August 31, 2009

MEMORANDUM TO: Eileen M. McKenna, Chief
AP1000 Projects Branch 2
Division of New Reactor Licensing
Office of New Reactors

FROM: Perry H. Buckberg, Senior Project Manager
AP1000 Projects Branch 2 ***/RA/***
Division of New Reactor Licensing
Office of New Reactors

SUBJECT: AUDIT PLAN TO REVIEW AP1000 DESIGN CONTROL DOCUMENT REVISION 16 AND 17 AND FUEL RACK SEISMIC ISSUES FOR CHAPTER 9

Enclosed is the audit plan to review selected areas related to Docket No. 52-006 and AP1000 Design Control Document (DCD), Section 9.1, "Fuel Storage and Handling" Westinghouse submitted to the U.S. Nuclear Regulatory Commission (NRC) DCD Revision 16 and 17 for its AP1000 application in May, 2007 and September, 2008, respectively. After conducting a comprehensive review of DCD Revision 16 and 17, the staff concluded that additional information is needed from the applicant to support the staff's safety evaluation. The purpose of this audit is to review additional Westinghouse documents that contain information not currently in the DCD that are related to the seismic and structural analysis of the AP1000 fuel racks.

Enclosures:
As Stated

CONTACT: Perry Buckberg, NRO/DNRL
(301) 415-1383
Perry.Buckberg@nrc.gov

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|---|---|---|---|
| NAME | RButler | PBuckberg | EMcKenna |
| DATE | 08/26/2009 | 08/31/2009 | 08/31/2009 |

**OFFICIAL RECORD COPY**

# Audit Plan Regarding the AP1000 Spent Fuel and New Fuel Storage Racks

| | |
|---|---|
| APPLICANT: | Westinghouse |
| APPLICANT CONTACT: | Paul Loza |
| DATE & TIME: | August 6, 2009<br>8:00 am. - 4:00 p.m.<br><br>August 7, 2009<br>9:00 a.m. - 4:00 p.m. (if required) |
| LOCATION: | Westinghouse Electric Company,<br>Washington Operations Center<br>12300 Twinbrook Parkway Suite 330<br>Rockville, MD 20852 |
| TECHNICAL REVIEWERS: | Pravin Patel (NRO, Audit Team Leader)<br>Richard Morante (NRC contractor/reviewer)<br>Joe Braverman (NRC contractor/reviewer) |

**Scope and Purpose**

The purpose of the audit is to review documentation regarding the AP1000 spent fuel and new fuel storage racks seismic and structural analysis. Access to the documentation will allow the NRC staff to understand the underlying technical support for the Westinghouse SFP methodology.

**Audit Agenda**

The audit will be conducted at the Westinghouse offices in Rockville, MD. The date of the audit has been coordinated with the applicant and will take place on August 6-7, 2009. The agenda is provided below:

**August 6, 2009**

| | |
|---|---|
| 8:00 a.m. – 12:00 p.m. | Commence Audit. NRC and contractor review of Westinghouse documentation and supporting materials. |
| 12:00 p.m. – 1:00 p.m. | Lunch |
| 1:00 p.m. - 5:00 p.m. | NRC and contractor review of Westinghouse documentation and supporting materials. |

**August 7, 2009**

| | |
|---|---|
| 8:00 a.m. - 8:30 a.m. | Planning for day 2. |
| 8:30 a.m. – 12:00 p.m. | NRC and contractor review of Westinghouse documentation and supporting materials. |
| 12:00 p.m. - 1:00 p.m. | Lunch |
| 1:00 p.m. - 4:30 p.m. | NRC and contractor review of Westinghouse documentation and supporting materials. |
| 4:30 p.m. - 5:00 p.m. | Audit closeout meeting. |

**Required Documentation**

The staff will require documents and full sized drawings as described in the AGENDA ITEMS table below.

**Audit Products**

Within ninety days of the exit meeting the NRC staff will generate an audit summary report and audit summary. The report will describe the outcome of the NRC review. The audit summary report will provide a list of the audited documents and an updated status of the AGENDA ITEMS.

