**From:** D. Ashley
**To:** John Hufnagel
**Date:** Mon, Oct 31, 2005 12:51 PM
**Subject:** OC Pre-Audit AMR Questions - Structures , LRA 3.5 - RJM - 10/28/05

John-

Welcome back! now get to work!

Greg Cranston asked me to send the attached files to you.

The attached files contain the pre-audit AMR questions for Structures. The questions were divided into 4 areas: Further Evaluations; Table 1; TLAA; and Table 2s.

Hope that your time off was as expected.

Will be traveling to Toms River tomorrow.

==========
regards,

Donnie Ashley
NRR/DRIP/RLEP
Oyster Creek
License Renewal Project Manger
301-415-3191
dja1@nrc.gov

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**The following AMR results in LRA Tables 3.5.2.1.1 through 3.5.2.1.19 need clarification:**

**General –**

What is the plant-specific operating experience for structural steel (SS, carbon and alloy, galvanized) and aluminum in a "concrete" environment? Have there been any occurrences of degradation? If yes, why is no aging management program credited for LR? (3.3.1-78)

What is the plant-specific operating experience for structural SS, galvanized steel, and aluminum in an "indoor air" environment? Have there been any occurrences of degradation? If yes, why is no aging management program credited for LR? (3.3.1-76, 3.3.1-74, 3.2.1-32)

What is the plant-specific operating experience for structural SS, galvanized steel, and aluminum in a "containment atmosphere" environment? Have there been any occurrences of degradation? If yes, why is no aging management program credited for LR? (3.3.1-76, 3.3.1-74)

For structural bolting, describe the AMR. How is "loss of preload" managed? (3.3.1-35, 3.3.1-36)

For elastomer seals, describe the AMR. Are fire barrier seals included in the structures scope? (3.3.1-46)

**LRA Table 3.5.2.1.1** - Primary Containment (Notes A through E only)

Describe the scope and AMR for Class MC Pressure Retaining Bolting. How is loss of preload managed? (3.2.1-25)

There are sixteen (16) references to the Protective Coatings Monitoring and Maintenance Program for corrosion mitigation (3.5.1-15). This is not consistent with the scope identified in the AMP description. Explain.

**LRA Table 3.5.2.1.2** - Reactor Bldg (Notes A through E only)

Describe the AMR for Penetration Seals. (3.3.1-46)

**LRA Table 3.5.2.1.3** - Chlorination Facility (Notes A through E only)

**LRA Table 3.5.2.1.4** - Condensate Transfer Bldg (Notes A through E only)

**LRA Table 3.5.2.1.5** - Dilution Structure (Notes A through E only)

**LRA Table 3.5.2.1.6** - EDG Bldg (Notes A through E only)

**LRA Table 3.5.2.1.7** - Exhaust Tunnel (Notes A through E only)

Describe the AMR for Penetration Seals. (3.3.1-46)

**LRA Table 3.5.2.1.8** - Fire Pond Dam (Notes A through E only)

**LRA Table 3.5.2.1.9** - Fire Pump Houses (Notes A through E only)

Describe the "aggressive environment" and "water-flowing" environments for Reinforced Concrete Foundation and Reinforced Concrete Walls. Describe the AMR. What is the plant-specific program to manage potential degradation?

**LRA Table 3.5.2.1.10** - Heating Boiler House (Notes A through E only)

**LRA Table 3.5.2.1.11** - Intake Structure and Canal (Notes A through E only)

Describe the AMR for the Trash Racks. (3.3.1-62)

**LRA Table 3.5.2.1.12** - Miscellaneous Yard Structures (Notes A through E only)

Describe the "aggressive environment" and "water-flowing" environments for Reinforced Concrete Walls, Slabs (SWS Seal Well). Describe the AMR. What is the plant-specific program to manage potential degradation?

**LRA Table 3.5.2.1.13** - New Radwaste Bldg (Notes A through E only)

Describe the AMR for Penetration Seals. (3.3.1-46)

Describe the "water retaining boundary" intended function.

**LRA Table 3.5.2.1.14** - Office Bldg (Notes A through E only)

**LRA Table 3.5.2.1.15** - Oyster Creek Substation (Notes A through E only)

**LRA Table 3.5.2.1.16** - Turbine Bldg (Notes A through E only)

Describe the AMR for Penetration Seals. (3.3.1-46)

**LRA Table 3.5.2.1.17** - Ventilation Stack (Notes A through E only)

Describe the AMR for Penetration Seals. (3.3.1-46)

**LRA Table 3.5.2.1.18** - Component Supports Commodity Group (Notes A through E only)

For Stainless Steel, Galvanized Steel, and Aluminum ASME Class 1, 2, 3 and MC Supports, describe the AMR. Why is loss of mechanical function not identified as an aging effect for these materials? (3.5.1-37)

**LRA Table 3.5.2.1.19** - Insulation Commodity Group (Notes A through E only)

3.5.2.2 Further Evaluations

3.5.2.2.1 PWR and BWR Containments

1. OK

2. OK

3. OK

4.
Question: The applicant has not addressed aging management of the portion of the drywell shell embedded in the drywell concrete floor. This area is inaccessible for inspection, but is potentially subject to wetting on both the inside and outside surfaces. The applicant is requested to submit its AMR for this inaccessible portion of the drywell shell.

