ArevaEPRDCPEm Resource

From: Tesfaye, Getachew
Sent: Tuesday, January 25, 2011 2:14 PM
To: 'usepr@areva.com'
Cc: Cheung, Calvin; Cerne, Tony; Gardner, Ronald; Laura, Richard; Kowal, Mark; Davis, Robert; Terao, David; Wheeler, Larry; Eul, Ryan; Lee, Samuel; Segala, John; Miernicki, Michael; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 469 (5336), FSAR Ch. 14
Attachments: RAI_469_CTSB_5336.doc

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on January 11, 2011, and discussed with your staff on January 12, 2011. No change is made to the draft RAI as a result of that discussion. Some minor editorial changes were made for consistency. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,
Getachew Tesfaye
Sr. Project Manager
NRO/DNRL/NARP
(301) 415-3361

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From: Tesfaye, Getachew

Created By: Getachew.Tesfaye@nrc.gov

Recipients:
"Cheung, Calvin" <Calvin.Cheung@nrc.gov>
Tracking Status: None
"Cerne, Tony" <Tony.Cerne@nrc.gov>
Tracking Status: None
"Gardner, Ronald" <Ronald.Gardner@nrc.gov>
Tracking Status: None
"Laura, Richard" <Richard.Laura@nrc.gov>
Tracking Status: None
"Kowal, Mark" <Mark.Kowal@nrc.gov>
Tracking Status: None
"Davis, Robert" <Robert.Davis@nrc.gov>
Tracking Status: None
"Terao, David" <David.Terao@nrc.gov>
Tracking Status: None
"Wheeler, Larry" <Larry.Wheeler@nrc.gov>
Tracking Status: None
"Eul, Ryan" <Ryan.Eul@nrc.gov>
Tracking Status: None
"Lee, Samuel" <Samuel.Lee@nrc.gov>
Tracking Status: None
"Segala, John" <John.Segala@nrc.gov>
Tracking Status: None
"Miernicki, Michael" <Michael.Miernicki@nrc.gov>
Tracking Status: None
"Colaccino, Joseph" <Joseph.Colaccino@nrc.gov>
Tracking Status: None
"ArevaEPRDCPEm Resource" <ArevaEPRDCPEm.Resource@nrc.gov>
Tracking Status: None
"'usepr@areva.com'" <usepr@areva.com>
Tracking Status: None

Post Office: HQCLSTR02.nrc.gov

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U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 14.03 - Inspections, Tests, Analyses, and Acceptance Criteria
Application Section: 14.03

QUESTIONS for Technical Specification Branch (CTSB)

14.03-16

The following comments and requested changes are a result of review of the US EPR (Revision 2) ITAAC and an evaluation of the AREVA response to the RAI 390, Question 09.02.02-106, dated October 15, 2010 (Supplement 6)Supplement 6. Since the first review and comments on the US EPR (Revision 0) ITAAC conducted in 2009, the staff has noted significant improvements to various ITAAC language and interpretation issues, as had been highlighted in the NRC Regulatory Issue Summary (RIS) 2008-05. It should be noted that the NRC had issued Revision 1 to RIS 2008-05 on September 23, 2010 with the intent of expanding upon previously identified ITAAC quality issues and further clarifying with additional examples the need for additional ITAAC "inspectability" improvements.

While the current NRC staff review has identified improvements, most notably in the elimination of much ambiguous ITAAC language, some "inspectability" concerns remain. Generally, some examples of ITAAC lack of inspection specificity continue to be identified. Also, some inconsistency in the use of Tier 1 definitions exists, not only with respect to the prescribed use of "inspection", "test", or "analyses" terminology, but also with regard to the need for validating "as-built" construction conditions, where appropriate. The NRC staff has worked with NEI in the development of the most recent revision to the NEI 08-01 document to provide adequate guidance on the proper use of "as-built" terminology and its application and interpretation. A problem exists not only where the term "as-built" is improperly used in an ITAAC, but also where this term should be required and instead, has been omitted.

Furthermore, as discussed in RIS 2008-05 (Revision 1), the ITA should specify activities that verify construction quality and not just a review of construction records or supplementing reports. The RIS also provides guidance on the need for proper ITAAC reference use and the appropriate information that should be provided.

