November 21, 2005

Mr. Russell Bell
Nuclear Energy Institute
1776 I (eye) Street, NW
Suite 400
Washington, DC 20006

SUBJECT: INSPECTIONS, TESTS, ANALYSIS, AND ACCEPTANCE CRITERIA (ITAAC) DETERMINATION LETTER DOCUMENTATION

Dear Mr. Bell:

Among the major topics discussed during our September 21, 2005 meeting on construction inspection issues was the closure process for ITAAC (Ref. NRC Memorandum for Summary of Meeting with NEI, dated October 5, 2005, ADAMS Accession No. ML052780485). A significant portion of the discussion was focused on the type of documentation needed to support the ITAAC determination letters. Over the last few meetings, NEI proposed examples of ITAAC determination bases, which the NRC staff has reviewed and on which the staff is now providing both general and specific comments.

The staff considers the ITAAC determination review to be one of the last major steps in the NRC construction inspection process leading up to reactor operation. The ITAAC determination review cannot be isolated from the overall construction inspection process, and as the final milestone in that process, must be a review informed not only by the inspection information gathered by the NRC during the entire period of construction, but also by the information used by the licensee in making its determination. Complete information is necessary for the staff to make an independent determination on whether all ITAAC have been satisfied in order to support a Commission finding in accordance with 10 CFR 52.103(g).

The ITAAC determination basis developed by the COL holder should have the following four characteristics:

Specificity - The ITAAC determination bases should be specific with respect to the design state (i.e., prototype or non-prototype).

Consistency - The ITAAC determination bases for similar or identical acceptance criteria should be consistent.

Accuracy - The ITAAC determination bases should directly correspond to the acceptance criteria to make the inspection process more efficient and to avoid misunderstandings or misinterpretations of the basis.

Scope - The ITAAC determination bases should properly reflect the scope of the verification effort.

In addition to referencing the specific ITAAC and the applicable structure, system or component, the letter from the licensee requesting closure of an ITAAC should include specific references to the various types of documents used by a licensee in concluding that the ITAAC acceptance criteria have been met. The list below is not intended to be all inclusive, but rather provides examples of documents or information that a licensee may rely upon to form the basis for the ITAAC determination and such documents should be referenced in the licensee's letter to the NRC.

Examples of those references include:

- licensee test report or procedure number and date performed/completed
- vendor or test facility report number and date performed/completed
- uniquely identified construction work planning documents and date performed/completed
- licensee inspection records and date performed/completed
- procurement documents
- fabrication records for components, equipment, or modules
- receipt inspection records
- certificates of compliance (C of C's)
- certified material test reports (CMTRs)
- certified approvals by registered professional engineers
- licensee inspections or walkdowns and date performed/completed

The enclosed Table 1, "Documents Supporting Closure of ASME-Related ITAAC," includes a general listing of design basis documents and ASME Code certification reports which the staff considers to be the types of documentation necessary to support closure of an ASME Code-related ITAAC. Enclosure 1 and Table 1 provide general examples of information relevant to closure of an ASME Code-related ITAAC for both pressurized water reactor (PWR) and boiling water reactor (BWR) designs. Enclosure 2 includes the staff's feedback on the types of information to be referenced in an ITAAC determination letter for those sample ITAAC not addressing specific provisions of the ASME Code. The references need not be enclosed with the ITAAC determination letter from the licensee, but should be available for audit at a designated location.

This information is provided for your review to further develop a mutual understanding regarding the details necessary for successful closure of ITAAC. If you have questions or comments on this information, please contact me at 301-415-1073, or Patrick Sekerak at 301-415-2623.

Sincerely,

/RA/
Mary Ann Ashley, Team Leader
Construction Inspection Program
Division of Inspection and Regional Support
Office of Nuclear Reactor Regulation

Enclosures: As stated

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OFFICE	DIRS/IRIB	DNRL/NRBA	NRR/OGC	ADRO/DIRS	DIRS/IRIB
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DATE	11/15/05	11/18/05	11/17/05	11/21/05	11/21/05

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Letter to Russell Bell dated November 21, 2005

SUBJECT: INSPECTIONS, TESTS, ANALYSIS, AND ACCEPTANCE CRITERIA (ITAAC) DETERMINATION LETTER DOCUMENTATION

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ITAAC Determination Documentation for ASME Code-Related ITAAC

The following examples are provided to illustrate the NRC staff's general expectations using selected ITAAC applicable to either a pressurized water reactor design or a boiling water reactor design.

