of the three RHR heat exchangers. The validation attributes for RHR heat exchanger capability and tube side flow should both be identified as acceptance criteria.	GE believes the parameter of 207°F is analogous to the other LOCA-related criteria discussed in Item 1 above. In which case, heat removal capability is the key characteristic of the RHR system which should be measured. However, in situ, heat removal testing for the RHR system cannot be achieved prior to fuel load and thus cannot be an ITAAC entry. However, ITAAC material for the RHR system will be modified to include a review of supplier documentation to confirm that the heat exchangers have been designed for the appropriate heat removal capacity.

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GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
(4)	In Item No. 5 add the following in the acceptance criteria, "RHR system shall be capable of bringing the reactor to the cold shutdown condition of less that 212°F within 36 hours following reactor shutdown with only two of the three RHR heat exchangers." Change ITAAC #2 to #3 to refer to containment cooling requirements.	The ability of the RHR system to bring the reactor to cold shutdown within 36 hours following reactor shutdown has been demonstrated in the SSAR. GE believes it is unnecessary to include this subject in ITAAC. As discussed in the SSAR, the RHR heat exchanger heat removal capability in this mode is bounded by containment cooling requirements. Containment cooling, as NRC correctly notes, is covered by ITAAC #3.
SRXB comments, RHR, testing (1)	Verification of actual pump NPSH requirements for as-procured pumps should be provided.	ITAAC #18 provides for verification of NPSH for installed pumps. No changes are required.
(2)	Test for adequacy of RHR pump minimum flow, and required miniflow bypass criteria should be provided in addition to logic test identified in Item 11 of the ITAAC.	ITAAC #11 provides for functional testing of each RHR loop at minimum flow load. This ITAAC will be clarified to address the NRC's comment.
SRXB comments, RHR, safety analysis (1)	In No. 2 of the acceptance criteria, only the PCT is given. The LOCA maximum hydrogen generation, coolable geometry and long-term cooling. Include all five items of the acceptance criteria as given in 10 CFR 50.46. Ensure that critical performance parameters used in the analysis are identified as acceptance criteria.	See above response to similar comment. GE believes the philosophy of ITAAC preparation is that the ITA describe what is done in the field with the AC based on parameters expected to be measured. The material presented in Chapter 15 of the SSAR provides the link between these measured system performance characteristics and the broader safety criteria identified in this comment.
(2)	Reference to the calculational bases for RHR pump flow 4200 gpm, time to rated flow 36 sec, RHR heat exchanger tube side flow 4200 gpm, wetwell spray flow rate of 500 gpm, etc., should be included since they are important safety analysis assumptions of ITAAC.	The Tier 1 design description and ITAAC are intended to provide top level design criteria and design features. The calculational bases for these criteria and features are contained in the SSAR and are at a level of detail that is not appropriate for Tier 1.

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GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/ . 1

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
Emergency diesel generator system comments (1.a)	It is the NRC understanding that the ABWR design requires that each of the three division be capable of supplying sufficient AC power to satisfy minimum safety-related functions defined in the accident analysis for the ABWR. The ITAAC should be consistent with the ABWR design commitments.	The design bases for ABWR requires that any two of the three divisions of emergency diesel generators be capable of providing power. This design basis requirement derives directly from application of the single active failure criterion to ABWR. A statement consistent with the ABWR SSAR, Section 8.3.1.1.8, has been added to the first paragraph, i.e., "...as required to achieve safe shutdown of the plant and/or to mitigate the consequences of a loss-of-coolant accident (LOCA) in the event of a coincident loss of normal electrical power." The ABWR has the capability to shut down the plant with only one division However, this is beyond the design bases for three divisions with a single active failure. Therefore, it is not appropriate to state this as a Tier 1 ITAAC.
(1.b)	The last part of this statement "other loads required by the plant design" implies that the three divisions can supply all loads-safety and nonsafety. This part of the statement should be clarified.	The "other loads..." has been replaced with the above.
(1.c)	It is not clear what the term "divisions" means in the above statement. The capability of the standby AC power supply should be addressed versus the capability of the Alternating Current Power System. The Standby power supply is a subsystem of the alternating current power system.	Due to the additions noted above, the first sentence of the second paragraph was unnecessary and has been deleted.
(2)	The last sentence of the first paragraph of the design basis section states that the division I RCIC system is steam-driven and therefore not dependent on the standby AC power supply system. This statement is not correct. The RCIC system is dependent on the DC system which is Dependent on the AC system.	GE will clarify this item by stating that RCIC does not present a significant load for the diesel generators. For example, "...not dependent on the standby ac power supply system." has been replaced with "...does not present a significant load to the diesel generator." The purpose of the paragraph in question was to identify 'major loads,' and the purpose of the sentence in question was to explain why Division I of the RCIC did not represent a major load. The sentence change should eliminate any confusion.
(3)	The term "by the plant design" needs to be explicitly defined.	The precise sequence and individual timing of each diesel generator load is a level of detail inappropriate for a Tier 1 ITAAC. However, the sentence has been clarified to state "...supplying its loads in the sequence and timing specified in the plant design documents."

