ITAAC Inspectability and Quality Issues and Examples (DRAFT)

Based on recent reviews of Design Certification and Combined License Applications, the staff has identified some ITAAC inspectability and quality issues. A sample of the issues and examples identified is included in this document. The staff believes this feedback is valuable because ITAAC must be clearly written to ensure that the licensee can complete the ITAAC closure and the staff can verify proper ITAAC closure. Some of the ITAAC have been revised by applicants addressing the identified issues; others are still considered open items.

SUMMARY OF CONCERNS

1. The ITAAC lacks specific and quantitative attributes.

   A. Use of unquantifiable and generic terms, such as “sufficient”, “appropriate”, and “adequate”.
   B. Lack of quantitative attribute or reference to standards to be inspected.
   C. Use of unexplained concepts, such as “highest to lowest”.
   D. Failure to identify specific equipment to which the ITAAC applies

2. The ITAAC is inconsistent with Tier 2 information.

3. The ITAAC lacks an analysis to determine the value that needs to be verified by the test.

4. Reference ITAAC improperly refers to sections of the DCD rather than other ITAAC.

5. The ITAAC either incorrectly uses the terminology “as-built”, which is specifically defined in Tier 1, or uses the undefined term “as-installed”.

6. The ITAAC improperly associates the defined terms “Inspection”, “Test”, or “Analysis” with the activity needed to validate the acceptance criteria.

7. The ITAAC does not verify the intent of the design commitment.

8. The ITAAC does not provide sufficient information to allow the inspector to verify the attributes essential to the performance of an ITAAC.

9. The ITAAC is not in agreement with the references provided in it.

1. The ITAAC lacks specific and quantitative attributes.

A. Use of unquantifiable and generic terms, such as “sufficient”, “appropriate”, and “adequate”.

Concern: The AC of these ITAAC refer to either an "acceptable level", "adequate thickness" or use the indefinite word "sufficiently”. Attempts to clarify such terms by the use of the phrase “as defined by design” are not acceptable. The subject matter of inspections should be sufficiently defined and objective, so that the inspector does not have to interpret the information subjectively.

Design Commitment	Inspection, Tests, Analyses	Acceptance Criteria
The BiMAC piping is inclined from horizontal to permit natural circulation flow.	Inspections of the as-built system will be conducted.	The as-built BiMAC includes piping inclined sufficiently from horizontal to permit natural circulation flow.
Penetrations in the divisional walls of the UHSRS, ESWPT and PSFSV, except for watertight doors, are provided appropriately against the internal and external flooding.	An inspection of the as-built penetrations will be performed.	The as-built penetrations in the divisional walls of the UHSRS, ESWPT and PSFSV are installed at an acceptable level above the floor, and are sealed up to the internal and external flooding levels.
For the UHSRS, ESWPT and PSFSV, external wall thickness below flood level is provided to protect against water seepage.	An inspection of the as-built external wall thickness for the UHSRS, ESWPT and PSFSV will be performed.	For the UHSRS, ESWPT and PSFSV, the as-built external walls below flood level are provided with adequate thickness to protect against water seepage.

Solution: The Design Commitment and AC of ITAAC were revised to state: “the penetrations in the external walls of the buildings in question were sealed up to the levels of the internal and external floods. The applicant before had used words, like “appropriate” and “adequate,” when describing the level to which the penetrations were sealed. The applicant also revised the ITAAC in both the Design Commitment and AC to refer to Table A.3-2 to obtain the thicknesses of external walls, instead of stating the walls were of “adequate” thickness.

Design Commitment	Inspection, Tests, Analyses	Acceptance Criteria
TBD	TBD	TBD
Penetrations in the divisional walls of the UHSRS, ESWPT and PSFSV, except for water- tight doors, are sealed up to the internal and external flooding levels.	An inspection of the as-built penetrations will be performed.	Penetrations in the divisional walls of the UHSRS, ESWPT and PSFSV, except for water-tight doors, are sealed up to the internal and external flooding levels.

For the UHSRS, ESWPT and PSFSV, external wall thicknesses, below flood level are as indicated in Table A.3-2 to protect against water seepage.	An inspection of the as-built external wall thicknesses for the UHSRS, ESWPT and PSFSV will be performed.	For the UHSRS, ESWPT and PSFSV, external wall thicknesses, below flood level are as indicated in Table A.3-2 to protect against water seepage.

