Florida Power & Light, 9760 S.W. 344 ST. Florida City, FL 33034

FPL.

MAY 18 2011

L-2011-100
10 CFR 50.90

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555-0001

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Response to NRC Request for Additional Information Regarding
Extended Power Uprate License Amendment Request No. 205 and Nuclear
Performance and Code Review Issues

References:

(1) M. Kiley (FPL) to U.S. Nuclear Regulatory Commission (L-2010-113), "License Amendment Request No. 205: Extended Power Uprate (EPU)," (TAC Nos. ME4907 and ME4908), Accession No. ML103560169, October 21, 2010.

(2) Email from J. Paige (NRC) to T. Abbatiello (FPL), "FINAL: Turkey Point EPU – Nuclear Performance and Code Review (SNPB) Request for Additional Information - Round 1," Accession No. ML111020120, April 11, 2011.

By letter L-2010-113 dated October 21, 2010 [Reference 1], Florida Power and Light Company (FPL) requested to amend Renewed Facility Operating Licenses DPR-31 and DPR-41 and revise the Turkey Point Units 3 and 4 Technical Specifications (TS). The proposed amendment will increase each unit's licensed core power level from 2300 megawatts thermal (MWt) to 2644 MWt and revise the Renewed Facility Operating Licenses and TS to support operation at this increased core thermal power level. This represents an approximate increase of 15% and is therefore considered an extended power uprate (EPU).

By email from the U.S. Nuclear Regulatory Commission (NRC) Project Manager (PM) dated April 11, 2011 [Reference 2], additional information regarding Nuclear Performance and Code Review issues was requested by the NRC staff in the Nuclear Performance and Code Review Branch (SNPB) to support their review of the EPU License Amendment Request (LAR). The Request for Additional Information (RAI) consisted of seven questions regarding nuclear design models and methods supporting reload strategies. The RAI questions and the FPL responses are documented in the Attachment 1 (non-proprietary) and Attachment 2 (proprietary) to this letter.

Attachment 2 contains information proprietary to Westinghouse Electric Company, LLC (Westinghouse). An affidavit signed by Westinghouse, as owner of the information, sets forth the basis for which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of §2.390 of the Commission's' regulations. Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR 2.390 of the Commission's regulations. Attachment 1 contains a non-proprietary version of the RAI responses.

Correspondence with respect to the copyright or proprietary aspects of items in response to RAI

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questions 1.2, 1.3, 1.4 and 1.5 in Attachment 2 of this letter or the supporting Westinghouse affidavit should reference CAW-11-3155 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance and Plant Licensing, Westinghouse Electric Company LLC, Suite 428, 1000 Westinghouse Drive, Cranberry Township, PA 16066.

In accordance with 10 CFR 50.91(b)(1), a copy of this letter is being forwarded to the State Designee of Florida.

This submittal does not alter the significant hazards consideration or environmental assessment previously submitted by FPL letter L-2010-113 [Reference 1].

This submittal contains no new commitments and no revisions to existing commitments.

Should you have any questions regarding this submittal, please contact Mr. Robert J. Tomonto, Licensing Manager, at (305) 246-7327.

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

Executed on May 18, 2011.

Very truly yours,

Michael Kiley
Site Vice President
Turkey Point Nuclear Plant

Attachment

cc: USNRC Regional Administrator, Region II
USNRC Project Manager, Turkey Point Nuclear Plant
USNRC Resident Inspector, Turkey Point Nuclear Plant
Mr. W. A. Passetti, Florida Department of Health

Turkey Point Units 3 and 4

RESPONSE TO NRC RAI REGARDING EPU LAR NO. 205
AND NUCLEAR PERFORMANCE AND CODE REVIEW

Non-Proprietary Responses

ATTACHMENT 1

Response to Request for Additional Information

The following information is provided by Florida Power and Light Company (FPL) in response to the U. S. Nuclear Regulatory Commission's (NRC) Request for Additional Information (RAI). This information was requested to support License Amendment Request (LAR) No. 205, Extended Power Uprate (EPU), for Turkey Point Nuclear Plant (PTN) Units 3 and 4 that was submitted to the NRC by FPL letter L-2010-113 on October 21, 2010 [Reference 1].

In an email dated April 11, 2011 [Reference 2], the NRC staff requested additional information regarding FPL's request to implement the EPU. The RAI consisted of seven questions from the NRC Nuclear Performance and Code Review (SNPB) branch regarding the EPU nuclear fuel, fuel design and reload methodology. The RAI questions and non-proprietary FPL responses are documented in this attachment].

Responses containing information which is proprietary to Westinghouse Electric Company LLC (Westinghouse) that is being requested to be withheld from public disclosure are provided in Attachment 2. Attachment 3 contains the affidavit signed by Westinghouse, as the owner of the information, setting forth the basis for which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations considered in paragraph (b)(4) of § 2.390 of the Commission's regulations.