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GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
Emergency diesel generator comments (4)	The fifth paragraph of the design description can be interpreted to mean that the diesel generator does not automatically start on an accident signal. The design basis should be clearly stated to indicate that the diesel generator will be started on an accident signal as implied in the design description in the ABWR SSAR. The design description for the ITAAC indicates that the diesel generator will only go to an idle standby condition if started by an accident signal without a loss of offsite power signal. If the diesel generator is to be operated at idle start after an accident signal without loss of offsite power as part of the ABWR design, this area will be considered an open issue for the Chapter 8.0 review of the ABWR SSAR.	GE has clarified by replacing the term "idle" with a better definition of the standby condition. The vague term idle has been removed, and the term standby has been augmented with "(i.e., running at rated voltage and frequency but unloaded)."
(5)	Part of design commitment 3 requires that loads be supplied in proper sequence; but, the acceptance criteria and compliance assessment procedures related to design commitment 3 do not address or require that proper sequence be demonstrated. Acceptance criteria and compliance assessment procedures for each design commitment should be consistent with the design commitment.	The Acceptance Criteria segment, "...and sequences its loads" has been replaced with, "...and properly sequences its loads in accordance with the plant sequence diagram." Also, the design commitment segment, "...required by the plant design," has been replaced with, "...specified in the plant design documents."
(6)	The commitment for independence, with no interconnections between redundant divisions contained in the third paragraph of the proposed design description is not consistent with the ABWR design commitment in Section 8.3.1.1.8.1 of the SSAR. The design description for the ITAACs should be consistent with the design description for the ABWR SSAR before it is sent to the NRC for technical evaluation.	GE will modify the design description to clarify this item. The word "automatic" has been added in the fourth paragraph of the Design Description, as stated in the ABWR SSAR Section 8.3.1.1.8.1.
(7)	Certified design commitment 2 (i.e., each diesel generator is capable of attaining rated frequency and voltage within 20 seconds after receipt of a start signal) has not been included in the design description for the ITAAC but is included in the design description for the ABWR SSAR. By what document are ITAACs being generated?	The Tier 1 design description ITAACs are being generated or based upon the information in the ABWR SSAR. The Tier 1 design description will be modified to make it consistent with certified design commitment #2, i.e., add 20 seconds (to the fourth paragraph).
(8)	The design description provided with the ITAAC is not consistent with the design description provided in the ABWR SSAR.	NRC commitment needs to be more specific. The GE intent is to make the design description consistent with the SSAR; if specific inconsistencies can be identified, GE will take appropriate action.