The following examples should be viewed as representative samples of the larger issues. In each case, there may be numerous examples of the same item and often different variations of the identified concern that could be discussed. **All ITAAC applicable to any specific issue have not been listed below, only examples are provided. This summary is intended to provide a more general discussion of the topical areas of concern.**

In some cases, the applicant may be able to provide a logical explanation for any questioned ITAAC. However, where there is agreement that a revision to the ITAAC is

either necessary or prudent, it should be understood that it is the responsibility of the applicant to identify all the ITAAC that need such revision. The examples below should not be viewed as a complete "punchlist" of all the ITAAC needing review or revision based upon the stated concerns. The generic areas of concern are noted below, supported by some (but not all) examples.

a. Generic comments on the application and consistency of the EPR ITAAC related to the ASME Boiler & Pressure Vessel Code requirements are documented below based on your response to RAI 390, Question 09.02.02-106, dated October 15, 2010 (Supplement 6)

The AREVA responses are generally reasonable, as written to discuss certain ITAAC organization logic. However, as some of the details in this response can be interpreted, the AREVA translation of this logic into proper ITAAC wording appears to present problems. One logical point of AREVA discussion is the desire to eliminate unnecessary "redundancy" amongst the ITAAC population. However, careful consideration must be applied to what actually constitutes "redundant" ITAAC. For example, it is not clear to the NRC staff why installation IAW an ASME Section III Design Report should be considered equivalent to full and complete installation and inspections IAW with all ASME Code Section III requirements. The ASME Code specifies many more requirements (e.g., material/fabrication/construction/testing) than what is implied only in an ASME "design report". Therefore, while the confirmation of piping installations installed IAW the approved "design reports" is certainly an important ITAAC attribute, it should not be assumed that this single verification check alone would satisfy the requirement that those same piping systems can be Code stamped as representing that all Section III requirements have been met.

The review of both the ITAAC revisions noted and included in this RAI response, [as well as other related ITAAC (from the EPR FSAR Revision 2) that were not included in the RAI response, but are affected by the requested revisions] has identified some inconsistencies and interpretation problems. These are discussed in greater detail below. The following summarize some of the identified ITAAC wording concerns. It should be noted that while specific system sections (e.g., the RCS) are used as examples, these concerns are generic to the ITAAC wording in all the ASME systems.

I. For the RCS piping, AREVA suggests the deletion of FSAR section 3.24 (and RCS Table 2.2.1-5 ITAAC 3.24) because of stated redundancy to the FSAR section 3.21 commitment.

Reading section 3.21 as follows {"RCS piping shown as ASME Code Section III on Figure 2.2.1-1 is installed in accordance with an ASME Code Section III Design Report"}, the staff is unsure whether this one ITAAC is intended to suffice for validation of all ASME Code piping installation requirements. If so, as stated above, this interpretation would appear to exceed the intent of what a "design report" provides. Furthermore, the ITA in the relevant ITAAC 3.21 of the RCS Table 2.2.1-5 is not written to match the 3.21 commitment. The ITA instead states that:

> "Analyses to reconcile as-built deviations to the ASME Code Design Reports (NCA-3550) will be performed. Piping analyzed using time-history methods will be reconciled to the as-built information."

Additionally, the AC for this ITAAC (while properly referencing the ASME N-5 Data Reports) conclude only that "design reconciliation" has been completed IAW the ASME Code.

"Design reconciliation" is separate from the piping "installation" (or overall Code construction requirements). Specifically, RCS ITAAC 3.21 does not represent a single, complete statement of acceptable ASME Code compliance for the referenced piping because the "analyses to reconcile as-built (piping) deviations" does not equate to "piping …… installed in accordance with the ASME Code…." While AREVA is correct in submitting that the final evidence may lie in the existence of correct N-5 Data Reports, a more proper ITA would involve "inspection of the as-built piping", not the noted "analyses to reconcile as-built deviations". By deleting RCS ITAAC 3.24, AREVA has eliminated what is a necessary nexus to as-built piping "inspection". {As noted earlier this is a generic concern that applies to all the ASME systems, but it is exemplified in the RCS discussion above.}

II. There is an additional ITAAC wording concern (again exemplified in the RCS system, but applicable to all ASME systems) with respect to RCS ITAAC Table 2.2.1-5 (ITAAC 3.20 for piping and 3.25 for components). This involves the ITA wording, as follows: "Inspections of ASME Code Section III Design Reports and associated reference documents will be performed". The problem with this language is that the use of the term "inspection" for this ITA does not comport with the definition of "Inspect or Inspection" in the "Definitions" of FSAR section 1.1.

