

May 6, 2016

MEMORANDUM TO: Michael T. Markley, Branch Chief  
Plant Licensing Branch II-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

FROM: Christopher J. Fong, Team Leader */RA CPfefferkorn for/*  
Risk Informed Licensing Initiatives Team  
PRA Licensing Branch  
Division of Risk Assessment  
Office of Nuclear Reactor Regulation

SUBJECT: AUDIT PLAN – PROPOSED RISK-INFORMED APPROACH TO  
RESOLVE GENERIC LETTER 2004-02 FOR VOGTLE  
ELECTRIC GENERATING PLANT, UNITS 1 AND 2 (CAC NOS.  
MC4727 AND MC4728)

By letter dated May 16, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13137A130) Southern Nuclear Operating Company (SNC) submitted its proposed path to resolve Generic Letter (GL) 2004-02 for Vogtle Electric Generating Plant, Units 1 and 2 (VEGP). Therein, SNC indicated its intention to pursue Option 2b, a full risk-informed resolution path, as described in SECY-12-0093, dated July 9, 2012 (ADAMS Accession No. ML121320270). SNC also indicated its intention to use software developed for use by the South Texas Project Nuclear Operating Company (STP), titled Containment Accident Stochastic Analysis (CASA) Grande, to complete the required risk analysis for VEGP. SNC further committed to submit a license amendment request (LAR) regarding risk-informed GL 2004-02 resolution activities at VEGP, pending the issuance of a U.S. Nuclear Regulatory Commission (NRC) safety evaluation for the analogous STP LAR. In subsequent correspondence (summarized in ADAMS Accession No. ML15327A168), SNC highlighted differences between VEGP and STP with respect to GL 2004-02 issues resolution risk-informed strategies and communicated its intention to use an alternative software platform to support its forthcoming LAR.

The NRC staff has determined that an audit to examine the documentation and software proposed for use by SNC, namely, the Break Accident Debris Generation Evaluator (BADGER) and Nuclear Accident Risk Weighted Analysis (NARWAL), is required to gain a better understanding of the detailed calculations, analyses and/or bases underlying the proposed LAR in support of a risk-informed approach to resolve GL 2004-02 at VEGP.

CONTACT: Candace M. Pfefferkorn, NRR/DRA/APLA/RILIT  
(301) 415-8395

M. Markley

- 2 -

The enclosure provides the audit plan in accordance with LIC-111, "Regulatory Audits, for conveyance to the licensee.

Enclosure:  
Audit Plan

M. Markley

- 2 -

The enclosure provides the audit plan in accordance with LIC-111, "Regulatory Audits, for conveyance to the licensee.

Enclosure:  
Audit Plan

**DISTRIBUTION:**

VCusumano, NRR  
ASmith, NRR

CFong, NRR  
SSmith, NRR

SKoenick, NRR

CPfefferkorn, NRR

**ADAMS Accession No.: ML16131A798**

OFFICE	NRR/DRA/APLA/RILIT	NRR/DSS/SSIB:BC	NRR/DRA/APLA/RILIT
NAME	CPfefferkorn	VCusumano	CFong
DATE	05/06/2016	05/06/2016	05/06/2016

**OFFICIAL RECORD COPY**

AUDIT PLAN  
PROPOSED RISK-INFORMED APPROACH TO RESOLVE GENERIC LETTER 2004-02  
SOUTHERN NUCLEAR OPERATING COMPANY  
VOGTLE ELECTRIC GENERATING PLANT, UNITS 1 AND 2 (CAC NOS. MC4727 AND  
MC4728)