Nuclear Design

SNPB-1.1 **Provide qualitative and quantitative technical basis as to why the nuclear design models and methods referenced in the Westinghouse reload methodology (WCAP-9272-P-A) are applicable to the modern fuel designs that will be loaded under EPU conditions. In particular, discuss the capability of the methods to address increased fuel enrichment limits and the capability of computer codes to make use of the latest cross-section libraries and fission product distributions. Provide this information, as applicable, for each computer code used in the reload methodology that is associated with the nuclear design.**

The nuclear design code package referenced in WCAP-9272-P-A has since been updated to the improved nuclear design methodology of the PHOENIX-P/ANC nuclear design system and has been used for the Turkey Point EPU submittal. The nuclear design codes shown specifically in WCAP-9272 Table 3-1, Analytical Techniques used in Reload Core Calculations, are no longer used in current Westinghouse reload analyses. The Turkey Point EPU Licensing Report references the codes ANC and PHOENIX-P in Licensing Report (LR) Section 2.8.2, Nuclear Design (see References 2 and 3 of LR Section 2.8.2.4). Although the nuclear design analysis utilizes the updated code package, the same reload bounding safety analysis approach specified in WCAP-9272 will be used for Turkey Point EPU reload analysis. All currently applicable computer codes have been separately referenced in support of the Turkey Point EPU and each of these codes have been separately reviewed and approved by the NRC.

Specifically, WCAP-11596-P-A, Qualification of the PHOENIX-P/ANC Nuclear Design System for Pressurized Water Reactor Cores, June 1988 (Proprietary) defines the methodology and computer codes used for the neutronics analysis which includes ANC and PHOENIX-P. The computer codes utilized in WCAP-11596-P-A, also reviewed and approved by the NRC, have been benchmarked against a wide range of data including critical experiments and actual plant operations.

In order to further improve the performance of the PHOENIX-P/ANC nuclear design system, the nuclear data library used with the code system was upgraded from the 42 group, ENDF/B-V based library, to a 70 group, ENDF/B-VI library. Westinghouse issued letter NSD-NRC-97-5026 "Westinghouse ENDF/B-VI-based Library for PHOENIX-P/ANC", March 18, 1997 to inform the NRC of the library upgrade. Before implementing this library into design use, Westinghouse qualified the library through comparisons to industry-recognized standard benchmark data and to reliable plant measured data. A wide range of benchmark data similar to that described in WCAP-11596-P-A was used for this qualification. Plant measurement comparisons included both startup and at-power data for a wide variety of core types, loading patterns, and fuel designs. All codes used in the qualification were controlled in accordance with Westinghouse code configuration procedures.

The PHOENIX-P/ANC nuclear design code package is the primary nuclear code system for nuclear design and safety analyses across the Westinghouse reactor fleet, both domestically and abroad. The system continues to show good performance in currently operating reactors with a broad range of design and operating characteristics. The performance of PHOENIX-P/ANC has remained stable and consistent with that described in WCAP-11596-P-A despite constantly varying design parameters over the years, demonstrating the strength of the methods and the accuracy of the data library. One example of this performance is that the prediction of the BOC HZP critical boron, the most accurate assessment of core reactivity, has improved in both mean and in standard deviation from that reported in the WCAP-11596-P-A. As shown in Table 1.1-1, current plant characteristics where PHOENIX-P/ANC is being utilized bound the Turkey Point EPU conditions. In summary, qualitative and quantitative assessments have demonstrated the PHOENIX-P/ANC nuclear design code package has been qualified and is capable of modeling the Turkey Point units at EPU conditions.

The PHOENIX-P/ANC methodology fundamental solution algorithms and the nuclear data library are based on "first principles" and, as such, can be applied to conditions not bounded by the range of design parameters benchmarked in the topical or in the library qualification. However, the wide range of benchmark data used in the qualification provides confidence in the performance capabilities of the PHOENIX-P/ANC nuclear design system for application to the Turkey Point EPU conditions. Additionally, the code system has been extensively used with good performance for core designs with parameters that bound the range of

parameters presented by the Turkey Point EPU.

Table 1.1-1
Comparison of PHOENIX-P/ANC Application to Currently Operating Plants and Turkey Point EPU

Parameter	PHOENIX-P/ANC Current Application	Turkey Point EPU
^{235}U Enrichments up to:	5%	5%
Nominal Power Level up to:	7 kW/ft	6.7 kW/ft
Reactor Power Levels up to:	3990 MWt	2644 MWt
Plant Operating Temperatures up to:	590°F	583°F
Cross-Section Library:	ENDF/B-VI	ENDF/B-VI
Lattice Design:	Square	Square
Control Rod Material:	Ag-In-Cd	Ag-In-Cd

Fuel System Design

SNPB-1.2 **Section 2.8.1.2.1 Fuel System Design Features: (a) Provide justification for the peak fuel assembly average burnup limit of 62,000 MWD/MTU for the Upgrade fuel assembly design; (b) Provide the description of enhanced intermediate flow mixer (EIFM); (c) Provide the justification that P-Grid will not have the problem of corrosion cracking; and (d) Provide the description of hafnium vessel flux depression (HVFD) absorber rods in the assembly and how they are going to be loaded in the core.**

