FPL

May 15, 2013

L-2013-168
10 CFR 50.54(f)

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

RE: St. Lucie Units 1 and 2
Docket Nos. 30-335 and 50-389
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.
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) 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 provided in Reference (2). By Reference (6) NEI

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recommended to the NRC that licensees delay submittal of the GSI-191 resolution path and schedule until January 31, 2013, or 30 days following both the Commission response to Reference (5) and the NRC staff's safety evaluation (SE) for 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 St. Lucie and provides a resolution path forward and schedule for resolution, a summary of actions completed for GL 2004-02, and the defense-in-depth and mitigative measures which will be established and maintained throughout the resolution period.

Regulatory Commitments made in by this submittal are contained in Attachment 2.

If you have any questions regarding this submittal, please contact Eric Katzman, Licensing Manager, at (772) 467-7748.

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

Executed on May 15, 2013

Joseph Jensen
Site Vice President
St. Lucie Plant

Attachments

Florida Power and Light St. Lucie Plant
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, 2012 (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.

Florida Power & Light (FPL) has selected Option 2 Risk Informed, because it has been determined that performing a risk-informed evaluation of the potential for recirculation sump(s) strainer blockage and in-vessel blockage (South Texas Project approach) will resolve GSI-191, as identified in SECY-12-0093, for St. Lucie Units 1 and 2.

To support use of this path, and justify continued operation for the period required to complete the necessary analysis and testing, FPL 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 are provided later in this document. Additionally, a summary of the existing margins and conservatisms that exist for St. Lucie Units 1 and 2 are included in this document. In the unlikely event that a risk-informed approach is determined not to be viable for St. Lucie Unit 1 or Unit 2, a resolution path utilizing a deterministic approach will be followed to resolve GL 2004-02.

The following provides the key components for the chosen resolution path option for St. Lucie Units 1 and 2.

Characterization of In-Vessel Effects

FPL intends to establish in-vessel debris limits for the type of plant design that exists at St. Lucie Units 1 and 2 through extensive modeling in 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

FPL does not currently have open commitments within the St. Lucie Unit 1 and Unit 2 commitment management system to provide additional updates or information to the NRC regarding GL 2004-02. New commitments as a result of this document are listed in Attachment 2.

Resolution Schedule

FPL will achieve closure of GSI-191 and address GL 2004-02 per the following schedule:

- FPL will schedule a meeting with NRC after June 1, 2013, to discuss this proposed resolution path.
- Measurements for insulation replacement for St. Lucie Unit 1 will be completed by December, 2013. Measurements for insulation replacement for St. Lucie Unit 2 will be completed by May, 2014.
- FPL will provide a preliminary schedule for completion of the risk-informed resolution path activities by September 30, 2013, that provides for submittal of a licensing action approximately 12 months following issuance of the safety evaluation (SE) for South Texas Project, as coordinated by the NRC. FPL has established an anticipated date for issuance of an SE for the STP approach as December, 2014.
- The key testing and analysis milestones, as currently expected, are provided in the tables below for St. Lucie Unit 1 and Unit 2.

St. Lucie Unit 1

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

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

St. Lucie Unit 2

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

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

- FPL will complete any necessary insulation replacements or remediation, or other identified plant changes, in two phases. The first phase is 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 for St. Lucie Unit 1 and Unit 2. The second phase is 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 St. Lucie Unit 1 and Unit 2. These plant changes will be completed by the fourth quarter of 2019 for St. Lucie Unit 1 and the first quarter of 2020 for St. Lucie Unit 2. These dates provide sufficient time to perform the engineering and planning necessary to implement any changes.
- Within six months of receipt of the SE for the risk-informed resolution licensing action, FPL will submit a final updated supplemental response to support closure of GL 2004-02 for St. Lucie Unit 1 and Unit 2.
- If it is determined during the risk-informed process that this option is not viable, FPL will complete a deterministic resolution path that will be acceptable to the NRC, by June 30, 2020.

