NRR-PMDAPEm Resource

From: Regner, Lisa
Sent: Friday, April 17, 2015 1:31 PM
To: Wayne Harrison; Sterling, Lance (lsterling@STPEGS.COM)
Cc: Watford, Margaret; Regner, Lisa; Fong, CJ
Subject: Draft 4/11 STP GSI-191 Audit Plan - Final
Attachments: STP GSI-191 Audit Plan.docx

Wayne, Lance,

Here is the draft audit plan for your use. I will not issue this formally since we're so close to the audit date. The NRC staff will, however, issue a formal Audit Report. Both the draft audit plan and formal audit report will be publicly available (following a 10 CFR 2.390 review).

Please note that I will not be able to attend the audit, but the new back-up STP DORL PM, Margaret Watford, will be going instead. The documentation for the change from Balwant to Maggie will be coming to you in the next few weeks. I will introduce you to her, hopefully, during our call on Monday. If not Monday, then at another convenient time next week.

If you have any questions on this plan, we can answer them during the call that we would like to have with your staff next week to discuss the audit and logistics.

Thanks, and have a good weekend.
Lisa

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Mail Envelope Properties (E85CAE0ED2FC5449B808712D77E97576EF37C7DE5D)

Subject: Draft 4/11 STP GSI-191 Audit Plan - Final
Sent Date: 4/17/2015 1:30:48 PM
Received Date: 4/17/2015 1:30:49 PM
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AUDIT PLAN

GENERIC SAFETY ISSUE 191

SOUTH TEXAS PROJECT NUCLEAR OPERATING COMPANY

SOUTH TEXAS PROJECT, UNITS 1 AND 2

MAY 12-14, 2015

I. BACKGROUND

By letter dated June 19, 2013 (Agencywide Documents Access and Management System(ADAMS) Accession No. ML 131750250), as supplemented by letters dated October 3,October 31, November 13, November 21, and December 23, 2013 (two letters); and January 9,February 13, February 27, March 17, March 18, May 15 (two letters), May 22, June 25, andJuly 15, 2014; and March 10 and 25, 2015 (ADAMS Accession Nos. ML13295A222, ML13323A673, ML13323A128,ML13338A165, ML14015A312, ML14015A311, ML14029A533, ML14052A053, ML14072A076,ML14086A383, ML14087A126, ML14149A353, ML14149A354, ML14149A434, ML14178A481, ML14202A045, ML15072A092, and ML15091A440, respectively), STP Nuclear Operating Company (STPNOC, the licensee)submitted exemption requests accompanied by a license amendment request (LAR) for a riskinformedapproach to resolve the issue of potential impact of debris blockage on emergencyrecirculation during design-basis accidents Generic Safety Issue (GSI)-191 for South TexasProject, Units 1 and 2 (STP). The proposed amendment request would implement a risk-informed approach for resolving GSI-191 for STP as the pilot plants for other licensees pursuing a similar approach.

The NRC staff is reviewing STP's LAR; however, the staff has determined that it needs additional information to complete its review.A regulatory audit of the physics and methodologies used in the licensee's application would assist in the timely resolution of staff concerns. The enclosure provides the audit plan in accordance with LIC-111, *Regulatory Audits*.

II. PURPOSE

The purpose of the audit is to gain a more detailed understanding of the analyses performed by the STPNOC to provide resolution to GSI-191, *Assessment of Debris Accumulation on PWR* [pressurized water reactors] *Sump Performance*, employing a risk-informed approach. The risk-informed approach, referred by the licensee as'RoverD,' and related computations are documented in Attachment 7 to the STP response to a request for additional information (RAI) dated March 25, 2015. The objective of the audit is to evaluate technical approaches implemented in support of the RoverD methodology and to identify related verification and validation activities.

III. SCOPE

The scope of the audit includes key components of the RoverD methodology, specifically:

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(i) the approach to compute the amount of debris given a break of a specified size at a specified weld location, starting from the computer-aided design (CAD) model of the nuclear power plant,

(ii) the approach to determine the exceedance break (e.g., the break size, for a particular weld location, at which the amount of low-density fiberglass (LDFG) fines would exceed a threshold amount) accounting for uncertainty in parameters such as the break orientation, and

(iii) theapproach to compute the core damage frequency using break frequencies in NUREG-1829, *Estimating Loss-of-Coolant Accident (LOCA) Frequencies Through the Elicitation Process*, and weld counts accounting for inner diameter dimensions.