Example 1-1: The ITAAC determination letter for the reactor pressure vessel (RPV) should include, either as references or as attachments:

(a) Information from the ASME III RPV Design Specification identifying the document number, title, revision, date of origination, and the date of certification by a Registered Professional Engineer. Alternatively, a copy of the cover sheet and any additional pages of the ASME III RPV Design Specification listing this information could be provided as an attachment.

(b) Information from the ASME III RPV Design Report identifying the document number, title, revision, date of origination, and the date of certification by a Registered Professional Engineer. Alternatively, a copy of the cover sheet and any additional pages of the ASME III RPV Design Report listing this information could be provided as an attachment.

(c) A reference to the ASME Code Section III Data Report Form N-1, including the dates of certification by the ASME III Certificate Holder and by the Authorized Nuclear Inspector. Alternatively, a copy of the ASME Code Section III Data Report Form N-1 could be included as an attachment.

(d) A reference to the ASME Code Section III Data Report Form N-3 (if applicable), including the dates of certification by the ASME III Certificate Holder and by the Authorized Nuclear Inspector. Alternatively, a copy of the ASME Code Section III Data Report Form N-3 could be included as an attachment.

(e) Information from the ASME III Overpressure Protection Report which addresses the RPV, identifying the document number, title, revision, date of origination, and the date of certification by a Registered Professional Engineer. Alternatively, a copy of the cover sheet and any additional pages of the ASME III Overpressure Protection Report listing this information could be provided as an attachment.

The general types of ITAAC to which this Example 1-1 documentation would apply include AP1000 ITAAC No. 2.1.3-2.3 and ABWR ITAAC No. 2.1.1d.2.

Example 1-2: The ITAAC determination letter for non-destructive examination (NDE) of ASME Code component pressure boundary welds should include, either as references or as attachments:

(a) A reference to the Final NDE Reports for the welds in the selected ASME Code component, including a specific summary conclusion that all welds in the selected component conform to the ASME Code, Section III NDE acceptance criteria. The format for this reference may depend on the format chosen by the ASME Certificate Holder for the permanent Quality Assurance (QA) Records required by ASME Code, Section III, NCA-4134.17. Regardless of the final format for the reference, the ITAAC closure letter should include a specific conclusion of adequacy based on the lifetime QA records (ASME III, Table NCA-4134.17-1) for NDE of the individual welds in the ASME component addressed by the selected ITAAC.

The general types of ITAAC to which this Example 1-2 documentation would apply include AP1000 ITAAC No. 2.2.3-4.3.b and ABWR ITAAC No. 2.1.1d.5.

Example 1-3: The ITAAC determination letter for the hydrostatic testing of ASME Code pressure boundary components or assemblies should include, either as references or as attachments:

(a) Information from the selected ASME III component Design Specification identifying the document number, title, revision, date of origination, and the date of certification by a Registered Professional Engineer. A statement should be included indicating whether the selected components were treated as parts or appurtenances of an assembly, or as separate components (see ASME Code, Section III, NCA-1270). Alternatively, a copy of the cover sheet and any additional pages of the ASME III Design Specification listing this information could be provided as an attachment.

(b) A reference to the ASME Code Section III Data Report Form N-1 (and other applicable Data Report Forms, e.g., Form N-2, if the items in this assembly were treated as separate components) indicating the hydrostatic test pressure applied to the assembly or to the individual components. The reference should include the dates of certification by the ASME III Certificate Holder and by the Authorized Nuclear Inspector. Alternatively, copies of the applicable ASME Code Section III Data Report Forms could be included as attachments.

The general types of ITAAC to which this Example 1-3 documentation would apply include AP1000 ITAAC No. 2.1.3-2.5 and ABWR ITAAC Nos. 2.1.1d.3, and 2.10.1.2.

Example 1-4: The ITAAC closure letter for the main steam piping design should include, either as references or as attachments:

(a) Information from the ASME III Piping Design Specification identifying the document number, title, revision, date of origination, and the date of certification by a Registered Professional Engineer. A statement, or copy of the table of contents, or other means of verification, should also be included identifying the applicability of the Piping Design Specification specifically to

the main steam piping. Alternatively, a copy of the cover sheet and any additional pages of the ASME III Piping Design Specification listing this information could be provided as an attachment.

