POINT BEACH

January 21, 2011

NRC 2011-0013
10 CFR 50.90

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

License Amendment Request 261
Extended Power Uprate
Response to Request for Clarification

References:
(1) FPL Energy Point Beach, LLC letter to NRC, dated April 7, 2009, License Amendment Request 261, Extended Power Uprate (ML091250564)
(2) NextEra Energy Point Beach, LLC letter to NRC, dated December 10, 2010, License Amendment Request 261, Extended Power Uprate, Response to Request for Additional Information (ML103440557)
(3) NextEra Energy Point Beach, LLC letter to NRC, dated January 7, 2011, License Amendment Request 261, Extended Power Uprate, Response to Request for Clarification (ML110100255)
(4) NRC electronic mail to NextEra Energy Point Beach, LLC, dated January 20, 2011, Point Beach Nuclear Plant, Units 1 and 2 – Request for Additional Information (SNPB) re: EPU Review (TAC Nos. ME1044 and ME1045) (ML110200692)

NextEra Energy Point Beach, LLC (NextEra) submitted License Amendment Request (LAR) 261 (Reference 1) to the NRC pursuant to 10 CFR 50.90. The proposed amendment would increase each unit's licensed thermal power level from 1540 megawatts thermal (MWt) to 1800 MWt, and revise the Technical Specifications to support operation at the increased thermal power level.

During an NRC desk audit of the Extended Power Uprate (EPU) boron precipitation analysis at Westinghouse's Rockville, MD. Offices on December 29, 2010, additional supporting information was requested for the request for additional information responses provided in Reference (2). NextEra's response to this request was submitted via Reference (3).

During a telephone conference with NRC staff on January 19, 2011, and during an NRC desk audit at Westinghouse's Rockville, MD, Offices on January 20, 2011, the NRC staff determined that additional clarification of NextEra's Reference (2) and (3) responses is required to enable the staff's continued review of the request (Reference 4). Enclosure 1 provides the NextEra response to the NRC staff's request for clarification.

Summary of Regulatory Commitments

The following new Regulatory Commitments are made via this response:

- NextEra shall revise the Point Beach Nuclear Plant (PBNP) emergency operating procedures (EOPs) for response to loss of coolant accidents (LOCAs) to ensure that boration will be terminated, if boration of the reactor coolant system (RCS) via the chemical and volume control (CVCS) charging pumps from the boric acid storage tanks (BASTs) is in progress at the initiation of the LOCA.

- NextEra shall add clarification to the EOP Background Document and operator training for LOCA response, that the transfer from containment spray (CS) on emergency core cooling system (ECCS) recirculation to cold leg recirculation via the safety injection (SI) pumps shall occur within 10 minutes. NextEra shall establish this time for the transfer from CS recirculation to SI cold leg recirculation as a time critical operator action in accordance with the Operations administrative procedure for control of time critical operator actions.

The information contained in this letter does not alter the no significant hazards consideration contained in Reference (1) and continues to satisfy the criteria of 10 CFR 51.22 for categorical exclusion from the requirements of an environmental assessment.

In accordance with 10 CFR 50.91, a copy of this letter is being provided to the designated Wisconsin Official.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on January 21, 2011.

Very truly yours,

NextEra Energy Point Beach, LLC

FOR
Larry Meyer
Site Vice President

Enclosure

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

ENCLOSURE 1

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

LICENSE AMENDMENT REQUEST 261
EXTENDED POWER UPRATE
RESPONSE TO REQUEST FOR CLARIFICATION

During a telephone conference with NRC staff on January 19, 2011, and during an NRC desk audit at Westinghouse's Rockville, MD, Offices on January 20, 2011, the NRC staff determined that additional clarification of the responses (References 1 and 2) is required (Reference 3) to enable the staff's continued review of License Amendment Request (LAR) 261, Extended Power Uprate (EPU) (Reference 4). The following information is provided by NextEra Energy Point Beach, LLC (NextEra), in response to the NRC staff's request for clarification.

