NEXTera ENERGY SEABROOK

May 15, 2013

SBK-L-13093
Docket No. 50-443

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
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Rockville, MD 20852

Seabrook Station

Path Forward for Resolution of GSI-191

References:
(1) Generic Letter (GL) 2004-02: Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors.
(2) December 23, 2010, Staff Requirements Memorandum – SECY-10-0113 – Closure Options for Generic Safety Issue - 191, Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance.
(3) October 12, 2011, Pressurized Water Reactor Owners Group (PWROG), Topical Report (TR) WCAP-16793-NP, Revision 2, "Evaluation of Long-Term Core Cooling Considering Particulate Fibrous and Chemical Debris in the Recirculating Fluid".
(4) May 4, 2012, Nuclear Energy Institute (NEI) to the U.S. Nuclear Regulatory Commission (NRC), Office of Nuclear Reactor Regulation, Director, Division of Safety Systems – Subject: GSI-191 - Current Status and Recommended Actions for Closure.
(5) July 9, 2012, SECY-12-0093 – Closure Options for Generic Safety Issue - 191, Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance.
(6) November 15, 2012, Nuclear Energy Institute (NEI) to the U.S. Nuclear Regulatory Commission (NRC), Office of Nuclear Reactor Regulation, Director, Division of Safety Systems – Subject: GSI-191 – Revised Schedule for Licensee Submittal of Resolution Path.
(7) November 21, 2012, Nuclear Regulatory Commission Review of Generic Safety Issue-191 Nuclear Energy Institute revised Schedule for Licensee Submittal of Resolution Path.

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(8) December 14, 2012, Staff Requirements Memorandum – SECY-12-0093 – Closure Options for Generic Safety Issue - 191, Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance.
(9) April 8, 2013, Final Safety Evaluation for Pressurized Water Reactor Owners Group Topical Report WCAP-16793-NP, Revision 2, "Evaluation of Long-Term Cooling Considering Particulate Fibrous and Chemical Debris in the Recirculating Fluid"

In Reference (4) The Nuclear Energy Institute (NEI) highlighted the current industry status and recommended actions for closure of Generic Safety Issue (GSI)-191 which were based on licensees providing a docketed submittal to NRC by December 31, 2012, that would outline a GSI-191 resolution path and schedule pursuant to the Commission direction in Reference (2). By Reference (6) NEI recommended to NRC that licensees delay submittal of GSI-191 resolution path and schedule until January 31, 2013, or 30 days following placement of both the Commission response to Reference (5) and the NRC staff safety evaluation (SE) of Reference (3). In Reference (8) the Commission approved the staff's recommendation in Reference (5) to allow licensees the flexibility to choose any of the three options discussed in the paper to resolve GSI-191. Further the Commission encouraged the staff to remain open to staggering licensee submittals and the associated NRC reviews to accommodate the availability of staff and licensee resources. The SE Reference (9) for Reference (3) was made publicly available by NRC on April 16, 2013.

An industry template was developed by NEI for the identification of a resolution path and schedule, and to describe defense-in-depth and mitigative measures to support the proposed resolution schedule.

The NEI template was used for the development of Attachment 1 for Seabrook Station and provides a resolution path forward and schedule for resolution, summary of actions completed for GL 2004-02, and defense-in-depth and mitigative measures which will be established and maintained throughout the resolution period.

Regulatory commitments are indentified in Attachment 2.

Should you have any questions regarding this submittal, please contact Mr. Michael O'Keefe, Seabrook Licensing Manager, at (603) 773-7745.

A copy of this letter has been forwarded to the New Hampshire State Liaison Officer pursuant to 10 CFR 50.91(b).

I declare under penalty of perjury that the foregoing is true and correct.

Executed on May 15, 2013.