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GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
Emergency diesel generator comments (cont.) (9)	The certified design commitment number 6 is not consistent with the ABWR commitments documented in the ABWR SSAR. The ABWR SSAR commitment is that the devices that monitor the conditions of the diesel generator (i.e., perform a function that is not required for the diesel generator to accomplish its safety functions and are part of the diesel generator by association (that is not isolated from the diesel generator)) shall be designed to meet those criteria necessary to ensure that these devices that monitor the condition of the diesel generator do not degrade the diesel generator below an acceptable level. An explicit statement as to what the necessary criteria is to ensure that these devices do not degrade the diesel generator below an acceptable level is currently considered as an open issue in _____ commitment. The four categories presented relate to protection of equipment. The staff feels that these categories are inappropriate as certified Tier 1 design commitments.	GE believes that conditions which trip or damage the diesel generator have safety implications, and their annunciations should be confirmed as part of the Tier 1 ITAAC. However, specific identification of annunciator points would be inappropriate at this level because of dependence on the specific diesel design. GE still believes the four categories are the best way to specify such tests for Tier 1.
(10)	Design criteria defined in IEEE Standard 308-1980 appear, for the most part, to be presented at the appropriate level to be considered tier 1 design criteria. The staff thus intends to use these criteria as the primary guidelines for review of ITAACs for completeness. Justification should be provided for each difference.	GE confirms that the ABWR Emergency Diesel Generators comply with all the provisions of IEEE 308-1980, Section 6.2.4, for the "Standby Power Supply." The ITAAC incorporates these provisions as follows: 1) Description [ITAAC Design Description (DD), 8th paragraph]; 2) Function [DD, 2nd paragraph]; 3) Capability [DD, 3rd paragraph]; 4) Independence [DD, 3rd and 9th paragraphs]; 5) Availability [DD, 4th and 5th paragraphs]; 6) Capacity [DD, 4th paragraph]; 7) Energy Storage [DD, 6th paragraph].

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GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
SPLB comments on RCW. First page, paragraph 2	The DD should identify all heat loads the system is designed to service, along with the maximum heat load expected for each division and the condition under which the maximum heat load is expected. The DD should also identify the RCW division that each heat load is on.	Tables have been added to the DD identifying equipment which receives RCW flow during the various plant operating and emergency modes. Divisional assignments are included. Identification of the RCW design basis condition has also been added to the DD. Numerical definition of the heat loads in the multiple heat exchangers and operating modes is provided in Table 9.2-4a, b and c of the ABWR SSAR. GE does not believe this level of detail is appropriate for Tier 1 and has not been included in either the DD or ITAAC. It may be expected that minor variations in this information will occur given as-built data and as a result of system balancing. Such variations will be acceptable and inclusion of such information in Tier 1 would unnecessarily prohibit a licensee from accepting such variations under 10 CFR 52.63 (b) 2.
3	The DD and accompanying figures should clearly identify the seismic and quality group classifications group classifications of the system. It should also specify which parts of the system are safety-related and which are not.	GE agrees and the DD has been modified to provide this information.
4	The DD should identify the specific location of the equipment and heat loads. In addition, the DD should identify all instrumentation as well as indicators, alarms, and controls located in the control room, remote shutdown panel, and locally.	The existing DD identifies the building in which equipment and heat loads are located. In addition, the Tier 1 material for each of the buildings will include general arrangement drawings showing major equipment locations, including RCW items. GE does not believe the RCW DD requires any modifications with respect to equipment locations. The DD has been modified to include a brief summary of major control room instruments and controls. Remote shutdown system considerations will be addressed in the DD for that system. (Item 2.2.6 of the proposed ABWR ITAAC list.) Local instrumentation information is not appropriate for Tier 1 treatment and has not been added to the RCW material.
5	The DD should explain system operation during various conditions (normal, LOSP, LOCA, LOSP/LOCA, hot shutdown, hot standby) as well as during high radiation and high leakage conditions.	The tables which have been added to the DD explain system operation during various modes of operation. Design features and operating procedures that address leakage and radiation are not viewed as Tier 1 material.
6	System parameters should be specified, such as design pressure, design temperature, normal operating pressure, normal operating temperature, pump flow rates and NPSH, and heat exchanger capacities.	Tier 1 is reserved for top level system design conditions. The RCW DD identifies the pump design pressure, temperature, flow and head, and the heat exchanger capacities. GE believes more comprehensive definition of design conditions should remain in Tier 2 and no changes are proposed. Normal operating pressures and temperatures are operational considerations that are not appropriate entries for Tier 1.
7	Protection of the system from the effects of fire, flooding, spray, jet impingement, pipe failures, and components should be addressed.	These issues will be addressed, as appropriate, in other system or generic ITAAC. For example, considerations of building flooding will be covered in the ITAACs for the control and reactor building.