B. Lack of any quantitative attribute to be inspected.

Concern: “Physical separation” is not defined quantitatively. An inspection of this attribute lacks sufficient specificity of the acceptance criterion to determine if the subject trains are adequately or sufficiently “physically separated”.

Design Commitment	Inspection, Tests, Analyses	Acceptance Criteria
The non safety-related control cables, instrument cables and power cables for equipment in the FAPCS trains A and B are physically separated and electrically independent.	Inspections of the nonsafety-related control cables, instrument cables, and power cables for equipment in the FAPCS trains A and B will be performed to show physical separation.	The nonsafety-related control cables, instrument cables and power cables for the equipment in the FAPCS trains A and B are physically separated.

Solution: Specify in the AC the minimum separation distance or refer to some standard (e.g., IEEE) that establishes acceptable physical separation or otherwise define the quantitative criteria upon which sufficient separation can be verified.

Design Commitment	Inspection, Tests, Analyses	Acceptance Criteria
TBD	TBD	TBD

C. Use of unexplained concepts, such as “highest to lowest”.

Concern: The AC is confusing in both language and in providing no verifiable “order of priority” for the functions. The terminology, “highest to lowest”, needs to be clarified. Also it is assumed there is a priority of actuation within the safety related and non-safety related categorizations. These need specification.

Design Commitment	Inspection, Tests, Analyses	Acceptance Criteria
The order of priority of automatic functions performed by PACS is listed from highest to lowest: • Safety related I&C functions • Non-safety related I&C functions	Operational tests will be performed using test signals to verify the order of priority of automatic functions performed by PACS.	The order of priority of automatic functions performed by PACS is listed from highest to lowest: • Safety related I&C functions • Non-safety related I&C functions

Solution: Reference a Tier 1 Table or system description that provides the needed information; i.e., the function prioritization. The functions need to be delineated and the appropriate "highest to lowest" prioritization requires better definition for this AC to properly validate the testing.

Design Commitment	Inspection, Tests, Analyses	Acceptance Criteria
TBD	TBD	TBD

D. Failure to identify specific equipment to which the ITAAC applies.

Concern: The ITAAC does not include the list of equipment to which the ITA and AC will be applied. As written, this ITAAC does not include specific information necessary to support ITAAC review and closure.

Design Commitment	**Inspection, Tests, Analyses**	**Acceptance Criteria**
The equipment qualification program's electrical equipment located in a harsh environment can perform its safety-related function under normal, abnormal, and design bases accident environmental conditions.	Type tests, analyses, or a combination of type tests and analyses will be performed on the equipment qualification program's equipment located in a harsh environment.	The equipment qualification program's electrical equipment located in a harsh environment is qualified to perform its safety function…

Solution: The ITAAC should be revised to include a list of equipment to which the ITA and AC will be applied.

Design Commitment	Inspection, Tests, Analyses	Acceptance Criteria
TBD	TBD	TBD

2. The ITAAC is inconsistent with Tier 2 information.

Concern: The AC does not agree with what is stated in Tier 2 for the opening of the Pressurizer Safety Relief Valves (PSRVs) Design Parameters. It is stated that each PSRV has a maximum opening time (including pilot valve opening time) of 0.7 seconds, whereas the AC of this ITAAC stated that the PSRVs open within 0.89 seconds (including pilot valve opening time).

Commitment Wording	Inspection, Tests, Analyses	Acceptance Criteria
Pressurizer Safety Relief Valves (PSRVs) open.	Testing will be performed.	PSRVs open within 0.89 seconds (including pilot valve opening time).

Solution: The AC of this ITAAC were revised to state that the PSRVs open within 0.70 seconds, which is in agreement with what is stated in Tier 2.

Commitment Wording	Inspection, Tests, Analyses	Acceptance Criteria
Pressurizer Safety Relief Valves (PSRVs) open.	Testing will be performed.	PSRVs open within 0.70 seconds (including pilot valve opening time).

3. The ITAAC lacks an analysis to determine the value that needs to be verified by the test.

Concern: The ITAAC lacks an analysis to determine what the expected plant loads will be under required plant conditions. When an analysis determines the highest expected load value, the diesel can then be tested to demonstrate the diesels ability to operate while supplying that load.

Design Commitment	Inspection, Tests, Analyses	Acceptance Criteria
Each standby diesel generator is sized to accommodate its expected loads.	Testing will be performed to demonstrate that each as-built standby diesel generator will operate between rated and maximum nameplate load, and nameplate power factor for a time period required to reach engine temperature equilibrium.	Each as-built standby diesel generator provides power at generator terminal rated voltage and frequency when at rated load.