The audit will also examine how guidance reports were implemented in the computation of debris amounts and transported amounts, and documentation trails to verify and validate RoverD supporting computations.

IV. AUDIT ACTIVITIES

The audit will be conducted by NRC staff and NRC contractor staff during May 11-14, 2015. Based on the identified scope, it is expected that four technical reviewers and one technical audit lead will spend three consecutive days at the licensee's offices to conduct the audit.The reviewers will perform the audit at Alion Science and Technoclogy offices in Albuquerque, NM or other location agreed upon by the licensee and NRC staff, that facilitate access to the licensee's computer models, documentation, and technical experts performing the work on GSI-191 resolution.

The following logistics are requested:

- Telephone available to call and teleconference with NRC Headquarters, if necessary
- Private space with a table and chairs for internal NRC staff discussions
- A white board in the conference room to assist in discussion
- A projector and screen for presentations
- Wireless internet access (if available in the select work space)

In general, the audit will seek to verify:

1. The CAD model described in the LAR accurately represents the as-built, as-operated plant.

2. Methods used by the licensee to model the generation, transport, and effects of debris are consistent with approved methodologies (e.g., NRC staff's safety evaluation for NEI-04-07, *PWR Sump Performance Evaluation Methodology*)

To accomplish these objectives, the reviewers will explore computer models assisted by STP staff, review documentation, discuss questions with the licensee technical experts, and review

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computational results. The review will require assistance from the licensee technical experts to identify and walkthrough a series of computations starting from visual representations of the nuclear power plant system to weld locations and amounts of debris generated in case of a LOCA, up to computations of core damage frequency (CDF). In the process, trails of documentation of validation and verification activities may be inspected to identify the location of key analyses. The purpose of the review is to provide assurance that the risk-informed models are adequate to support license amendments to support the resolution of GSI-191. The results of the audit will be documented in an audit summary, which will be made publically available in ADAMSwithin 90 days of the completion of the audit. The licensee will be provided a draft copy so that they may conduct a proprietary review.Absent special circumstances, non-docketed information will not be removed from the audit site by the team.

The reviewers will focus the audit on the areas suggested in the bullets below. Given the sequential nature of the computations, a walkthrough approach to go from weld location to core damage frequency is recommended to cover the audit scope. The followinglist provides suggestions for the licensee support for the walkthrough audit:

1. Select sample weld locations (see table below) and demonstrate how CASA Grande computes the amount of debris, including pipe and equipment insulation, and concrete and steel coatings surfaces. Include examples of the presence of robust barriers to limit the zone-of-influence (ZOI). Provide comparisons to the CAD model, and present documentation of the verification efforts to demonstrate that the CASA Grande computations are reasonably accurate, such as benchmarking using a double-ended guillotine break (DEGB) at the weld location 31- NOC-AE-15003220. Discuss model updates in the CASA Grande that caused reductions in the amount of debris computed in Version 1.6 compared to debris amounts in Version 1.7, as well as updates to determining the orientation angle of the LOCA break.

2. Discuss how guidance in the NRC staff's safety evaluation to NEI 04-07 were incorporated in the computations including the geometry and dimensions of the ZOI, determinations of debris size distributions (i.e., fine, small, large).

3. Present examples of how the damage zones in a ZOI were implemented, and how the size(i.e., fine, small, large) distributions of LDFG are computed within CASA Grande.

4. Discuss how the transport fractions, including erosion into fines, are used to compute the potential amount of debris that could be transported to screens and to the core. In particular, explain the assumptions and methodology used for determination of erosion of large and small fibrous debris retained in the pool and above the pool.

5. Clarify how conclusions regarding transport and testing areas were incorporated in the new RoverD methodologywith reference to the applicable NRC staff questions in an RAI dated December 23, 2009 (ADAMS Accession No. ML093410607).

6. Discuss the approach to compute the exceedance break (i.e., the break at which the amount of LDFG fines exceeds 192 lb and96 lb for two and one operating trains,

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respectively). Include in the discussions the incorporation of any uncertainties affecting the amount of debris and the orientation angle of the break. Provide plots of LDFG fines mass versus break size for a number of weld locations, comparisons of these plots to the 192 lb and 96 lb limits, and comparison of intercepts to exceedance breaks in Attachment 7 of theSTP RAI response dated March 25, 2015.