Sincerely,

Kevin T. Walsh
Site Vice President
NextEra Energy Seabrook, LLC

cc: NRC Region I Administrator
NRC Project Manager
Seabrook Station NRC Senior Resident Inspector

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SBK-L-13093 Attachment 1

NextEra Energy Seabrook
Closure Option for Generic Safety Issue 191,
Assessment of Debris Accumulation on
Pressurized Water Reactor Sump Performance

NextEra Energy Seabrook
Closure Option for Generic Safety Issue 191,
Assessment of Debris Accumulation on
Pressurized Water Reactor Sump Performance

Generic Safety Issue - 191 "Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance" (GSI-191) remains a long-standing open issue. GSI-191 concluded that debris could clog the containment sump strainers in pressurized water reactors (PWRs), leading to the loss of net positive suction head for the emergency core cooling system (ECCS) and containment spray system (CSS) pumps. The Nuclear Regulatory Commission (NRC) issued Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors" (ML042360586), dated September 13, 2004, requesting that licensees address the issues raised by GSI-191. GL 2004-02 was focused on demonstrating compliance with 10 CFR 50.46.

In accordance with the May 4, 2012 NEI letter to the NRC (ML12142A316), each licensee would submit a resolution option and associated implementation schedule to the NRC, by December 31, 2012. This was modified by the November 21, 2012 letter from the NRC to NEI (ML12326A497) that provided for submittal of the resolution option and associated implementation schedule by January 31, 2013, or 30 days following the NRC making the final safety evaluation (SE) associated with the review of WCAP-16793, Revision 2, "Evaluation of Long-Term Cooling Considering Particulate, Fibrous and Chemical Debris in the Recirculating Fluid," and the Staff Requirements Memorandum (SRM) associated with SECY-12-0093, "Closure Options for Generic Safety Issue – 191, Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance," publicly available. SRM-SECY-12-0093 became publicly available on December 17, 2012 (ML12349A378). The SE for WCAP-16793, Revision 2 became publicly available on April 16, 2013 (ML13084A152).

On July 9, 2012 the NRC staff issued SECY-12-0093, "Closure Options for Generic Safety Issue - 191, Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance," presenting three options to the Commission all of which are considered to be viable paths for resolving GSI-191. These options are: Option 1- Deterministic, Option 2- (Deterministic or Risk-informed), and Option 3- Deterministic/Risk-informed. SECY-12-0093 considered and expanded upon the options provided in the May 4, 2012 NEI letter. The options identified in the SECY provide approaches that can be used to address plants with minimal fibrous insulation, low to medium fibrous insulation, and substantial amounts of fibrous insulation. On December 14, 2012, the NRC issued SRM-SECY-12-0093 which endorsed the proposed resolution options in SECY-12-0093 and also provided direction on the establishment of resolution option timelines.

NextEra Energy Seabrook, LLC (NextEra Energy Seabrook) determined that performing a risk-informed evaluation of the potential for recirculation sump strainer blockage and

in-vessel fuel assembly blockage (STP approach) is the preferred approach to resolve GSI-191 for Seabrook Station. This resolution path is identified in SECY-12-0093 as Option 2, Mitigative Measures and Alternative Methods Approach, the full risk-informed resolution path. The South Texas Project (STP) developed a software tool known as CASA Grande to analyze the accident sequences associated with pipe breaks that lead to containment sump strainer and fuel assembly debris loading for inputs into the plant-specific probabilistic risk assessment (PRA). CASA is an acronym for Containment Accident Stochastic Analysis and Grande refers to the STP large dry containment.

To support the use of this resolution path, and justify continued operation for the period required to complete the necessary analysis and testing, NextEra Energy Seabrook has evaluated the design and procedural capabilities that exist to identify and mitigate sump strainer and in-vessel blockage. A description of these detection and mitigative measures is provided later in this document. Additionally, a summary of the existing margins and conservatisms that exist for NextEra Energy Seabrook, is included in this document. In the unlikely event that a risk-informed approach is determined not to be viable for Seabrook Station, a resolution path utilizing the Option 2 deterministic approach will be followed to resolve GL 2004-02.

The following provides the key components for the chosen resolution path option for Seabrook Station.

Characterization of In-Vessel Effects

NextEra Energy Seabrook intends to establish in-vessel debris limits for Seabrook Station through extensive modeling involving a risk-informed framework or through the efforts currently being undertaken by the Pressurized Water Reactor Owners Group (PWROG), or through a combination of both paths.

