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FPL

DEC 07 2007

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
11555 Rockville Pike
Rockville, Maryland 20852

L-2007-155
10 CFR 50.54(f)

Re: Florida Power and Light Company
St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251

FPL Energy Seabrook, LLC
Seabrook Station
Docket No. 50-443

Request for Extension of Completion Date of the St. Lucie Unit 1, St. Lucie Unit 2 and Turkey Point Unit 3 Generic Letter 2004-02 Actions

By letter L-2005-181 dated September 1, 2005, Florida Power and Light Company (FPL), the Licensee for St. Lucie Units 1 and 2 and Turkey Point Units 3 and 4 and FPL Energy Seabrook, LLC (FPL Energy Seabrook), the licensee for Seabrook Station (collectively referred to as FPL) submitted the second of two responses requested by Generic Letter (GL) 2004-02. The St. Lucie Units 1 and 2, Turkey Point Units 3 and 4 and Seabrook Station responses to NRC Request 2(a) indicated that corrective actions would be implemented to assure that emergency core cooling system and containment building spray recirculation functions under debris loading conditions would be in compliance with the "Applicable Regulatory Requirements" section of the generic letter when all modifications are completed. In response to NRC Request 2(b), FPL indicated that installation of the sump strainers for St. Lucie Units 1 and 2, Turkey Point Units 3 and 4 and Seabrook Station were planned for their respective 2006 and 2007 refueling outages. The response also indicated that actions requiring containment access (e.g., new sump strainer installation) would be completed prior to restart from their respective refueling outages and that all required actions, including those that may emerge after September 1, 2005, would be completed prior to December 31, 2007.

By letter L-2006-028 dated January 27, 2006, FPL requested short extensions to complete the corrective actions required by GL 2004-02 for both Turkey Point Unit 4 and Seabrook Station until completion of the spring 2008 outages for those units. The extension requests were approved in NRC letters dated April 11, 2006 and April 13, 2006 for Seabrook Station and Turkey Point Unit 4 respectively. No changes are being requested in this letter to the previously approved Turkey Point Unit 4 and Seabrook Station implementation schedule for resolving GL 2004-02.

At St. Lucie Unit 1 and Turkey Point Unit 3, the required plant modifications, including new containment sump strainers, were installed during each unit's respective 2007 refueling outage. At St. Lucie Unit 2, the required plant modifications, including new containment sump strainers,

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are being installed during the current fall 2007 refueling outage. For Turkey Point Unit 4 and Seabrook Station, the strainer installations are scheduled for the spring 2008 outages as previously approved.

FPL has found that addressing chemical effects is challenging. The ongoing development and review of this issue prevented FPL from meeting its previous target of March, 2006 (FPL letter L-2005-181) for completion of chemical effects testing for all five stations. Protocols for adequate chemical effects testing are still being refined by industry stakeholders. In addition to the generic industry concerns, FPL found it necessary to change strainer vendors for the design and manufacture of strainers for two units (St. Lucie Unit 2 and Turkey Point Unit 4), change the installer for the replacement strainers at St. Lucie Unit 2, Turkey Point Units 3 and 4 and Seabrook Station, and select new vendors to perform the chemical effects testing and analysis for St. Lucie and Turkey Point. These factors delayed our moving forward to assess chemical effects until new vendors could be integrated into our containment sump corrective action plans and test protocols could be refined. Table 1, of Attachment 1, to this letter summarizes the changes in vendors associated with the strainer design, installation and chemical effects testing of the five units. Although planned modifications are either complete or are planned to be complete by the scheduled dates (including approved extensions), impact of chemical effects on full implementation of GSI-191 corrective actions will not be fully assessed by December 31, 2007.

FPL plans to use multiple vendors to complete the chemical effects testing for St. Lucie, Turkey Point, and Seabrook. This approach was selected to optimize the testing for different debris loads and vendor designs while completing the work within a reasonable time frame. Table 2, of Attachment 1, identifies the refueling outages for strainer installation, target schedules for chemical effects testing, and dates for submitting updated responses for each of the five units. In summary, FPL anticipates to complete chemical testing and analysis by June 30, 2008.

Additionally, recently issued industry guidance on downstream effects, both in-vessel and ex-vessel, will require additional analyses. The ongoing development and review of this issue prevented FPL from meeting its previous milestone of March, 2006 (FPL letter L-2005-181) for completion of downstream effects evaluations for all five units. FPL has completed some analyses based on available draft methodology. Completing the downstream effects analyses in accordance with the recently released methodology cannot be accomplished by December 31, 2007. FPL plans on completing the additional analyses by March 31, 2008.

A telephone conference was held on October 10, 2007, between FPL and NRC representatives to brief the NRC on the need to extend the completion date of December 31, 2007 for GL 2004-02 closeout for St. Lucie Unit 1, St. Lucie Unit 2 and Turkey Point Unit 3. As discussed during the conference call, the actions to develop, perform and document the results of additional chemical effects testing and to submit the final response for GL 2004-02 will extend into the second quarter of 2008. This schedule is affected, in part, by the availability of suitable chemical effects test facilities. Additionally, the recently issued industry guidance on both in-vessel and ex-vessel downstream effects require ongoing and scheduled analyses to be revised.

Attachments 2, 3, and 4 of this letter provide the bases supporting the FPL conclusion that it is acceptable to extend completion of the corrective actions required by Generic Letter 2004-02 for St. Lucie Unit 1, St. Lucie Unit 2 and Turkey Point Unit 3 respectively until June 30, 2008. Additionally, these attachments outline the mitigative actions (including permanent plant

modifications) already taken or planned to be taken prior to December 31, 2007 to improve existing margins until the final chemical effects testing and downstream effects analysis can be completed. Attachments 2, 3, and 4 respond to the criteria contained in SECY-06-0078, Status of Resolution of GSI-191, "Assessment of [Effect of] Debris Accumulation on PWR Sump Performance," March 31, 2006.

It is noted that this extension is based on successful confirmation of margins provided by the GL modifications, but it is possible that the final testing and analyses may result in further reexamination of original assumptions and bases of other calculations or, potentially, additional outage related plant modifications. Should additional outage related modifications be required, they would be implemented in subsequent outages. These outages would be in fall of 2008 for St. Lucie Unit 1, spring of 2009 for St. Lucie Unit 2 and spring of 2009 for Turkey Point Unit 3, fall of 2009 for Turkey Point Unit 4 and fall of 2009 for Seabrook Station. In the case that additional corrective actions are required, FPL will contact the Commission.

In summary, FPL has made improvements with respect to the containment sumps and is completing the planned scope of work in the outages. FPL has substantially increased the strainer area in all of the units discussed above. Considerable resources have been expended for insulation removal, modification, and replacement. Pump seals have been upgraded to improve their reliability. Additionally, FPL is participating in industry meetings for chemical and downstream effects to facilitate aggressive resolution of these issues. These efforts have significantly improved the safety margin associated with the containment sumps.

The attached information is provided pursuant to the requirements of Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f).

Please contact Rajiv S. Kundalkar at (561) 694-4848 if you have any questions regarding this extension request.