Request from Telephone Conference with NRC Staff on January 19, 2011:

Clarification Request

With regard to post-LOCA boron precipitation analysis, ensure that the following operator actions and requirements are addressed in the Emergency Operating Procedures (EOPs):

a) *In the event of a LOCA with boration of the reactor coolant system in progress at the time of event initiation, ensure the procedures direct termination of boration from the boric acid storage tanks (BASTs)*

b) *In the event of a LOCA, ensure that the transfer from Containment Spray (CS) on emergency core cooling system (ECCS) recirculation to cold leg injection via the Safety Injection (SI) pumps is completed within 10 minutes.*

NextEra Response

In response to Clarification Request 1.a), NextEra makes the following Regulatory Commitment:

- NextEra shall revise the Point Beach Nuclear Plant (PBNP) emergency operating procedures (EOPs) for response to loss of coolant accidents (LOCAs) to ensure that boration will be terminated, if boration of the reactor coolant system (RCS) via the chemical and volume control (CVCS) charging pumps from the boric acid storage tanks (BASTs) is in progress at the initiation of the LOCA.

In response to Clarification Request 1.b), NextEra shall maintain the requirement to align safety injection for containment sump recirculation to the RCS cold legs within 4-½ hours from termination of cold leg injection. In addition, NextEra makes the following Regulatory Commitment:

- NextEra shall add clarification to the EOP Background Document and operator training for LOCA response, that the transfer from containment spray (CS) on emergency core cooling system (ECCS) recirculation to cold leg recirculation via the safety injection (SI) pumps shall occur within 10 minutes. NextEra shall establish this time for the transfer from CS recirculation to SI cold leg recirculation as a time critical operator action in accordance with the Operations administrative procedure for control of time critical operator actions.

Requests from NRC Desk Audit on January 20, 2011 (Reference 3):

Clarification Request 1

Please describe the models and method utilized to compute the boric acid concentration in the sump following sump re-circulation that is used as a boric acid source during the recirculation mode of injection.

Describe how the vapor source to the containment from the reactor coolant system is computed, the resultant condensation, and hence the boric acid content of the sump.

If 100% of the vapor source to the containment is assumed, then provide the basis and justification for this assumption.

If appropriate, please reference relevant containment transient data for the condensation efficiency of the containment sprays and CAR fans.

Please identify the uncertainty applied to the computation of the sump boric acid concentration and its basis.

NextEra Response

The SKBOR computer program is part of the Westinghouse methodology for long-term cooling (LTC). For plants with upper plenum injection (UPI), SKBOR is used to determine:

(1) Time at which ECCS recirculation should be reestablished to the RCS cold legs to prevent the precipitation of boric acid in the core.

(2) Time at which UPI should be established to prevent the precipitation of boron in the core and for breaks where the RCS may stabilize above the UPI cut-in pressure.

A typical SKBOR calculation considers two volumes: one representing the effective vessel mixing volume (denoted as the CORE); and one representing the remaining system inventory (denoted as the SUMP). The CORE and SUMP are initially assumed to contain borated liquid at the system-average boron concentration. Vapor generated due to decay heat boiling exits the CORE with a boron concentration of zero (vapor is assumed to condense fully in containment) and is returned to the SUMP as unborated liquid (see additional discussion below). Borated liquid is added from the SUMP as required to keep the CORE volume full. In this way, the

SUMP boron concentration gradually decreases, while the CORE boron concentration increases toward the boric acid solubility limit. The logic of the mass and boron calculations in SKBOR is shown in Figures 1 and 2.

Most of the inputs to SKBOR are used to specify plant-specific parameters such as the component masses and boron concentrations, the effective vessel mixing volume, and the initial core power level. These inputs are chosen to maximize the rate at which boron accumulates in the core. The results of the analysis are used to establish the times at which the necessary operator actions should be initiated.

As described above SKBOR assumes that vapor generated in the core returns to the sump as unborated liquid (i.e. 100% condensation). The containment will reach saturated conditions (100% relative humidity) very quickly after the pipe break. At this point, since the containment atmosphere cannot hold any more water vapor, 100% of the steam generated in the core will condense. The amount of water vapor in the containment atmosphere, both before and after the pipe break is small relative to the amount of water in the sump. These assumptions are validated by examining the predicted conditions from the PBNP EPU LOCA Containment Analysis (Figures 3 and 4).