Licensing Basis Commitments

NextEra Energy Seabrook does not currently have open commitments within the Seabrook Station commitment management system to provide additional updates or information to the NRC regarding GL 2004-02. New commitments made to address closure of GSI-191 as a result of this document are listed in Attachment 2.

Resolution Schedule

NextEra Energy Seabrook will achieve closure of GSI-191 and address GL 2004-02 per the following schedule.

- NextEra Energy Seabrook will schedule a meeting with the NRC after June 1, 2013, to discuss this proposed resolution path with a due date of August 1, 2013.

- Measurements for insulation replacement at Seabrook Station will be completed by May 31, 2014.

- NextEra Energy Seabrook will provide a preliminary schedule for the completion of the risk-informed resolution path activities by September 30, 2013, that provides for submittal of a licensing action within approximately 12 months following issuance of the safety evaluation (SE) for South Texas Project (STP).

- The key testing and analysis milestones, as currently expected, are provided in the table below:

MILESTONE	EXPECTED COMPLETION DATE
Update Containment CAD models to include pipe welds	3rd Quarter 2013
Conduct meeting with NRC	3rd Quarter 2013
Modify PRA to include Strainer and Core Blockage models	1st Quarter 2014
**Perform baseline strainer bypass testing	2nd Quarter 2014
Assemble base inputs for CASA Grande	2nd Quarter 2014
Establish break frequencies based on weld type failure probabilities	3rd Quarter 2014
**Perform modeling of RCS, Core, and Containment conditions	1st Quarter 2015
**Perform Chemical Effects testing	2nd Quarter 2015
**Perform Strainer Head Loss testing to establish correlation for range of break sizes	2nd Quarter 2015
**Evaluate Boric Acid Precipitation impacts	3rd Quarter 2015
Finalize inputs to CASA Grande	3rd Quarter 2015
Complete Sensitivity Analyses in/for CASA Grande	4th Quarter 2015
Integrate CASA Grande results into PRA to determine ΔCDF and ΔLERF	1st Quarter 2016
Licensing Submittal for Seabrook Station	To be established through discussions with NRC – tentatively September 2016

** Denotes those milestone activities that will determine the viability of this resolution strategy approach.

- NextEra Energy Seabrook will complete any necessary insulation replacements or remediation, or other identified plant changes in two phases. The first phase includes those plant changes determined to be required by the analyses supporting submittal of the licensing action for NRC review and approval for the risk-informed approach. These plant changes will be completed by the fourth quarter

of 2018. The second phase includes those plant changes determined to be necessary through any re-analysis associated with the NRC review of the licensing action leading up to issuance of a SE for Seabrook Station. These plant changes will be completed by the second quarter of 2020. This schedule provides sufficient time to perform the engineering and planning necessary to implement any changes.

- Within six months of receipt of the Seabrook Station SE, NextEra Energy Seabrook will submit a final updated supplemental response to support closure of GL2004-02 for Seabrook Station.

- If it is determined during the risk-informed process that this option is not viable, NextEra Energy Seabrook will complete an Option 2 deterministic resolution path that will be acceptable to the NRC, by June 30, 2020.

- NextEra Energy Seabrook will update the current licensing basis UFSAR following receipt of the NRC SE that approves the risk-informed resolution approach and completion of any identified removal or modification of insulation debris sources in containment per plant modification procedures and processes (10 CFR 50.71(e)).

Summary of Actions Completed for GL 2004-02

In response to GL 2004-02, NextEra Energy Seabrook has completed the following actions for Seabrook Station.

- Replaced the ECCS recirculation sump screens that had a simple geometry and a filtering surface area of 346.4 square feet with a nominal 0.097 X 0.097 inch square opening with complex geometry strainers that have a filtering area of 4724 square feet, and nominal 0.063-inch diameter circular openings.

- Installed a series of debris interceptors to direct fibrous debris from within the biological shield wall area to the outer containment annulus and to direct ECCS recirculation flow over a series of debris interceptors prior to reaching the ECCS recirculation sump strainers. This feature allows fibrous debris to settle and remain captured behind the debris interceptors.