Using the FSAR definition, one cannot "inspect" the design to determine if the ASME Code is met. One could inspect that the "design reports" exist, but that would only be a "bookkeeping" activity and not represent the intent of this ITAAC. While the AC for this ITAAC appears to be acceptable in that it specifies the requirements that Design Reports exist and conclude ASME Code compliance, a more appropriate term for use in the ITA would be an "Analysis", implying an "engineering or technical evaluation" that the Design Reports meet all ASME Code Section III requirements.

{Again, while the above example illustrates questions on the RCS ITAAC, this generic concern applies to the applicable ITAAC in all other ASME systems.}

III. A similar problem with ITAAC wording involving use of the term "inspection" is exemplified in the Main Feedwater System (ITAAC Table 2.8.6-3) with the ITA for ITAAC 3.14. Similar to the above issue, ITAAC 3.14 states, "An inspection of the ASME Code Data Reports will be performed". Since the "Commitment Wording" indicates that the applicable main feedwater "components … are installed in accordance with ASME Code Section III requirements", the "inspection" ITA should not be of the ASME Code Data Reports, but instead, inspection of the component installation. The AC for this ITAAC (just like above) is acceptable, but the ITA is aligned neither with the Commitment Wording, nor with the proper use of the defined term, "inspection".

{This ITA wording problem was also identified to be applicable to Table 2.8.7.3, ITAAC 3.13, for the Steam Generator Blowdown System, and

Table 2.7.11.3, ITAAC 3.17 for the ESWS -- but this may be generically applicable to other ASME systems, as well.}

IV. An additional ITAAC concern was identified with respect to the apparent lack of ITAAC specificity for the ASME Code component "installation". While the above example for the Main Feedwater ITAAC may have some wording problems, as noted, at least there exists an ITAAC for "component installation". In the case of the RCS (and several other ASME systems), there does not appear to be any similar, comparable ITAAC. For example, for the RCS ITAAC Table 2.2.1-5, there appears to no ITAAC for RCS ASME Code component "installation". ITAAC 3.26 indicates a requirement for Code component "fabrication", but that would be a vendor activity and not representative of as-built installation at the plant site. It is not clear why there is no component "installation" ITAAC for several ASME systems, and yet some exist for other systems, like the main feedwater system noted above.

While it may be possible that AREVA intends to include ASME component installation as part of the ITAAC for "piping system" installation (in line with ASME Code definitions), the EPR ITAAC that would be applicable discuss "piping" and not "piping systems". Therefore, it is not clear that if this was the intent, it was appropriately addressed in the ITAAC requirements. As a minimum, there are inconsistencies in this area of ASME component installation; and just like the other comments, this applies to more than just the RCS system.

In summary, the generic comments on the EPR ITAAC noted above represent issues that must be resolved.

b. Continued examples of some interpretable ITAAC word usage or inspection criteria that are not clear or sufficiently detailed to allow a common, shared understanding of what is required to complete and accept the ITAAC have been identified. Some examples follow:

I. RB Table 2.1.1-8, ITAAC 2.8: What dimension defines wall openings "slightly above the floor"? Also, for ITAAC 2.1, do high-level (i.e., Tier 1) design and fabrication details exist for the six "rib support structures" and is it not important to specify these criteria in meeting the intent of this ITAAC? For ITAAC 2.2, what are the appropriate inspection criteria for a "spreading area water ingression barrier"? Similarly, for ITAAC 2.3, what design and construction details are important for the undefined "concrete barriers"?

II. CMSS Table 2.3.2-1, ITAAC 2.1 thru 2.5: Are there specific criteria (dimensions, details) needed for "sacrificial concrete" and "refractory brick"? Is the number of cooling water channels specified? Are room numbers in the AC required?

III. RSS Table 2.4.1-7, ITAAC 4.15: Where are the "corresponding controls" to the "correct actuation signals" to demonstrate "correct functionality" defined?

IV. Radiation Monitoring System Table 2.4.22-3, ITAAC 7.1: How do "high radioactivity levels" correlate specifically to exceeding an undefined "preset limit"?