Figure 3 shows the relative humidity versus time for the limiting LOCA containment pressure analysis. As indicated, the relative humidity in containment rises to 100% very quickly, within seconds of the pipe break. There are several dips from 100% relative humidity related to the relatively rapid changes in containment pressure. The assumption that the amount of water vapor in the containment atmosphere is small relative to the amount of water in the sump can be justified by examining Figure 4, the containment water vapor mass (or steam mass) as a function of time after a large break LOCA. The maximum containment steam mass is approximately 100,000 lbm very early in the transient, and falls to approximately 25,000 lbm after about 3600 seconds. The water vapor mass in the containment atmosphere before the LOCA is approximately 1000 lbm. Thus, it is demonstrated that the containment atmosphere's retention of water vapor mass is small compared to the total water mass in the sump (approximately 2,700,000 lbm). The transients in Figures 3 and 4 are modeled assumptions to maximize containment pressure. A more representative condition for limiting boric acid precipitation scenarios would be a minimum containment pressure transient which is consistent with the minimum containment pressure assumption used in the boric acid precipitation analysis. Lower containment pressure would reduce the potential containment atmosphere retained water mass from what is indicated in Figure 4. The effect of 50,000 lbm of water vapor mass retained in the containment atmosphere on computed hot leg switchover (HLSO) time was examined by reducing the pure water mass in the SKBOR initial sump conditions. The effect on boric acid buildup in the core was small (time to reach 29.27 wt% boric acid concentration was 4.71 hours versus 4.82 hours).

Explicit uncertainties are not applied to SKBOR results. The analysis relies on the selection of conservative inputs to the calculations. For example, bounding inputs are chosen to maximize the mass of boration contributors to the sump and minimize the mass of dilution contributors to the sump. Similarly, bounding boron concentration inputs are chosen to maximize the boron mass in the sump. Other input options allow conservative modeling such as options to instruct the code to conservatively ignore safety injection subcooling effects in either the lower plenum or upper plenum.