- Removal of cable tray labels that were a significant contributor to strainer surface area debris load.

- Conducted testing to qualify significant quantities of previously unqualified coatings.

- Conducted containment latent debris surveys to ensure that the amount considered in the design basis was sufficiently conservative.

- Completed debris generation and debris transport analysis.

- Completed chemical effects analysis that include fuel pin fouling and precipitate formation in the recirculating sump fluid.

- Completed integrated strainer fiber, particulate and chemical effects testing of the strainers to determine the maximum differential pressure of the limiting debris bed and applied the conservative strainer differential pressure in the ECCS and CBS pump net positive suction head (NPSH) calculations.

- Completed ex-vessel downstream effects analysis to demonstrate acceptable long-term wear characteristics of the ECCS and CBS systems, structures and components.

- Completed containment walkdowns to identify any paths that would hold up ECCS recirculation water from draining to the ECCS recirculation sumps and strainers. The major holdup volume is the refueling canal volume which conservatively has not been credited in the strainer design bases.

- Completed strainer bypass testing to characterize the amount and size of the fibrous debris that may bypass the strainers and deposit on the fuel assemblies and compared these values to fuel assembly test results from the PWROG FA differential pressure and debris loading.

- Completed testing to determine a fiber debris erosion fraction at expected recirculation pool flow velocities that are greater than those included in an industry report.

Summary of Margins and Conservatisms for Completed Actions for GL 2004-02

The following provides a summary description of the margins and conservatisms associated with the resolution actions taken to date. These margins and conservatisms provide support for the extension of time required to address GL 2004-02 for Seabrook Station.

Unqualified coatings, labels and other miscellaneous debris sources in containment were assumed to be in the containment pool at the time of recirculation initiation. This is conservative in that many of the materials will require a substantial period of time to fail, or may not fail.

Latent Debris – 200 pounds of latent debris was assumed in the debris generation calculation. Actual latent debris, determined from containment sampling, was 40.7 pounds. Thirty pounds of the 200 pounds of latent debris was assumed to be fiber debris.

Allowance for Labels – The strainer design allocates 150 square feet per strainer that may be covered by sheet forms such as labels. The actual area of labels determined by plant walkdowns and sampling is 28.15 square feet.

The containment refueling canal was conservatively assumed to hold up ECCS recirculation and containment building spray water based on the conservative assumption that the drain path would become blocked with fiber debris.

The containment sump strainer tests showed no potential for the formation of vortexes at the entrance to the containment sump strainers even when the water level was lowered to one foot below the top of the strainer assembly.

The NPSH calculation for the ECCS recirculation pumps and the CBS pumps does not include an allowance for the hot water NPSHr as allowed by the Hydraulic Institute Standards even though the limiting NPSH is calculated at 212 °F compared to the cold water NPSH determined at 54 to 69 °F.

For strainer bypass, the Seabrook Station ECCS operates in the cold leg recirculation mode for six hours prior to switching to hot leg recirculation. During hot leg recirculation, the majority of ECCS recirculation flow is directed to the top of the core and can makeup to the core regardless of any debris blockage of the fuel assembly inlet nozzle.

The Seabrook Station ECCS recirculation flow rates to the reactor vessel result in flow rates per fuel assembly that are less than the maximum flow rates used in the PWROG fuel assembly fiber debris testing program. This would allow a greater debris load for the Seabrook Station fuel assemblies at the same differential pressure. Furthermore, considering the effects of the water chemistry used at the two PWROG locations for testing fuel assemblies, the fuel assemblies can withstand a greater debris load than the 15 gm/FA initially established. These conservatisms are further described in the PWROG letter OG-12-287.

Summary of Defense-In-Depth (DID) Measures

The following describes the plant specific design features and procedural capabilities that exist for detecting and mitigating a strainer blockage or fuel blockage condition.

Strainer Blockage

- Seabrook Station has within its Emergency Operating Procedure (EOP) framework, specific steps for monitoring for indications of sump strainer blockage and actions to be taken if this condition occurs. These actions are described in the Seabrook Station response to NRC Bulletin 2003-01 dated

August 8, 2003 (ML032240419) and the subsequent response to the NRC request for additional information dated October 28, 2004 (ML043140281). The actions taken in response to the Bulletin are still in effect at Seabrook Station.

