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

Re: Turkey Point Units 3 and 4 Docket Nos. 50-250 and 50-251 Relief Request For Use Of Proposed Alternate Material For The Reactor Vessel Head Adapter Plugs

Westinghouse Nuclear Safety Advisory Letter (NSAL 98-008) notified utilities of a potential material discrepancy for the reactor vessel head adapter plugs. During an investigation of the heat treatment condition of replacement reactor vessel head adapter plugs for another utility, Westinghouse discovered that a number of head adapter plugs were fabricated from ASTM A 276 Type 304 stainless steel bar, rather than from ASTM A 182 Type 304 as specified in the Westinghouse drawings. Florida Power & Light Co. (FPL) has since determined that reactor vessel head adapters made from ASTM A 276 Type 304 stainless steel bar were installed at Turkey Point Units 3 and 4. Six adapter plugs are installed on Unit 3 and 8 head adapter plugs are installed on Unit 4. This material specification was not authorized for use as primary pressure boundary material by the American Society of Mechanical Engineers (ASME) Code, Section III, 1965 edition through Summer 1966 addenda, the design Code for Turkey Point Units 3 and 4.

In accordance with 10 CFR 50.55a(a)(3)(i), FPL requests relief from Section III of the ASME Boiler and Pressure Vessel Code, "Nuclear Vessels," 1965 edition, through Summer 1966 addenda, for Turkey Point Units 3 and 4. The proposed alternative to the ASME Section III code requirement is to use ASTM material A 276 Type 304 for the 14 reactor vessel head adapter plugs that have been installed in Units 3 and 4 since original construction.

The attachment to this letter provides a detailed discussion of the bases for the requested relief. Based on supplementary test and comparison of the material requirements, FPL determined that the material installed is functionally equivalent to the ASTM A 182 Type 304 and therefore, provides an equivalent and acceptable level of quality and safety.

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This relief request is similar to that submitted to the NRC on August 16, 1999, by Wisconsin Electric Power Company for the Point Beach Nuclear Plant, Units 1 and 2.

Should there be any questions concerning this submittal, please contact us.

Very truly yours,

R. J. Hovey

Vice President Turkey Point Plant

OIH

Attachment

cc: Regional Administrator, Region II, USNRC Senior Resident Inspector, USNRC, Turkey Point Plant ATTACHMENT TO L-2000-070

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FLORIDA POWER AND LIGHT

TURKEY POINT UNITS 3 AND 4

RELIEF REQUEST FOR USE OF PROPOSED ALTERNATE MATERIAL FOR THE REACTOR VESSEL HEAD ADAPTER PLUGS

Relief Request

I. Component Identification:

Turkey Point Unit 3 (6 plugs) and Turkey Point Unit 4 (8 plugs), Class 1 reactor pressure vessel, Reactor Vessel Head Penetrations Adapter Plugs (Figure 1)

II. Component Drawing:

Westinghouse Drawing 883D194 (FPL Drawing 5610-M-405-163), Vessel Head Mechanism Housing Adapter Plug

III.Background:

The reactor vessel head adapter plugs are used to provide a Class 1 pressure boundary for control rod drive mechanism vessel head penetrations that are functionally inactive. The head adapter plug is designed and fabricated to the requirements of the American Society of Mechanical Engineers (ASME) Section III Subsection NB. The head adapter plugs are threaded onto spare head penetrations via Acme threads, which maintains the structural pressure boundary. A specially designed canopy seal weld is made to prevent leakage past this mechanical connection. Originally, there were eight head adapter plugs installed on each unit. In 1987, 2 penetrations on Unit 3 were cut and capped below the head adapter plugs due to leakage in the specially designed canopy seal weld. Unit 3 currently has 6 head adapter plugs remaining in service. Unit 4 currently has 8 head adapter plugs in service.

While Westinghouse was investigating the heat treatment condition of the replacement reactor vessel head adapter plugs for another utility, they discovered that a number of head adapter plugs were fabricated from ASTM A 276 Type 304 stainless steel bar, rather than ASTM A 182 Type 304 as was called out in the drawing (Westinghouse drawing 883D194). This material specification was not authorized for use as primary pressure boundary material by ASME Section III, 1965 edition through Summer 1966 addenda. Westinghouse issued a Nuclear Safety Advisory Letter (NSAL 98-008). Florida Power and Light Company (FPL) has since determined that head adapters made from ASTM A 276 Type 304 stainless steel were installed at Turkey Point Units 3 and 4. Based on supplementary tests and comparison of the material requirements, FPL has determined that the material installed is functionally equivalent to the ASTM A 182 Type 304 material and therefore, provides an equivalent and acceptable level of quality and safety. In addition, replacement of the head adapter plugs would result in high personal radiological exposure without an increase in the level of quality and safety.