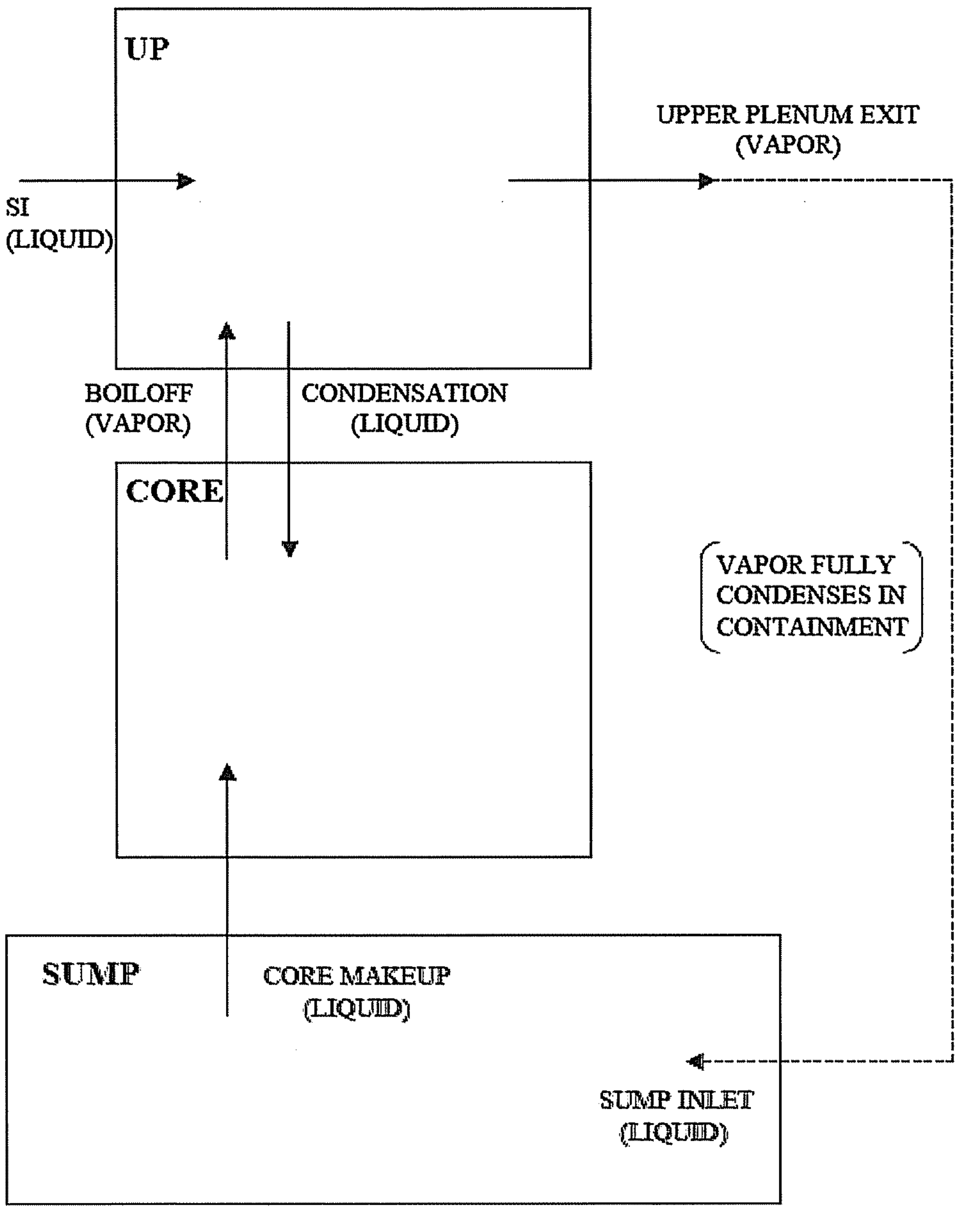

FIGURE 1: Mass Calculations in SKBOR

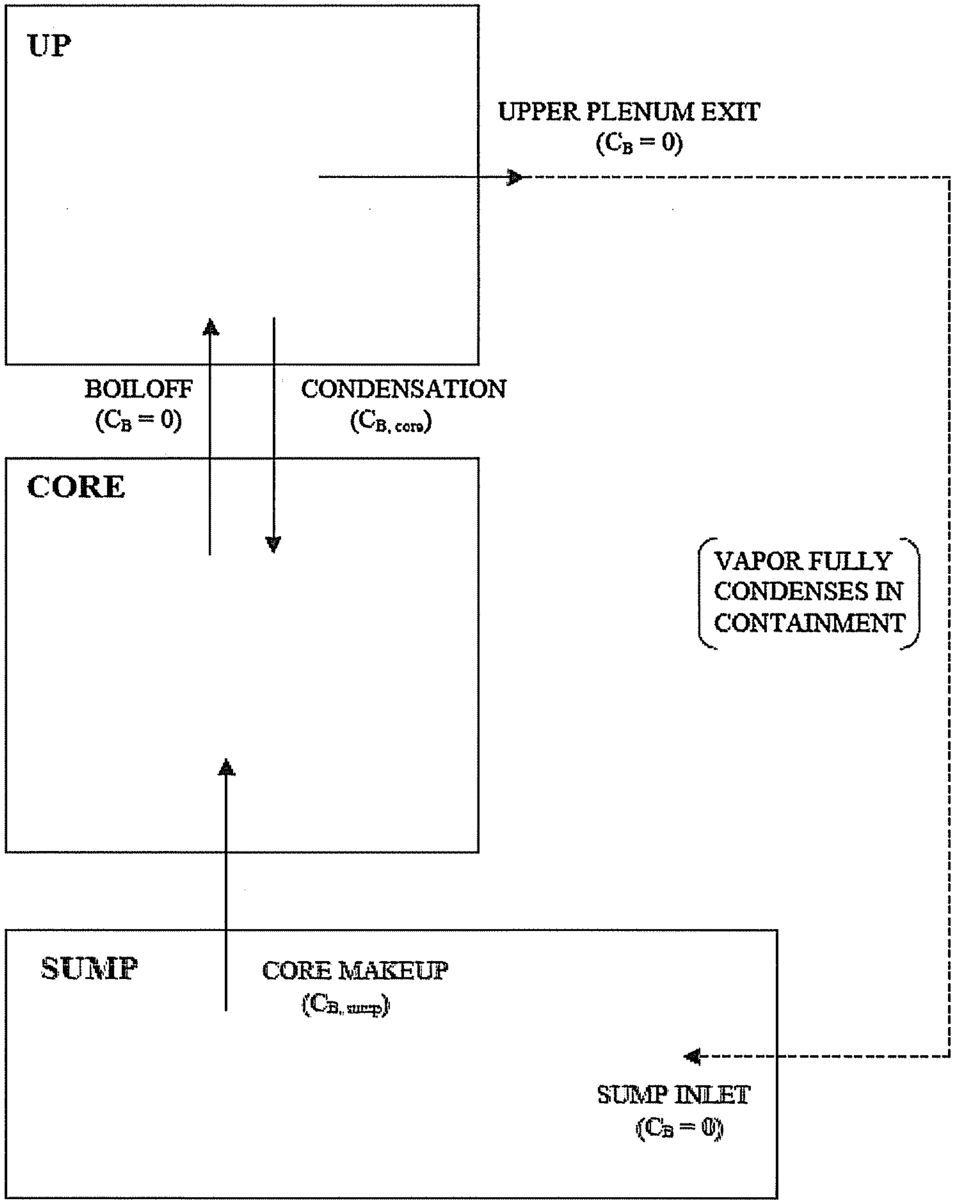

FIGURE 2: Boron Calculations in SKBOR

WEP_MINSI
Jan/20/2011 16:48:22
GOTHIC Version 7.2a(QA) - January 2006
File: /data/wrightjj/PTB_EPU/QA/WEP_MINSI