(a) The length of the 15x15 Upgrade fuel rod was selected to permit a maximum rod average burnup of [ ]^{a,c} MWD/MTU based on the fuel rod growth criteria that the fuel rod will not contact both the top and bottom nozzles. The Upgrade fuel assembly length was selected to permit an assembly maximum average burnup of 62,000 MWD/MTU based on the fuel assembly growth criteria that the fuel assembly hold down spring will not be compressed solid. In operation, the EPU is based on core designs that will use a maximum fuel enrichment of 5.0 weight percent and a maximum fuel rod average burnup of 62,000 MWD/MTU. The fuel rod is limited to a maximum average rod burnup of 62,000 MWD/MTU by the conditions in the approval of modeling codes such as in WCAP-15063-P-A, Revision 1, Westinghouse Improved Performance Analysis and Design Model, (PAD 4.0) July 2000. By definition, the fuel assembly average burnup will be less than the maximum fuel rod burnup in that assembly. Therefore, the design limitation of 62,000 MWD/MTU on fuel rod burnup for any reload core design ensures that the fuel assembly average burnup will not exceed 62,000 MWD/MTU. Thus, the reload design evaluation process ensures that fuel assembly burnup limits are satisfied.

(b) The 15x15 Upgrade IFM grid design was enhanced to increase the contact

area. The dimple contact length was increased by a factor of three, also resulting in an increase to the inner strap height. The dimples on the enhanced IFM are coplanar in every cell to provide better restoring forces if the rods vibrate or attempt to bow. The IFM grid straps for the enhanced IFM will also now be annealed to reduce grid growth. The enhanced IFM has the same symmetrical pattern as is used on the I-spring mid-grid. These straps incorporate the anti-snag vane and tab design to decrease the potential of adverse assembly interactions. The term "enhanced" specifically applies to the contact area which significantly improves the fuel rod wear margin.

(c) A recent industry issue associated with the Protective Grid (P-grid) design has been identified involving grid dimple separation, due primarily to primary water stress corrosion cracking (PWSCC), which has resulted in some fuel failures in plants with the 17x17 fuel design. These loose fragments from the P-grid pose a slight increase in the risk of fuel rod debris fretting failures. To date the known fuel failures due to this P-grid issue has been limited to a few rods in the 17x17 fuel design. Although there has been evidence of ligament cracking, there has been no evidence of dimple separation for the P-grid of the 15x15 fuel design employed at the Turkey Point units.

As a result of the dimple separation, an interim compensatory measure was developed by the fuel vendor to help mitigate dimple detachment by using a "pinning" process during heat treatment of the P-grid in the manufacturing process. The pinned P-grid is being used on Turkey Point Units 3 & 4 as an Intermediate Compensatory Measure (ICM) until the new 15x15 Robust Protective Grid (RPG) is developed (Fall 2012 and beyond deliveries). The pinned P-grid has helped to mitigate the corrosion cracking issue observed on several of the plants with the 17x17 fuel array.

The pinning process consists of placing an Alloy 718 ("Inconel") pin of the appropriate size in each fuel rod cell prior to the combined anneal and age hardening process. The pinning process uses tooling that has been developed to optimize the alignment. This action opens the tighter grid cells in order to reduce the stresses, but also maintains the forces required for rod support. This process has been shown to achieve stress reductions of approximately 50 percent thereby adding additional margin to the existing P-grid designs.

Additionally, the 15x15 Upgrade Fuel design implemented at the Turkey Point units has zirconium dioxide (ZrO_2) coated cladding on lower portions of the fuel rod to increase debris fretting resistance. The combination of the ICM pinning process and ZrO_2 coating has been successful in reducing the risk of fuel failure due to the P-Grid corrosion cracking issue.

Finally, it is important to note that the implementation of the RPG design will further improve the performance of the protective grid design by providing additional design margin that significantly reduces grid strap vibration as well as reducing the dimple stresses, thereby further reducing the likelihood of cracking.

(d) The HVFD absorbers have been removed from the Turkey Point units in previous cycles and there is no plan to load them back into the cores in the future.

SNPB-1.3 **Section 2.8.1.2.3 Seismic/LOCA: (a) Justify that the structural loading methodologies including the WEGAP code are applicable for the Upgrade fuel assembly design of 15x15 array; (b) Describe of the two limiting mixed cores of DRFA and Upgrade fuel assemblies; (c) Elaborate how the leak-before–break methodology is used for the reactor coolant loop piping, (d)Provide details how the maximum structural loads occurs at the outer three assembly rows on the core periphery for the Upgrade fuel at non-RCCA locations; and (e) Provide details how the maximum fuel assembly deflection occurs in an assembly row consisting of 9, 11, 13, and 15 fuel assemblies in the Z-direction during a LOCA ACC loading.**

(a) The seismic/LOCA methodology as modeled by the WEGAP computer code, is based on modeling the fuel assembly as a simplified beam model, which is a system of discrete masses and linear spring-viscous damper elements, representative of the specific fuel being modeled. The fuel assembly grids act as nodes for the beam model of the fuel assembly. The mechanical constants for the simplified fuel assembly model, including spring stiffness and damping coefficient, were based on the fuel assembly mass distribution, natural frequencies, mode shapes, and the orthogonality relationship among the vibration modes, as determined via computer analysis and based on actual testing of the vibrational characteristics of the fuel assembly in question. All Westinghouse fuel designs, whether it is a 17x17 array fuel assembly or a 15x15 array fuel assembly, consist of fuel rods and structural support grids. Thus, it is possible to model any of the different Westinghouse fuel designs as a simplified beam model composed of discrete masses and linear spring-viscous damper elements. The number of fuel rods within a given fuel array does not change the basic beam model, but merely changes the mechanical constants for that specific model. Thus, any fuel array, that is, 15x15, 17x17 or otherwise, can be modeled in the WEGAP computer code provided that the fuel assembly consists of a number of fuel rods held together in the axial direction by a number of structural grids. The above discussion also holds true for the modeling of the fuel assemblies in the ANSYS computer code model of the reactor vessel which is used to generate the core plate motions to be used for the WEGAP computer code for the purposes of determining the grid impact forces and deflections for the Seismic/LOCA events (see LR Section 2.2.3, Reactor Pressure Vessel Internals and Core Supports).

