NEXTera ENERGY
POINT BEACH

June 12, 2009

NRC 2009-0053
GL 2004-02

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

Point Beach Nuclear Plant, Units 1 and 2
Dockets 50-266 and 50-301
Renewed License Nos. DPR-24 and DPR-27

Request for Extension of Unit 1 and 2 Completion Dates for Generic Letter 2004-02, Potential Impact for Debris Blockage in Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors (TAC Nos. MC4705/4706)

References (1) FPL Energy Point Beach Letter to NRC, dated September 8, 2008, Request for Extension of Unit 1 and 2 Completion Dates for Generic Letter 2004-02, Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors (TAC Nos. MC4719 and MC4720) (ML082530196)

(2) NRC Letter to FPL Energy Point Beach Nuclear Plant Units 1 and 2, dated October 6, 2008, GSI-191/GL 2004-02, Additional Extension Request Approval (TAC Nos. MC4705 and MC4706) (ML082740151)

On May 18, 2009, and June 3, 2009, telephone conferences were held between representatives of NextEra Energy Point Beach, LLC (NextEra) and the NRC staff to discuss a request for an extension to achieve compliance with the provisions of GSI-191/GL 2004-02 at Point Beach Nuclear Plant (PBNP), Units 1 and 2.

NextEra previously requested an extension to achieve compliance by June 30, 2009, for PBNP Unit 1, and by December 31, 2009, for PBNP Unit 2 (Reference 1). An extension was granted by the Commission until June 30, 2009, for PBNP Unit 1 and to June 30, 2009, for PBNP Unit 2 via Reference 2.

Based on evaluation of the current configuration and test data, NextEra has determined that a reduction of fibrous insulation inside the PBNP Units 1 and 2 containments is the optimum solution. Completion of the fiber reduction effort will result in final plant configurations that, on the basis of the most recent test results, will be in compliance with the provisions of GSI-191/GL 2004-02. Based upon an assessment of design and fabrication lead times, NextEra proposes to complete the corrective actions by June 30, 2010, for PBNP Unit 1, and by June 30, 2011, for PBNP Unit 2.

Enclosure 1 provides a description of the fiber reduction effort and the basis for the proposed extension request. NextEra requests approval of the extension request by June 30, 2009.

The target milestones for final resolution of GSI-191/GL 2004-02 are as follows:

GSI-191/GL 2004-02 Target Milestones

Description	Target Date
Telephone conference between NextEra and NRC to address comment resolution and provide verbal responses to January 7, 2009, NRC letter transmitting request for additional information	June 22, 2009
Public meeting between NextEra and NRC to discuss January 7, 2009, NRC letter requesting additional information	Mid-July, 2009
Submittal of NextEra response to January 7, 2009, NRC letter requesting additional information	October 1, 2009
Completion of GSI-191/GL 2004-02 related analyses	December 18, 2009
Unit 1 Replacement of Fibrous Insulation	U1R32 Refueling Outage (Currently scheduled to begin on March 1, 2010)
Unit 1 GSI 191/GL 2004-02 completion of corrective actions	June 30, 2010
Unit 2 Replacement of Fibrous Insulation	
Phase 1	U2R30 Refueling Outage (Currently scheduled to begin on October 15, 2009
Phase 2	U2R31 Refueling Outage (Currently scheduled to begin on March 1, 2011)
Unit 2 GSI 191/GL 2004-02 completion of corrective actions	June 30, 2011

Summary of Regulatory Commitments

The following regulatory commitment was made by NextEra in Reference (1):

> FPL Energy Point Beach will complete actions to resolve GSI-191 at PBNP by June 30, 2009, for Unit 1, and by December 31, 2009, for Unit 2.

The regulatory commitment is revised as follows:

> NextEra Energy Point Beach will complete modifications to resolve GSI-191 at PBNP by June 30, 2010, for Unit 1, and by June 30, 2011, for Unit 2.

If you have questions or require additional information, please contact Mr. James Costedio at 920/755-7427.

A copy of this submittal has been provided to the designated Wisconsin Official.

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

Executed on June 12, 2009.

Very truly yours,

NextEra Energy Point Beach, LLC

Larry Meyer
Site Vice President

Enclosure

cc: Resident Inspector, Point Beach Nuclear Plant, USNRC
Project Manager, Point Beach Nuclear Plant, USNRC
Administrator, Region III, USNRC
PSCW

ENCLOSURE 1

NEXTERA ENERGY POINT BEACH, LLC
POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2

REQUEST FOR EXTENSION FOR COMPLETION DATE FOR GENERIC LETTER 2004-02, POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY RECIRCULATION DURING DESIGN BASIS ACCIDENTS AT PRESURIZED WATER REACTORS (TAC NOS. MC4705 AND MC4706)

1.0 Background

On September 13, 2004, the NRC issued NRC Generic Letter 2004-02, Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors (ML042360586). The generic letter requested licensees to take the following actions:

> Using an NRC-approved methodology, perform a mechanistic evaluation of the potential for the adverse effects of post-accident debris blockage and operation with debris-laden fluids to impede or prevent the recirculation functions of the emergency core cooling system (ECCS) and containment spray system (CSS) following all postulated accidents for which the recirculation of these systems is required.
>
> Implement any plant modifications that the above evaluation identifies as being necessary to ensure system functionality.