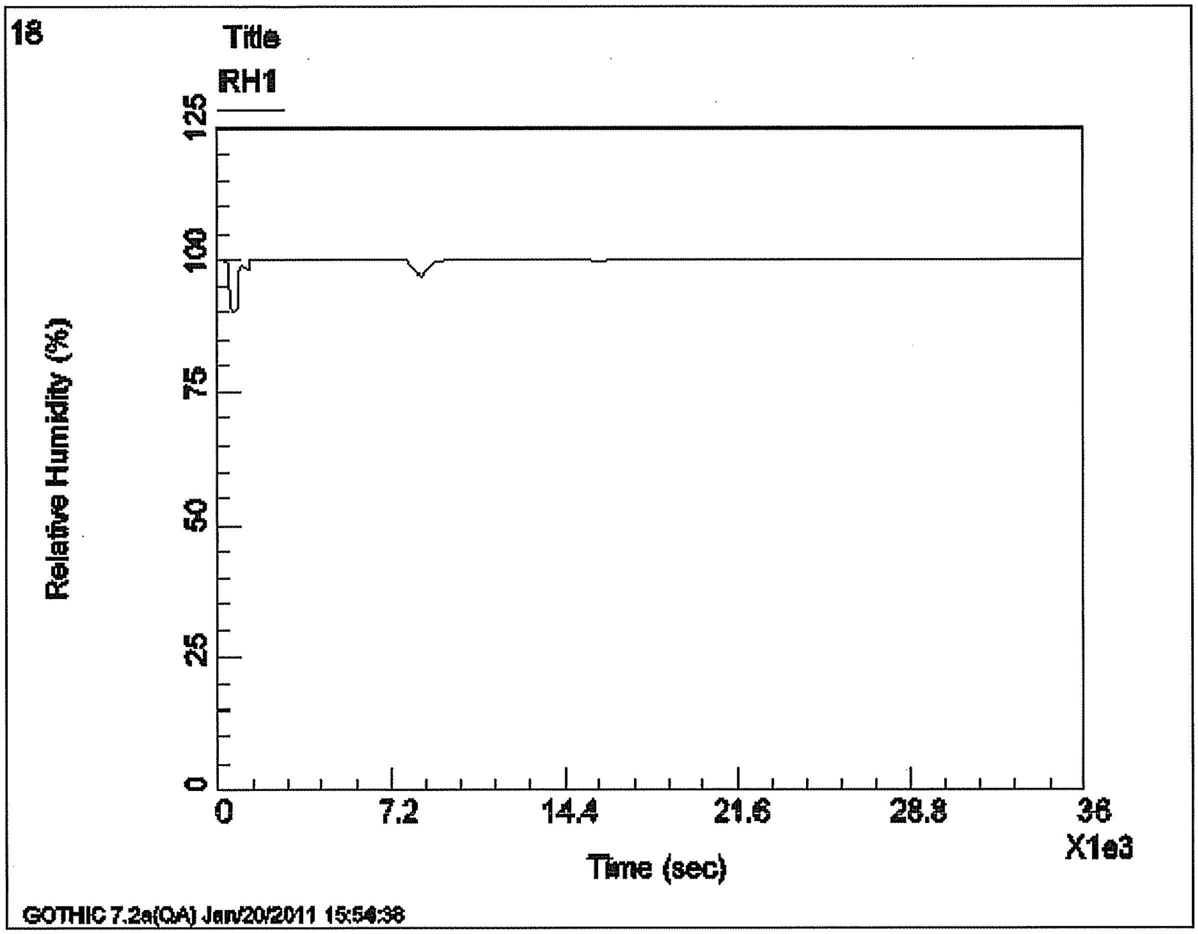

FIGURE 3: PBNP EPU LOCA Containment Analysis – Relative Humidity

WEP_MINSI
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GOTHIC Version 7.2a(QA) - January 2006
File: /data/wrightjj/PTB_EPU/QA/WEP_MINSI