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GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
SPLB comments on RCW. Second page (Table 2.11.13) Item 1	Figure 2.11.3 should clearly identify all components, instruments and heat loads in the system and their locations. In addition, the seismic and quality group classifications should be specified. Finally, the figure should identify which portions of the system are safety-related and which are not.	To the extent GE believes it is appropriate to include details in Tier 1, these issues are addressed in response to the above items identified as Paragraph 2 and 3. Important RCW control room instruments are shown on Figure 2.11.3.
Item 1	Inspection procedures should be reviewed.	The purpose of ITAAC is to confirm that the plant has been built and will operate in accordance with the design certification. Review of procedures is a function that is performed in accordance with the QA program under 10 CFR Part 50 Appendix B, and is not appropriate for inclusion in the ITAAC. Consequently, GE proposes no change in response to this comment.
Item 2	Inspection and test procedures should be reviewed to ensure that they can adequately demonstrate system independence.	See response to the above item. ITAAC #2 covers independence and separation of the RCW divisions.
Item 3	Operational modes should be identified and test procedures should be reviewed to ensure that hydraulic demands can be met in each mode.	The new tables discussed above provide information on the operational modes. Existing ITAAC #3 covers hydraulic performance of the systems. No other changes are proposed.
Item 4	Simulate LOCA, LOSP, LOCA/LOSP, and high leakage conditions. Isolation time limits should also be identified.	ITAAC #5 includes provisions for testing simulated LOCA/LOSP conditions. ITAAC #4 includes provisions for testing isolation of essential from nonessential equipment. Isolation time limits are not critical, and GE does not believe that this level of detail in appropriate for Tier 1. Assuming "high leakage" means failure of the nonessential portions of the system, testing described in ITAAC #4 will confirm necessary isolation will occur.
Item 5	Tests should be conducted with different combinations of pumps and heat exchangers initially running. These should be conducted for LOCA, LOSP, and LOCA/LOSP. Pump start and valve opening times should be specified as well as diesel loading times.	Existing ITAAC #5 simulates system performance for LOCA/LOSP conditions with all combination of RCW pumps and heat exchangers in each division initially running. GE does not believe any changes in ITAAC #5 are required. GE does not believe that details on pump start time and valve opening times are appropriate for Tier 1. Diesel loading times are addressed in the ITAAC for the standby AC power supply system.
Additional items	Test should ensure that any two divisions can adequately handle system or heat loads.	GE agrees that ITAAC #3 should be modified to clarify divisional capability. Because the ITAAC must be complete prior to fuel load, it will not be possible or feasible to directly test the system's ability to handle the types of heat loads that are generated during operation. Instead, as discussed in ITAAC #3, system hydraulic tests will be conducted to confirm that the RCW has sufficient water flow to handle the heat loads. Testing during plant startup and operation will confirm adequate thermal performance of the system.