Nuclear Management Company, LLC (NMC), the former license holder for Point Beach Nuclear Plant (PBNP) Units 1 and 2, responded to GL 2004-02 via letters dated September 1, 2005 (ML052500302), April 28, 2006, (ML061210032) and October 3, 2006 (ML062850105). NMC also responded to NRC Bulletin 2003-01, Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors - 60-Day Response, via letter dated August 8, 2003 (ML032310423).

Following the sale of PBNP Units 1 and 2 on September 28, 2007, FPL Energy Point Beach, LLC, responded to GL 2004-02 on November 16, 2007 (ML073230345), and February 29, 2008 (ML080630613).

By letter dated November 16, 2007 (ML073230345), FPL Energy Point Beach requested an extension of the December 31, 2007, completion date for compliance with GL 2004-02. By letter dated December 20, 2007 (ML073511698), the NRC granted an extension until June 30, 2008.

By letter dated June 9, 2008 (ML081620337), supplemented by a letter dated June 23, 2008 (ML081760129), FPL Energy Point Beach requested an extension of the June 30, 2008, completion date for GL 2004-02, to September 30, 2008. In the June 9, 2008, letter, FPL Energy Point Beach reported replacement of the sump screens in PBNP Units 1 and 2, and revision of the affected plant procedures to reflect the operating requirements of the new screens. These modifications represented a significant improvement of the previous design by providing increased strainer surface areas, increased net positive suction head (NPSH) margin and reduced downstream effects.

On September 8, 2008 (ML082530196), FPL Energy Point Beach requested an extension of the September 30, 2008, completion date to June 30, 2009, for Unit 1, and December 21, 2009, for Unit 2 to permit installation of additional strainer modules and to gain additional margin by replacing the cylindrical portion of the pressurizer insulation in both units.

In PBNP Unit 1, approximately 400 ft^2 of strainer surface area has been added to each train and the strainer assemblies have been structurally reinforced to accommodate a greater differential pressure. Similar modifications are scheduled for PBNP Unit 2 during the fall 2009 refueling outage.

By letter dated October 6, 2008 (ML082740151), the NRC granted an extension until June 30, 2009, for completion of strainer chemical effects testing and in-vessel and ex-vessel downstream effects evaluations. In that letter, the NRC staff stated that for PBNP Unit 2, the extension is intended to be an interim extension period to allow the NRC staff time to determine if there is the need for additional regulatory action.

2.0 Reason for the Request for Extension

NextEra will be undertaking a significant reduction in fibrous insulation in PBNP Units 1 and 2 to achieve a calculated fiber load on the containment sump strainers that is bounded by the results of previously completed tests. NextEra believes that the selective replacement of fibrous insulation with reflective metal insulation (RMI) will resolve questions and concerns regarding debris generation and transport.

NextEra performed head loss testing in May 2006 prior to the establishment of an accepted industry test protocol. Based upon revised test methodologies that reflect current industry guidance, additional confirmatory testing was conducted by NextEra, AREVA and Alden Research Laboratory in July 2008. During this testing, it was determined the containment sump strainer configuration of eleven (11) strainer modules per train that had been installed in the PBNP Unit 1 and Unit 2 emergency core cooling system (ECCS), did not meet test acceptance criteria. Further testing indicated that three (3) additional strainer modules per train, for a total of 14 strainer modules, along with the addition of debris interceptors with an assumed net effective debris reduction of 75%, would be required to meet the provisions of GSI-191/GL 2004-02.

The results of prototypical debris interceptor testing conducted at Alden Research Laboratory in January 2009 indicated that debris interceptors are effective in reducing fibrous material in water transported to containment sumps during the recirculation phase. However, the net efficiency of debris removal exhibited during testing was not as high as required.

In addition, the NRC staff recently raised concerns regarding the destruction Zone Of Influence (ZOI) for jacketed NUKON® fibrous insulation, and has not yet issued a safety evaluation for the current industry methodology for evaluating in-core downstream effects.

NextEra will address these issues by undertaking a major fibrous insulation reduction effort, and by revising the debris generation and transport analyses to model the reduced fiber source configuration. The July 2008 tests that were completed under the industry-accepted protocol will be used to determine the fiber load that can be accommodated by the strainers.