Solution: The ITAAC should be revised to include an analysis to determine the expected plant loads under the required conditions.

Design Commitment	Inspection, Tests, Analyses	Acceptance Criteria
TBD	TBD	TBD

4. Reference ITAAC improperly refers to sections of the DCD rather than other ITAAC.

Concern: As written, this ITAAC will require that all the Subsection 2.11.2 ITAAC be completed before the ITAAC could be considered complete. If this is not the intent, then only the relevant ITAAC in Subsection 2.11.2 should be referenced.

Design Commitment	Inspection, Tests, Analyses	Acceptance Criteria
The ECCS provides containment isolation of the ECCS piping that penetrates the containment.	See Subsection 2.11.2 (Containment Isolation Systems).	See Subsection 2.11.2 (Containment Isolation Systems).

Solution: This ITAAC was deleted and another one was added to replace it. The applicant indicated that (1) all containment isolation valves (CIVs) were consolidated in one table by adding 15 ITAAC, which validate by tests the response times for the CIVs in the following systems: RCS, waste management system (WMS), refueling water storage system (RWS), instrument air system (IAS), fire protection water supply system (FSS), containment ventilation system (CVVS), chilled water system (VWS), radiation monitoring system (RMS), incore instrument gas purge system (ICIGS), safety injection system (SIS), chemical volume and control system (CVCS), condensate and feedwater system (CFS), steam generator blowdown system (SGBDS), component cooling water system (CCWS), and process and post-accident sampling system (PSS); (2) each CIV is also listed in its respective system's equipment tables, as applicable, because it typically has functions other than those associated with containment isolation; (3) a cross reference was placed in the Design Description of each system having containment isolation valves to indicate that the containment isolation function is verified for those valves by the CIS ITAAC; and (4) the original system ITAAC cited in this RAI question which only referred to Subsection 2.11.2 were deleted.

5. The ITAAC either incorrectly uses the terminology "as-built", which is specifically defined in Tier 1, or uses the undefined term "as-installed".

Concern: The ITAAC uses the terms "as-built: and "as-installed" interchangeably. Tier 1 "Definitions" specify the meaning of "as-built", but do not indicate a definition for "as-installed". The use of two different terms with similar interpretative meaning in the same ITAAC is a source of confusion.

Design Commitment	Inspection, Tests, Analyses	Acceptance Criteria
The 250 V safety-related DC systems equipment identified as Seismic Category I in Table 2.13.3-1 can withstand Seismic Category I loads without loss of safety function.	iii. Inspections and analyses will be performed to verify that the as-installed 250V DC systems equipment, including anchorage, identified as Seismic Category I in Table 2.13.3-1 are seismically bounded by the tested or analyzed conditions.	iii. The as-built 250V DC system equipment, including anchorage, identified in Seismic Category I in Table 2.13.1-1 can withstand Seismic Category I loads without loss of safety function.

Solution: Revise the "as-installed" term to "as-built" or define "as-installed". If two different terms are defined, select the one most consistent for this ITAAC application.

Design Commitment	Inspection, Tests, Analyses	Acceptance Criteria
TBD	TBD	TBD

6. The ITAAC improperly associates the defined terms "Inspection", "Test", or Analysis" with the activity needed to validate the acceptance criteria.

Concern: ITAAC "Inspections" are intended to physically confirm the attribute being checked. Therefore, they are logically conducted at the appropriate time, either during or after the work is being performed. An "inspection" of documentation is an after-the-fact record check, which, while possibly appropriate from a QA standpoint, is not a physical verification of the acceptance criteria.

Commitment Wording	Inspection, Tests, Analyses	Acceptance Criteria
As described in Section, 2.1.1, the RSB and RCB are constructed of reinforced concrete and the RCB is pre-stressed.	Inspection of the RSB and RCB construction records will be performed.	The RSB and RCB are constructed of reinforced concrete and the RCB is pre-stressed.

Solution: Require the "inspection" of the applicable SSC; in this case the RSB and RCB to verify the existence of reinforced concrete and pre-stressed concrete design/construction, as applicable. Even when such SSC attributes are best checked at a vendor, a licensee should verify thru procurement details and audits that the "inspections" at the vendor satisfy the ITAAC. Records support such inspections, but do not qualify as the object of adequate ITAAC "inspections".