(b) Mixed core conditions have been evaluated many times in the past and it has been determined that the most limiting cases are those in which one type of the fuel assembly design is located at the periphery (baffle location) and other fuel assembly design occupies all the in-board locations, as shown by the examples in

Figures 1.3-1 and 1.3-2 below. For the Turkey Point EPU, the mixed core conditions evaluated included conditions in which the 15x15 Upgrade fuel is located at the periphery (baffle location) with the 15x15 Debris Resistant Fuel Assembly (DRFA) fuel occupying the in-board conditions (see Figure 1.3-1), as well as conditions in which the 15x15 DRFA fuel is located at the periphery (baffle location) with the 15x15 Upgrade fuel occupying all the in-board locations (see Figure 1.3-2). Although only two row types are shown, all 6 row types were analyzed, that is, 3 FA row, 7 FA row, 9 FA row, 11 FA row, 13 FA row and the 15 FA row.

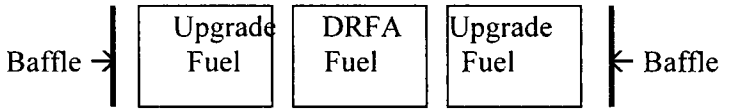

Figure 1.3-1: Mixed Core Fuel Assembly Arrangement (Example: 3 FA Row – Upgrade Fuel at Baffle)

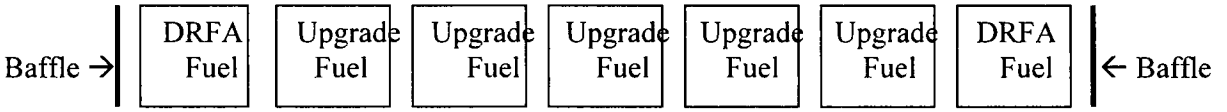

Figure 1.3-2: Mixed Core Fuel Assembly Arrangement (Example: 7 FA Row – DRFA Fuel at Baffle)

The most limiting configuration for the mixed core for both Turkey Point Unit 3 and 4 is the 3 FA Row. The limiting configurations evaluated both the arrangement in which the Upgrade fuel assemblies are at the baffle location (see Figure 1.3-1) and the arrangement in which the DRFA fuel assemblies are at the baffle location (see Figure 1.3-2) as both of these arrangements result in grid crush for the assemblies at the baffle location, as shown by Table 1.3-1 below. The reasons why the 3 FA row is limiting include the facts that the 3 FA row has the smallest accumulated gap when compared to the other rows and that there are fewer fuel assemblies to dissipate the energy/motion produced by the Seismic/LOCA forcing function compared to rows with more fuel assemblies.

Table 1.3-1
Turkey Point Unit 3 and 4 – Maximum Mixed Core Square Root Sum of Squares (SRSS) Grid Impact Forces
(SRSS of Maximum SSE-Z and Maximum LOCA ACC, Z Direction)

a,c

[redacted]

(c) There is no change to the licensing basis for leak-before-break with the EPU. Turkey Point is approved for leak-before-break (LBB) on the main reactor coolant loop (RCL), and this is credited in the structural analyses, including fuel. The largest branch line breaks, either the accumulator line break, surge line break, or RHR line break (depending on the analysis), are considered when generating LOCA hydraulic forcing functions used as input to these analyses.

As described in Licensing Report Section 2.1.6, Leak-Before-Break, evaluations were performed to demonstrate that the elimination of breaks in the reactor coolant system primary loop piping from the structural design basis continues to be valid following implementation of EPU. The design loadings, operating pressure and temperature parameters used in this evaluation bound the EPU conditions. The same acceptance criteria as used in the current licensing basis were applied to this evaluation. The evaluation results demonstrated that the LBB acceptance criteria for the primary loop piping continue to be satisfied under EPU conditions. It was therefore concluded that the dynamic effects of primary loop pipe breaks need not be considered in the structural design basis at EPU conditions. The largest branch line breaks considered in the current design basis, therefore, are the same breaks considered for EPU. Credit for utilizing smaller break size assumptions for the LOCA Forces was not pursued.

(d) Table 1.3-1 presented the limiting maximum loads for each of the core rows, that is, 3 FA row, 7 FA row, 9 FA row, 11 FA row, 13 FA row and 15 FA row.