Based upon the current fibrous insulation reduction plan, NextEra expects to achieve full compliance with the provisions of GSI-191/GL 2004-02 by June 30, 2010, for PBNP Unit 1, and by June 30, 2011, for PBNP Unit 2.

3.0 Technical Basis for Proposed Extension

NextEra considers that the conditions at PBNP continue to meet the criteria identified in SECY-06-0078, Status of Resolution of GSI-191, Assessment of [Effect of] Debris Accumulation on PWR Sump Performance (ML053620174), for extension beyond the completion date of December 31, 2007, that was specified in GL 2004-02. The SECY criteria are as follows:

Proposed extensions to permit changes at the next outage of opportunity after December 2007 may be acceptable if, based on the licensee's request, the staff determines that:

- *The licensee has a plant-specific technical/experimental plan with milestones and schedules to address the outstanding technical issues with enough margin to account for uncertainties.*
- *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.*
- *For proposed extension 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 containment to better ensure a high level of ECCS sump performance.*

These criteria are met as described below:

3.1 Plant-Specific Plan, Milestones and Schedule

As discussed in a letter to the Commission dated June 23, 2008 (ML081760129), and acknowledged via the NRC Safety Evaluation dated July 1, 2008 (ML081790538), which granted an extension request to September 30, 2008, there were five additional contingencies for consideration in the event that the testing of the current plant configurations was not successful. The contingencies were:

- Further steam jet testing to reduce the asbestos, CalSil and generic fiberglass insulation destruction pressures from the conservative default values endorsed in NEI 04-07.
- Alternative testing protocols to more closely and realistically simulate the settling of debris on the floor of containment prior to the start of sump recirculation.
- Abatement and replacement of fibrous insulation debris sources.
- Enhancing existing metallic insulation jacketing with additional banding to reduce the debris that could be generated.
- Installation of debris interceptors.

NextEra has explored these approaches and has determined that the best option for fully resolving GSI-191/GL 2004-02 issues at PBNP Units 1 and 2 is to reduce the quantity of fibrous insulation that can arrive at the sump strainers. Therefore, NextEra will replace sufficient amounts of fibrous insulation with reflective metal insulation (RMI) to achieve a calculated fiber load on the strainer that is bounded by the previous test results. NextEra may revise the currently planned scope as appropriate to achieve final plant configurations that are bounded by the results of previously completed tests. Additional testing is not anticipated.

Completion of the fiber reduction effort will result in final plant configurations that are in compliance with the requirements of GSI-191/GL 2004-02. Details of the fiber reduction effort are as described below:

Unit 1

During the fall 2008 outage, NextEra installed three (3) additional strainer modules on each train of existing strainers, structurally reinforced the strainer assemblies to accommodate an increased differential pressure and replaced the pressurizer insulation with jacketed NUKON®. Although much of the insulation in Unit 1 is already RMI, NextEra will further reduce the fibrous insulation in Unit 1 to ensure that the calculated fiber load on the strainer is bounded by the test results. The affected components include the steam generator channel heads and reactor coolant pump bowls. Additionally, insulation on the applicable portions of the chemical and volume control system (CVCS) letdown line, steam generator blowdown lines, containment spray lines, resistance temperature detector (RTD) bypass lines, safety injection lines, and RHR suction lines will be replaced.

The current debris generation and transport evaluations are based on a ZOI of 5D for jacketed NUKON® insulation. NextEra is aware there may be pending questions regarding the testing and analyses that formed the basis for the reduced ZOI. If a 5D ZOI is ultimately accepted by the NRC, no significant sources of NUKON® will remain for the postulated breaks per the planned insulation replacements. NextEra is following the industry efforts to respond to the pending questions on the matter, and anticipates satisfactory resolution in the near future.

If the ZOI for NUKON® is expanded, NextEra will take the appropriate actions to ensure the plant configuration meets the design analysis. The proposed fiber reduction effort will already eliminate the significant fiber sources in containment with the exception of the Unit 1 pressurizer. Additional actions may be required, which could include a blast deflector, reinforcement of the existing jacketing or replacement of the insulation.

The greatest lead time for these options is the replacement of the insulation, which requires approximately five months for design and fabrication. As an alternative, the existing banding on the Unit 1 pressurizer vertical section may be supplemented with Sure-Hold® brand banding and latches to achieve the 2.4D ZOI endorsed in Table 3.2 of NEI 04-07 Volume II for jacketed NUKON® with Sure-Hold® bands. Use of this banding will substantially reduce the dose expended and waste generated by a large scale replacement of the existing NUKON® insulation, while ensuring that the ZOI for the insulation is reduced to the point that it is not damaged by postulated LOCA sources.