7. Provide an example to compute the final core damage frequency, using the exceedance breaks for the set of 45 or 94 critical welds (for two- or one-operating train case), NUREG-1829 break size frequencies and interpolating approaches, the count of the number of pipes that could potentially yield the same break size, and the probabilities for having more or equal (or less) than two functional trains. Discuss differences in the approach for the continuum break model and the DEGB-only model.

8. Discuss documentation trails of the verification of the mass-balance computations implemented in Python.

9. Provide a walkthrough of large early release frequency calculations; include an explanation of how random failures and unavailability of the containment fan coolers were modeled.

In the discussion in the previous bullets, consider both critical* and non-critical welds. A list of welds locations of interest is provided in the table below. The goal isfor NRC staff to gain a better understanding of differences between weld break locations where fiber will exceed 192 lb of LDFG fines or not exceed this threshold. At the end of the audit, the team should have a clear understanding of the features that determine a set of 'critical welds.' The audit team expects to be able to confirm that "near miss" non-critical breaks (i.e., those breaks with low margin to failure) were classified correctly.

Inner diameter (inches)	Critical* Weld Location	Non-critical Weld Location
12.814	16-RC-1412-NSS-8	16-RC-1412-NSS-9, 29-RC-1401-NSS-2, 16-RC-1412-NSS-6
27.5	27.5-RC-1103-NSS-1, 27.5-RC-1203-NSS-1	27.5-RC-1103-NSS-RPV1-N2ASE, 27.5-RC-1103-NSS-6
29	29-RC-1101-NSS-RSG-1A-IN-SE, 29-RC-1101-NSS-5.1	29-RC-1201-RPV1-N1BSE, 29-RC-1401-NSS-RPV1-N1DSE
31	31-RC-1102-NSS-2, 31-RC-1202-NSS-RSG-1B-ON-SE	All 31-in inner diameter weld locations are critical
* A critical weld location is a location that could produce a LOCA break yielding LDFG fines in excess of 192 pounds for the two-train operating case.		

V. AUDIT TEAM

The reviewers for this audit are anticipated to be:

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- Margaret Watford, lead, NRC
- CJ Fong, technical lead, NRC
- Steve Smith, technical reviewer, debris generation / transport, NRC
- Steve Laur, technical reviewer, PRA, NRC
- Ashley Guzetta, technical reviewer, debris generation / transport, NRC
- Osvaldo Pensado, NRC contractor

VI. DOCUMENTS REQUESTED FOR STAFF REVIEW

The following documentation should be available to the audit team:

- Benchmarking using a DEGB at the weld location 31-NOC-AE-15003220 to demonstrate that CASA Grande computations to determine debris amounts are reasonably accurate.

- Documentation of any verification(s) performed on the Python code for debris mass balance computations.

- Other verification and validation documents relevant to the scope of the audit.

VII. REFERENCES

U.S. Nuclear Regulatory Commission (NRC), Report NEI 04-07, “Pressurized Water Reactor Sump Performance Evaluation Methodology. Volume 2 – Safety Evaluation by the Office of Nuclear Reactor Regulation Related to NRC Generic Letter 2004-02, Revision 0, December 6, 2004,” Washington, DC, December 2004. (ADAMS No. ML050550156)

U.S. Nuclear Regulatory Commission (NRC).“South Texas Project, Units 1 and 2 -RE: Requestfor Additional Informationfor Generic Letter 2004-02, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY RECIRCULATION DURING DESIGN BASIS ACCIDENTS AT PRESURIZED-WATER REACTORS" (TAC NOS.MC4719 AND MC4720).”Letter from Mohan C. Thadani (NRC) to Edward D. Halpin, dated December 23, 2009.(ADAMS No.ML093410607)

South Texas Project (STP), Nuclear Operating Company. “Description of Revised Risk-Informed Methodology and Responses to Round 2 Requests for Additional Information Regarding STP Risk-Informed GSI-191 Licensing Application.” NOC-AE-15003220. STP: Wadsworth, Texas.March 25, 2015.(ADAMS No.ML15091A440)

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