V. CCWS Table 2.7.1-3, ITAAC 4.7: What is the quantitative “flow rate difference” that validates the AC interlock isolation?

c. Several ITAAC omit the term, “as-built”, where it appears to be needed for proper interpretation of where the subject component testing may be conducted. As an example, in RCS Table 2.2.1-5, ITAAC 5.2 and 7.1 describe valve testing which should be conducted with the valves installed in their final system/plant configuration (i.e., “as-built). However, as written, it is unclear where these valve tests may be conducted to satisfy these ITAAC. Other examples are the SI/RHRS Table 2.2.3-3, where in ITAAC 3.2, it should be assumed that the check valve testing is conducted with valves installed (i.e., “as-built”) and the EDG Table 2.5.4-4, ITAAC 4.3 where the EDG equipment listed should be tested “as-built”.

Furthermore, it is unclear for the MS Table 2.8.2-3, ITAAC 5.2 thru 5.5 and 7.2 thru 7.5, which of these MS valve tests are acceptable as bench tests versus those that require the valve to be tested “as-built” in its final installed configuration. Whereas system testing (as discussed in NEI 08-01) implies an “as-built” configuration, individual component tests (e.g., valves or other equipment) should specify the descriptor (“as-built”) when it is inferred that these component tests are only validly conducted after installation of the components.

d. ITAAC references to tables or other documents should be specific and appropriate to the detailed criteria that require verification. In several ITAAC, reference is made to the “construction drawings” in the ITA and/or AC. Such construction drawings are not Tier 1 documents, as by their very nature they will be subject to design changes and revisions as the construction proceeds. Therefore, such references in Tier 1 ITAAC to Tier 2 construction details raises the question of the validity of what must be verified by the applicable ITAAC inspection requirements. Three examples follow for illustration purposes, but this referencing concern is prevalent throughout the ITAAC tables:

I. RB Table 2.1.1-8, ITAAC 2.7b.

II. EPGB Table 2.1.2-3, ITAAC 3.3c.

III. ESWB Table 2.1.5-3, ITAAC 3.2b.

Using the last ITAAC for discussion, the AC specifies that the ESWB “as-built missile protection shields conform to the construction drawings”. This lack of specificity makes this ITAAC a “floating target’ with no detail defined as a Tier 1 requirement. In effect, the reference to “construction drawings” is undefined and unsuitable as a stand-alone Tier 1 acceptance criterion.

Additionally, other ITAAC referencing problems exist. For example, in the RB Table 2.1.1-8, ITAAC 2.10b specifies a walkdown of “essential equipment” (for plant shutdown) be conducted to check location above flooding levels. Where is this “essential equipment” defined or referenced? In the RCS Table 2.2.1-5, ITAAC 3.9 requires “measured RCS gaps” to meet undefined “specification requirements” that have no reference. {This ITA has a separate problem in dictating a “test”, when an “inspection” is more appropriate to the measurement of gaps.} As a final example, in the EPSS Table 2.5.1-3, ITAAC 6.4 and 6.6 specify requirements that EPSS loads be sequentially energized by the protection system during design basis events and then shed by other design basis events without specifying any reference to the sequencing steps. If the

sequencing were done out of order, while it certainly would not be the intent of this ITAAC, taken literally, this ITAAC would still be met because the "correct" sequencing/shedding steps have not been properly referenced. These examples of referencing problems or omissions are illustrative only and not the complete list of all other comparable ITAAC issues.

e. RIS 2008-05 (Revision 1) notes that ITA specifying only an "inspection" of construction records is inconsistent with most construction activities where the contemporaneous "inspection" of the actual construction quality should be the focus of the ITA. Even for vendor activities (where the vendor/supplier is considered an extension of a licensee), the ITA should be written consistent with the design "commitment wording" to validate the fabrication activities. Contrary to this principle are the following examples:

   I. CRACS Table 2.6.1-3, ITAAC 6.5a and SBVSE Table 2.6.7-3, ITAAC 6.1, where in both cases, the ITA only requires and inspection of the manufacturer's documentation. Additionally, the AC in the second example is written as an activity ("verify") instead of an acceptance criterion.

   II. Additional examples of this are discussed in the Item a, addressing the ASME ITAAC comments with respect to the "inspection of design reports".