Purpose and Scope

By letter dated May 16, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13137A130) Southern Nuclear Operating Company (SNC) submitted its proposed path to resolve Generic Letter (GL) 2004-02 for Vogtle Electric Generating Plant, Units 1 and 2 (VEGP). Therein, SNC indicated its intention to pursue Option 2b, a full risk-informed resolution path, as described in SECY-12-0093, dated July 9, 2012 (ADAMS Accession No. ML121320270). SNC also indicated its intention to use software developed for use by the South Texas Project Nuclear Operating Company (STP), titled Containment Accident Stochastic Analysis (CASA) Grande, to complete the required risk analysis for VEGP. SNC further committed to submit a license amendment request (LAR) regarding risk-informed GL 2004-02 resolution activities at VEGP, pending the issuance of a U.S. Nuclear Regulatory Commission (NRC) safety evaluation for the analogous STP pilot LAR. In subsequent correspondence (summarized in ADAMS Accession No. ML15327A168), SNC highlighted differences between VEGP and STP with respect to GL 2004-02 issues resolution risk-informed strategies and communicated its intention to use an alternative software platform to support its forthcoming LAR.

The purpose of this audit is to improve NRC staff understanding of the architecture, documentation, validation and verification, and underlying algorithms and equations constituting the software proposed for use by SNC in its forthcoming GL 2004-02 related LAR, namely, the Break Accident Debris Generation Evaluator (BADGER) and Nuclear Accident Risk Weighted Analysis (NARWHAL).

Audit Agenda

The audit is scheduled for three days at the ENERCON Office in Albuquerque, New Mexico. The audit will include an entrance and exit meeting on the first and last day of the audit, respectively.

The agenda will include discussion and/or examination of:

- NARWAL quality assurance documentation, including planning, implementation and verification and validation documents.
- NARWAL software requirements.

Enclosure

- NARWAL architecture and underlying algorithms and equations governing phenomena such as mass balance, pH, chemical effects, debris transport, head loss, degasification, net positive suction head, and boric acid precipitation impacts.
- NARWAL graphical user interface features and results output options.
- BADGER architecture and features including the computer aided design model, automatic sizing and placement of zones of influence (ZOIs), truncation of ZOIs using control volumes, calculation of insulation and qualified coatings debris quantities, and size distribution methodology.
- VEGP-specific example failure calculations including a break-specific case with time dependent results and comparison of results to failure criteria and a bulk simulation case with several thousand breaks defined.
- Simplified vs. detailed risk quantification options and an example(s) for both cases.
- Loss of Coolant Accident (LOCA) frequency methodology.
- Example conditional failure probability and probabilistic risk assessment calculations.
- Uncertainty quantification (version 1 vs. version 2 capabilities).

#### Audit Team

The audit team will consist of:

- Christopher Fong, Team Leader, Risk Informed Licensing Initiatives Team, NRR
- Victor Cusumano, Chief, Safety Issue Resolutions Branch, NRR
- Candace Pfefferkorn, General Engineer, Risk Informed Licensing Initiatives Team, NRR
- Ashley Smith, Reactor Systems Engineer, NRR
- Stephen Smith, Sr. Reactor Systems Engineer, NRR

The following support personnel are requested:

SNC representatives and/or ENERCON personnel familiar with the NARWAL and BADGER software and VEGP specific applications.

#### Documents Requested for Staff Examination

No documents are requested prior to the audit. During the audit, documents may be requested by the NRC staff to aid in understanding of the NARWAL and BADGER software and its underlying architecture and algorithms/equations.

#### Logistical Considerations

The following logistics are requested:

- Telephone available to call NRC Headquarters.
- Designated private space for internal NRC staff discussion.
- A computer with running version of NARWAL/BADGER software.
- Wireless internet in meeting spaces.

To facilitate resolution of logistical considerations, the NRC staff conducted a pre-audit conference call and a webinar with SNC representatives and ENERCON personnel.

#### Documentation of Audit

Following the audit, the NRC staff will prepare an audit summary documenting the information reviewed during the audit, and any open items identified as a result of the audit. The NRC staff will also document its understanding of the proposed resolution of any identified open items. The audit summary may be provided to the licensee in draft form for proprietary markup.