NextEra plans to make a determination based on the status of the resolution of the ZOI issues in time to ensure that the necessary actions are completed during the Unit 1 spring 2010 refueling outage.

Unit 2

During the fall 2009 outage currently scheduled October 14, 2009, NextEra will install three (3) additional strainer modules on each train of existing strainers, structurally reinforce the strainer assemblies to accommodate an increased differential pressure and begin implementation of the fiber reduction effort.

NextEra plans to conduct the fiber reduction effort in two phases. The scope of the first phase includes replacement of the insulation on the steam generator channel heads and other insulation including the reactor coolant pump bowls and reactor coolant system loops as necessary to ensure no NUKON® insulation on these components remains within the ZOI. This work is scheduled to be performed during the fall 2009 refueling outage.

In addition, during the fall 2009 refueling outage, NextEra plans to conduct detailed walkdowns of applicable sections of the pressurizer, as well as the CVCS letdown line, steam generator blowdown lines, RTD bypass lines, safety injection lines, and RHR suction lines. These walkdowns will be performed in preparation for replacing the insulation in these areas during the spring 2011 refueling outage.

During the Unit 1 fall 2008 refueling outage, considerable engineering rework and radiation exposure to personnel (approximately 3 rem) were expended to replace the pressurizer insulation due, in part, to the support straps for the top portion of the pressurizer insulation requiring rework. In addition, the available insulation design drawings were not of sufficient detail to identify supports, transitions and interferences, which also contributed to the re-work. The existing equipment fabrication and plant arrangement drawings were useful for scoping, material procurement and fabrication of basic modules. However, they lacked sufficient detail to ensure that all aspects of replacement insulation attachments, potential interferences, etc., could be addressed with the certainty necessary for final design and insulation fabrication.

Due to the likelihood of similar findings for Unit 2, NextEra plans to perform walkdowns to identify areas where discrepant conditions may exist, areas where interference resulting from piping supports, etc., may occur, and areas that will require asbestos abatement. The final design and significant portions of fabrication will be deferred until all locations can be physically accessed and these details verified. These walkdowns will permit development of detailed drawings to support the insulation replacement. This will reduce the potential re-work that is required and will maintain personnel radiation exposure ALARA, while also minimizing the time of worker exposure to asbestos.

During the fall 2009 refueling outage, NextEra will be replacing approximately 685 ft^3 of insulation. This is approximately 60% of the total insulation to be replaced on Unit 2. The scale of the fiber reduction effort requires significant personnel and material resources to be applied in a relatively small area within the containment, resulting in adequate work space concerns. These concerns are further compounded by the handling and disposal practices associated with asbestos-laden insulation in accordance with OSHA and Clean Air Act requirements.

NextEra is aware of the pending questions regarding the testing and analyses that forms the basis for the reduced ZOI. If a 5D ZOI is ultimately accepted, no significant sources of NUKON® will remain for the postulated breaks per the planned insulation replacements. If the ZOI for NUKON® is expanded, the fiber reduction effort will eliminate the significant fiber sources with the exception of the Unit 2 steam generator barrels above the steam generator channel heads. NextEra is proceeding with the planning and fabrication of this insulation and may replace this insulation during the fall 2009 outage if the 5D ZOI issues are not resolved. As an alternative, the existing banding on the Unit 2 steam generator vertical sections may be supplemented with Sure-Hold® brand banding and latches to achieve the 2.4D ZOI endorsed in Table 3.2 of NEI 04-07 Volume II for jacketed NUKON® with Sure-Hold® bands. Use of this banding will substantially reduce the dose expended and waste generated by a large scale replacement of the existing NUKON® insulation, while ensuring that the ZOI for the insulation is reduced to the point that it is not damaged by postulated LOCA sources.

As part of Phase 1 of the fibrous reduction effort, NextEra plans to make a determination, based on the status of the resolution of the ZOI issues, in time to ensure that the necessary actions on the steam generators are completed during the Unit 2 fall 2009 refueling outage.

Summary of Target Milestones

Description	Target Date
Telephone conference between NextEra and NRC to address comment resolution and provide verbal responses to January 7, 2009, NRC letter transmitting request for additional information	June 22, 2009
Public meeting between NextEra and NRC to discuss January 7, 2009, NRC letter requesting additional information	Mid-July, 2009
Submittal of NextEra response to January 7, 2009, NRC letter requesting additional information	October 1, 2009
Completion of GSI-191/GL 2004-02 related analyses	December 18, 2009
Unit 1 Replacement of Fibrous Insulation Unit 1 GSI 191/GL 2004-02 completion of corrective actions	U1R32 Refueling Outage (Currently scheduled to begin on March 1, 2010) June 30, 2010

Unit 2 Replacement of Fibrous Insulation	
Phase 1	U2R30 Refueling Outage (Currently scheduled to begin on October 15, 2009
Phase 2	U2R31 Refueling Outage (Currently scheduled to begin on March 1, 2011)
Unit 2 GSI 191/GL 2004-02 completion of corrective actions	June 30, 2011

3.2 Mitigative Measures / Physical Improvements

The following summarizes mitigative measures that NextEra has established and implemented to minimize the risk of degraded ECCS and CSS functions during the proposed extension period.