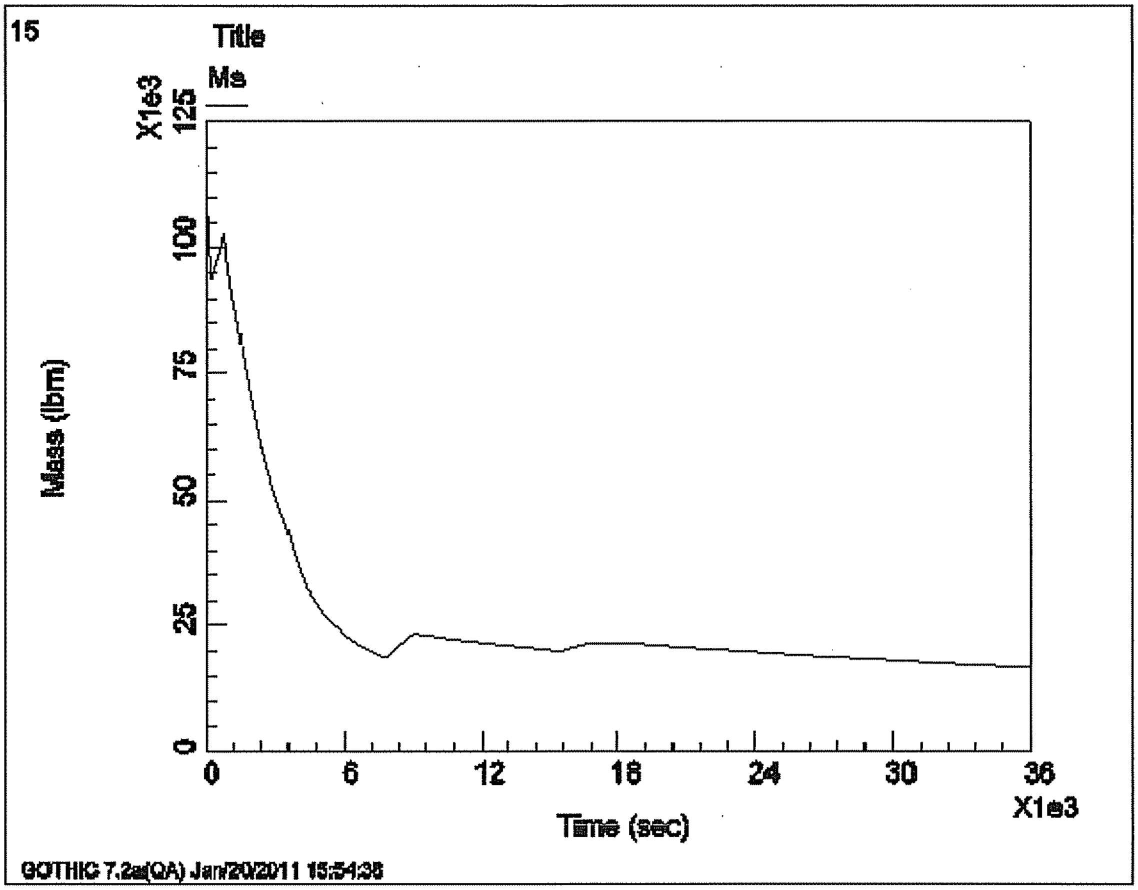

FIGURE 4: PBNP EPU LOCA Containment Analysis – Containment Steam Mass

Clarification Request 2

Please also list all of the major conservatisms and margins inherent in the methods utilized to determine the boric acid build-up in the vessel and the timing for precipitation.

NextEra Response

Listed below are the conservatisms inherent in the methods utilized to determine the boric acid build-up in the vessel and the timing for precipitation. They are broken up into two categories; methodology conservatisms and analysis assumption conservatisms.

Methodology Conservatisms

Containment Pressure: The solubility limit used to determine an appropriate hot leg switchover time (i.e. simultaneous injection) is based upon the saturation temperature of boric acid at atmospheric pressure conditions (29.27 w/o). Figure 2.8.5.6.3-12 and Table 2.8.5.6.3-12 of LAR 261 (Reference 4) capture the effect of the increase in the solubility limit of boric acid at the saturation temperature at increased pressures. The solubility limit increases with increased pressure. The analysis takes no credit for any pressure above atmospheric conditions when determining the solubility limit of boric acid.

