KHNPDCDRAIsPEm Resource

From:	Ciocco, Jeff
Sent:	Monday, February 01, 2016 8:20 AM
To:	apr1400rai@khnp.co.kr; KHNPDCDRAIsPEm Resource; Harry (Hyun Seung) Chang; Andy Jiyong Oh; Christopher Tyree
Cc:	Yeshnik, Andrew; Mitchell, Matthew; Wunder, George; Lee, Samuel
Subject:	APR1400 Design Certification Application RAI 380-8443 (09.01.02 - New and Spent Fuel Storage)
Attachments:	APR1400 DC RAI 380 MCB 8443.pdf

KHNP,

The attachment contains the subject request for additional information (RAI). This RAI was sent to you in draft form. Your licensing review schedule assumes technically correct and complete responses within 30 days of receipt of RAIs. However, KHNP requests, and we grant, 60 days to respond to RAI question 09.01.02-49. We may adjust the schedule accordingly.

Please submit your RAI response to the NRC Document Control Desk.

Thank you,

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U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

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Options
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REQUEST FOR ADDITIONAL INFORMATION 380-8443

Issue Date: 02/01/2016
Application Title: APR1400 Design Certification Review – 52-046
Operating Company: Korea Hydro & Nuclear Power Co. Ltd.
Docket No. 52-046
Review Section: 09.01.02 - New and Spent Fuel Storage
Application Section: 9.1.2

QUESTIONS

09.01.02-48

Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Appendix A, General Design Criteria 1 and 30; and 10 CFR Part 50.55a contain provisions regarding quality standards for material specifications that are met by compliance with the applicable provisions of the ASME Boiler and Pressure Vessel Code (ASME Code) and by acceptable application of materials Code Cases as described in Regulatory Guide (RG) 1.84, "Design, Fabrication, and Materials Code Case Acceptability, ASME Section III." Specifications for permitted materials are identified in the ASME Code, Section III, Appendix I, or described in detail in the ASME Code, Section II.

Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Appendix A, General Design Criteria 4 requires SSCs to be designed and fabricated to accommodate the effects of environmental conditions during normal, off normal, and accident conditions.

On November 13th 2015 the applicant provided docketed responses to eight of the ten items of concern that were sent as part of a request for a July 29th, 2015 public meeting on DCD Tier 2, FSAR Section 9.1.1 (ML15317A525).

In Issue #3 (AI 9.24.3) the staff asked the applicant:

> "Provide material specifications for all materials wetted by the water in the spent fuel pool and material specifications for the new fuel rack."

The response to Issue #3, the applicant provided the staff with the following:

> Material for piping wetted by the water in the spent fuel pool is Type 304 stainless steel; ASME SA-312 and ASTM A-312 are applied for the safety-related piping and the non-safety-related piping, respectively.
>
> Material for the spent fuel pool liner is Type 304 stainless steel (ASTM A-240).

There are two follow up items:

1) This information has not been added to the DCD. Add this information to the SAR.
2) No welding material is listed for the spent fuel pool liner or the piping. Provide this information and update the SAR.

09.01.02-49

Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Appendix A, General Design Criteria 4 requires SSCs to be designed and fabricated to accommodate the effects of environmental conditions during normal, off normal, and accident conditions.

NRC Report NUREG/CR-7111 (ML12047A184) documents operating experience associated with spent fuel pool and reactor cavity leakage. The report contains 11 spent fuel pool leakage events that are of interest to the APR-1400 design. While there is limited information on the root cause of the events the nature of the leaks suggests that the degradation is a localized phenomenon.

The most probable cause of localized failure of this system would be 1) construction flaws or 2) intergranular failure due to sensitization.

As such, the staff requests information on any special process controls that will be utilized for the Type 304 stainless steel liner and piping connected to the spent fuel pool. These controls should address flaws during welding, cleanness, and sensitization. Controls may include:

1) Minimum delta ferrite requirements
2) Prior to welding, requiring the wetted side of the stainless steel to meet a cleanness class specified in NQA-1 Subpart 2.1 "Quality Assurance Requirements for cleaning of Fluid Systems and Associated Components for Nuclear Power Plants".
3) Minimizing grinding except when necessary to meet weld profiles and/or prevent radiological accumulation on the steel surface.
4) Limiting heat input during welding. This may include:
    a. Using relatively low heat welding processes
    b. Specifying a maximum heat input
    c. Limiting interpass temperature
    d. Use of the stringer bead technique

If no special processes will be used for the spent fuel pool liner and connected piping: provide the staff with a justification of how the leakage events in NUREG/CR-7111 are prevented or not applicable.]