1. Hardware Modifications

Unit 1

During the spring 2007 refueling outage, a new strainer design was installed on the ECCS system in containment. This design increased the available flow area from approximately 21 ft^2 to approximately 1,500 ft^2 for each of two redundant strainers on the ECCS recirculation piping. This design also reduced the size of the flow openings from 0.125" to 0.066" diameter and greatly reduced the approach velocity of the openings to allow for increased settling of particulates and fiber. A prototype of this design was successfully tested during May 2006 with scaled flow and debris.

Testing conforming to the latest Performance Contracting Inc. (PCI) protocols was conducted in July 2008 which showed that the installation of additional strainer modules and a reduction in fibrous debris arriving at the strainers would be effective and result in acceptably low head loss, even in the presence of limiting chemical effects. As a result of the July 2008 large flume testing, additional hardware modifications have been made. These modifications increased each strainer train area from approximately 1,500 ft^2 square feet to approximately 1,900 ft^2, structurally reinforced the strainer assemblies to accommodate an increased differential pressure and replaced the original mineral wool pressurizer insulation with jacketed NUKON®. Lastly, debris interceptors designed to reduce the quantity of suspended debris that could be transported to the screen surface were installed and the refueling cavity drain piping was rerouted to direct debris suspended in containment spray water from these areas to upstream of the debris interceptors. While subsequent informational testing of a prototype debris interceptor did not achieve the high efficiency desired, the prototype did exhibit the ability to significantly reduce the quantity of suspended fibrous debris. These changes were implemented during the fall 2008 refueling outage.

Unit 2

During the fall 2006 refueling outage, a new strainer design was installed on the ECCS system in containment. This design increased the available flow area from approximately 21 ft^2 to approximately 1,500 ft^2 for each of two redundant strainers on the ECCS recirculation piping. This design also reduced the size of the flow openings from 0.125" to 0.066" diameter and greatly reduced the approach velocity of the openings to allow for increased settling of particulates and fiber. A prototype of this design was successfully tested during May 2006 with scaled flow and debris.

During the fall 2009 refueling outage currently scheduled to begin October 15, 2009, NextEra plans to install three (3) additional strainer modules to increase each strainer train area from approximately 1,500 ft^2 square feet to approximately 1,900 ft^2, structurally reinforce the strainer assemblies to accommodate an increased differential pressure and initiate the fibrous insulation reduction effort.

2. Coatings Inspections and Qualification Common to Units 1 and 2

Inspections of the protective coatings in containment are performed on a refueling outage frequency. Inspections of the pressurizer and reactor coolant system (RCS) loop compartments are performed during alternate outages, due to ALARA considerations. The inspections are part of a protective coatings program complying with Regulatory Guide 1.54, Service Level I, II and III Protective Coatings Applied to Nuclear Plants, dated June 1973, and ANSI N101.4-1972, Quality Assurance for Protective Coatings Applied to Nuclear Facilities, dated November 28, 1972, to ensure that coatings do not adversely affect safety-related systems, structures or components. Information was previously provided to the Commission on this subject in response to a request for additional information associated with EN 42129 reported on November 8, 2005, and in letters dated February 16, 2006 (ML060860028), May 12, 2006 (ML061420158), and May 19, 2006 (ML06120132). The NRC issued a safety evaluation on this subject on September 18, 2006 (ML060880084).

3. Containment Cleanliness Common to Units 1 and 2

NextEra has established procedural controls to limit potential debris sources in the Unit 1 and 2 containments. These procedures address periodic inspections and assessment of latent debris, control of insulation changes, control of metallic aluminum and control of introduced non-metallic materials such as tags, labels, tie-wraps, etc., inside containment. In MODE 1 through MODE 4, the containment is a special foreign material exclusion zone requiring strict controls on the types and quantities of materials that may be taken into or left inside of the containment buildings.

Latent fiber and particulate debris resident in the Unit 1 and 2 containments have been quantified and the results demonstrate that the latent debris inventory is substantially lower than that assumed in the debris generation calculations.

4. Procedure Guidance Common to Units 1 and 2

Emergency operating procedure (EOP) 1.3, Transfer to Containment Sump Recirculation-Low Head Injection, directs operators to monitor for sump performance. If blockage is indicated, emergency contingency procedure (ECA) 1.3, Containment Sump Blockage, directs plant staff to mitigate the effects of the blockage and to restore core injection.