(b) Information from the ASME III Piping Design Report identifying the document number, title, revision, date of origination, and the date of certification by a Registered Professional Engineer. A statement, or copy of the table of contents, or other means of verification, should also be included identifying the applicability of the Piping Design Report specifically to the main steam piping. Alternatively, a copy of the cover sheet and any additional pages of the ASME III Piping Design Report listing this information could be provided as an attachment.

(c) A reference to the ASME Code Section III Data Report Form N-1, including the dates of certification by the ASME III Certificate Holder and by the Authorized Nuclear Inspector. Alternatively, a copy of the ASME Code Section III Data Report Form N-1 could be included as an attachment.

(d) A reference to the ASME Code Section III Data Report Form N-5, including the dates of certification by the ASME III Certificate Holder and by the Authorized Nuclear Inspector. Alternatively, a copy of the ASME Code Section III Data Report Form N-5 could be included as an attachment.

(e) A reference to the ASME Code Section III Data Report Form NPP-1 (if applicable), including the dates of certification by the ASME III Certificate Holder and by the Authorized Nuclear Inspector. Alternatively, a copy of the ASME Code Section III Data Report Form NPP-1 could be included as an attachment.

(f) A reference to the ASME Code Section III Data Report Form N-3 (if applicable), including the dates of certification by the ASME III Certificate Holder and by the Authorized Nuclear Inspector. Alternatively, a copy of the ASME Code Section III Data Report Form N-3 could be included as an attachment.

(g) Information from the ASME III Overpressure Protection Report which addresses the main steam piping, identifying the document number, title, revision, date of origination, and the date of certification by a Registered Professional Engineer. Alternatively, a copy of the cover sheet and any additional pages of the ASME III Overpressure Protection Report listing this information for the main steam system could be provided as an attachment.

The general type of ITAAC to which this Example 1-4 documentation would apply include AP1000 ITAAC No. 2.2.4-4.2.b. Also, ABWR ITAAC No. 2.10.1.5 could be addressed by item (b) in Example 1-4, together with an additional statement concluding that the main steam piping can withstand applicable load combinations including a safe shutdown earthquake, as addressed in the ASME Piping Design Report.

Table 1. Documents Supporting Closure of ASME-Related ITAAC

Document Type	ASME III Reference	Comment
Design Specification	NCA-3250	
Design Report	NCA-3350	
Certified Material Test Report	NCA-1221.1	
Certificate of Compliance	NCA-1221.1	When an item is furnished as material
Certified Design Report Summary	NCA-3551.3 NCA-3260	For standard supports (in lieu of a Design Report)
Overpressure Protection Report	NCA-3270; NB-7200	
Final NDE Reports	Table NCA-4134.17-1, Item 15	For ITAAC addressing welds
Data Report Form N-1	ASME III, Appendix V; Table NCA-8100-1	ASME Class 1, 2, 3, and MC nuclear vessels
Data Report Form N-2	ASME III, Appendix V; Table NCA-8100-1	ASME Class 1, 2, 3, parts or appurtenances
Data Report Form N-3	ASME III, Appendix V; NCA-8420	Applies when the Owner of the nuclear facility possesses an ASME Certificate of Authorization
Data Report Form N-5	ASME III, Appendix V; Table NCA-8100-1	Installation or shop assembly of ASME Class 1, 2, 3 components, including field fabrication of piping systems
Data Report Form N-6	ASME III, Appendix V; Table NCA-8100-1	ASME Class 2 and 3 storage tanks
Data Report Form NPP-1	ASME III, Appendix V; Table NCA-8100-1	ASME Class 1, 2, 3 piping sub-assemblies
Data Report Form NPV-1	ASME III, Appendix V; Table NCA-8100-1	ASME Class 1, 2, 3 pumps and valves
Data Report Form NV-1	ASME III, Appendix V; Table NCA-8100-1	ASME Class 1, 2, 3 pressure or vacuum relief valves
Data Report Form NCS-1	ASME III, Appendix V; Table NCA-8100-1	Reactor core support structures
Data Report Form NS-1	ASME III, Appendix V; Table NCA-8100-1; NF-1110	ASME Class 1, 2, 3, and MC component support structure
Data Report Form NM-1	ASME III, Appendix V; Table NCA-8100-1	ASME Class 1, 2, 3 tubular products and fittings fabricated by welding
Data Report Form C-1	ASME III, Appendix V; Table NCA-8100-1	ASME III, Division 2, Class CC concrete containment
Construction Specification	NCA-3342 Table NCA-3200-1	ASME III, Division 2 construction requirements
Construction Report	NCA-3454 Table NCA-3200-1	ASME III, Division 2 construction requirements