5. OK

6. OK

7.
Question: The Dresden/Quad Cities BWR units have a history of problems with containment penetration bellows, and the licensee has a long-term replacement program that will continue into the LR period. The applicant is requested to address this industry operating experience and submit a specific technical basis why the Oyster Creek containment penetration bellows are not subject to the aging effects and aging mechanisms observed at Dresden/Quad Cities.

8. OK

3.5.2.2.2 Class 1 Structures

1. (1) OK

(2)
Question: More information is needed about the water-flowing and aggressive environments for the freshwater pump house and the service water seal well, and the operating experience for these structures. Has degradation been observed, monitored, repaired? Are there any special considerations (e.g., more frequent inspections, more detailed inspections) over and above the normal SMP inspection procedures? If not, explain why it is not necessary.

(3) OK

(4) OK

(5) OK

(6) OK

(7) OK

(8)
Question: More information is needed about the elevated temperature condition in the reactor building drywell shield wall. When was the condition first discovered? What was the extent of the elevated temperature region and what was the extent of the cracked region (distribution, length, width of cracks) when first discovered? When did NRC conclude that this condition is acceptable? Did this conclusion consider the remaining operating life of OC at that time? Describe the monitoring program, including the dates and quantitative results obtained, since NRC acceptance of the condition. Currently, what is the extent of the elevated temperature region and what is the extent of the cracked region (distribution, length, width of cracks)? Has there been a need to conduct re-analysis or make any repairs? Is the LR commitment under the OCGS SMP greater than, equal to, or less than the condition monitoring activities currently being conducted to satisfy the NRC staff's recommendation?

(9) OK

2.
Question: More information is needed about aging management of inaccessible concrete areas. The applicant is requested to submit the dates and complete results (at specific locations/not averages or ranges) of all past groundwater monitoring tests. Discuss why the groundwater is non-aggressive, but the fire pond water is "slightly" aggressive. Confirm that the OCGS SMP credited for LR will inspect all inaccessible areas that may be exposed by excavation for any reason, whether the environment is considered aggressive or not, and also will inspect any inaccessible area where observed conditions in accessible areas, which are exposed to the same environment, show that significant concrete degradation is occurring.

3.5.2.2.3 Component Supports

1. OK

2. OK

3.5.2.3 TLAAs

Question: The only LRA information about the Equipment Pool and Reactor Cavity Walls Rebar Corrosion is presented below this question. It is not discussed in LRA Section 3.5.2.2, Table 3.5.1, Tables 3.5.2.2.x, or under operating experience in Appendix B.

More information is needed about the Equiprnent Pool and Reactor Cavity Walls Rebar Corrosion. When was the condition first discovered? When was the concrete core sample taken? What was the extent of rebar corrosion (surface area, depth into concrete, rebar diameter loss) when first discovered? Was the source of water leakage ever determined? Was any remedial action taken? Once informed, did the NRC staff conduct a safety evaluation of this condition? If so, where is it documented and what did it conclude? If applicable, did this conclusion consider the remaining operating life of OC at that time? Describe the inspections, including the dates and results obtained, that have been conducted since the initial estimate of a corrosion rate. Currently, what is the extent of rebar corrosion (surface area, depth into concrete, rebar diameter loss)? Has there been a re-analysis of the structures to account for the rebar corrosion? Have any repairs been made? Is there an LR commitment under the OCGS SMP to conduct enhanced inspections (e.g., more frequent inspections, more detailed inspections) to monitor the progress of rebar corrosion during the extended period of operation? If not, explain why it is not necessary.

**(FROM THE OCGS LRA)**

**3.5.2.3 Time-Limited Aging Analyses**

The time-limited aging analyses identified below are associated with the Primary Containment, Structures, and Component Supports components:

- Section 4.6, Primary Containment, Attached Piping and Components
- Section 4.7.1, Reactor Building Crane, Turbine Building Crane, Heater Bay Crane Load Cycles
- Section 4.7.2, Drywell Corrosion
- Section 4.7.3, Equipment Pool and Reactor Cavity Walls Rebar Corrosion

**4.7.3 EQUIPMENT POOL AND REACTOR CAVITY WALLS REBAR CORROSION**

**Summary Description**

In a letter to the NRC discussing drywell corrosion, it was reported that leakage was observed in the vicinity of the equipment pool and reactor cavity walls, indicating slight corrosion of the reinforcing bar (Reference 4.8.26). Based on a representative concrete core sample, it was conservatively estimated that the diameter of a typical reinforcing rebar in the localized area could be expected to be reduced by 0.002 inch/year. The walls in question are reinforced with #8 and #11 rebar. Assuming the corrosion continues for the entire 40-year life of the plant the diameter of the reinforcing bar would be reduced by 8% and 6% respectively. The corrosion was localized and the reduced reinforcing bar diameter was judged to have no impact on the concrete integrity.