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

Executed on DECEMBER 7, 2007

Sincerely yours,

Rajiv S. Kundalkar

for J. A. Stall
Senior Vice President, Nuclear and
Chief Nuclear Officer

Attachments (4)

cc: Regional Administrator, Region I
Regional Administrator, Region II
USNRC Project Manger, Turkey Point and St. Lucie
Senior Resident Inspector, USNRC, Turkey Point
Senior Resident Inspector, USNRC, St. Lucie
USNRC Project Manager, Seabrook Station
Senior Resident Inspector, USNRC, Seabrook Station

Table 1

Key Vendor Changes Related to Generic Letter 2004-02

Unit	Strainer Designer	Installation	Chemical Effects
	New / Previous	New / Previous	New / Previous
St. Lucie Unit 1	GE (1) / no change	GE / no change	Alion (2) / GE
St. Lucie Unit 2	PCI (3) / GE	FPL / GE	PCI (4) / GE
Turkey Point Unit 3	GE / no change	FPL / GE	Alion / GE
Turkey Point Unit 4	PCI / GE	FPL / GE	PCI (4) / GE
Seabrook Station	GE / no change	FPLE/ GE	GE / no change

(1) General Electric
(2) Alion Science and Technology
(3) Performance Contracting, Inc.
(4) Contract in process

Table 2

Chemical Effects Testing and Assessment Schedule

Unit	Strainer Installation Status	Anticipated Chemical Effects Test Schedule	Evaluate Test Results, Update Affected Calculations and Submit Updated Supplemental Response to NRC
St. Lucie Unit 1	Spring 2007 Outage (strainers installed)	Nov 2007-Mar 2008	June 30, 2008
St. Lucie Unit 2	Fall 2007 Outage (strainers being installed)	Mar 2008-May 2008	June 30, 2008
Turkey Point Unit 3	Fall 2007 Outage (strainers installed)	Nov 2007-Mar 2008	June 30, 2008
Turkey Point Unit 4	Spring 2008 Outage	Mar 2008-April 2008	Within 3 months following the Spring 2008 Outage (1)
Seabrook Station	Spring 2008 Outage	Feb 2008-Mar 2008	Within 3 months following the Spring 2008 Outage (1)

(1) For Seabrook Station and Turkey Point Unit 4, this date refers only to the submittal of an updated supplemental response. It is expected that all GL 2004-02 corrective actions will be completed prior to each unit's startup from their respective spring 2008 refueling outage. Should the chemical effects testing identify that additional corrective actions are required, FPL will contact the Commission

Basis for Acceptability of Request for Extension of Completion Date of St. Lucie Unit 1 GL 2004-02 Actions

1. Background

By letter dated September 1, 2005, (Reference 1) Florida Power and Light Company (FPL), the Licensee for St. Lucie Units 1 and 2, submitted the second of two responses requested by Generic Letter (GL) 2004-02. In Attachment 1 of that submittal, in response to NRC Request 2(a), FPL indicated that corrective actions would be implemented to ensure that the emergency core cooling system and containment spray system recirculation functions under debris loading conditions would be in compliance with the Applicable Regulatory Requirements section of NRC GL 2004-02 when all modifications are completed. In response to NRC Request 2(b), FPL indicated that installation of the new Unit 1 sump strainer was planned for refueling outage SL1-21 in the spring 2007. It was stated that actions requiring containment access would be completed prior to restart from the refueling outage (SL1-21) and that all required actions including those that may emerge after September 1, 2005 would be completed prior to December 31, 2007.

As committed to in the September 1, 2005 letter, a new sump strainer system was installed during the St. Lucie Unit 1 refueling outage SL1-21 in spring 2007. The new strainer system is a General Electric design with a surface area of greater than 8100 ft^2 with 1/16-inch perforations to retain debris. This is a significant increase over the surface area of the previous outer sump screens with a surface area of 366 ft^2 and ½-inch openings. The previously installed inner screens could filter out particles ¼-inch and smaller.

St. Lucie Unit 1 plant specific strainer sector testing and analysis confirmed that the newly installed strainers are of sufficient size to demonstrate acceptable ECCS pump NPSH margin when fully loaded with debris. This includes an assumed margin for chemical effects. However, the actual margin cannot be fully quantified until additional testing for chemical effects is completed and assessed.

Additional corrective actions implemented during the spring 2007 outage included 1) the stainless steel banding of selected calcium silicate insulation within the zone of influence to reduce the quantity of calcium silicate debris that can be transported to the new strainers, and 2) replacing the High Pressure Safety Injection (HPSI) pump seals and cyclone separators with a seal system that does not use cyclone separators or rely on fluid flushing that uses HPSI pump discharge.

In Attachment 1 of the September 1, 2005 response to Generic Letter 2004-02, a milestone was provided that stated that "vendor strainer testing to validate chemical effects is planned to be completed in March, 2006." FPL has found that addressing chemical effects is challenging. Protocols for adequate chemical effects testing are still being refined by industry stakeholders. In addition to the generic industry concerns, FPL found it necessary to change strainer vendors for the design and manufacture of strainers for two units (St. Lucie Unit 2 and Turkey Point Unit 4), change the plan to install the strainers at St. Lucie Unit 2, Turkey Point Units 3 and 4 and Seabrook Station, and select new vendors to perform the chemical effects testing and analysis. The new vendors had to be integrated into our containment sump corrective action plans. The assessment of the impact of chemical effects remains an open issue that will not be fully resolved by December 31, 2007.

FPL has selected Alion Science and Technology to perform chemical effects testing for St. Lucie Unit 1. A purchase order has been issued for performing a 30-day integrated chemical affects test. The results of this test will be applied to the existing debris-only head loss testing results in order to determine the total head loss across the screen. Testing is expected to be completed in the first quarter of 2008, with analysis being completed by June 30, 2008.

Additionally, the recently issued industry guidance on downstream effects, both ex-vessel (WCAP-16406-P, Reference 8) and in-vessel (WCAP-16793-NP, Reference 9) will require additional analyses. The ongoing development and review of this issue prevented FPL from meeting its previous target of March, 2006 for completion of downstream effects evaluations. Completing the downstream analyses in accordance with this recently issued methodology cannot be accomplished by December 31, 2007. FPL plans to complete these analyses by March 31, 2008.

In GL 2004-02, the NRC Staff summarized their reasoning and assessment to conclude that existing pressurized water reactors (PWRs) may continue to operate through December 31, 2007 while responding to the GL and implementing the required corrective actions. The requested extension of the GSI-191 full implementation schedule, from December 31, 2007 to June 30, 2008, does not impact the NRC staff's original conclusions summarized in GL 2004-02, wherein the staff concluded that it is acceptable to operate until the corrective actions are completed. An estimate of the potential additional risk for the requested extension is provided. The following sections also address the three criteria specified in SECY-06-0078 (Reference 7) that the NRC Staff expects to be satisfactorily addressed in an extension request.

2. Risk Estimate

Introduction

This section summarizes the calculation of the risk impact of extending the completion of Generic Letter 2004-02 actions at St. Lucie Unit 1, until June 30, 2008.

Background

NRC Generic Issue GSI-191 identifies that the current design basis methodology for assessing the potential for debris-induced sump blockage may not be conservative.

Westinghouse developed a report, WCAP-16362, "PRA Modeling Template for Sump Blockage" (Reference 2) that addresses the implications of sump blockage on risk. This WCAP provides a general model for sump blockage but did not produce quantitative values. The WCAP modeling approach was used in this simplified evaluation.

