AUDIT REPORT
(Prepared June 11, 2012)

STP Spent Fuel Racks
WCAP-17331-P, Revision 2,
"Structural Analysis Report for STP Units 3 and 4
Spent Fuel Storage Rack Baseline Design"

APPLICANT: Nuclear Innovation North America, LLC (NINA)

APPLICANT CONTACT: Scott Head, John Agles, Bill Mookhoek, et. al

DATE/TIME: January 17, 2012 – 1:00 PM to January 20, 2012 – 12:00 PM

LOCATION: Westinghouse Office, 12300 Twin Brook Parkway, Rockville, Maryland 20852, Suite 150

REVIEWERS: Samir Chakrabarti (NRO/DE/SEB2), Richard Morante, BNL, Xing Wei, BNL

PROJECT MANAGER: Rocky D. Foster (NRO/DNRL/LB3)

AUDIT OBJECTIVE:

The objective of the audit was to review detailed reports and supporting calculations that would aid in resolving the remaining technical issues concerning the New and Spent Fuel Storage. Enclosure 2 contains the staff's Audit Plan.

On January 9, 2012, the staff transmitted Request for Additional Information No. 6263, Revision 6, Questions 09.01.02-17 through 09.01.02-32, to the applicant. See Enclosure 3. An additional staff objective was to review the applicant's proposed responses to these questions and provide feedback.

MATERIAL AUDITED:

Revision 2 of WCAP-17331-P presents high level information pertaining to the methods used and the results of the seismic analysis of the spent fuel racks (SFRs) and fuel assemblies, and the fuel assembly accidental drop analyses. The report lists sixteen (16) references. References (3), (4), (6), (7), (13), and (16) are not docketed, and were only available to the staff at the audit.

Reference (3), Westinghouse Calculation CN-MRCDA-11-23, Revision 0, November 3, 2011, is the primary reference for the seismic analysis of the SFRs. All back-up calculations to Reference (3) were available for retrieval and download during the audit, in case the staff needed to review them in conjunction its review of with Reference (3).

Reference (4), Westinghouse Calculation CN-RVHP-10-33, Revision 2, October 20, 2011, is the primary reference for the drop analyses. All back-up calculations to Reference (4) were available for retrieval and download during the audit, in case the staff needed to review them in conjunction its review of with Reference (4).

Reference (16) is important for the seismic evaluation of the fuel assemblies. From the information provided in the response to RAI 09.01.02-10 and in the Technical Report, Revision 2, there are other sources for information used in this evaluation. However, no other references were cited. The staff requested that all relevant information used for this approximate evaluation be available at the audit. The staff also requested a brief presentation by the applicant, discussing the dimensions and other details of the ABWR Design Control Document fuel assembly that are used in this evaluation, including sources for the information, the determination of the seismic capacity of the fuel assembly, and the comparison to the seismic demand, when stored in the SFR.

Reference (6) was audited as part of the resolution of RAI 09.01.02-9. The review was more comprehensive than originally planned, because STP did not provide sufficient detail in Revision 2 of the Technical Report, as was originally committed.

An unexpected result of the applicant's ANSYS nonlinear analyses documented in Section 8.1.1 of the Technical Report, Revision 2, was the magnitude of the sliding displacements (12" to 20"), which appear to be too large, and the trend of increasing displacement with increasing coefficient of friction. This result is not consistent with the AP1000 and ESBWR results. The staff did not understand the reason for this inconsistency, and was concerned this may be indicative of a significant error in the analyses conducted. Therefore, the staff reviewed the ANSYS input and output with the applicant.

To aid in discussion of the applicant's proposed responses to the sixteen (16) recently transmitted questions, the staff requested that all technical material supporting the proposed responses be readily available or retrievable at the audit.

AUDIT RESULTS

The daily list of audit attendees is included as Enclosure 4 to this report. During the entrance meeting, the staff and the applicant reviewed the proposed audit agenda, and made minor adjustments to facilitate the best use of time and technical resources.

As the technical discussions progressed, the applicant developed a running list of Audit Action Items, identifying commitments made by either the applicant or the staff. The goal was to close each Audit Action Item by the end of the audit. "Closure" was defined as no further action required, or development of a clear statement of what was needed and by whom, as the next step in resolving the stated technical issue.

Enclosure 5 contains the final Audit Action Item list, distributed at the exit meeting. Most of the action items are tied to resolution of the questions in the staff's latest RAI, submitted to the applicant on January 9, 2012. The major technical issues needing resolution are summarized below:

- Demonstration of Fuel Assembly Integrity under Seismic Loading

- Technical Justification that the magnitude and trend of sliding displacements under Seismic Loading are correct, and not caused by modeling errors

- Technical Justification for the assumptions made in simulating hydrodynamic coupling, in light of the large predicted sliding displacements

- More complete explanation and technical justification for the buckling analyses conducted

- Additional technical justification for the design adequacy of vertical connections between adjacent cells

Following the audit, the applicant made several submittals of additional information, in response to the Audit Action Items. Subsequent to these submittals, the applicant informed the staff that a significant error had been uncovered in the non-linear ANSYS analyses, which will require changes to the ANSYS model and complete re-analysis. The staff requested that the applicant carefully review all prior responses to RAI and Audit Action Items, and amend the responses as necessary to be consistent with the new analysis results.

The staff's review is temporarily on hold, pending the applicant's completion of the corrected ANSYS analyses, submittal of the Technical Report revision, and submittal of updated RAI and Audit Action Item responses. Enclosure 6, dated May 8, 2012, documents the status of the staff's review, up to suspension of the review effort. The staff has determined that the January 17-20, 2012 Audit may need to be re-opened, in light of the applicant's findings of a major analysis error.