This table shows that the "3 FA row" is more limiting than the other rows within the core and that some amount of grid crush is predicted. As shown by Figure 1.3-3, the grid crush was evaluated for both the "X" and "Z" lateral directions. Also, as shown by Figure 1.3-3, there are no Rod Control Cluster Assemblies (RCCAs) in the 3 FA row (control rod locations are indicated by the "A", "B", "C" and "D" core locations, shutdown banks are indicated by the "SA" and "SB" core locations). It is also important to note that the analysis conservatively assumes that the RCCAs are full withdrawn and not inserted into any of the fuel assemblies. The presence of RCCAs in the fuel assemblies would tend to dampen the effects of the LOCA and/or seismic event, although this is a very small effect.

The grid crush limit for the 15x15 DRFA fuel is [ ] [a,c] lbs and the grid crush limit for the 15x15 Upgrade fuel is [ ] [a,c] lbs. As shown by the results in the above table, it is only the 3 FA rows which exceed these limits. It is acceptable to be above the grid crush limit provided that it can be demonstrated that RCCA insertability and a coolable geometry are maintained. As discussed in LR Section 2.8.1, Fuel System Design, RCCA insertability is not a concern and a coolable geometry is maintained with the grid crush experienced by the fuel assemblies in the 3 FA row locations. The 3 FA row locations do not have RCCAs so that insertability is not a concern. Because the assemblies on the 3 FA locations are the only assemblies to experience grid crushing and they reside on the core periphery, it is concluded that additional analyses are not warranted and no Peak Clad Temperature (PCT) penalty is required. This conclusion is based on the fact that the peripheral assemblies are in low power locations and based on the observation that any flow redistribution which may occur due to crushed grids in these locations would tend to benefit the in-board assemblies, which are more limiting with respect to the PCT. In addition, long term core cooling is ensured as the decay heat levels in these peripheral locations are relatively low when compared to the in-board assemblies.

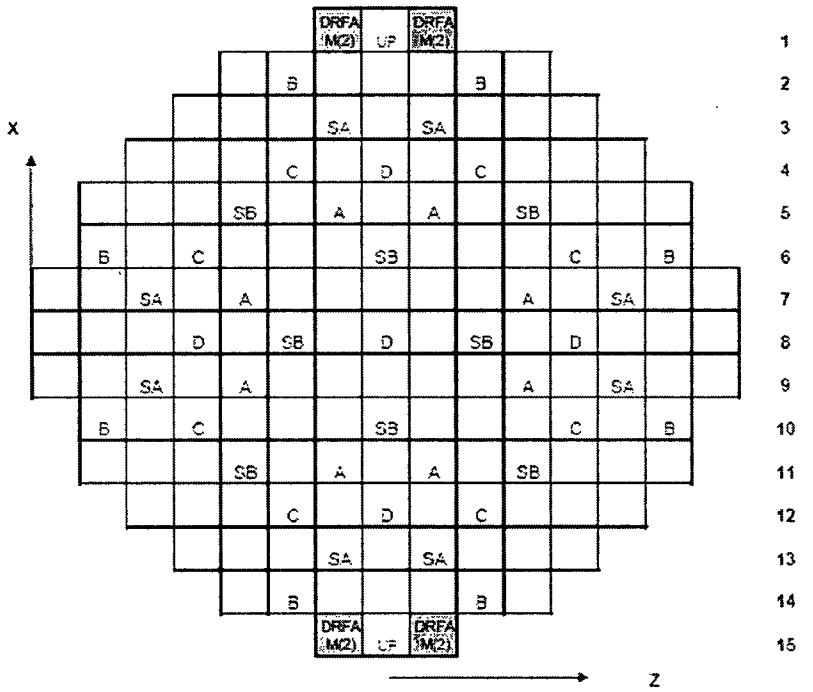

Figure 1.3-3 Core Directions used in the Seismic/LOCA Analysis (Example: Mixed Core of 15x15 Upgrade Fuel and 15x15 DRFA Fuel

(e) The "X" and "Z" directions are defined as shown by Figure 1.3-3. The basis for why one direction may be more limiting than another is primarily the result of the location of the LOCA break relative to the fuel assemblies in the core. An examination of the core plate motions for both the "X" and "Z" directions shows that the core plate motions in the "Z" direction are significantly greater than for the "X" direction, thus, the more limiting results for the maximum fuel assembly deflection is in the "Z" direction for the different fuel assembly rows, that is, 9, 11, 13 and 15 FA rows. Table 1.3-2 presents the results for the different fuel rows for the "Z" direction during a LOCA due to accumulator line break in the cold leg (ACC) loading.

Table 1.3-2
Turkey Point Unit 3 and 4 – Maximum Grid Deflection
(LOCA-ACC Loading Z Direction)

a,c

( )

SNPB-1.4 Provide analyses of rod internal pressure, corrosion, and fuel melting for an Upgrade fuel rod at EPU limiting conditions. The rod power histories should take into account of all applicable transients.

Analysis of rod internal pressure, corrosion, and fuel melting was performed for several core designs at the EPU limiting conditions covering a range of rod power histories and for Condition I axial xenon oscillations and Condition II overpower transients. The limiting results for an Upgrade fuel rod from this analysis are summarized below.

The maximum calculated upper bound rod internal pressure for Turkey Point Upgrade fuel at EPU limiting conditions is [ ]^{a,c}, which is below the system pressure of 2,250 psi. Therefore, no gap reopening can occur due to the differential between rod internal pressure and system pressure. Both Condition I operations and Condition II events are considered in all rod internal pressure calculations, and the most limiting of these are used in calculating the end-of-life internal pressure. Cycle-specific consolidated rod power histories, which bound

all individual rod power histories, were utilized in all rod internal pressure calculations.