Evaluation

The risk impact is limited to large-break LOCAs, since only these LOCAs are large enough to create enough debris to clog the containment sump. The frequency of a large-break LOCA is 1.33E-06 per year (NUREG/CR-6928, "Industry-Average Performance for Components and Initiating Events at U.S. Commercial Nuclear Power Plants" (Reference 3). Minimal credit is taken for mitigation of sump blockage given a large-break LOCA. At St. Lucie, mitigation includes

establishing the minimum required sump suction (stopping safety injection pumps and containment spray pumps) as conditions permit and making up to the refueling water tank (RWT) to allow extended injection. These actions are based on steps in the emergency procedures. For these recovery actions, a screening value of 0.2 was used for the probability of failing to successfully perform these mitigating activities.

Conclusion

The increase in the core damage frequency due to clogging of the sump is therefore (1.33E-06 per year) * (0.2) = 2.66E-07 per year.

This calculated increase in the core damage frequency is well below the Regulatory Guide 1.174 (Reference 4) definition of less than 1E-06 per year for a "very small change" in core damage frequency. Therefore, extending the completion of Generic Letter 2004-02 Actions at St. Lucie Unit 1, until June 30, 2008, does not pose a significant increase in risk.

3. SECY-06-0078 Criteria

SECY-06-0078, "Status of Resolution of GSI-191, Assessment of [Effect of] Debris Accumulation on PWR Sump Performance" (Reference 7) specifies three criteria to be addressed in GL 2004-02 extension requests. These criteria and the FPL responses are provided below:

a. SECY-06-0078 Criterion No. 1

"The licensee has a plant-specific technical/experimental plan with milestones and schedule to address outstanding technical issues with enough margin to account for uncertainties."

FPL Response:

FPL has selected Alion Science and Technology to perform chemical effects testing for St. Lucie Unit 1. A purchase order has been issued for performing a 30-day integrated chemical effects test. The results of this test will be applied to the existing debris-only head loss testing and determine the total head loss across the screen. Testing is expected to be completed in the first quarter of 2008, with analysis completing by June 30, 2008.

With respect to ex-vessel downstream effects, FPL expected to complete analyses utilizing the "draft" revision 1 of WCAP-16406-P (Reference 15) by December 31, 2007. The recently issued industry guidance on downstream effects, both in-vessel (Reference 9) and ex-vessel (Reference 8) will require additional analyses. FPL plans on completing the additional analyses and verification that all the downstream effects work complies with this recently issued methodology by March 31, 2008.

In order to assure completion of the above confirmatory testing and analyses for Generic Letter 2004-02 installed modifications at St. Lucie Unit 1, an extension is requested to June 30, 2008. It is further noted that this extension is based on the successful confirmation of margins provided by the GL modifications, but it is possible that these final testing and analyses may result in further

reexaminiation of original assumptions and bases of other calculations, or potentially additional outage related plant modifications.

b. SECY-06-0078 Criterion 2

"The licensee identifies mitigative measures to put in place prior to December 31, 2007, and adequately describes how these mitigative measures will minimize the risk of degraded ECCS and CSS functions during the extension period."

FPL Response:

The following mitigative measures have been implemented and will minimize the risk of degraded ECCS and CSS functions during the extension period:

Leak-Before-Break

St. Lucie Unit 1 has NRC approval (Safety Evaluation Report attached to NRC letter dated March 5, 1993) (Reference 5) to invoke the leak-before-break technology to eliminate the dynamic effects of postulated primary coolant piping (hot leg, cold leg, and cross-over piping) ruptures from the licensing and design basis of the plant. The approval was based on the conclusion that the leakage detection systems are diverse and provide reasonable assurance that primary system leakage (both identified and unidentified) will be detected and meet the requirements of General Design Criterion 30 with respect to provisions for reactor coolant pressure boundary (RCPB) leakage detection and identification, and the guidelines of Regulatory Guide 1.45 (Reference 6) with respect to RCPB leakage detection system design are, therefore, acceptable. While leak-before-break is not being used to establish the design basis load on the sump strainer, it does provide a basis for safe continued operation until completion of GL 2004-02 actions.

Chokepoint Walkdown

A walkdown of the St. Lucie Unit 1 containment, to identify chokepoints in the recirculation flow paths, did not identify any chokepoints.

Procedural Guidance, Training and Actions

As discussed in our responses to NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," St. Lucie has implemented a number of interim corrective actions to assure core cooling and containment integrity (References 10 and 11). In the NRC letter of September 30, 2005 (Reference 12) the staff concluded that FPL was responsive to and met the intent of Bulletin 2003-01 for St. Lucie Unit 1.

Operators are trained and have guidance for continuously monitoring emergency core cooling system (ECCS) and containment spray system (CSS) pump parameters, including loss of net-positive suction head (NPSH) as indicated by erratic pump current or discharge flow. Training briefs presented during operator requalification training have increased operations personnel awareness of the potential for the containment recirculation sump to become clogged during operation of the ECCS and CSS pumps in the recirculation cooling mode. Procedural actions were developed to provide additional RWT makeup in the event that sump blockage prevents

continued recirculation. Initial RWT levels are being maintained higher than required by the Technical Specifications to delay entry into recirculation and provide additional available NPSH.

Containment Cleanliness

FPL has implemented a number of actions to enhance containment cleanliness as documented in the response to Bulletin 2003-01. Detailed containment cleanliness procedures exist for unit restart readiness and for containment entry at power. These procedures incorporate the industry guidance of Nuclear Energy Institute (NEI) 02-01, revision 1 (Reference 13) to minimize miscellaneous debris sources within the containment. The requirements to assure that the containment is free of loose debris and fibrous material, and that items not approved for storage in the containment are removed, are specifically addressed. Plant procedures also require that the Plant General Manager and the Site Vice President perform a detailed walkdown of the containment prior to entry into Mode 4 at the end of each refueling outage to ensure plant readiness. Detailed containment sump inspections are performed at the end of each outage.

Information Notice 2005-26

On September 16, 2005, NRC issued Information Notice (IN) 2005-26, "Results of Chemical Effects Head Loss Tests in a Simulated PWR Sump Pool Environment" (Reference 14). The IN applies to plants that have calcium silicate (Cal-Sil) insulation and utilize trisodium phosphate (TSP) as a buffering agent in the containment sump. St. Lucie Unit 1 uses sodium hydroxide as a buffering agent, not TSP. Therefore, St. Lucie Unit 1 is not susceptible to the chemical effects issues delineated in the IN.

Permanent Modifications

The following permanent physical improvements to St. Lucie Unit 1 were implemented during refueling outage SL1-21 (spring 2007):

The sump screens have been completely replaced with a strainer system that has a total strainer surface area of greater than 8100 ft^2 with perforations of 1/16-inch. The new system consists of 21 strainer modules with interconnecting piping and is completely passive.

The High Pressure Safety Injection (HPSI) pump seals and cyclone separators have been replaced with a seal system that does not use cyclone separators or rely on the HPSI pumped water for flushing and cooling the mechanical seals. The new seal system recirculates the clean seal cavity water through an external heat exchanger to flush and cool the seal faces.

