AUDIT PLAN FOR THE NORTH ANNA UNIT 3, COMBINED LICENSE APPLICATION REVIEW OF STRUCTURAL DESIGN EVALUATION OF SEISMIC CATEGORY I STRUCTURES AND SUPPORTING INFORMATION DESCRIBED IN FINAL SAFETY ANLYSIS REPORT SECTION 3.8 AUDIT NO. 2

March 21 – 25, 2016

A. Background

Dominion has performed site-specific structural design evaluation of the Economic Simplified Boiling Water Reactor (ESBWR) Seismic Category I (SC-I) structures for the North Anna 3 site in support of its combined license application and in response to the U. S. Nuclear Regulatory Commission (NRC) staff's request for additional information (RAI) in Final Safety Analysis Report (FSAR) Sections 3.7 and 3.8. Dominion's approach to performing site-specific evaluation was provided in the Seismic Closure Plan (SCP) transmitted via letter NA3-14-043 and discussed with the NRC staff in subsequent public meetings held on November 20, 2014, April 15, 2015, and September 10, 2015. The NRC staff conducted Audit-1 during September 28 – October 2, 2015 to review technical information used to establish the site-specific seismic demands for the North Anna 3 SC-I structures. Dominion documented site-specific structural design evaluation of SC-I structures in FSAR Section 3.8 markups and RAI responses transmitted through letter NA3-15-037 and provided several technical reports containing the details of such evaluations.

The purpose of this audit is to review pertinent technical information such as calculations and supporting documents used in site-specific structural design evaluation of the ESBWR SC-I structures for the North Anna 3 site. The audit results will constitute part of the technical basis for NRC staff's safety evaluation.

B. Regulatory Audit Bases

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix B, requires, in part, that design control measures shall be provided for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculation methods or by the performance of a suitable testing program. Appendix A to Standard Review Plan (SRP) Section 3.7.2 and Appendix B to SRP Section 3.8.4 provide guidelines for implementation of the audits. These documents as stated above, provide the regulatory bases for this scheduled audit.

C. Regulatory Audit Scope or Methodology

The scope of the Audit-2 is to review the site-specific structural design evaluation of the ESBWR SC-I structures for the North Anna 3 site. The applicant completed Phase 1 seismic analyses to establish the site-specific seismic demands for the North Anna 3 SC-I structures. The applicant, then, performed Phase 2 design evaluation to demonstrate that either the site-specific seismic demands are bounded by the ESBWR Design Certification (DC) demands (or capacities) or site-specific modifications to the ESBWR standard design will be made to accommodate any demand exceedances.

Specifically, the staff will review on a sample basis calculations and other pertinent materials that were prepared in support of the information provided to the staff in accordance with the SCP transmitted in letter NA3-14-043 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14297A199). The audit will focus on the review of supporting information for addressing reconciliation of the North Anna 3 site-specific seismic demands with the ESBWR DC demands, including any design changes made to accommodate the exceedances. The staff will also review the process of how the site-specific final seismic demands described in FSAR Section 3.7 are translated into seismic loads input to structural design analyses discussed in FSAR Section 3.8.

Specific audit areas are listed below. Any significant findings during the audit will be documented in the audit report and RAIs may be issued if necessary.

- North Anna 3 site-specific seismic demands and their comparison with ESBWR DC demands/capacities.

- Method of applying the seismic demands computed in FSAR Section 3.7 to the detailed static structural model (NASTRAN) for calculating member forces.

- SC-I structures to be reviewed include: Reactor building (RB) fuel building (FB) complex, reinforced concrete containment vessel (RCCV) and internal structures, steel components of the containment, containment liner, control building (CB), and fire water service complex (FWSC).

- Technical areas of review include: (a) analytical models, (b) site design loads, load combinations, material properties, and acceptance criteria, (c) structural analysis, and (d) structural design and any design changes.

- Foundation stability (overturning, sliding), dynamic bearing pressure, lateral pressure on exterior embedded walls.

- Site-specific structural evaluation of new and spent fuel storage racks.

- Plant-specific seismic margin analysis (SMA) update - seismic fragility analyses, high confidence of low probability of failure (HCLPF) values.

- Site-specific ITAAC for seismic Category II structures (Turbine Building, Service Building, Ancillary Diesel Building, Access Tunnel) and Radwaste Building and Tunnel.

D. Information and Other Material Necessary for the Regulatory Audit

A complete list of the applicant's calculations and the supporting documents related to the site-specific structural design evaluation of seismic Category I structures at the North Anna 3 site should be made available to the staff prior to the start of the audit. Two hard copies of the calculations and supporting documents should be made available for review during the audit.