5. Safety Features and Margins in Current Configuration/Design

The PBNP Units 1 and 2 containment sumps incorporate design features that help to minimize the possibility of strainer blockage. The containment sump is the lowest full containment floor elevation. The screens are located outside the reactor coolant system (RCS) loop compartments to minimize the potential for damage from a high energy pipe failure. There are two redundant trains to minimize the potential for a single failure resulting in loss of function. The sump strainers rest on supports that are slightly off the sump floor, rather than mounted in a depressed sump that could collect debris and obstruct active screen area.

NextEra uses sodium hydroxide as a sump pH buffer at PBNP Units 1 and 2. The sodium hydroxide is added via the containment spray system while spray is drawing from the refueling water storage tank (RWST). The duration of this spray is limited by the available RWST inventory and would be terminated when the RWST is depleted.

Calculations of aluminum corrosion were performed in accordance with the guidance of WCAP-16530-NP, Evaluation of Post-Accident Chemical Effects in Containment Sump Fluids to Support GSI-191, Revision 0, dated February 2006. To conservatively bound the maximum time that spray may remain in operation, it was assumed that spray would continue for six (6) hours after which time it would be manually secured. As noted earlier, the July 2008 test program that credited installation of three new strainers per train and the installation of debris interceptors, demonstrated that there were minimal chemical effects on the sump NPSH.

3.3 Basis for Continued Operation / Acceptability of Proposed Schedule

In Generic Letter 2004-02, the NRC staff provided a justification for continued operation for pressurized water reactors through December 31, 2007. The following operability elements remain applicable at PBNP Units 1 and 2 and provide assurance that the ECCS can perform its safety function in the event of a LOCA during the proposed extension period.

1. Switchover to recirculation from the sump during a large break LOCA would not occur until at least 27 minutes after accident initiation, allowing time for much of the debris to settle in other places within containment.

2. The probability of the initiating event is extremely low.

3. The evaluation of the net positive suction head (NPSH) available at the pump suctions does not credit submergence or over-pressure at the outlet of the ECCS strainers. It assumes that the only pressure present is the vapor pressure of the water. The flashing evaluation demonstrates that the head loss across the strainer and associated piping is less than the available pressure throughout the full range of containment pressures and temperatures. Therefore, flashing will not occur and the evaluation of NPSH for the RHR pumps is valid.

NextEra is currently in the fourth 10-year interval of the inservice inspection (ISI) program. During the third interval, which ended in 2002, 100% of the RCS piping ultrasonic test (UT) examinations required by ASME Section XI were completed with no rejectable flaws detected.

The scope of the inspections included all sizes of piping within the RCS pressure boundary, including large, medium and small bore.

For the fourth 10-year interval, NextEra has implemented a risk-informed approach to the selection of weld examinations, as provided in NRC safety evaluation, Evaluation of Risk Informed Inservice Inspection Program, dated July 2, 2003 (ML031630940). This approach uses probabilistic risk assessment (PRA), risk ranking and degradation mechanisms to arrive at the weld examination program plan. UT inspections completed to date have not revealed any rejectable flaws. Additionally, at the end of every refueling outage, the Code-required VT-2 visual examination for leakage is conducted on the RCS. No through-wall leaks have been detected during the pressure tests.

The current industry issue regarding Primary Water Stress Corrosion Cracking (PWSCC) associated with Alloy 600/82/182 welds is of very low safety significance at PBNP. The pressurizers, reactor vessels and pumps do not contain Alloy 600/82/182 dissimilar metal welds and are not susceptible to PWSCC. Likewise, the Unit 1 steam generators do not contain Alloy 600/82/182 dissimilar metal welds. The Unit 2 steam generators have hot leg and cold leg nozzles with Alloy 600/82/182 welds, which were clad with Alloy 52 during initial fabrication to mitigate their susceptibility to PWSCC. These welds are examined in accordance with the requirements of ASME Code Case N-722.

A rapidly propagating failure of the large bore RCS piping components is unlikely at PBNP. The following safety evaluations have been issued by the Commission on this subject:

- Review of Leak-Before-Break Evaluation for Accumulator Line Piping as provided by 10 CFR Part 50, Appendix A, GDC 4, dated November 7,2000 (ML003767681).
- Review of Leak-Before-Break Evaluation for the Pressurizer Surge Line Piping as provided by 10 CFR Part 50, Appendix A, GDC 4, dated December 15, 2000 (ML003777863).
- Review of Leak-Before-Break Evaluation for the Residual Heat Removal System Piping as provided by 10 CFR Part 50, Appendix A, GDC 4, dated December 18, 2000 (ML003777964).
- Supplement to Safety Evaluation on Leak-Before-Break Regarding Correction of Leak Detection Capability, dated February 7, 2005 (ML04358008).
- Issuance of Amendments RE: Leak-before-Break Evaluation for Primary Loop Piping, dated June 6, 2005 (ML043360295).