ITAAC Determination Documentation for System, Structure, and Component ITAAC

General Comments

The development of the ITAAC determination bases by licensees or COL applicants should properly reflect the scope of the verification effort associated with the specific reactor design described in a COL application. Specifically, seemingly similar terms in regard to ITAAC of different designs may be defined to have far different scope. The importance of reflecting proper scope is illustrated below in the distinctions between seemingly similar terminology defined in certified design documents such as “basic configuration” (for the ABWR) and “functional arrangement” (for the AP1000):

ITAAC determination bases for system and structures must provide for a clear distinction between “basic configuration” as used in the ABWR Tier 1 Document and “functional arrangement” and “physical arrangement” as used in the AP1000 Tier 1 Document. Based on the definitions provided by GE in Section 1.2 of the ABWR Tier 1 Document and by Westinghouse in Section 1.1 of the AP1000 Tier 1 Document, the NRC understands that these definitions are not interchangeable. Further, it is the NRC staff’s understanding that verification of “basic configuration” includes inspection of functional arrangement and inspections, tests, and analyses that are applicable to the system or structure. This may warrant inspections, including non-destructive examinations (NDE), of the as-built, pressure boundary welds for ASME Code Class 1, 2 or 3 components, type tests, analyses, or a combination of type tests and analyses of Seismic Category I mechanical and electrical equipment, demonstration of environmental qualification of electrical equipment, tests or type tests of safety-related motor-operated valves (MOVs), as applicable, etc. In contrast, the staff understands that verification of “functional arrangement” and “physical arrangement” entails inspection of the system or structure to ensure that its construction is consistent with the design drawings included in Tier 1, but does not include functional inspections, tests, and analyses. Additional AP1000 ITAAC will cover the functional inspections, tests, and analyses. The ITAAC Determination Bases should identify any deviations and reference the documentation of successful resolution of the issue.

Specific Examples

The following provides a discussion of NRC expectations associated with the following examples:

Example 2-1: RPV internals (ITAAC for RVH3 - ABWR ITAAC 2.1.1.7)

Reference to a specific vibration type test report and date performed/completed for prototype RPV internals should be included in the ITAAC closure letter. For non-prototype RPV internals, specific reference to an engineering analysis that addresses the applicability and acceptability of previously performed testing of the prototype RPV internals design from which the non-prototype RPV internals design originated, should be included in the ITAAC closure letter. In addition, reference to a specific inspection report and date performed/completed should be included in the ITAAC closure letter for documenting that the as-built RPV internals experienced no damage or loose parts after an appropriate flow test.

Example 2-2: Control room displays (ITAAC for TGS2 - ABWR ITAAC 2.10.9.2)

Reference to a specific inspection report number or pre-operational test number and the date performed/completed should be included in the ITAAC closure letter for discrete human system interfaces (HSI) that are identified in an ITAAC. The inspection report or pre-operational test report should conclude that the acceptance criteria for the ITAAC have been met. In the ABWR example referenced, the acceptance criterion that is met is that system displays for the turbine gland seal system are retrievable in the main control room. It should be noted that the other characteristic important to HSIs (e.g., accuracy, usability, etc.) are assured by the non-systems- based human factors engineering ITAAC and may also be verified/validated by the same pre-operational test referenced as the basis for concluding that systems displays are retrievable in the main control room.

Example 2-3: Check Valves (ITAAC for CVS5 - AP1000 ITAAC 2.3.2-4.11.a)

The ITAAC closure letter should provide a specific reference to the pre-operational test report, procedure number and date performed/completed. The test report that is to be made available for onsite inspection should include the following information:

Pre-operational test procedure for the system containing check valve(s) to include:
(a) Initial conditions / test setup
(b) Test acceptance criteria
(c) Identification of the method used to determine that the check valve transferred open, transferred closed, or both
(d) Test procedures
(e) Data/test results, including date performed

Example 2-4: Fire Protection features (ITAAC for STR3 - ABWR ITAAC 2.15.10.3)

For fire protection related ITAAC, the licensees should include in their ITAAC closure letters references to the specific documents containing the following types of information used as the bases for concluding that ITAAC acceptance criteria have been met:

(a) References to applicable codes and standards used in the design and installation of fire protection systems and components. For example, National Fire Protection Association (NFPA), American Society of Testing and Materials (ASTM).