Calcium-silicate insulation (Cal-Sil) on selected piping in the containment has been fitted with a banding system to reduce the Cal-Sil zone of influence (ZOI) from 5.45D to 3D which significantly reduces the quantity of debris that can reach the strainers. A Westinghouse jet impingement test report performed specifically for FPL documents the testing of the banded Cal-Sil insulation and demonstrates that banded Cal-Sil insulation at St. Lucie Unit 1 can be excluded as a debris source when the ZOI ≥ to 3D (pipe diameters).

c. SECY-06-0078 Criterion 3

"For proposed extensions beyond several months, a licensee's request will more likely be accepted if the proposed mitigative measures include temporary physical improvements to the ECCS sump or materials inside the containment to better ensure a high level of sump performance."

FPL Response:

There are no temporary physical improvements required for St. Lucie Unit 1 to support the requested extension until June 30, 2008. As discussed under criterion 2, the final sump strainers and other modifications for St. Lucie Unit 1 have been installed and appropriate plant mitigative measures will be implemented by December 31, 2007.

d. Conclusions

An extension until June 30, 2008 for completing all the requested GL 2004-02 actions and modifications required by GL 2004-02 is acceptable because:

1. The calculated increase in the core damage frequency is well below the Regulatory Guide 1.174 definition of less than 1E-06 per year for a "very small change" in core damage frequency. Therefore, extending the completion of the analyses and confirmation of the acceptability of the sump modifications at St. Lucie Unit 1 does not pose a significant increase in risk.

2. FPL has taken aggressive action, including extensive analysis and testing, and has implemented physical improvements (including a new larger sump strainer) to better ensure a high level of sump performance.

3. FPL has implemented mitigative measures that will minimize the risk of degraded ECCS/CSS functions during the extension period.

4. FPL has a plant-specific plan with milestones to address outstanding technical issues with margin to account for uncertainties.

4. References

1. Letter from J. A. Stall, "Generic Letter 2004-02 – Potential Impact of Debris Blockage on Recirculation during Design Basis Accidents at Pressurized Water Reactors, September 1, 2005

2. Westinghouse WCAP-16362, "PRA Modeling Template for Sump Blockage," April 2005

3. NUREG/CR-6928, "Industry-Average Performance for Components and Initiating Events at U.S. Commercial Nuclear Power Plants", February 2007

4. Regulatory Guide 1.174, Rev. 1, "An Approach to for Using Probabilistic Risk Assessment in Risk Informed Decisions on Plant-Specific Changes to the Licensing Basis," November 2002

5. NRC Letter, from J. A. Norris (NRC) to J.H. Goldberg (FPL), "St. Lucie Units 1 and 2 – Application of Leak-Before-Break Technology to Reactor Coolant System Piping (TAC M8560 and M84561)," dated March 5, 1993

6. Regulatory Guide 1.45, "Reactor Coolant System Boundary Leakage Detection System," May 1973

7. NRC SECY-06-0078, "Status of Resolution of GSI-191, 'Assessment of [Effect of] Debris Accumulation on PWR Sump Performance," March 31, 2006

8. WCAP-16406-P, Revision 1, "Evaluation of downstream Sump Debris Effects in Support of GSI-191," August 2007

9. WCAP-16793-NP, Revision 0, "Evaluation of Long-Term Cooling Considering Particulate, Fibrous and Chemical Debris in the Recirculating Fluid," May 2007

10. Letter from J. A. Stall, "NRC Bulletin 2003-01, Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," August 8, 2003

11. Letter from W. Jefferson, "St. Lucie Units 1 and 2 - Response to Request for Additional Information Regarding NRC Bulletin 2003-01, Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," May 20, 2005

12. Letter from B. T. Moroney to J. A. Stall, "St. Lucie Units 1 and 2 – Response to NRC Bulletin 2003-01, Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," (TAC Nos. MC9605 and MC9606), September 30, 2005

13. NEI 02-01, Rev. 1, "Condition Assessment Guidelines: Debris Sources Inside PWR Containments"

14. NRC Information Notice 2005-26, "Results of Chemical Effects Head Loss Tests in a Simulated PWR Sump Pool Environment," September 16, 2005.

15. WCAP-16406-P, Draft Revision 1 "Evaluation of Downstream Sump Debris Effects in Support of GSI-191," May 2006

Basis for Acceptability of Request for Extension of Completion Date of St. Lucie Unit 2 GL 2004-02 Actions

1. Background

By letter dated September 1, 2005, (Reference 1) Florida Power and Light Company (FPL), the Licensee for St. Lucie Units 1 and 2, submitted the second of two responses requested by Generic Letter (GL) 2004-02. In Attachment 1 of that submittal, in response to NRC Request 2(a), FPL indicated that corrective actions would be implemented to ensure that the emergency core cooling system and containment spray system recirculation functions under debris-loading conditions would be in compliance with the Applicable Regulatory Requirements section of NRC GL 2004-02 when all modifications are completed. In response to NRC Request 2(b), FPL indicated that installation of the new Unit 2 sump strainer was planned for refueling outage SL2-17 in the fall 2007 and that actions requiring containment access (e.g., new sump strainer installation) would be completed prior to restart from refueling outage SL2-17 and that all required actions including those that may emerge after September 1, 2005 would be completed prior to December 31, 2007.

As committed to in the September 1, 2005 letter, a new sump strainer system is being installed during refueling outage SL2-17 in fall 2007. The new strainer system is a Performance Contracting Inc. (PCI) design with a surface area of approximately 5600 ft^2 with 1/16-inch perforations to retain debris. The new strainers will replace the existing sump screen which has a surface area of approximately 571 ft^2.

Additional corrective actions being implemented during refueling outage SL2-17 include replacing the high pressure safety injection (HPSI) and containment spray (CS) pump seals and cyclone separators with seal systems that do not use cyclone separators or rely on fluid flushing that use pump discharge.

The strainer system has been designed to limit the total debris-laden head loss such that the total system head losses will maintain acceptable NPSH for the high pressure safety injection and containment spray pumps with an assumed margin to account for chemical effects. The conservative strainer head losses were based on Point Beach testing. A comparison between Point Beach and St. Lucie Unit 2 concluded that St. Lucie Unit 2 is bounded by Point Beach. The plant specific chemical effects testing program summarized below will ensure that the influence of chemical effects on strainer hydraulics is fully addressed.

In Attachment 1 of the September 1, 2005 response to Generic Letter 2004-02, a milestone was provided that stated that "vendor strainer testing to validate chemical effects is planned to be completed in March, 2006." FPL has found that addressing chemical effects is challenging. Protocols for adequate chemical effects testing are still being refined by industry stakeholders. In addition to the generic industry concerns, FPL found it necessary to change strainer vendors for the design and manufacture of strainers for two units (St. Lucie Unit 2 and Turkey Point Unit 4), change the plan to install the strainers at St. Lucie Unit 2, Turkey Point Units 3 and 4 and Seabrook Station, and select new vendors to perform the chemical effects testing and analysis. The new vendors had to be integrated into our containment sump corrective action plans. The assessment of the impact of chemical effects remains an open issue that will not be fully resolved by December 31, 2007.