Fuel (Core) Blockage

- Detection

  Multiple methods exist for detection of a core blockage condition as manifested by an inadequate reactor coolant system (RCS) inventory or RCS and core heat removal condition. The primary methods include core exit thermocouples (CET) and reactor vessel level indication system (RVLIS). This monitoring is initiated early in the event in the EOPs through the Critical Safety Function Status Trees which is performed at least every 15 minutes and then throughout the event by personnel in the control room. An additional method for detection of a core blockage condition includes monitoring of containment radiation levels by the control room and technical support center (TSC) staff and/or if an alarm setpoint is reached resulting in an alarm in the control room.

- Mitigation

  Upon identification of an inadequate RCS inventory or core heat removal condition, the EOPs direct the operators to take actions to restore cooling flow to the RCS including:
  - Reducing centrifugal charging pump flow rate.
  - Refill the Refueling Water Storage Tank (RWST).
  - Attempt to provide core cooling by steaming through the steam generators.
  - Fill the RCS from alternate paths.

  The operators will also inform the TSC of the condition. The TSC will evaluate the condition and recommend the following actions, as necessary, to the operators to restore core heat removal:
  - Reduce RCS injection flow rate to meet minimal heat removal requirements.
  - Makeup to the RWST from various plant water sources using a fire hose connection. These water sources include the following borated water sources; Volume Control Tank (VCT), Spent Fuel Pool, Boric Acid Tanks (BAT), and non-borated water sources including all water tanks that reside on-site, the fire tanker truck, and the Browns River.
  - Restart Reactor Coolant Pumps (RCP).
  - Flood containment using the Portable Diesel Driven Pump (PDDP)

The PWROG Procedures Subcommittee has developed guidance for updating the EOP framework for Westinghouse plants (DW-12-013). This guidance will provide additional information to the operators and technical staff for a symptom based condition of lower plenum blockage in the core. NextEra Energy Seabrook will evaluate the recommended changes to the EOP framework and implement the necessary changes, along with the requisite operator training by March 15, 2014.

Although these measures are not expected to be required based on the very low probability of an event that would challenge either the capability of the strainer to provide the necessary flow to the ECC and CS systems, or result in significant quantities of debris being transported to the reactor vessel that would inhibit the necessary cooling of the fuel, they do provide additional assurance that the health and safety of the public would be maintained. These measures provide support for the extension of time required to completely address GL 2004-02 for Seabrook Station.

Conclusion

NextEra Energy Seabrook expects that the GSI-191 resolution path for Seabrook Station is acceptable, based on the information provided in this document. The execution of the actions identified in this document will result in successful resolution of GSI-191 and closure of GL 2004-02.

SBK-L-13093 Attachment 2

NextEra Energy Seabrook Summary of Planned Actions to Resolve GSI-191

REGULATORY COMMITMENTS

The following table identifies those actions committed to by NextEra Energy Seabrook in this letter for Seabrook Station. Any other actions discussed in this submittal represent intended or planned actions by NextEra Energy Seabrook. They are described to the NRC for the NRC's information and are not regulatory commitments.

Commitment	Date
NextEra Energy Seabrook will schedule a meeting with the NRC to discuss this proposed resolution path.	August 1, 2013
NextEra Energy Seabrook will provide a preliminary schedule for completion of the risk-informed resolution path activities.	September 30, 2013
NextEra Energy Seabrook will update the EOP framework and complete Operator training per DW-12-013.	March 15, 2014
NextEra Energy Seabrook will complete measurements for insulation replacement.	May 31, 2014
NextEra Energy Seabrook will complete any necessary insulation replacements or remediation, or other identified plant changes.	June 30, 2020*
NextEra Energy Seabrook will submit a final updated supplemental response to support closure of GL 2004-02.	Within 6 months of receipt of the SE for the risk-informed resolution licensing action

* Date is based on expected NRC review and approval schedule consistent with considerations in SRM-SECY-12-0093