## AGENDA ITEMS

## OUTSTANDING RAIs AND DOCUMENTS NEEDED FOR AUDIT

| RAI NO. | STATUS | DESCRIPTION OF REMAINING ISSUE(S) | MOST RECENT WESTING-HOUSE LETTER | DOCUMENTS NEEDED FOR AUDIT (Unless otherwise noted, hard copies of the documents should be made available) |
|---|---|---|---|---|
| TR54-03 | U (AIP) | Holtec calculation needs to be revised for definition of Mv as virtual mass (added mass). | 4/9/07 | 1. Holtec calculation/report for the fuel drop analysis where the revision for Mv is made.<br>2. Holtec Report HI-2063519, "Analysis of AP1000 Fuel Storage Racks Subjected to Fuel Drop Accidents (W calculation APP-FS02-Z0C-001); (referenced in RAI response). |
| TR54-16 | U (AIP) | Holtec Report HI-2063523: Signed off drawings for revisions needed to address gaps and impact bars.<br>Holtec Report HI-2063519: Revise report to be consistent with description of fuel assembly model presented in TR 54 Rev. 1. | 4/18/08 | 1. Holtec Report HI-2063523, Spent Fuel Rack Structural/Seismic Analysis for Westinghouse AP1000 (APP-FS02-S3C-001).<br>2. Same as document 2 in TR54-03 above.<br>3. Holtec Dwgs. 4743 series (signed off as final) which include revisions to address the issues related to gaps and impact bars. |
| TR54-25 | U | Mixed (partial filled rack) loading cases:<br>1. Provide description of this mixed loading case in TR 54 and<br>2. Questions related to displacements in TR 54, Rev. 2. | 5/17/07 and TR 54, Rev. 2. | 1. Calculations/reports associated with the mixed loading cases.<br>2. In case the reports do not contain sufficient information, the computer analysis input and output is highly recommended. If this is very large then the electronic version would be acceptable. |
| TR54-26 | U (AIP) | Signed off drawings for revisions needed to address gaps and tolerances. | 5/17/07 | Signed off as final, rack drawings containing revised gap dimensions and tolerances. |

Enclosure 2

| | | | | |
|---|---|---|---|---|
| SRP 9.1.2-SEB1-04 | U - Review in Progress* | Implementation of procedure for measurement of post-seismic event gaps between racks. | 2/24/09 | None |
| SRP 9.1.2-SEB1-07 | U - Review in Progress | Technical basis for revised calculation of buckling of the cell wall. | 4/14/09 | 1. Report/calculation associated with the cell wall buckling calculation.<br>2. Roark's Formulas for Stress and Strain, 6th Edition. |
| SRP 9.1.2-SEB1-08 | U - Review in Progress* | Deletion of Figures 9.1-2 (shts 1 and 2) and Figure 9.1-3 (sht 2 of 2). | 2/19/09 | None |
| TR44-10 | U/C | U – Calculation (1) for the new free-standing rack configuration needs to be audited.<br><br>C - Documents (2) and (3) need to be audited | 4/01/09<br><br>4/13/07 | 1. The detailed calculation(s) leading to the conclusion that there are no credible impacts between the new fuel rack and the fuel pit walls, for the new free-standing configuration..<br><br>2. APP-FS01-S3C-001, Latest Revision, "New Fuel Storage Rack Structural/Seismic Analysis"<br>3. APP-FS02-ZOC-001, Latest Revision, "Analysis of AP1000 Fuel Storage Racks subjected to Fuel Drop Accidents" |
| TR44-16 | U (tied to resolution of RAI TR54-25) | Is a partially loaded fuel rack a controlling condition, or is a fully loaded fuel rack a worst case? | 6/07/07 | None |
| TR44-17 | U (tied to resolution of RAI TR54-26) | How are the assumed design gaps ensured for the as-built condition? | 7/05/07 | 1. Construction drawings showing the desired gaps, which match the gaps assumed for design. |
| TR44-25 | U | Calculation and DCD drawing for the new free-standing rack configuration needs to be audited. | 4/13/07 | 1. The detailed calculation(s) leading to the conclusion that there are no credible impacts between the new fuel rack and the fuel pit walls, for the new free-standing configuration.<br>2. Revised Figure 9.1-1 "New Fuel Rack Layout", depicting the latest configuration for the new fuel rack.. |

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|---|---|---|---|---|
| SRP 9.1.2-SEB1-01 | U - Review in Progress* | Implementation of procedure for measurement of post-seismic event gaps between racks. | 2/24/09 | None |
| SRP 9.1.2-SEB1-02 | U - Review in Progress | Describe how the impact forces between the rack and the fuel pit walls have been considered in the design of the rack and the pool walls. | 4/01/09 | 1. The detailed calculation(s) leading to the conclusion that there are no credible impacts between the new fuel rack and the fuel pit walls, for the new free-standing configuration. |
| SRP 9.1.2-SEB1-03 | U - Review in Progress | Technical basis for revised calculation of buckling of the cell wall. | 4/14/09 | 1. Report/calculation associated with the cell wall buckling calculation for new fuel rack.<br>2. Roark's Formulas for Stress and Strain, 6th Edition. |

Status = U is unresolved
AIP = Agreed in Principal
* Although review not complete, the response appears to be to be acceptable at this time.