FPL currently plans to utilize Performance Contracting, Inc. (PCI) for chemical effects testing for St. Lucie Unit 2. This test is a large flume integrated debris and chemical test utilizing WCAP 16530-NP (Reference 16). The integrated flume testing is currently projected to start at the end of March, 2008. Although no written vendor schedule is currently available, FPL expects to complete testing in the second quarter of 2008, with analysis completing by June 30, 2008.

Additionally, the recently issued industry guidance on downstream effects, both ex-vessel (WCAP-16406-P, Reference 8) and in-vessel (WCAP-16793-NP, Reference 9) will require additional analyses. The ongoing development and review of this issue prevented FPL from meeting its previous target of March, 2006 for completion of downstream effects evaluations. Completing the downstream analyses in accordance with this recently issued methodology cannot be accomplished by December 31, 2007. FPL plans to complete these analyses by March 31, 2008.

In GL 2004-02, the NRC Staff summarized their reasoning and assessment to conclude that existing pressurized water reactors (PWRs) may continue to operate through December 31, 2007 while responding to the GL and implementing the required corrective actions. The requested extension of the GSI-191 full implementation schedule, from December 31, 2007 to June 30, 2008, does not impact the NRC staff's original conclusions summarized in GL 2004-02, wherein the Staff concluded that it is acceptable to operate until the corrective actions are completed. An estimate of the potential additional risk for the requested extension period is provided. The following sections also address the three criteria specified in SECY-06-0078 (Reference 7) that the NRC Staff expects to be satisfactorily addressed in an extension request.

2. Risk Estimate

Introduction

This section summarizes the calculation of the risk impact of extending the completion of Generic Letter 2004-02 actions at St. Lucie Unit 2, until June 30, 2008.

Background

NRC Generic Issue GSI-191 identifies that the current design basis methodology for assessing the potential for debris-induced sump blockage may not be conservative. Modifications to the sump are being designed to improve the performance of a sump during recirculation. FPL may need additional time to complete the sump modification.
Westinghouse developed a report, WCAP-16362, "PRA Modeling Template for Sump Blockage," (Reference 2) that addresses the implications of sump blockage on risk. This WCAP provides a general model for sump blockage but did not produce quantitative values. The WCAP modeling approach was used in this simplified evaluation.

Evaluation

The risk impact is limited to large-break LOCAs, since only these LOCAs are large enough to create enough debris to clog the containment sump. The frequency of a large-break LOCA is 1.33E-06 per year (NUREG/CR-6928, "Industry-Average Performance for Components and

Initiating Events at U.S. Commercial Nuclear Power Plants," (Reference 3). Minimal credit is taken for mitigation of sump blockage given a large-break LOCA. At St. Lucie Unit 2, mitigation includes establishing the minimum required sump suction (stopping SI pumps and containment spray pumps) as conditions permit and making up to the refueling water tank (RWT) to allow extended injection. These actions are based on steps in the emergency procedures. For these recovery actions, a screening value of 0.2 was used for the probability of failing to successfully perform these mitigating activities.

Conclusion

The increase in the core damage frequency due to clogging of the sump is therefore (1.33E-06 per year) * (0.2) = 2.66E-07 per year.

This calculated increase in the core damage frequency is well below the Regulatory Guide 1.174 (Reference 4) definition of less than 1E-06 per year for a "very small change" in core damage frequency. Therefore, extending the completion of Generic Letter 2004-02 Actions at St. Lucie Unit 2, until June 30, 2008, does not pose a significant increase in risk.

3. SECY-06-0078 Criteria

SECY-06-0078, "Status of Resolution of GSI-191, Assessment of [Effect of] Debris Accumulation on PWR Sump Performance" (Reference 7) specifies three criteria to be addressed in GL 2004-02 extension requests. These criteria and the FPL responses are provided below:

a. SECY-06-0078 Criterion No. 1

"The licensee has a plant-specific technical/experimental plan with milestones and schedule to address outstanding technical issues with enough margin to account for uncertainties."

FPL Response:

FPL currently plans to utilize Performance Contracting, Inc. (PCI) for chemical effects testing for St. Lucie Unit 2. The test is a large flume integrated debris and chemical test utilizing WCAP 16530-P (Reference 16). FPL expects to complete testing in the second quarter of 2008, with analysis completing by June 30, 2008.

With respect to ex-vessel downstream effects, FPL expected to complete analyses utilizing the "draft" revision 1 of WCAP-16406-P (Reference 17) by December 31, 2007. The recently issued industry guidance on downstream effects, both in-vessel (Reference 9) and ex-vessel (Reference 8) will require additional analyses. FPL plans on completing the additional analyses and verification that all the downstream effects work complies with this recently issued methodology by March 31, 2008.

In order to assure completion of the above confirmatory testing and analyses for Generic Letter 2004-02 installed modifications at St. Lucie Unit 2, an extension is requested to June 30, 2008. It is further noted that this extension is based on the successful confirmation of margins provided by the GL modifications, but it is possible that these final testing and analyses may result in further

reexaminiation of original assumptions and bases of other calculations, or potentially additional outage related plant modifications.

b. SECY-06-0078 Criterion 2

"The licensee identifies mitigative measures to put in place prior to December 31, 2007, and adequately describes how these mitigative measures will minimize the risk of degraded ECCS and CSS functions during the extension period."

FPL Response:

The following mitigative measures have been implemented and will minimize the risk of degraded ECCS and CSS functions during the extension period.

Leak-Before-Break

St. Lucie Unit 2 has NRC approval (Safety Evaluation Report attached to NRC letter dated March 5, 1993) (Reference 5) to invoke the leak-before-break technology to eliminate the dynamic effects of postulated primary coolant piping (hot leg, cold leg, and cross-over piping) ruptures from the licensing and design basis of the plant. The approval was based on the conclusion that the leakage detection systems are diverse and provide reasonable assurance that primary system leakage (both identified and unidentified) will be detected and meet the requirements of General Design Criterion 30 with respect to provisions for reactor coolant pressure boundary (RCPB) leakage detection and identification, and the guidelines of Regulatory Guide 1.45 (Reference 6) with respect to RCPB leakage detection system design are, therefore, acceptable. While leak-before-break is not being used to establish the design basis load on the sump strainer, it does provide a basis for safe continued operation until completion of the GL 2004-02 actions.

Chokepoint Walkdown

A walkdown of the St. Lucie Unit 2 containment, to identify chokepoints in the recirculation flow paths and subsequent assessments, did not identify any chokepoints.

Procedural Guidance, Training and Actions

As discussed in our responses to NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," St. Lucie has implemented a number of interim corrective actions to assure core cooling and containment integrity (References 10 and 11). In the NRC letter of September 30, 2005 (Reference 12) the staff concluded that FPL was responsive to and met the intent of Bulletin 2003-01 for St. Lucie Unit 2.
Operators are trained and have guidance for continuously monitoring emergency core cooling system (ECCS) and containment spray system (CSS) pump parameters, including loss of net-positive suction head (NPSH) as indicated by erratic pump current or discharge flow. Training briefs presented during operator requalification training have increased operations personnel awareness of the potential for the containment recirculation sump to become clogged during operation of the ECCS and CSS pumps in the recirculation cooling mode. Procedural actions were developed to provide additional RWT makeup in the event that sump blockage prevents

continued recirculation. Initial RWT levels are being maintained higher than required by the Technical Specifications to delay entry into recirculation and provide additional available NPSH.