Commitment Wording	Inspection, Tests, Analyses	Acceptance Criteria
The RCB is a post-tensioned, pre-stressed concrete structure.	Inspection of the RCB will be performed.	The RCB contains posttensioning tendons for prestressing the concrete structure.

7. The ITAAC does not verify the intent of the design commitment.

Concern: If both the existence and operation of the indications/controls are to be validated, the ITAAC should clearly state that. However, functionality can only be verified by a test.

Commitment Wording	Inspection, Tests, Analyses	Acceptance Criteria
Control Room indications and controls are provided for the GDCS.	Inspections will be performed on the Control Room indications and controls for the GDCS.	Indications and controls exist or can be retrieved in the control room as defined in Subsection 4.2

Solution: If both the existence and operation of the indications/controls are to be validated, the ITAAC should be revised to state that. If the ITAAC was to verify just the existence of the indications/controls, that could be accomplished by an inspection. However, functionality could only be verified by a test.

Design Commitment	Inspection, Tests, Analyses	Acceptance Criteria
TBD	TBD	TBD

8. The ITAAC does not provide sufficient information to allow the inspector to verify the attributes essential to the performance of an ITAAC.

Concern: The Design Commitment and AC of these ITAAC do not refer to the actual locations of the flood barriers and water-tight doors nor referred to a figure or table where the locations of the flood barriers and water-tight doors are identified. The ITAAC did not provide locations of where the inspector could verify that they existed and were installed per design.

Design Commitment	Inspection, Tests, Analyses	Acceptance Criteria
Divisional flood barriers are provided in the R/B and the PS/B to protect against the internal and external flooding.	An inspection will be performed to verify that the as-built divisional flood barriers exist in the R/B and the PS/B.	The as-built divisional flood barriers exist at the appropriate locations in the R/B and the PS/B against the internal and external flooding.
Water-tight doors are provided in the R/B to protect against the internal and external flooding.	An inspection of the as-built water- tight doors will be performed.	The as-built water-tight doors exist at the appropriate locations in the R/B against the internal and external flooding.

Solution: The ITAAC AC were revised to refer to tables and figures that indicate flood barriers and water-tight doors as they relate to penetrations in divisional walls within the R/B and each PS/B.

Design Commitment	Inspection, Tests, Analyses	Acceptance Criteria
a. Divisional flood barriers are provided in the R/B and the PS/B to protect against the internal and external flooding.	An inspection will be performed to verify that the as-built divisional flood barriers exist in the R/B and the PS/B.	The as-built divisional flood barriers exist at the location, indicated in Table XXXX and on Figure X1, in the R/B and the PS/B to protect against internal and external flooding.
b. Water-tight doors are provided in the R/B to protect against the internal and external flooding.	An inspection of the as-built water- tight doors will be performed.	The as-built water-tight doors exist at the locations, indicated in Table YYYY and on Figure Y1, in the R/B to protect against internal and external flooding.

9. **The ITAAC is not in agreement with the references provided in it.**

Concern: Both the Commitment Wording and the AC do not fully describe what comprises the flooding barrier that prevents the ingress of water into the core melt area. The Commitment Wording and AC refer to a flooding wall and water-tight door as described in Table 2.1.1-3. The referenced table lists four walls, and it could not be determined which wall is being referred to in the ITAAC. Inspection could not confirm what flooding wall and door provided the actual flooding barrier.

Commitment Wording	Inspection, Tests, Analyses	Acceptance Criteria
A flooding wall, including a water tight door, is provided to prevent ingress of water into the core melt spreading area as described in Table 2.1.1-3.	Inspection of the RCB will be performed.	The RCB provides a flooding wall, including a water-tight door as described in Table 2.1.1-3.

Solution: Commitment Wording was revised to state that as shown on Figure 2.1.1-4 a flooding barrier consisting of several walls is provided to prevent ingress of water into the core-melt spreading area, and the AC revised were revised to state that the RCB provides a spreading area water ingression barrier consisting of flooding walls and a water-tight door as shown on Figure 2.1.1-4.

Commitment Wording	Inspection, Tests, Analyses	Acceptance Criteria
As shown on Figure 2.1.1-4, a flooding barrier consisting of several walls is provided to prevent ingress of water into the core melt spreading area. This barrier includes a watertight door that provides entry to the venting shaft of the spreading area.	Inspection of the RCB will be performed.	The RCB provides a spreading area water ingression barrier consisting of flooding walls and a water-tight door as shown on Figure 2.1.1-4.