

## **PM Summer ColpEM Resource**

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**From:** Hearn, Peter  
**Sent:** Monday, May 01, 2017 11:42 AM  
**To:** KELLENBERGER, NICHOLAS ROY  
**Subject:** Summer RAI for LAR 16-18

Hi Nick,

Below is the RAI that you requested:

Staff Request for Addition Information Regarding  
V.C. Summer LAR-16-18

**Regulatory Basis:**

10 CFR Part 50, GDC 1, "Quality Standards and Records," requires that structures, systems, and components important to safety shall be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed.

10 CFR Part 50, GDC 2, "Design Bases for Protection Against Natural Phenomena," requires that structures, systems, and components important to safety shall be designed to withstand the effects of natural phenomena such as earthquakes, tornadoes, hurricanes, floods, tsunami, and seiches without loss of capability to perform their safety functions.

10 CFR Part 50, GDC 4, "Environmental and Dynamic Effects Design Bases," requires that structures, systems, and components important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing and postulated accidents, including loss-of-coolant accidents.

10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," Appendix D, "Design Certification Rule for the AP1000 Design," Section VIII.B.6 requires prior NRC approval for changes to Tier 2\* information. The proposed changes affect Tier 2\* information and therefore requires NRC approval.

**RAI Question 1:**

The proposed Tier 2\* wording describes the testing methodology and results used to justify that the specific population of inaccessible welds that did not receive the appropriate nondestructive examination (NDE) can meet their design requirements. Currently, the proposed Tier 2\* wording describes the impacted welds as:

*The non-conforming partial penetration welds associated with reinforcement bar size #9 and size #11 C3J couplers installed on carbon steel embedment plates under CA20 at V.C. Summer Unit 2 and Unit 3 and under CA01 at Unit 2 that did not undergo non-destructive examination at the time of fabrication...*

While the proposed Tier 2\* wording describes the impacted welds, it does not clearly state that the testing is only representative of the population of Cives couplers that are referenced in LAR-16-18.

- a. Please clarify the proposed Tier 2\* wording so that it is clear that it is only applicable to this specific population of Cives couplers, and that it is not applicable for future welds that may not receive the appropriate NDE.

### **RAI Question 2:**

The proposed Tier 2\* wording states that, “the strength and quality of the welds is demonstrated through non-destructive examination and static tension testing of portions of the uninstalled production and through visual examination of the total production population.” The “Static Tension Testing” paragraph of the proposed Tier 2\* wording states that, “static tension testing of portions of the uninstalled populations of welds is evaluated experimentally in two phases.”

While a portion (fifteen #9 and three #11) of the uninstalled production Cives population were tested, fifteen #9 sized supplemental Joseph Oat couplers were also tested. The second to last paragraph states, “Safety margin was calculated using the nominal tensile strength and the 90/95% confidence interval test coefficient based on the test samples”. The LAR’s Phase II analysis groups the 33 total couplers into one data set in order to calculate the test coefficient, “c”. The value of “c” is based on the single data set using both production Cives couplers, and supplemental Joseph Oat couplers. The value of “c” is a direct input for calculating both factors of safety for the #9 and #11 sized couplers.

Therefore, it is inaccurate to state that only portions of the uninstalled production Cives population was tested for Phase II as the safety margins are also influenced by the supplemental Joseph Oat couplers.

- a. Either revise the analysis so that it only uses the Cives production couplers or provide the following information requested in b of this Question.
- b. For the proposed Tier 2\* wording, please clarify that both production and supplemental couplers were tested since their results were used as part of the inputs for the calculated safety margins in your evaluation.

### **RAI Question 3:**

The supplemental Joseph Oat couplers were produced at a different vendor and three years after the production couplers. Therefore, the staff requests additional justification to provide reasonable assurance that the supplemental Joseph Oat couplers are representative of the production Cives couplers.

- a. Either revise the analysis so that it only uses the Cives production couplers, or provide the following information requested in b, c, d, and e of this Question.
- b. Confirm that the Joseph Oat welders’ qualifications were reviewed to meet the applicable code.
- c. Confirm that the weld procedures and PQRs were reviewed to meet the applicable code.
- d. Provide the weld procedure (including name, welding process, revision and date) that was used for both the Joseph Oat supplemental couplers and the Cives production couplers.
- e. Provide an evaluation that the Cives production and Joseph Oat supplemental couplers’ welding records were verified to ensure that essential variables were within the allowable limits, and the values were similar between the production and supplemental coupler populations.

### **RAI Question 4:**

The design of the Phase II test assembly was to aid in the fit-up for the tensile testing machine, and to attempt to isolate the failure point at the test weld. The test assembly design ground out the threads of the test coupler, filled in the test coupler with weld material, and welded an oversized coupler to the test coupler with a fixture weld. During a previous public meeting, the staff requested justification to show that this design would not have any impact on the mechanical properties of the test weld. LAR-16-18 states that hardness testing was performed. From the description in LAR-16-18,

the hardness testing only shows the potential changes to the mechanical properties at the fillet weld surface. Based on the test assembly design, it is likely that the majority of the heat input would impact the partial joint penetration (PJP) weld and the heat affected zone (HAZ).

- a. Please provide additional detail related to the hardness testing that demonstrates that the test assembly design had no impact on the test weld mechanical properties (particularly at the PJP and HAZ).

The stainless steel embed plate LAR-16-11, and supplement (ADAMS ML16267A163 and ML17046A224, respectively) stated that several Phase II test welds were “influenced by the fixture weld” during tensile testing due to instances of voids or incomplete bond to the coupler body, and therefore they were not considered as part of the test results. In the CS embed plate LAR-16-18, there is no discussion related to this concept.

- b. Please confirm that no CS coupler weld tests were influenced by the fixture weld.

**RAI Question 5:**

ACI 349-01, Section 12.14.3.4.1 requires six static test samples. However, the Phase I testing described in LAR-16-18 only used test data for two #9 couplers from Joseph Oat, two #9 couplers from Cives, and two #11 sized couplers from Cives.

- a. Either reevaluate the Phase I results so that it does not include the two #9 Joseph Oat couplers, or provide justification that the two #9 Joseph Oat couplers are appropriate for use in the Phase I analysis.
- b. Provide justification on why the six static test qualification test couplers for each of the #9 Joseph Oat (if used), #9 Cives, and #11 Cives couplers (total of 18 couplers) was not used in the evaluation provided in LAR-16-18.

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