Containment Cleanliness

FPL has implemented a number of actions to enhance containment cleanliness as documented in the response to Bulletin 2003-01. Detailed containment cleanliness procedures exist for unit restart readiness and for containment entry at power. These procedures incorporate the industry guidance of Nuclear Energy Institute (NEI) 02-01, Revision 1 (Reference 13) to minimize miscellaneous debris sources within the containment. The requirements to assure that the containment is free of loose debris and fibrous material, and that items not approved for storage in the containment are removed, are specifically addressed. Detailed containment sump inspections are performed at the end of each outage. Plant procedures also require that the Plant General Manager and the Site Vice President perform a detailed walkdown of the containment prior to entry into Mode 4 at the end of each refueling outage to ensure plant readiness.

Information Notice 2005-26

On September 16, 2005, NRC issued Information Notice (IN) 2005-26, "Results of Chemical Effects Head Loss Tests in a Simulated PWR Sump Pool Environment" (Reference 14). The IN applies to plants that have calcium silicate (Cal-Sil) insulation and utilize trisodium phosphate (TSP) as a buffering agent in the containment sump. St. Lucie Unit 2 uses TSP as a buffering agent and utilizes small quantities of Cal-Sil insulation. Upon receipt, the IN was entered into the corrective action program. By letter dated November 30, 2005 (Reference 15), FPL informed the NRC that the concerns raises in the IN were not directly applicable to St. Lucie Unit 2.

Permanent Modifications

The following permanent physical improvements to St. Lucie Unit 2 are being implemented during refueling outage SL2-17 (fall 2007):

The sump screens are being replaced with a strainer system that has a total strainer surface area of approximately 5607 ft^2 with perforations of 1/16-inch. The new system consists of eight strainer modules located in the sump and is completely passive.

The HPSI pump seals and cyclone separators are being replaced with a seal system that does not use cyclone separators or rely on the HPSI pumped water for flushing and cooling the mechanical seals. The new seal system recirculates the clean seal cavity water through an external heat exchanger to flush and cool the seal faces.

The CS pump seals and cyclone separators are being replaced with a seal system that does not use cyclone separators or rely on the CS pumped water for flushing and cooling the mechanical seals. The new seal system recirculates the clean seal cavity water through an external heat exchanger to flush and cool the seal faces.

Replacement steam generators are being installed. The new steam generators are insulated with Transco RMI in place of the existing Nukon insulation. This significantly reduces the amount of fiber in the containment.

c. SECY-06-0078 Criterion 3

"For proposed extensions beyond several months, a licensee's request will more likely be accepted if the proposed mitigative measures include temporary physical improvements to the ECCS sump or materials inside the containment to better ensure a high level of sump performance."

FPL Response:

There are no temporary physical improvements required for St. Lucie Unit 2 to support the requested extension until June 30, 2008. As discussed under criterion 2, the final sump strainers and other modifications for St. Lucie Unit 2 will be installed and appropriate plant mitigative measures will be implemented by December 31, 2007.

d. Conclusions

An extension until June 30, 2008 for completing the requested GL 2004-02 actions is acceptable because:

1. The calculated increase in the core damage frequency is well below the Regulatory Guide 1.174 definition of less than 1E-06 per year for a "very small change" in core damage frequency. Therefore, extending the completion of the sump modifications at St. Lucie Unit 2 does not pose a significant increase in risk.

2. FPL has taken aggressive action, including extensive analysis, and has or will implement physical improvements, including a new larger sump strainer, to better ensure a high level of sump performance by December 31, 2007.

3. FPL has implemented mitigative measures that will minimize the risk of degraded ECCS/CSS functions during the extension period.

4. FPL has a plant-specific plan with milestones to address outstanding technical issues with margin to account for uncertainties.

4. Reference

1. Letter from J. A. Stall, "Generic Letter 2004-02 – Potential Impact of Debris Blockage on Recirculation during Design Basis Accidents at Pressurized Water Reactors, September 1, 2005

2. Westinghouse WCAP-16362, "PRA Modeling Template for Sump Blockage," April 2005

3. NUREG/CR-6928, "Industry-Average Performance for Components and Initiating Events

at U.S. Commercial Nuclear Power Plants", February 2007

4. Regulatory Guide 1.174, Rev. 1, "An Approach to for Using Probabilistic Risk Assessment in Risk Informed Decisions on Plant-Specific Changes to the Licensing Basis," November 2002

5. NRC Letter, from J. A. Norris (NRC) to J.H. Goldberg (FPL), "St. Lucie Units 1 and 2 – Application of Leak-Before-Break Technology to Reactor Coolant System Piping (TAC M8560 and M84561)," dated March 5, 1993

6. Regulatory Guide 1.45, "Reactor Coolant System Boundary Leakage Detection System," May 1973

7. NRC SECY-06-0078, "Status of Resolution of GSI-191, 'Assessment of [Effect of] Debris Accumulation on PWR Sump Performance," March 31, 2006.

8. WCAP-16406-P, Revision 1, "Evaluation of downstream Sump Debris Effects in Support of GSI-191," August 2007

9. WCAP-16793-NP, Revision 1, "Evaluation of Long-Term Cooling Considering Particulate, Fibrous and Chemical Debris in the Recirculating Fluid," May 2007

10. Letter from J. A. Stall, "NRC Bulletin 2003-01, Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," August 8, 2003.

11. Letter from W. Jefferson, "St. Lucie Units 1 and 2 - Response to Request for Additional Information Regarding NRC Bulletin 2003-01, Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," May 20, 2005

12. Letter from B. T. Moroney to J. A. Stall, "St. Lucie Units 1 and 2 – Response to NRC Bulletin 2003-01, Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," (TAC Nos. MC9605 and MC9606), September 30, 2005

13. NEI 02-01, Rev. 1, "Condition Assessment Guidelines: Debris Sources Inside PWR Containments"

14. NRC Information Notice 2005-26, "Results of Chemical Effects Head Loss Tests in a Simulated PWR Sump Pool Environment," September 16, 2005

15. Letter from W. Jefferson, "St. Lucie Unit 2 – NRC Information Notice 2005-26 – Results of Chemical Effects Head Loss Tests in a Simulated PWR Sump Pool Environment," November 30, 2005

16. WCAP-16530-NP, "Evaluation of Post-Accident Chemical Effects in Containment Sump Fluids to Support GSI-191"

17. WCAP-16406-P, Draft Revision 1, "Evaluation of Downstream Sump Debris Effects in Support of GSI-191," May 2006

Basis for Acceptability of Request for extension of Completion Date of Turkey Point Unit 3 GL 2004-02 Actions

1. Background

By letter dated September 1, 2005, (Reference 1) Florida Power and Light Company (FPL), the licensee for Turkey Point Units 3 and 4, submitted the second of two responses requested by Generic Letter (GL) 2004-02. In Attachment 2 of that submittal, in response to NRC Request 2(a), FPL indicated that corrective actions would be implemented to ensure that the emergency core cooling system and containment spray system recirculation functions under debris loading conditions would be in compliance with the Applicable Regulatory Requirements section of NRC GL 2004-02 when all modifications are completed. In response to NRC Request 2(b), FPL indicated that installation of the new Unit 3 sump strainer was planned for refueling outage PT3-23 in the fall 2007 and that actions requiring containment access (e.g., new sump strainer installation) would be completed prior to restart from the refueling outage and that all required actions including those that may emerge after September 1, 2005 would be completed prior to December 31, 2007.