With respect to corrosion, the maximum calculated clad metal-oxide interface temperatures during steady-state, [ ]^{a,c}, and transient operation, [ ]^{a,c}, are below the design limits of [ ]^{a,c} and [ ]^{a,c}, respectively. Additionally, the best-estimate hydrogen pickup in the cladding does not exceed [ ]^{a,c} on a volume-average basis at end-of-life. For the Turkey Point EPU, the [ ]^{a,c} hydrogen concentration [ ]^{a,c} is [ ]^{a,c}. Cycle-average rod power histories were used to evaluate clad corrosion, and both Condition I operations and Condition II events were modeled.

The melting temperature of uranium dioxide (UO_2) is 5080 °F in the unirradiated condition and decreases 58 °F per 10,000 MWD/MTU fuel burnup. A fuel centerline temperature design value of [ ]^{a,c} is used as the limiting temperature to preclude fuel melt for Turkey Point at the EPU limiting conditions. The power-to-melt limit to reach this fuel centerline temperature is 22.72 kW/ft for the Turkey Point EPU Upgrade fuel when considering Condition I operations and Condition II events. This power-to-melt limit was calculated by conservatively depleting the fuel rod as a function of burnup using a power history that bounds the conditions seen by the fuel over its lifetime. The maximum calculated local linear power is [ ]^{a,c} during a Condition II transient event, which is below the 22.72 kW/ft, fuel melting criterion for the Turkey Point EPU.

Thermal and Hydraulic Design

SNPB-1.5 With regards to Table 2.8.3-5, Note 6, provide a qualitative and quantitative description of the transition core penalty methodology. How is the penalty determined?

Transition core DNBR penalties are calculated according to the NRC-approved methodology documented in WCAP-11837-P-A, "Extension of Methodology for Calculating Transition Core DNBR Penalties," January 1990. In the lower grid spans, there is localized flow redistribution away from the DRFA fuel because the DRFA mixing vane grid loss coefficients are greater than the mixing vane grid loss coefficients in the Upgrade fuel assembly. In the upper spans, there is localized flow redistribution away from the Upgrade fuel due to the added IFM grids between the mixing vane grids in the Upgrade fuel assemblies. Therefore, transition core penalties are calculated and applied to both fuel types. The penalties are calculated as a function of the number of each type of fuel assembly in the core, as approved by the NRC in WCAP-11837-P-A. A cycle-specific penalty will be calculated for each fuel type during reload safety analyses based on the actual core loading utilizing Equations 1.5-1 to 1.5-3. The penalty equations are plotted and shown in Figures 1.5-1 and 1.5-2 below. The WRB-1 transition core penalty is applied to the entire fuel length regardless of where the minimum DNBR occurs. The ABB-NV correlation is only utilized for the fuel

below the first grid. The methodology described in WCAP-11837-P-A calculated a [ ]^{a,c} value for the Transition core DNBR penalty for Upgrade fuel when using the ABB-NV correlation.

DRFA Fuel Transition Penalty for WRB-1
[ ]^{a,c} 1.5-1
Uncertainty of [ ]^{a,c} was included.

Upgrade Fuel Transition Penalty for WRB-1
[ ]^{a,c} 1.5-2
Uncertainty of [ ]^{a,c} was included.

DRFA Fuel Transition Penalty for ABB-NV
[ ]^{a,c} 1.5-3
Uncertainty of [ ]^{a,c} was included.

Upgrade Fuel Transition Penalty for ABB-NV
[ ]^{a,c}

Where:
y = DNBR Penalty (Fraction) including uncertainty.
x = Fraction of DRFA fuel in the core
DNBR Penalty (%) = y *100%