IV. ASME Code Requirements:

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> The ASME Section III 1965 edition through Summer 1966 addenda, Article N-310 states, "Any pressure-boundary material, or material welded thereto, except as provided in N-518.2, used under the rules of Subsection A shall conform to the requirements of one of the specifications for materials in Tables N-421, N-422, and N-423 and to all the special requirements of Article 3 which apply to the product form in which the material is used."

> Table N-422 lists requirements for material ASTM A 182 Type 304 but does not include the ASTM A 276 Type 304 material.

V. Relief Requested:

The proposed alternative to the ASME Section III code requirement is to use ASTM material A 276 Type 304 for the 14 reactor vessel head adapter plugs that have been installed since original construction. This material is not listed in Tables N-421, N-422, or N-423.

VI. Basis for Relief:

Relief is sought, pursuant to 10CFR50.55a(a)(3)(i), for the proposed alternative which provides an equal and acceptable level of quality and safety.

VII.Justification for Relief:

The head adapter plugs are currently installed (from original construction) on the reactor vessel and constitute part of the reactor vessel pressure boundary. The basis for this requested relief and proposed alternative is as follows:

1) The current material installed (ASTM A 276 Type 304) is considered to be functionally equivalent to the ASME Section III accepted code material of ASTM A 182 Type 304. Comparison studies of the requirements for the type 304 austenitic stainless steel by the two material specifications, A 276 and A 182, indicate that there is essentially no difference in terms of material chemistry and mechanical requirements. It was found that there were two other requirements that are different: a) minimum annealing temperature and b) macro-etch test.

The minimum annealing temperature required for the A 182 forging is 1900°F. Industry recommended practice for the annealing of austenitic stainless steels is from 1850°F to 2050°F. Based on the recommended temperature range there is about a 50°F difference in the minimum annealing temperature between A 276 and A 182 specifications. The difference in minimum annealing temperature can make a difference in grain size, which in turn would impact the mechanical properties of the material. However, this is not considered significant since the comparison of the actual mechanical properties for the Turkey Point material heats show no indication of any difference.

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> The macro-etch required by A 182 specification of the 1965 edition was intended for detecting evidence of laminations, cracks and segregation in case there is any dispute on the soundness of the forging manufactured under the specification. The head adapter plugs had an ultrasonic examination performed on the raw material prior to machining, to determine if any injurious laminations were present that would affect the remaining machined part, and a surface examination (liquid penetrant) after machining. These tests are considered adequate to satisfy the intent of the macroetch test. A review of the fabrication records by Westinghouse confirmed these tests were performed and the results were acceptable.

- 2) Tests were conducted on two spare adapter plugs fabricated from A 276 Type 304 (one was heat #57462, the same heat as that used for the Turkey Point Unit 3 head adapter plugs). The test results included chemical analysis that confirmed the equivalence in composition requirements for A 182 Type 304. The metallography and intergranular corrosion susceptibility evaluation was performed and results did not indicate any adverse microstructures or evidence of intergranular attack. These results indicate that the material is in the proper annealed condition. The A 276 Type 304 adapters meet the tensile requirements for A 182 Type 304. In conclusion, testing and metallographic analysis demonstrates the A 276 Type 304 material is functionally equivalent to A 182 Type 304.
- 3) The connection between the head adapter plug and the spare penetration is made by mechanical threads. A seal weld is made between the head adapter plug and the spare penetration to prevent leakage of water containing boron onto the reactor vessel head. The seal welding does not impact or affect any of the material properties of the pressure-retaining portion of the head adapter plug since it is below the mechanical threaded region.
- 4) Although not a basis for this requested relief, the replacement of the head adapter plugs would result in excessive radiation exposure to plant personnel. A replacement of four part-length control rod drives with head adapter plugs in 1997, on another Westinghouse designed reactor vessel head, using remotely operated tooling resulted in a radiation exposure of 12 rem to personnel performing the job. Therefore, it is estimated that the exposure to replace the spare penetrations are 3 man-rem/adapter plug or a total of 52 man-rem to replace all fourteen head adapter plugs at Turkey Point Units 3 and 4.

Based on the above, the currently installed A 276 Type 304 head adapter plugs are considered functionally equivalent to the A 182 Type 304 material. Therefore the proposed alternate material for the 14 installed head adapter plugs provides an equivalent and acceptable level of quality and safety. Attachment to L-2000-070 Page 4 of 4

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