- FPL 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, FPL has completed the following actions for St. Lucie Unit 1 and Unit 2:

- Replaced strainers in Unit 1 that had a simple geometry with a filtering surface area of ~24 ft^2, with nominal 1/4" mesh openings with complex geometry strainers having a filtering surface area of ~8,275 ft^2, with nominal 0.0625" circular openings.
- Replaced strainers in Unit 2 that had a simple geometry with a filtering surface area of ~571 ft^2, with nominal 0.090" mesh openings with complex geometry strainers having a filtering surface area over 5600 ft^2, with nominal 0.0625" circular openings.
- Installed new HPSI pump seals (removed cyclone separators) (Unit 1).
- Installed new Containment Spray pump seals (removed cyclone separators) (Unit 2).
- Installed additional banding on jacketed Cal-Sil (3" spacing) for ~1,800 feet of 3/4" to 12" piping (Unit 1).
- Increased refueling water tank (RWT) water level.
- The latent debris quantity in Unit 1 (134.72 lbs) was established at twice the measured value of latent debris determined from sampling in Unit 2. Miscellaneous debris sources (labels, etc.) were also evaluated and established at a value of 88.10 ft^2 for Unit 1, which is approximately 25% greater than that determined from walkdowns in Unit 2.
- Completed debris generation and debris transport analyses.
- Completed ex-vessel downstream effects analysis.
- Completed NPSH analysis.
- Established programmatic and procedural controls to maintain acceptable configuration and protect the containment recirculation function.

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

- St. Lucie Unit 1 and Unit 2 are re-performing deterministic analyses and testing to establish baseline conditions for the containment sump strainers to support resolution of GL 2004-02 using the risk-informed approach. Those inherent conservatisms that exist as a result of the use of deterministic methodologies can be applied to St. Lucie Unit 1 and Unit 2.

- For in-vessel, the injection flow rate (~6.9 gpm per fuel assembly,) is significantly lower than the value used for fuel assembly blockage testing (~44.7 gpm per fuel assembly) as described in WCAP-16793-NP. This provides for a significant margin above the bounding 15g/FA established in the WCAP.
- Additionally, for in-vessel, there are additional conservatisms described in PWROG-OG-12-287 that can be applied to St. Lucie Unit 1 and Unit 2.

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

- St. Lucie Unit 1 and Unit 2 have within their 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 St. Lucie Unit 1 and Unit 2 response to NRC Bulletin 2003-01 dated August 8, 2003 (ML032240419) and the subsequent response to the NRC request for additional information dated May 20, 2005 (ML051530153). The actions taken in response to the Bulletin are still in effect at St. Lucie Unit 1 and Unit 2.

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 monitoring system (RVLMS). This monitoring is initiated early in the event in the EOPs through the Safety Function Status Checks which is performed at least every 15 minutes and then throughout the event by personnel in the Technical Support Center (TSC). An additional method for detection of a core blockage condition includes monitoring of containment radiation levels by the 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 HPSI flow rate.
  - Refill the RWT.
  - 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:

- Inject water into the RCS through the aux spray lines.
- Reduce RCS injection flow rate to meet minimal heat removal requirements.
- Makeup to the RWT 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 Mixing Tanks (BAMT), and non-borated water sources; All water tanks that reside on-site, the fire tanker truck, and the Intake Cooling Water (ICW) system.
- Consideration of the use of the unaffected unit's water supplies.
- Restart Reactor Coolant Pumps (RCP).
- Flood containment using the Portable Diesel Fire Pump (PDFP)

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 St. Lucie Unit 1 and Unit 2.

Conclusion

FPL expects that the GSI-191 resolution path for St. Lucie Unit 1 and Unit 2 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.

REGULATORY COMMITMENTS

The following table identifies those actions committed to by FPL in this letter for St. Lucie Units 1 and 2. Any other actions discussed in this submittal represent intended or planned actions by FPL. They are described to the NRC for the NRC's information and are not regulatory commitments.

Unit 1 Commitments	Date
FPL will schedule a meeting with NRC to discuss this proposed resolution path.	August 1, 2013
FPL will provide a preliminary schedule for completion of the risk-informed resolution path activities.	September 30, 2013
FPL will complete measurements for insulation replacement.	December 31, 2013
FPL will complete any necessary insulation replacements or remediation, or other identified plant changes.	December 31, 2019*
FPL 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

Unit 2 Commitments	Date
FPL will schedule a meeting with NRC to discuss this proposed resolution path.	August 1, 2013
FPL will provide a preliminary schedule for completion of the risk-informed resolution path activities.	September 30, 2013
FPL will complete measurements for insulation replacement.	May 31, 2014
FPL will complete any necessary insulation replacements or remediation, or other identified plant changes.	March 31, 2020*
FPL 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