a,c

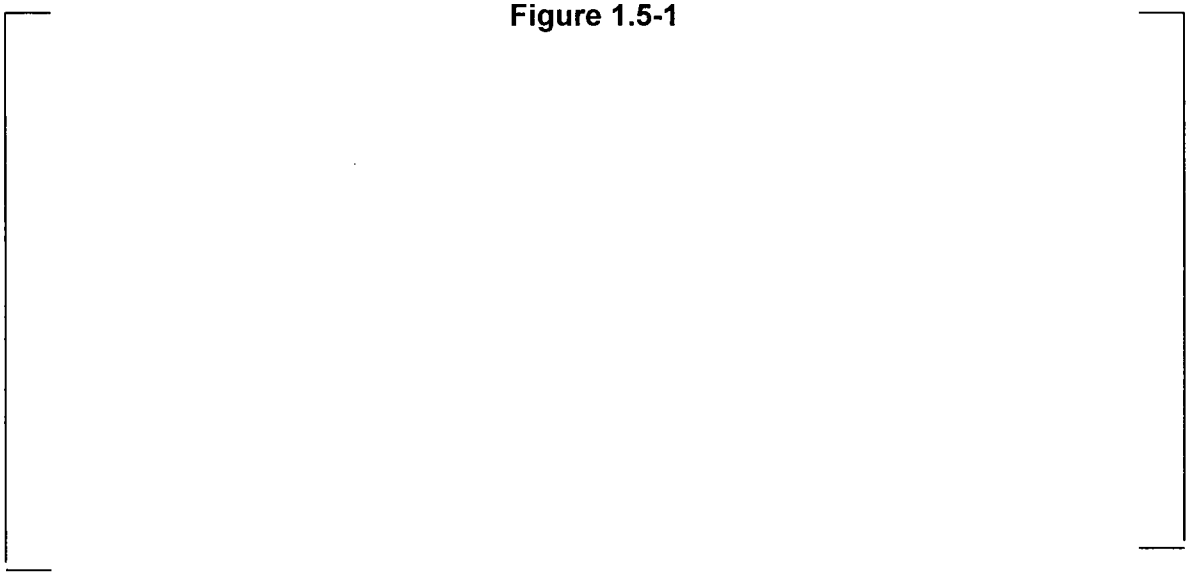

Figure 1.5-1

a,c

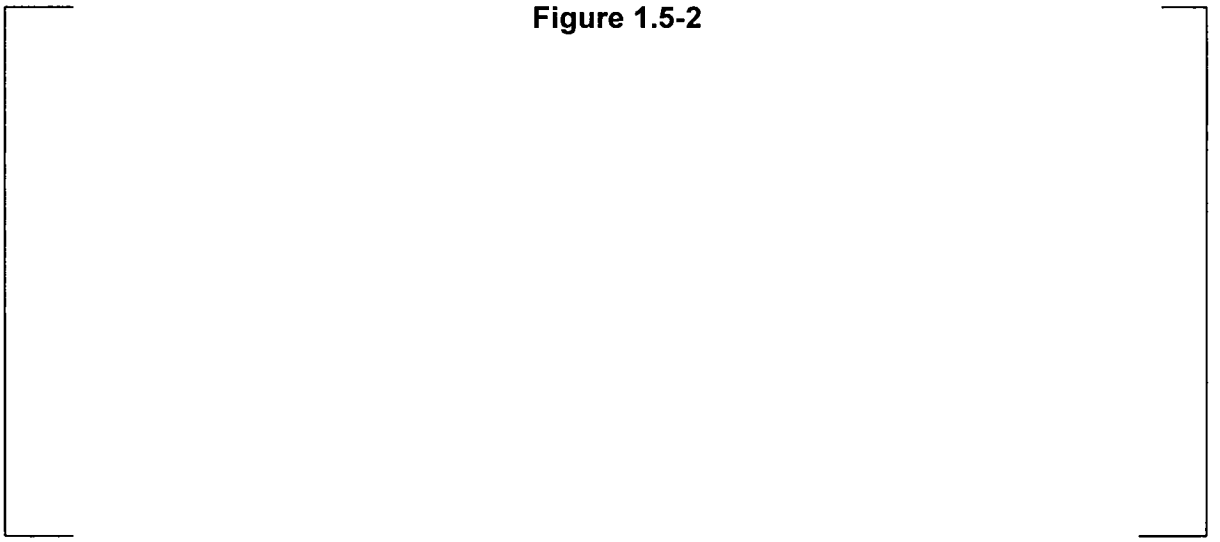

Figure 1.5-2

SNPB-1.6 **In section 2.8.3.2.3.8, "Effects of Fuel Rod Bow on DNBR," supply a reference supporting the statement that in spans containing IFM grids in the**

Upgrade fuel, no rod bow penalty is necessary due to the short spacing between grids.

Reference 1.6-1 describes the effect of the presence of IFM grids on the rod bow DNB penalty. In the upper spans of the 15x15 Upgrade fuel assemblies, additional restraint is provided with the IFM grids such that the grid-to-grid spacing in those spans with IFM grids is shorter. Using the NRC-approved scaling factor from Reference 1.6-2 results in a predicted channel closure of less than 50 percent in these spans. A closure of less than 50 percent requires no rod bow DNB penalty. Therefore, due to the reduction in span length, no rod bow DNB penalty is applied in the IFM spans.

Reference 1.6-1: WCAP-10444-P-A, "Reference Core Report Vantage 5 Fuel Assembly," September 1985.

Reference 1.6-2: WCAP-8691, Revision 1, "Fuel Rod Bow Evaluation," July 1979.

SNPB-1.7 **In conjunction with section 2.8.3.2.5, "Results," and Table 2.8.3-5, provide an additional table showing the departure from nucleate boiling (DNB) Margin/Penalty Summary for those analyses that utilize the standard thermal design procedure (STDP). Indicate the CHF/DNB correlation that was used, the correlation limit, and the DNBR limit. For the case of Rod Withdrawal from Subcritical, indicate these values for below the first mixing vane grid and for a typical grid span.**

Table 2.8.5.0-1 in the licensing report provides the results for the accidents analyzed for DNB using Standard Thermal Design Procedures. For the EPU, only two transients were evaluated using STDP: Uncontrolled Rod Withdrawal from Subcritical (Item 14.1.1) and Hot Zero Power Steamline Break (Item 14.2.5). The table presents the DNB correlation that was used, the correlation limit, and the minimum DNBR predicted using STDP (referred to as non-RTDP) for these two transients. Item 14.1.1 presents for the Uncontrolled Rod Withdrawal the values below the first mixing vane grid as well as the minimum DNBR for fuel above the first mixing vane grid.