09.01.02-50

Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Appendix A, General Design Criteria 4 requires SSCs to be designed and fabricated to accommodate the effects of environmental conditions during normal, off normal, and accident conditions.

On November 13th 2015 the applicant provided docketed responses to eight of the ten items of concern that were sent as part of a request for a July 29th, 2015 public meeting on DCD Tier 2, FSAR Section 9.1.1 (ML15317A525).

On Issue #4 (AI 9.24.4) the applicant provided the staff with the following:

Information of the welding, cleanness and general fabrication sequence of fuel rack is as follows;

1) Welding

Welding information for fabrication of fuel rack is as follows;

(1) Welding materials shall be selected and controlled to contain between 8 and 25 percent ferrite, as determined by Subsection NB-2433 of the ASME Code. Electrodes shall conform to ASME SFA 5.4 or 5.9, Type 308. Commonly, for avoidance of sensitization of austenitic stainless steel, Type 308L is used as electrodes.

(2) Austenitic stainless steel items shall not be heated above 177°C (350°F) (except during welding), unless they are subsequently given a full solution anneal at temperatures recommended for the individual types of stainless steel followed by water quenching or spraying from the solution heat treating temperature to below 427°C (800°F) (or black metal) within three minutes.

2) Cleanness

(1) All internal and external surfaces shall be thoroughly cleaned of scale, dirt, chips, non-adherent weld spatter (which can be removed by power wire brushing), oil, grease, organic matter, loose particles, and all other potentially harmful materials. Adherent weld spatter on the interior surface of a fuel storage location shall be removed, such that the function of the mock fuel assembly inspection gage is not hindered by weld spatter.

(2) Components, parts and subassemblies, that will have crevices or inaccessible surfaces after assembly, shall be cleaned prior to assembly. Acidic materials shall not be used on items containing crevices or inaccessible areas where complete drainage, neutralization, or removal of residuals cannot be accomplished.

(3) Cleaning of corrosion-resistant materials shall be in accordance with ASME NQA-1 to the extent specified herein. The surfaces of cleaned components shall, as a minimum, meet the requirements of ASME NQA-1, Part II, Subpart 2.1, Class C.

3) General fabrication sequence

General fabrication sequences for new and spent fuel racks are as follows; (These sequences present the fabrication process of major parts for racks)

- General fabrication sequence for new fuel rack

- Step 1: Fabricating the box.
- Step 2: Fabricating the base plate for assembling with box.
- Step 3: Fabricating the support for shoring up the fuel rack weight.
- Step 4: Assembling the base plate with support. (called support assembly)
- Step 5: Assembling the box with support assembly.

- General fabrication sequence for spent fuel rack
  - Step 1: Fabricating the box.
  - Step 2: Fabricating the sheathing plate for fastening the location of neutron absorbing material and protecting the neutron absorbing material.
  - Step 3: Assembling the box with neutron absorbing material and sheathing plate. (called box assembly) Location of neutron absorbing material is between box and sheathing plate. Welding among each item is as follows;
    - Box and sheathing plate : Resistance weld (Spot weld)/Intermittent fillet weld
    - Box and neutron absorbing material : No weld
    - Sheathing plate and neutron absorbing material : No weld
  - Step 4: Fabricating the base plate for assembling with box assembly.
  - Step 5: Fabricating the support for shoring up the fuel rack weight.
  - Step 6: Assembling the base plate with support. (called support assembly)
  - Step 7: Assembling the box assembly with support assembly.

There are two methods to install liner plates in spent fuel pool;

(1) Wall-paper Type (floors): Liner plates are field welded to stainless steel embedment strips in the concrete.

(2) Form Type(walls): Liner plates (with its anchorage system) are field welded together as a complete unit or shop welded together as a module at the SSLP assembly filed shop which act initially as form work during concrete placement of walls and subsequently as a leak tight membrane.

Add this information to the SAR or technical report APR1400-H-N-NR-14012.


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