

**United States Nuclear Regulatory Commission Regulatory Audit of Seismic Hazard  
Software and New Central and Eastern United States Seismic Source Characterization  
Model Implementation for North Anna Nuclear Power Plant Unit 3**

AUDIT SUMMARY

Audit Location: LCI Office  
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Audit Dates: August 20-21, 2012

Audit Participants:

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Audit Purpose and Scope

The purpose of this regulatory audit was for the Nuclear Regulatory Commission staff to audit distinct seismic hazard calculation software being used by the industry to respond to the Fukushima Near-Term Task Force (NTTF) Recommendation 2.1 seismic request for additional information (RAI) submitted to all combined operating license (COL) applicants. The audit focused only on the seismic hazard software and examined the implementation of the new seismic source models described in NUREG-2115, "Central and Eastern United States Seismic Source Characterization for Nuclear Facilities." As a result of the audit, the NRC staff will be able to conduct its review of RAI 6529, Question 1 more efficiently once it has been submitted by the applicant. The audit did not cover any potentially available preliminary hazard calculations performed for the site. The site-specific hazard results may be the subject of a separate audit at a later time.

## Audit Activities

LCI made a couple of presentations to the NRC staff providing details of its seismic hazard software and the methodology used in implementing the new Central and Eastern United States seismic source model for North Anna Nuclear Power Plant Unit 3 seismic hazard calculations. The NRC staff reviewed the software test runs and performed a quality assurance review of LCI's software related documents. The following documents were reviewed by the NRC staff during the audit:

- *"Quality Assurance Manual", LCI, dated 8/8/2012*
- *"THAZ v1.0" validation", THAZ-V1.0-SUM-0, Revision 0 ; v1.0 and v1.2, THAZ-V1.2-SVRR-0*
- STRATA-V1.0-SVRR-0, dated 6/25/2012

## Audit Findings

The NRC staff compared the seven test sites' seismic hazard curves published in NUREG.2115 with the seismic hazard curves calculated by LCI at the same seven test sites. The comparisons indicated that the LCI calculations duplicated the test site seismic hazard results within reasonable limits using its own seismic hazard software. The staff also discussed with LCI experts about their seismic source selection process and procedures used to calculate seismic source distance calculations. The staff informed the applicant that the staff would look further into potential impacts of the new seismic source implementation process when the RAI response is evaluated.

During the audit exit meeting, the NRC staff reviewed each of the six items to be completed during the audit and provided feedback:

- (Review seismic hazard software.) – **This task was completed and no further action is needed for this item.**
- (Review details of the implementation of the new CEUS seismic source model in hazard calculations.) – **This task was completed and no further action is needed for this item.**
- (Review input parameters and seismic source zones.) – **This task was completed and no further action is needed for this item.**
- (Review new model computer code implementation by comparing seismic hazard calculations conducted at the seven test sites presented in NUREG-2115.) – **This task was completed and no further action is needed for this item.**

- (Review any additional test run calculations and conduct simplified test runs.) – **This task was completed and no further action is needed for this item.**
- (Review application of the new cumulative absolute velocity (CAV) filter settings for removing effect of non-damaging earthquakes in seismic hazard calculations.) – **This task was completed and no further action is needed for this item.**

### Conclusion

The NRC staff evaluated the implementation of the new seismic source models described in NUREG-2115 in support of the NTTF Recommendation 2.1 seismic RAI submitted to the COL applicant for NANPP (RAI 6529, Question 1). As a result of the audit, no new RAIs were identified; however, the staff will be better prepared to review the applicant's response to RAI 6529, Question 1 when the full response is submitted.