References

1. M. Kiley (FPL) to U.S. Nuclear Regulatory Commission (L-2010-113), "License Amendment Request No. 205: Extended Power Uprate (EPU)," (TAC Nos. ME4907 and ME4908), Accession No. ML103560169, October 21, 2010.
2. Email from J. Paige (NRC) to T. Abbatiello (FPL), "Turkey Point EPU – Nuclear Performance and Code Review (SNPB) - Round 1," April 11, 2011.

Turkey Point Units 3 and 4

RESPONSE TO NRC RAI REGARDING EPU LAR NO. 205
AND NUCLEAR PERFORMANCE AND CODE REVIEW ISSUES

Westinghouse Affidavit for Withholding Proprietary Information from Public Disclosure

ATTACHMENT 3

This coversheet plus 9 pages

Westinghouse Electric Company
Nuclear Services
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Cranberry Township, Pennsylvania 16066
USA

U.S. Nuclear Regulatory Commission
Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Direct tel: (412) 374-4643
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e-mail: greshaja@westinghouse.com
Proj letter: FPL-11-121

CAW-11-3155

May 13, 2011

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: FPL-11-121 P-Attachment, "Turkey Point Units 3 and 4 – Response to NRC Request for Additional Information (RAI) from the Nuclear Performance and Code Review Branch (SNPB) Related to Extended Power Uprate (EPU) License Amendment Request (LAR) No. 205 (TAC Nos. ME 4907 and ME 4908)" (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced report is further identified in Affidavit CAW-11-3155 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by Florida Power and Light.

Correspondence with respect to the proprietary aspects of the application for withholding or the Westinghouse affidavit should reference this letter, CAW-11-3155, and should be addressed to J. A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company LLC, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

Very truly yours,

J. A. Gresham, Manager
Regulatory Compliance

Enclosures

CAW-11-3155

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF BUTLER:

Before me, the undersigned authority, personally appeared J. A. Gresham, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

J. A. Gresham, Manager
Regulatory Compliance

Sworn to and subscribed before me
this 13th day of May 2011

Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Cynthia Olesky, Notary Public
Manor Boro, Westmoreland County
My Commission Expires July 16, 2014
Member, Pennsylvania Association of Notaries

(1) I am Manager, Regulatory Compliance, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse Application for Withholding Proprietary Information from Public Disclosure accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of

Westinghouse's competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390; it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in FPL-11-121 P-Attachment, "Turkey Point Units 3 and 4 – Response to NRC Request for Additional Information (RAI) from the Nuclear Performance and Code Review Branch (SNPB) Related to Extended Power Uprate (EPU) License Amendment Request (LAR) No. 205 (TAC Nos. ME 4907 and ME 4908)" (Proprietary) for submittal to the Commission, being transmitted by Florida Power and Light letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse for use by Turkey Point Units 3 and 4 is expected to be applicable for other licensee submittals in response to certain NRC requirements for Extended Power Uprate submittals and may be used only for that purpose.

This information is part of that which will enable Westinghouse to:

(a) Provide input to the U.S. Nuclear Regulatory Commission for review of the Turkey Point EPU submittals.

(b) Provide results of customer specific calculations.

(c) Provide licensing support for customer submittals.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of the information to its customers for the purpose of meeting NRC requirements for licensing documentation associated with EPU submittals.

(b) Westinghouse can sell support and defense of the technology to its customer in licensing process.

(c) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar information and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

PROPRIETARY INFORMATION NOTICE

Transmitted herewith are proprietary and/or non-proprietary versions of documents furnished to the NRC in connection with requests for generic and/or plant-specific review and approval.

In order to conform to the requirements of 10 CFR 2.390 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the affidavit accompanying this transmittal pursuant to 10 CFR 2.390(b)(1).

COPYRIGHT NOTICE

Florida Power and Light

Letter for Transmittal to the NRC

The following paragraphs should be included in your letter to the NRC:

Enclosed are:

1. __ copies of "Turkey Point Units 3 and 4 – Response to NRC Request for Additional Information (RAI) from the Nuclear Performance and Code Review Branch (SNPB) Related to Extended Power Uprate (EPU) License Amendment Request (LAR) No. 205 (TAC Nos. ME 4907 and ME 4908)" (Proprietary)

2. __ copies of "Turkey Point Units 3 and 4 – Response to NRC Request for Additional Information (RAI) from the Nuclear Performance and Code Review Branch (SNPB) Related to Extended Power Uprate (EPU) License Amendment Request (LAR) No. 205 (TAC Nos. ME 4907 and ME 4908)" (Non-Proprietary)

Also enclosed is the Westinghouse Application for Withholding Proprietary Information from Public Disclosure CAW-11-3155, accompanying Affidavit, Proprietary Information Notice, and Copyright Notice.

As Item 1 contains information proprietary to Westinghouse Electric Company LLC, it is supported by an affidavit signed by Westinghouse, the owner of the information. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of Section 2.390 of the Commission's regulations.

Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR Section 2.390 of the Commission's regulations.

Correspondence with respect to the copyright or proprietary aspects of the items listed above or the supporting Westinghouse affidavit should reference CAW-11-3155 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company LLC, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.