As committed to in the September 1, 2005 letter, a new sump strainer system was installed during refueling outage PT3-23 in fall 2007. The new strainer system is a General Electric design with a surface area of approximately 5,500 ft^2 with 3/32" perforations to retain debris. The new strainers replaced the previous sump screens which had a combined total surface area of approximately 63 ft^2 with a ¼-inch screen mesh.

Additional corrective actions implemented during the fall 2007 outage to address GL 2004-02 include 1) the removal of calcium silicate thermal insulation from the pressurizer relief tank (PRT), 2) replacing the thermal insulation on the reactor coolant pumps (RCPs) with reflective metallic insulation (RMI), and 3) replacing the thermal insulation on the pressurizer surge line with RMI.

Plant specific strainer testing and analysis confirmed that the newly installed strainers are of sufficient size to demonstrate acceptable ECCS pump NPSH margin when fully loaded with debris. This includes an assumed margin for chemical effects. However, the actual margin cannot be fully quantified until additional testing for chemical effects is completed and assessed.

In Attachment 2 of the September 1, 2005 response to Generic Letter 2004-02, a milestone was provided that stated that "vendor strainer testing to validate chemical effects is planned to be completed in March, 2006." FPL has found that addressing chemical effects is challenging. Protocols for adequate chemical effects testing are still being refined by industry stakeholders. In addition to the generic industry concerns, FPL found it necessary to change strainer vendors for the design and manufacture of strainers for two units (St. Lucie Unit 2 and Turkey Point Unit 4), change the plan to install the strainers at St. Lucie Unit 2, Turkey Point Units 3 and 4 and Seabrook Station, and select new vendors to perform the chemical effects testing and analysis. The new vendors had to be integrated into our containment sump corrective action plans. The assessment of the impact of chemical effects remains an open issue that will not be fully resolved by December 31, 2007.

FPL has selected Alion Science and Technology to perform chemical effects testing for Turkey Point Unit 3. A purchase order has been issued for performing 30-day integrated chemical

effects tests. The results of these tests will be applied to the existing debris-only head loss testing and determine the total head loss across the screen. Testing is expected to commence this year and complete in the first quarter of 2008, with analysis completing by June 30, 2008.

Additionally, the recently issued industry guidance on downstream effects, both ex-vessel (WCAP-16406-P, Reference 12) and in-vessel (WCAP-16793-NP, Reference 13) will require additional analyses. The ongoing development and review of this issue prevented FPL from meeting its previous target of March, 2006 for completion of downstream effects evaluations. Completing the downstream analyses in accordance with this recently issued methodology cannot be accomplished by December 31, 2007. FPL plans to complete these analyses by March 31, 2008.

In GL 2004-02, the NRC Staff summarized their reasoning and assessment to conclude that existing pressurized water reactors (PWRs) may continue to operate through December 31, 2007 while responding to the GL and implementing the required corrective actions. The requested extension of the GSI-191 full implementation schedule, from December 31, 2007 to June 30, 2008, does not impact the NRC Staff's original conclusions summarized in GL 2004-02, wherein the staff concluded that it is acceptable to operate until the corrective actions are completed. An estimate of the potential additional risk for the requested extension period is provided. The following sections also address the three criteria specified in SECY-06-0078 (Reference 5) that the NRC Staff expects to be satisfactorily addressed in an extension request.

2. Risk Estimate

Introduction

This section summarizes the calculation of the risk impact of extending the completion of Generic Letter 2004-02 actions at Turkey Point Unit 3, until June 30, 2008.

Background

NRC Generic Issue GSI-191 identifies that the current design basis methodology for assessing the potential for debris-induced sump blockage may not be conservative.

Westinghouse developed a report, WCAP-16362, "PRA Modeling Template for Sump Blockage" (Reference 2) that addresses the implications of sump blockage on risk. This WCAP provides a general model for sump blockage but did not produce quantitative values. The WCAP modeling approach was used in this simplified evaluation.

Evaluation

The risk impact is limited to large-break LOCAs, since only these LOCAs are large enough to create enough debris to clog the containment sump. The frequency of a large-break LOCA is 1.33E-06 per year (NUREG/CR-6928, "Industry-Average Performance for Components and Initiating Events at U.S. Commercial Nuclear Power Plants" (Reference 3). Minimal credit is taken for mitigation of sump blockage given a large-break LOCA. At Turkey Point Unit 3, mitigation includes making up to the refueling water storage tank (RWST) to allow extended injection and starting the Unit 4 SI pumps for injection from the Unit 4 RWST. These actions are

based on steps in the emergency procedures. For these recovery actions, a screening value of 0.2 was used for the probability of failing to successfully perform these mitigating activities.

Conclusion

The increase in the core damage frequency due to clogging of the sump is Therefore (1.33E-06 per year) * (0.2) = 2.66E-07 per year.

This calculated increase in the core damage frequency is well below the Regulatory Guide 1.174 (Reference 4) definition of less than 1E-06 per year for a "very small change" in core damage frequency. Therefore, extending the completion of Generic Letter 2004-02 Actions at Turkey Point Unit 3, until June 30, 2008, does not pose a significant increase in risk.

3. SECY-06-0078 Criteria

SECY-06-0078 (Reference 5) specifies three criteria that should be addressed in GL 2004-02 licensee extension requests. These criteria and the FPL responses are provided below:

a. SECY-06-0078 Criterion No. 1

"The licensee has a plant-specific technical/experimental plan with milestones and schedule to address outstanding technical issues with enough margin to account for uncertainties."

FPL Response:

FPL has selected Alion Science and Technology to perform chemical effects testing. A purchase order has been issued for performing a 30-day integrated chemical effects test. The results of this test will be applied to the existing debris-only head loss testing in order to determine the total head loss across the screen. Testing is expected to be completed in the first quarter of 2008, with analysis being completed by June 30, 2008.

With respect to ex-vessel downstream effects, FPL expected to complete analyses utilizing the "draft" revision 1 of WCAP-16406-P (Reference 14) by December 31, 2007. The recently issued industry guidance on downstream effects, both in-vessel (Reference 12) and ex-vessel (Reference 13) will require additional analyses. FPL plans on completing the additional analysis and verification that all the downstream effects work complies with this recently issued methodology by March 31, 2008.

In order to assure completion of the above testing and analyses for Generic Letter 2004-02 installed modifications at Turkey Point Unit 3, an extension is requested to June 30, 2008. It is further noted that this extension is based on successful confirmation of margins provided by the GL modifications, but it is possible that the final testing and analyses may result in further reexamination of original assumptions and bases of other calculations, or potentially, additional outage related plant modifications.

b. SECY-06-0078 Criterion 2

"The licensee identifies mitigative measures to be put in place prior to December 31, 2007, and adequately describes how these mitigative measures will minimize the risk of degraded ECCS and CSS functions during the extension period."

FPL Response

The following mitigative measures have been implemented and will minimize the risk of degraded ECCS and CSS functions during the extension period.