Containment Sump Buffering Agents: It has been experimentally shown that sump buffering agents increase the solubility of boric acid. Unit 1 and Unit 2 utilize sodium hydroxide that is injected into the sump via the containment spray system. No credit is taken for the increase in the boric acid solubility limit due to the presence of the sump buffering agents.

Subcooling: The coolant that enters the core during the recirculation phase would be at a temperature below that of the saturation temperature at atmospheric conditions due to cooling in the residual heat removal system heat exchanger. No credit is taken for this subcooling of the coolant that enters the inner vessel region. Credit for subcooling would decrease the amount of boil-off for a given decay heat and slow down the concentration of boric acid.

Entrainment: Early in the recirculation phase there are high levels of entrainment that exist and would provide a means of transport of boric acid out of the inner vessel region. Due to Unit 1 and Unit 2 being an upper plenum injection (UPI) design, a hot leg break is the limiting scenario for boric acid precipitation. Early in the recirculation phase, there would still be significant entrainment out of the break. The concentration of boric acid in this entrained fluid is conservatively set to zero and no credit is taken for the phenomenon in the analysis.

Analysis Assumption Conservatisms

Source Boron Concentrations: Source boron concentrations for the contributors to the containment sump (RWST, accumulators, RCS, etc.) are conservatively maximized. Margin would be gained if surveillance data was used to determine as-operated boron concentrations of the contributors to the containment sump.

Source Mass: Source masses are conservatively maximized for boron sources and conservatively minimized for dilution sources when determining the masses of the contributors to the sump. Margin would be gained if as-operated source masses were to be used in the analysis.

Appendix K Decay Heat: The decay heat used to determine boil-off is 1971 ANS + 20% for infinite operation. This increase in the boil-off due to the conservative nature of the decay heat utilized increases the rate of concentration of boric acid in the core region and the solubility limit is reached much sooner than if a realistic decay heat model or reduced uncertainty (i.e., 10% beyond 1000 seconds) were to be used.

Clarification Request 3

Please also describe the interfacial drag correlation used in the WCOBRA/TRAC code to determine the vapor content in the inner vessel, which determines the liquid content and mixing volume for establishing the timing for precipitation.

What is the vapor velocity in the core at 14.7 psia at the time of precipitation?

NextEra Response

The interfacial drag correlations modeled in the WCOBRA/TRAC code version used in the simulation to support the boric acid precipitation calculation have most recently been described in Section 4-4 of WCAP-16009-P-A, "Realistic Large Break LOCA Evaluation Methodology Using Automated Statistical Treatment of Uncertainty Method (ASTRUM)." Section 4-4 of WCAP-16009-P-A provides the model basis, a description of the model as coded and scaling considerations for each interfacial drag model in WCOBRA/TRAC.

At the nominal interfacial drag setting, WCOBRA/TRAC has been shown to over-predict level swell in the core compared to near atmospheric pressure boil-off tests performed in the Westinghouse G1 and G2 test facilities (Paper 4215 of Proceedings of the International Congress on Advances in Nuclear Power Plants (ICAPP '04), June 13-17, 2004, "Simulation of Westinghouse G1 and G2 Low Pressure Boil-Off Experiments Using WCOBRA/TRAC)." For the purpose of calculating liquid mass present in the inner vessel, the over-prediction of level swell is conservative since the additional level swell will tend to reduce the total liquid volume in the core, and will also tend to push fluid towards the hot leg break.

The axial vapor velocity in the core predicted by WCOBRA/TRAC around 2 hours after the break oscillates near 15 ft/sec at mid-core and 35 ft/sec at core exit at 14.7 psia.

References

(1) NextEra Energy Point Beach, LLC letter to NRC, dated December 10, 2010, License Amendment Request 261, Extended Power Uprate, Response to Request for Additional Information (ML103440557)

(2) NextEra Energy Point Beach, LLC letter to NRC, dated January 7, 2011, License Amendment Request 261, Extended Power Uprate, Response to Request for Clarification (ML110100255)

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(4) FPL Energy Point Beach, LLC letter to NRC, dated April 7, 2009, License Amendment Request 261, Extended Power Uprate (ML091250564)