The leak-before-break analyses include the RCS primary loop piping, SI accumulator discharge lines to the RCS, the pressurizer surge line, and the high pressure RHR piping connections to the RCS. The analyses encompass essentially all of the large and medium bore piping considered within the scope for GSI-191/GL 2004-02. NRC review and acceptance of these analyses demonstrates that a rapidly propagating failure of the large bore RCS piping components at PBNP is highly unlikely.

The remaining RCS pressure boundary piping 2" or greater that is not addressed in the leak-before-break analyses consists of:

- Letdown line (short 8" "pot" adjacent to the main loop piping reducing to a 2" line)
- Short branch of capped 6" pipe off the main loop piping (1 per loop)
- Short branch of capped 4" pipe off the main loop piping (1 per loop)
- Pressurizer safety valve lines (4")
- Pressurizer PORV and spray lines (3")
- RTD manifold lines (2" and 3")
- Charging line (3")
- Excess letdown connection (2", reducing to ¾")

These lines were constructed with compatible materials, design pressures, temperatures, NDE requirements, etc., as those previously analyzed in the leak-before-break analyses. Therefore, it can be concluded that they are also not likely to be sources of rapidly propagating failures of the RCS pressure boundary.

If the remaining RCS pressure boundary piping 2" or greater were to be considered of lower reliability, it is instructive to compare the fibrous debris that may be generated by a break of one of these lesser lines with the results of previously completed analyses. As previously discussed, NextEra has determined that a reduction in fiber debris generation from the worst case analyzed break needs to be 75% or more (i.e. reduced to 25% or less than the previously analyzed debris quantity). The largest piping that has not been analyzed for leak-before-break described above is the short 8" diameter "pot" at the junction of the RCS loop piping and the letdown line.

The main RCS loop piping varies in size from 27.5" to 31" inside diameter, while the 8" diameter "pot" has an inner diameter of 7.2". The ratio of diameters (and therefore ZOI sizes) ranges from 23% to 26%. The maximum quantity of debris that could be generated by a complete severance of the 8" diameter "pot" is bounded by 26% of that calculated for the worst case RCS loop piping break. This is near the upper threshold for acceptable debris generation.

The ratio of debris that would be more realistically generated is likely to be closer to the ratio of the cube of the pipe diameters (i.e. the volumes of the ZOIs). This ratio ranges from 1.3% to 1.8%, and provides assurance that a complete break of the limiting 8" diameter "pot" piping would not result in generating an unacceptably large quantity of fibrous debris. This approach may be applied to the smaller diameter lines to arrive at even smaller fractions of debris generation.

The PBNP pressurizers are surrounded by thick, reinforced concrete vaults. Breaks from small piping inside of the pressurizer cubicle have limited ZOIs that are bounded by debris from postulated large pipe breaks in the adjacent RCS loop compartment. On one side of the pressurizer cubicle, the bottom ~7' of the ~50' compartment is open to an adjacent RCS loop compartment. The opening is above the elevation of the RCS loop piping, and is closed off by an angle iron and a sheet metal HVAC barrier. The existing mineral wool insulation is also metal jacketed. The surrounding concrete vault, metal HVAC barrier, distance from the large bore RCS piping (>5D), and the vertical offset from the plane of the RCS loop piping result in substantial shielding of the pressurizers from direct impingement and large scale insulation removal during a postulated large bore RCS piping break.

The combination of acceptable ISI test results, low PWSCC susceptibility, upgraded sump strainers, minimal quantity of debris that can be creditably generated from smaller-medium and small bore piping, leak-before-break piping analyses, and pressurizer vault configurations provide assurance that a postulated LOCA which results in a challenge to the proper functioning of the sump strainers is not likely during the proposed extension period.

3.4 Risk Evaluation

In GL 2004-02, the NRC acknowledges that the probability of the most severe initiating event (i.e., large and intermediate break LOCAs) is extremely low, and that small LOCAs are also of low probability, would require less ECCS flow, would take more time to use up the water inventory in the refueling water storage tank (RWST), and in some cases may not require the use of recirculation from the ECCS sump. In GL 2004-02, it is also recognized that there are PWR design features that tend to prevent blockage of the ECCS sumps during a LOCA and that PWRs typically do not need to switch over to recirculation from the sump during a LOCA until greater than 20 to 30 minutes following LOCA initiation.