Leak-Before-Break

Turkey Point Unit 3 has NRC approval (Safety Evaluation Report attached to NRC letter dated June 23, 1995) (Reference 6) to invoke the leak-before-break methodology to eliminate the dynamic effects (pipe whip and jet impingement) of postulated reactor coolant piping (hot leg, cold leg, and cross-over piping) ruptures from the design basis of the plant. The approval was based on the conclusion that the probability, of a pipe failure before noticeable leakage could be detected and the plant brought to a safe-shutdown condition, is negligibly small. While leak-before-break is not being used to establish the design basis load on the sump strainer, it does provide a basis for safe continued operation until the completion of the GL 2004-02 actions.

Procedural Guidance, Training and Actions

As discussed in our responses to NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," Turkey Point has implemented a number of interim corrective actions to assure core cooling and containment integrity (References 7 and 8). In the NRC letter of August 15, 2005 (Reference 9) the Staff concluded that FPL was responsive to and met the intent of Bulletin 2003-01 for Turkey Point Units 3 and 4.

Operators are trained and have guidance for continuously monitoring emergency core cooling system (ECCS) and containment spray system (CSS) pump parameters, including loss of net-positive suction head (NPSH) as indicated by erratic pump current or discharge flow. Training briefs presented during operator requalification training have increased operations personnel awareness of the potential for the containment recirculation sump to become clogged during operation of the ECCS and CSS pumps in the recirculation cooling mode. Procedural actions were developed to provide additional injection sources by aligning the opposite unit's RWST and high head safety injection (HHSI) pumps to the accident unit, or aligning the accident unit's charging pump to drain the remaining inventory from the RWST.

Containment Cleanliness

FPL has implemented a number of actions to enhance containment cleanliness as documented in the response to Bulletin 2003-01. Detailed containment cleanliness procedures exist for unit restart readiness and for containment entry at power. These procedures incorporate the industry guidance of Nuclear Energy Institute (NEI) 02-01, Revision 1 (Reference 10) to minimize miscellaneous debris sources within the containment. Detailed containment sump inspections are performed at the end of each outage. These visual inspections of the containment sump

screens ensure that the suction inlets are not restricted by debris. Specifically, the procedures require that no loose debris (rags, trash, clothing, etc) is present in the containment which could be transported to the containment recirculation sumps. In addition, the Plant General Manager and the Site Vice President are required to personally walk down the containment prior to the restart from an outage.

Information Notice 2005-26

On September 16, 2005, NRC issued Information Notice (IN) 2005-26, "Results of Chemical Effects Head Loss Tests in a Simulated PWR Sump Pool Environment" (Reference 11). The IN applies to plants that have calcium silicate (Cal-Sil) insulation and utilize trisodium phosphate (TSP) as a buffering agent in the containment sump. Both Turkey Point Units 3 and 4 use sodium tetraborate as a buffering agent, not TSP. Therefore, Turkey Point Unit 3 is not susceptible to the chemical effects issues delineated in the IN.

Permanent Modifications

Our mitigative measures include the following permanent physical improvements to Turkey Point Unit 3 ECCS sump and materials inside containment that were implemented during refueling outage PT3-23 (fall 2007):

The sump screens have been completely replaced with a strainer system that has a total strainer surface area of approximately 5,500 ft^2 with perforations of 3/32-inch. The new system consists of 12 strainer modules with interconnecting piping, and is completely passive.

The existing calcium silicate insulation and insulation protective metal was removed from the PRT to reduce the quantity of insulation debris postulated for a loss-of-coolant accident.

The existing reactor coolant pump insulation has been replaced with RMI to reduce the quantity of insulation debris.

The existing pressurizer surge line insulation (consisting of NUKON and calcium silicate) was also replaced with RMI.

The containment closeout inspection procedure was revised to verify removal of the refueling cavity drain covers prior to entry into Mode 4 to eliminate a potential recirculation flow path choke point.

c. SECY-06-0078 Criterion 3

"For proposed extensions beyond several months, a licensee's request will more likely be accepted if the proposed mitigative measures include temporary physical improvements to the ECCS sump or materials inside the containment to better ensure a high level of sump performance."

FPL Response

There are no temporary physical improvements required for Turkey Point Unit 3 to support the requested extension to June 30, 2008. As discussed under criterion 2, the final sump strainers are installed, other supporting modifications have been completed, and appropriate mitigative measures have been implemented.

d. Conclusions

An extension until June 30, 2008 for completing the requested GL 2004-02 actions and modifications is acceptable because:

1. The calculated increase in the core damage frequency is well below the RG 1.174 definition of less than 1E-06 per year for a "very small change" in core damage frequency. Therefore, extending the completion of the analyses and confirmation of the acceptability of the sump modifications for Turkey Point Unit 3 does not pose a significant increase in risk.

2. FPL has taken aggressive action including extensive analysis and testing, and has implemented physical improvements (including a new larger sump strainer) to ensure a high level of sump performance.

3. FPL has implemented mitigative measures that will minimize the risk of degraded ECCS/CSS functions during the extension period.

4. FPL has a plant-specific plan with milestones to address outstanding technical issues with margin to account for uncertainties.

4. References

1. Letter from J. A. Stall, "Generic Letter 2004-02 – Potential Impact of Debris Blockage on Recirculation during Design Basis Accidents at Pressurized Water Reactors, September 1, 2005

2. Westinghouse WCAP-16362, PRA Modeling Template for Sump Blockage, April 2005

3. NUREG/CR-6928, "Industry-Average Performance for Components and Initiating Events at U.S. Commercial Nuclear Power Plants", February 2007, p. D-11.

4. Regulatory Guide 1.174, Rev. 1, "An Approach to for Using Probabilistic Risk Assessment in Risk Informed Decisions on Plant-Specific Changes to the Licensing Basis," November 2002

5. NRC SECY-06-0078, "Status of Resolution of GSI-191, 'Assessment of [Effect of] Debris Accumulation on PWR Sump Performance," March 31, 2006

6. NRC Letter, from R. P. Croteau (NRC) to J.H. Goldberg (FPL), "Turkey Point Units 3 and

4 - Approval to Utilize Leak-Before-Break Methodology for Reactor Coolant System Piping (TAC M91494 and M91495)," dated June 23, 1995

7. Letter from J. A. Stall, "NRC Bulletin 2003-01, Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," August 8, 2003

8. Letter from T. O. Jones, "Response to Request for Additional Information Regarding NRC Bulletin 2003-01, Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," November 9, 2004

9. Letter from B. T. Moroney to J. A. Stall, "Turkey Point Nuclear Plant Units 3 and 4 – Responses to NRC Bulletin 2003-01, Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," (TAC Nos. MB9623 and MB9624), August 15, 2005

10. NEI 02-01, Rev. 1, "Condition Assessment Guidelines: Debris Sources Inside PWR Containments"

11. NRC Information Notice 2005-26, "Results of Chemical Effects Head Loss Tests in a Simulated PWR Sump Pool Environment," September 16, 2005

12. WCAP-16793-NP, Revision 0, "Evaluation of Long-Term Cooling Considering Particulate, Fibrous and Chemical Debris in the Recirculating Fluid," May 2007

13. WCAP 16406-P, Revision 1, "Evaluation of Downstream Sump Debris Effects in Support of GSI-191," August 2007

14. WCAP 16406-P, Draft Revision 1, "Evaluation of Downstream Sump Debris Effects in Support of GSI-191," May 2006