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GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
Additional items	Tests should ensure that each division can handle the maximum heat loads on that division.	See above response to divisional and heat load testing.
Additional items	Tests should ensure that each division can handle the maximum heat loads on that division.	See above response to divisional and heat load testing.
Circulating water system design description. Paragraph 1	The DD should specify system flow rate, contain system P&IDs, and provide a substantive description of the water box fill and vent subsystem. In addition, the DD should identify the condenser pit level which initiates system isolation.	As stated in the Staff Requirements Memorandum of February 15, 1991, the Commission has approved a graded approach to the level of detail of information needed for design certification; i.e., the level of detail will vary depending upon a system's relationship to safety. The ABWR CWS does not serve or support any safety function and has no safety design basis. Because the information identified in the NRC comment has no relationship to safety, GE does not believe that it is appropriate for inclusion in Tier 1. However, GE agrees to add a simplified P&ID comparable to the SSAR P&ID. It is noteworthy that the CWS was selected by GE as a pilot ITAAC example precisely because it is a non-safety system and would thus representative of the less detailed end of the graded treatment spectrum.
Paragraph 2	The DD should identify the maximum system temperature and how it is maintained as well as the alarms, indicators, and controls which are located in the control room and locally.	See Response to Comment 1 in the first paragraph.
Paragraph 3	Finally, the DD should explain the various system starting interlocks and source of pump bearing lubricating and seal water.	See Response to Comment 1 in the first paragraph.
Circulating water system Table 2.10.2S, Item 1 Additional items	Include required isolation times.	The ITAAC includes provisions for verifying the isolation function. The isolation times for the isolation valves are not critical and are not appropriate for Tier 1.
1	Provide flow diagram which identifies system components, instruments and their locations, and quality group classifications.	See Response to Comments 1. As discussed in the design description, CWS is designed and constructed in accordance with Quality Group D specifications. The simplified P&ID shows major components.
2	Ensure through construction records that the system is built to Quality Group D specifications.	See Response to Comment 1 in the first paragraph.
3	Ensure through tests that required flow capacities are met.	See Response to Comment 1 in the first paragraph.
4	Ensure through visual inspections that the system components and their locations are in accordance with the flow diagram.	See Response to Comment 1 in the first paragraph.

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GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE	NRC COMMENT	GE RESPONSE
Control building flooding design description Paragraph 1	The Design Description (DD) should identify all potential internal flooding hazards on a floor-by-floor basis and discuss features to protect safety-related systems and equipment from these hazards.	In the DD, GE will identify the type of design features used to control potential floods. The DD now includes a summary of the flood analysis presented in the SSAR; a comprehensive repetition of this material in Tier 1 is not believed appropriate.
2	The DD should identify internal flooding hazards due to system failures in adjacent buildings which have common access areas to the control building.	GE will describe the plant features aimed at protecting the control building from this type of flood hazard; i.e., watertight doors installed below internal flood level.
3	The DD should detail the design of the control building roof and how the design prevents excessive water weight on the roof due to precipitation.	The DD will be modified to include a commitment to provide roofs designed to prevent pooling of large amounts of water.
Table 2.19.12. Item 2, Paragraph 1	All watertight doors should be identified on Figures 2.15.12a through 2.15.12g.	Figures will be modified to show watertight doors.
2	All major piping identified as a potential flooding hazard should be identified on Figure 2.15.12a through 2.15.12g.	This detailed type of information is discussed in the SSAR Section 3.4.1.1.2.2. GE believes this level of detail is not appropriate for Tier 1.
3	Visual inspection should be conducted to verify that flood protection features such as watertight doors are in place as specified in Figures 2.15.12a through 2.15.12g.	Since these features are to be added to the figures, this request is now satisfied by ITAAC #1 of Table 2.15.12.
4	Visual inspections should be conducted to ensure that primary flood hazards were properly identified in DD and figures.	Confirmation that an adequate floods hazards analysis was performed is a design issue that should be addressed during the SSAR design review process. The intent of ITAAC is to confirm that the as-built facility conforms to the certified design; no DD or ITAAC changes are proposed in response to this NRC comment.

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GE RESPONSES TO NRC ITAAC COMMENTS DATED 12/5/91

COMMENT SOURCE*	NRC COMMENT	GE RESPONSE
Informal Comments on Proposed Generic EQ ITAAC	GE summary of NRC comments: The main thrust of the NRC's comments is to modify the generic EQ ITAAC to address only the qualification of electrical equipment as called for in 10 CFR 50.49. In addition, the [illegible] is modified to identify that the preferred method of verifying qualification is a 100 per cent audit of qualification [illegible]	The intent of the proposed GE generic EQ ITAAC was that it be all-inclusive and address all important safety equipment (mechanical and electrical) and the full range of environmental conditions expected in the plant (from harsh to mild). GE believes a comprehensive approach is appropriate and has slightly modified the NRC's comment to retain this full scope. GE believes identification in Tier 1 of a "preferred method of verifying the qualification..." is too imprecise and proposes to base the ITAAC on the "minimum...audit..." approach identified by the NRC in their comments. The basis for this response is the understanding that ITAAC are mandatory and it would be inappropriate to include "preferred methods" or recommendations.

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