- **Special Requests**

  The NRC requests that Dominion Electric Company provide:

  - A working space for the duration of the audit at the GE-Hitachi office.
  - A small private conference room for NRC internal discussions
  - A telephone for contacting NRC staff and Headquarter
  - A teleconference line for the audit entrance and exit meetings
  - Preferably an internet connection to be used by the staff to access NRC systems and online references

E. Audit Team

The audit team will include:

- James Shea, Lead Project Manager (NRC)
- Donald Brittner, Project Manager (NRC)
- Jim Xu, Branch Chief (NRC)
- Manas K. Chakravorty, Lead Technical Reviewer (NRC)
- Jinsuo Nie, Technical Reviewer (NRC)
- George Wang, Technical Reviewer (NRC)
- Sunwoo Park, Technical Reviewer (NRC)
- Joseph Braverman, NRC Contractor (BNL)

F. Logistics

Date:	March 21 through March 25, 2016
Time:	See Agenda
Location:	GE Hitachi Offices 3901 Castle Hayne Road 3901 Wilmington, NC 28401
Point-of-Contact:	Regina Borsh, Dominion Electric Company

G. Deliverables

Within 90 days of completion of the audit, the audit team will generate an audit results summary report (ARSR). The ARSR will provide a list of documents audited by the audit team, summary of progress toward resolution of technical issues, and a description of any new outstanding issues that will emerge during the audit.

AGENDA FOR NORTH ANNA 3 AUDIT -2

March 21 - 25, 2016

North Anna 3: Review of Structural Design Evaluation of Seismic Category I Structures and Supporting Information Described In FSAR Section 3.8
(Times are subject to change based on the progress of audit.)

Monday, March 21, 2016

- Entrance Meeting (8:30 a.m.-9:00 a.m.) – **ALL**

  Introductions
  Purpose and Objectives of Audit
  Review of Audit Plan and Schedule
  Contacts for Dominion, GE-Hitachi, and NRC

- Presentation of the current status and action item list (9:00-9:30 am) – Dominion

- Presentation on RCCV thermal analysis with respect to the difference between the DCD method and the NA 3 method for site-specific evaluation of the thermal effect in combination with other applicable loads. Also include brief presentation on the SSDP-2D computer program – (9:30 a.m.-10:00 a.m.) – Dominion

- Review of Structural Design Evaluations (10:00 am-4:30 pm) – NRC

  - Reactor Building and Fuel Building (shear walls, floor slabs, main steam tunnel, IC/PCCS pool, pool girders and walls, foundation mat, spent fuel pool)

  - Containment (RCCV, RPV pedestal, top slab and suppression pool slab, containment foundation mat, containment liner plate and anchorage, metal components, drywell head, and PCCS condenser)

  - Containment Internal Structures (diaphragm floor, vent wall structure, reactor shield wall, RPV support bracket, GDCS pool)

  - Control Building (shear walls, floor slabs, foundation mat)

  - Fire Water Service Complex (shear walls, roof slabs, foundation mat, concrete fill, shear keys)

- NRC Staff Caucus (4:30 p.m.-5:00 p.m.) – NRC

- Summary of the Day and Action Items (5:00 p.m.-5:30 p.m.) – ALL

Tuesday, March 22, 2016

- Review of previous day's action items/Plan of the day (8:00 a.m.-8:30 a.m.) – ALL
- Review of Structural Design Evaluations for RB, FB, Containment, CIS, CB, and FWSC – Continued (8:30 a.m.-4:30 p.m.) – NRC
- NRC Staff Caucus (4:30 p.m.-5:00 p.m.) – NRC
- Summary of the Day and Action Items (5:00 p.m.-5:30 p.m.) – ALL

Wednesday, March 23, 2016

- Review of previous day's action items/Plan of the day (8:00 a.m.-8:30 a.m.) – ALL
- Review of Structural Design Evaluations for RB, FB, Containment, CIS, CB, and FWSC – Continued (8:30 a.m.-4:30 p.m.) – NRC
- NRC Staff Caucus (4:30 p.m.-5:00 p.m.) – NRC
- Summary of the Day and Action Items (5:00 p.m.-5:30 p.m.) – ALL

Thursday, March 24, 2016

- Review of previous day's action items/Plan of the day (8:00 a.m.-8:30 a.m.) – ALL
- Review of Stability Evaluations, SMA Update, Fuel Racks, ITAAC, V&V of SHAKE2000, RAI Responses, and FSAR Markups – (8:30 a.m.-4:30 p.m.) – NRC
- NRC Staff Caucus (4:30 p.m.-5:00 p.m.) – NRC
- Summary of the Day and Action Items (5:00 p.m.-5:30 p.m.) – ALL

Friday, March 25, 2016

- Review of previous day's action items/Plan of the day (8:00 a.m.-8:30 am) – **ALL**
- NRC Staff Caucus (8:30 a.m.-10:00 a.m.) – **NRC**
- Audit Action Items and Discussion of Path Forward (10:00 a.m.-11:00 a.m.) – **ALL**
- Exit Meeting (11:00 a.m.-12:00 noon) - **ALL**

Notes: Lunch break: 12:00 noon – 1:00 pm, each day