The containments are open at PBNP, eliminating areas of flow restriction that could concentrate flow and promote debris transport. The minimum time to switchover to recirculation (at least 27 minutes after initiation of an event) allows for significant settling of debris suspended by the initial blast and the initial wash-down of containment by containment spray. As discussed in Section 3.3 above, the results of continuing inservice inspections, low susceptibility to PWSCC and completed leak-before-break analyses render the probability of a rapidly propagating failure of all large and most medium bore piping as very low. Additionally, there is confidence that piping that has not been rigorously evaluated by a leak-before-break analysis is sufficiently small so a rupture of the piping would not jeopardize the proper functioning of the containment sump screens. Further, the July 2008 test program that credited installation of three new strainers per train and debris interceptors also demonstrated that there were minimal chemical effects on the sump net positive suction head (NPSH).

The evaluation of downstream effects was developed using a fibrous debris inventory that will be reduced as a result of the fiber reduction effort, a conservative quantity of latent debris and a conservative quantity of coating debris. Therefore, there is substantial conservatism (margin) in the evaluation of ex-core downstream effects. The evaluations, with this margin included, concluded that:

- The PBNP Unit 1 and Unit 2 ECCS and containment spray system (CSS) valves, heat exchanger tubing, instrument tubing, piping and orifices were found to have adequate thickness such that erosive wear due to debris laden fluid will not compromise the design functions of these components for the required mission times.

- The degradation of hydraulic performance for the designated mission times is acceptable based on the methodology provided in WCAP-16406-P, PRA Modeling Template for Sump Blockage. Therefore, the pump capabilities credited in the FSAR and licensing bases analyses to ensure that peak fuel cladding temperature (PCT) limits continue to meet the design basis requirements during the time and flow critical transient portion of a design basis loss-of-coolant accident (LOCA).

- Residual heat removal (RHR), CSS and high head safety injection (HHSI) pump mechanical shaft seals are expected to perform satisfactorily with the debris laden fluid following a postulated LOCA for the designated mission times.

- Using the WCAP-16406-P wear model, it was determined that the potential extent of wear on the high head safety injection (HHSI) pumps would not adversely affect pump vibration or hydraulic efficiency and the HHSI pump meets the requirements for vibration operability following a postulated LOCA.

- The residual heat removal (RHR), CSS and HHSI pump bearings are anti-friction, oil lubricated ball bearings equipped with various stages of protection against hot liquid leakage from the shaft seals. Hence they would not be affected by potentially debris laden fluid.

- The limiting passageways in the ECCS and CSS were reviewed. The most limiting passageway was confirmed to be larger than the largest assumed debris diameter. Hence blockage of the ECCS and CSS passageways due to debris laden fluid is not a concern.

GSI-191 identifies that the current design basis methodology for assessing the potential for debris-induced sump blockage may not be conservative. Westinghouse developed WCAP-16362 which 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.

The risk impact is limited to LOCAs, since only these LOCAs are large enough to create sufficient 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, February 2007). Minimal credit is taken for mitigation of sump blockage given a large-break LOCA. At PBNP, mitigation includes transfer of reactor makeup water to the refueling water storage tank (RWST) to allow extended injection. These actions are based upon steps in approved emergency operating procedures. For these recovery actions, a screening value of 0.2 was used for the probability of failing to successfully perform these mitigating activities.

The increase in core damage frequency due to clogging of the sumps is calculated as follows:

1.33E-06 per year x (0.2) = 2.66E-07 per year

The calculated increase in the core damage frequency is below the definition of less than 1.0E-06 per year for a "very small change" in core damage frequency, in accordance with Regulatory Guide 1.174, An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis.

Therefore, the requested extensions for Unit 1 from June 30, 2009, to June 30, 2010, and for Unit 2 from June 30, 2009, to June 30, 2011, do not pose a significant increase in risk.

4.0 Conclusions

An extension for completing the GSI-191/GL 2004-02 corrective actions by June 30, 2010, for PBNP Unit 1 and by June 30, 2011, for PBNP Unit 2, is acceptable based upon:

1. The calculated increase in the core damage frequency is below the Regulatory Guide 1.174 definition of less than 1.0E-06 per year for a "very small change" in core damage frequency. Extension of the time to demonstrate compliance to June 30, 2010, for PBNP Unit 1, and to June 30, 2011, for PBNP Unit 2, does not pose a significant increase in risk.

2. NextEra has taken, and is continuing to take, aggressive action in order to achieve compliance with GI-191/GL 2004-02. This includes installation of additional strainers, structural reinforcement of the strainer assemblies and a significant fiber reduction effort.

3. NextEra has implemented mitigative measures to minimize the risk of degraded ECCS functions during the extension period. These measures include the installation of strainers with substantially increased surface area, improved monitoring of containment coatings condition, improved monitoring and control of containment cleanliness and procedural action in the unlikely event of sump screen blockage.

4. NextEra has a plant-specific plan with milestones to address the outstanding technical issues.