**Analysis**

The equipment pool and reactor cavity walls were recently visually inspected. The walls indicated no signs of water intrusion. No indications of further deterioration were observed. Conservatively assuming the above corrosion rates continue for the end of the period of extended operation, the diameter of the #8 and #11 reinforcing bar are estimated to reduce by 12% and 9%, respectively. Since the corrosion continues to be localized there is no significant impact on the integrity of the concrete.

**Disposition: 10 CFR 54.21(c)(1)(ii)**

The corrosion of the reinforcing bar has been projected to end of the period of extended operation. The integrity of the concrete will be maintained even if the reinforcing bar corrosion continues to the end of the period of extended operation.

**A.4.5.3 Equipment Pool and Reactor Cavity Walls Rebar Corrosion**

Corrosion was found on a rebar in a localized area in the vicinity of the equipment pool and the analysis of the corrosion rate is a TLAA. The corrosion of the reinforcing bar has been projected to the end of the extended period in accordance with 10 CFR 54.21(c)(1)(ii), and determined that the integrity of the concrete will be maintained through the period of extended operation.

Table 3.5.1 Summary of Aging Management Evaluations

Item Number

3.5.1-1
Question: Explain the reference to 3.5.1-1 in LRA Section 3.4 for the "expansion joint" in the Main Steam System.

3.5.1-2
Question: See question on LRA Section 3.5.2.2.1.7.

3.5.1-3 OK

3.5.1-4 OK

3.5.1-5 OK

3.5.1-6 OK

3.5.1-7 OK

3.5.1-8 OK

3.5.1-9 OK

3.5.1-10 OK

3.5.1-11 OK

3.5.1-12 OK

3.5.1-13
Question: See question on LRA Section 3.5.2.2.1.4.

3.5.1-14 OK

3.5.1-15
Question: The "Discussion" indicates a larger scope for managing loss of material than the scope identified in the AMP description (B.1.33). Please clearly define the complete scope for which this AMP is credited, for managing loss of material.

3.5.1-16 OK

3.5.1-17 OK

3.5.1-18
Question: See question on LRA Section 3.5.2.2.1.7.

3.5.1-19 OK

3.5.1-20 OK

3.5.1-21
Question: See questions on LRA Section 3.5.2.2.2.1, (2) and (8).

3.5.1-22
Question: See question on LRA Section 3.5.2.2.2.2.

3.5.1-23
Question: See question on LRA Section 3.5.2.2.2.1, (2).

3.5.1-24 OK

3.5.1-25 OK

3.5.1-26 OK

3.5.1-27 OK

3.5.1-28 OK

3.5.1-29
Question: See question on LRA Section 3.5.2.2.2.1, (8).

3.5.1-30 OK

3.5.1-31
Question: In the Structures AMR Table 2s, there are 19 references to Table 1 Item Number 3.3.1-46, all covering change in material properties of elastomer seals. The SMP is credited for aging management, and Note E is identified. Please clarify why these Table 2 line items do not reference Table 1 Item Number 3.5.1-31.

3.5.1-32
Question: The aging effect "Lock-up due to wear" is a concern whether or not Lubrite plates are used to provide a sliding surface. Please submit the AMR for lock-up due to wear for the radial beams. Describe the design features that permit free movement of the radial beams, and identify the aging management activities that ensure this intended function for the extended period of operation.

3.5.1-33 OK

3.5.1-34
Question: Are there any Group B.1, B.2, B.3 stainless steel and/or galvanized steel supports for which "loss of mechanical function" is an applicable aging effect? If so, are these supports included in the scope covered by Item Number 3.5.1-37, and subject to aging management under IWF?

3.5.1-35 OK

3.5.1-36 OK

3.5.1-37
Question: Are there any Group B.1, B.2, B.3 stainless steel and/or galvanized steel supports for which "loss of mechanical function" is an applicable aging effect? If so, are these supports included in the scope covered by Item Number 3.5.1-37, and subject to aging management under IWF? (same question as 3.5.1-34 above)

3.5.1-38
Question: More information is needed about bolting materials used in structural applications at OCGS, including Group B1.1 applications. What are the bolting materials used? What are the nominal yield strengths and upper-bound as-received yield strengths? Describe the OCGS resolution of the bolting integrity generic issue, as it relates to structural bolting. Was any structural bolting identified as potentially susceptible to cracking due to SCC? Was any structural bolting replaced as part of the resolution?