   If a vendor/supplier report documents the acceptable performance of the required ITA, this quality record can be referenced in the AC. The generic point for such ITAAC, particularly any involving site construction, is that a review of construction records is not an adequate ITAAC when the construction/fabrication itself should be subject to verification.

f. As discussed in some of the above comments, as well as in Item a on the ASME ITAAC, specific words (like inspection, test, or analysis) or conditions (design basis versus system operating) should be used only in ways that comport with their proper usage and intent. Some examples follow:

   I. EPGB Table 2.1.2-3, ITAAC 3.6: Does the ITA "inspection" of key dimensions alone, along with analyses of deviations, comport with the AC requirement that the as-built EPGB withstand all design basis loads? Is this ITAAC redundant to or an augmentation of ITAAC 3.4? {These questions also apply to the ESWB.}

   II. EUPS Table 2.5.2-3, ITAAC 5.15: While the ITA only calls for an "analysis", how can this be validated without additional "testing"?

   III. SMS Table 2.4.7-1, ITAAC 3.1b: While an "inspection" can confirm the existence of a display, how can the AC be met without "testing" to demonstrate that the indications and alarms can be retrieved?

   IV. SI/RHRS Table, 2.2.3-3, ITAAC 7.1: Is testing of only one heat exchanger acceptable to meet this ITAAC, and if so, should not "analyses" be also required to verify full system functionality?

   V. Several ITAAC (e.g., RCS Table 2.2.1-5, ITAAC 7.1 & SI/RHRS Table 2.2.3-3, ITAAC 7.7) refer to testing and analyses of components under "system operating conditions". Where are these conditions defined? What is the

relationship of “system operating conditions” to the design basis for the full range of component operation required for these ITAAC?

VI. RIS 2008-05 (Revision 1) discussed the use of the ITAAC word “exists” in the context of the NRC Standard Review Plan, Section 14.3. In such usage, something “exists” when it is “present” and meets those criteria in its design description that can be verified by its existence. Various other design criteria (e.g., functionality) cannot be verified by “existence” alone. The following comment is generic to several ITAAC, as exemplified in the IRWSTS Table 2.2.2-3, ITAAC 4.2, as well as EDG Table 2.5.4-4, ITAAC 4.2:

VII. The ITA directs the performance of “tests” for the “existence” of control signals. This testing implies that the signals provide functional control to the equipment that receives them. However, the AC only specifies that controls “exist”, not that there is objective evidence of “functionality” that the controls actuate the equipment through the test signals. If this is what is implied by this ITAAC, the AC should be better written to require control signal functionality with respect to the referenced equipment.

Throughout the ITAAC, the use of the term, “exists”, cannot stand alone as evidence that whatever exists provides the functionality implied in the design description of the subject systems or components.

g. The following represent some miscellaneous comments (some editorial in nature). However, as in all of the above comments, these examples should be viewed only as “representative”, not the complete list of situations where similar comments may apply.

I. <u>ITAAC numbering</u>: For ITAAC 2.1a in Table 2.1.1-4, the use of the “a” lettering in the ITAAC ID is no longer necessary since ITAAC 2.1b was deleted in Revision 1, making this a singular 2.1 ITAAC.

II. <u>Redundancy question</u>: In ITAAC Table 2.1.3-1, the wording of ITAAC 2.1 is repeated as a preface to the ITA & AC wording of ITAAC 3.2. Is there a reason for this? If so, this should be edited to clearly distinguish the ITAAC requirements of 3.2a & b from the redundant wording “inspection” requirements.

III. <u>Interpretation issue</u>: In Table 2.1.5-3, the ITA of ITAAC 3.2a requires an “analysis” of missile protection shields for “design basis loads” to be performed, but the AC only requires that the missile protection shields be “provided”. The implied adequacy of these shields to sustain “design basis loads” is lacking in the AC provisions. It appears that the AC should be appropriately revised.

IV. <u>Mismatch</u>: In Table 2.6.7-3 ITAAC 4.2, the ITAAC commitment Wording and ITA describe the existence and testing of “controls”. The Acceptance Criteria only describes “displays”. This ambiguity should be corrected to describe the expected results of the control testing activities.

V. <u>Word Usage</u>: In Table 2.10.1-2, ITAAC 3.2a specifies an “inspection” of the polar crane system “design” in the ITA. The corresponding “inspection report” is then referenced in the AC. Given the Tier 1 definition for “inspection”, an “analysis” would be a more appropriate ITA activity, with

the results of such analysis being documented in a “report” that can be evaluated as part of the acceptance criteria. The use of the term “inspect” with respect to design adequacy is misleading and does not comport with approved Tier 1 definitions.