(b) Qualification documents showing compliance with applicable fire codes and standards. For example, fire barrier (doors, walls, floors, and ceiling) assemblies qualification rating documents, certificate of compliance, and independent testing laboratory certificate.

(c) Mathematical computations, engineering calculations, or technical

evaluations of the as-built fire protection systems. For example, fire pump curves, and sprinkler system hydraulic calculations.

(d) Test data and results to evaluate the performance or integrity of the as-built fire protection systems and components. This includes test acceptance criteria and test procedures. For example, following construction, testing of emergency lighting and communication equipment should be performed to demonstrate that the systems will perform satisfactorily in service and that design criteria are met. Written test procedures for installation tests reflect the specifications and acceptance limits contained in applicable design documents.

(e) Inspection records based on visual observations, or physical examination that compare the as-built fire protection systems' and components' condition to one or more design description commitments. For example, (a) inspection of penetrating seals, fire barriers, and fire retardant coating installations to verify the activity is satisfactorily completed; (b) inspection of cable routing to verify conformance with design specifications; (c) inspection to verify that specified measures for room isolation (sealing penetrations, floors, and other fire barriers) are accomplished during construction.

Example 2-5: Flood protection features (ITAAC for STR4 - AP1000 ITAAC 3.3.6.5.a), b), & c))

To ensure consistency, different aspects of this ITAAC should be similarly supported. For example, NEI's proposal for the ITAAC Determination Basis for 3.3.6.5.c) includes a flooding calculation whereas the NEI proposal for 3.3.6.5.b) does not. A flooding calculation should also be part of the ITAAC determination basis for 3.3.6.5.b) such that the provisions relied upon to prevent flooding above specified levels can be demonstrated analytically.

To ensure accuracy, the proposed ITAAC Determination Basis for 3.3.6.5.c) should state "...A flooding calculation along with construction work planning and inspection records has documented that flooding *between PXS Valve/Accumulator Room A (11205), PXS Valve/Accumulator Room B (11207), and CVS room (11209), is prevented by limiting the flood levels to a maximum of 110 feet in Rooms A (11205) and B (11207) and to 109'-10" in the CVS room (11209)*."

The licensee should include references to specific documents, as described below, in its ITAAC closure letters, that it relies upon to establish the basis for concluding that the ITAAC acceptance criteria have been met:

(a) Work planning records (i.e., specific identification of work package numbers, including date completed) that document proper placement and sequence of placement of flood protection features

(b) Inspection records (i.e., inspection reports with unique identifiers, date completed, inspection procedure reference)

(c) Certificates of compliance for procured components, equipment (i.e., specific reference to C of C's for compliance with design standards)

(d) Certified material test reports for procured materials (e.g., specific reference to CMTR for water barrier material)

(e) Performance test reports for shop tested equipment/components (e.g., drain plugs, equipment hatches, etc.)

(f) Calculations that analytically demonstrate compliance with flood prevention acceptance criteria

(g) Calculations that specify "design provisions" that are credited in achieving compliance with ITAAC acceptance criteria (e.g., design provisions in floors, walls that are credited to prevent flooding between specified rooms)

Example 2-6: Motor-Operated Valves (ITAAC for CVS5 - AP1000 ITAAC 2.3.2-4.11a)

The ITAAC determination letter should provide a specific reference to the following documents:

(a) Qualification tests and analyses, which may include system startup tests, that conclude that each MOV is capable of changing position as indicated in Table 2.3.2-1 with sufficient thrust and torque margin for rising-stem valves and torque margin for quarter-turn valves for the full range of system, ambient, and supply voltage conditions up to and including design basis conditions.

(b) Design calculations that conclude that the as-installed MOVs are capable of performing their intended functions under design basis conditions (including the full range of applicable system, ambient, and supply voltage parameters).

(c) System startup tests and date performed/completed, which document that the MOVs change position as indicated in Table 2.3.2-1 with sufficient torque and thrust margin, as applicable, to perform their intended functions under design basis conditions.