



DEC 19 2003

L-2003-308  
10 CFR 50.4

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

Re: Turkey Point Unit 4  
Docket No. 50-251  
NRC Order EA-03-009 – Reactor Pressure Vessel Head  
And Vessel Head Penetration Nozzle Inspection Results

NRC Order EA-03-009, issued on February 11, 2003 established interim inspection requirements for reactor pressure vessel heads of pressurized water reactors. Section IV. E. of the NRC Order requires that the results of the inspection be provided within 60 days of the plant being returned to operation. In accordance with section IV. E. of the NRC Order, the attachment to this letter submits the Florida Power and Light Company (FPL) inspection results for Turkey Point Unit 4 for the October 2003 refueling outage.

Based on the results of the reactor pressure vessel head visual examination, reactor pressure vessel head penetration nozzles ultrasonic examinations and leak path assessments (including ECT of the vent), FPL concludes that the alloy 600 reactor pressure vessel head penetration nozzles are not degraded, and no wastage has occurred of the reactor pressure vessel head.

Should there be any questions on this letter, please contact Walter Parker at (305) 246-6632.

Very truly yours,

A handwritten signature in black ink that reads "Terry O. Jones" in a cursive style.

Terry O. Jones  
Vice President  
Turkey Point Nuclear Plant

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Attachment

cc: Regional Administrator, Region II, USNRC  
Senior Resident Inspector, USNRC, Turkey Point

**NRC ORDER EA-03-009: REACTOR PRESSURE VESSEL HEAD AND VESSEL HEAD  
PENETRATION NOZZLE POST OUTAGE INSPECTION RESULTS  
FOR TURKEY POINT UNIT 4**

The NRC issued an Order EA-03-009<sup>1</sup> on February 11, 2003, establishing interim inspection requirements for reactor pressure vessel heads of pressurized water reactors. In section IV.E. of the NRC Order, the NRC required that the results of the inspection be provided within 60 days of the plant being returned to operation. Florida Power and Light Company (FPL) hereby submits the inspection results for Turkey Point Unit 4 (PTN-4) for the October 2003 refueling outage (PTN-4-CYC21).

**Turkey Point Unit 4 October 2003 (PTN-4-CYC21) Post Outage Reactor Vessel Upper Head Inspection Results:**

**1. Plant Susceptibility Category:** The Turkey Point Unit 4 reactor pressure vessel (RPV) closure head had approximately 18.6 effective degradation years (EDY) at the start of the October 2003 refueling outage, as identified in the FPL response to NRC Bulletin 2002-02<sup>2</sup>. The inspection category identified in the Order is High. The corresponding inspection method specified in Section IV.C.(1). is as follows:

*IV.C.(1) For those plants in the High category, RPV head and head penetration nozzle inspections shall be performed using the following techniques every refueling outage.*

*(a) Bare metal visual examination of 100% of the RPV head surface (including 360° around each RPV head penetration nozzle), AND*

*(b) Either:*

*(i) Ultrasonic testing of each RPV head penetration nozzle (i.e., nozzle base material) from two (2) inches above the J-groove weld to the bottom of the nozzle and an assessment to determine if leakage has occurred into the interference fit zone, OR*

*(ii) Eddy current testing or dye penetrant testing of the wetted surface of each J-Groove weld and RPV head penetration nozzle base material to at least two (2) inches above the J-groove weld.*

**2. Inspection Scope and Method:**

**2.a. RPV Bare Metal Head Surface Visual:** A bare metal visual inspection (VT) of 100% of the RPV head top surface, including 360° around each RPV head penetration nozzle, was performed as identified in section IV.C.(1)(a) of the NRC Order. The VT was performed with the head shroud raised and all of the RPV head insulation removed, providing unrestricted visual access using both direct and remote visual examination techniques. The scope of the inspection did not include the inside surface of the 58 RPV stud holes as clarified in the summary of the February 24, 2003 NRC meeting<sup>3</sup> conducted to discuss the NRC Order.

Some areas of the ½" thick square cut shroud support ring provided limitations where the ring comes in close contact with the sloping RPV head outside of the RVHP nozzles. Only a small portion of the ring thickness and circumference of this 120" diameter ring was limited. The adjacent areas uphill and downhill of the shroud ring and the areas under the shroud ring where a gap existed were visually examined. These areas were found to be free of any boric acid

accumulation or staining. The shroud ring metal edge to vessel contact, and lack of staining indicated that no wastage could have occurred. The limited area under the shroud ring was not considered relevant because there was no source of external boric acid leakage at or under the shroud ring that could result in wastage (Reference 3, NRC response to NEI question # 2). The limited area under the shroud ring is less than 0.6% of the vessel head surface ( $<188 \text{ in}^2 / 31,700 \text{ in}^2$ ), since only the edge of the shroud ring was intermittently in contact with the RPV head, instead of the entire  $\frac{1}{2}$ " thickness.

**2.b. RPV Head Penetration Inspection:** The ultrasonic (UT) examination technique option, identified in section IV.C.(1)(b)(i) of the NRC Order, was performed on all of the 66 reactor vessel head penetration (RVHP) nozzles, including the vent line. The inspection included the nozzle base material 2" above the J-groove weld, down to the bottom end of all of the penetrations, with minor limitations due to probe design and contact. The 65 penetrations (excluding the vent) were inspected from 2" above the J-groove weld, down to a minimum of 0.62 inches below the weld. The vent line is flush with the weld and was inspected from 2" above the J-groove weld, down to the bottom of the vent line.

Fifty-three RVHP nozzles were inspected using the UT circumferential "blade probe," consisting of two elements in a pitch/catch configuration. A blade probe was used due to internal restrictions that included guide sleeves, drive rods, and level instrumentation. A bottom up rotating UT probe with multiple UT transducers was used for the remaining 12 RVHP nozzles and the vent line nozzle. The inspection area was the subject of a relaxation request<sup>4, 5</sup>, which was approved by the NRC.<sup>6</sup> As part of the UT examinations, the 65 RVHPs with interference fits were assessed to determine if leakage had occurred into the interference fit zone (annulus between the RPV head and the penetration above the pressure boundary weld). This assessment used the Framatome-ANP proprietary "leak path" technique, which was described in the post outage inspection report for the previous FPL St. Lucie Unit 1 RPV head inspection.<sup>7</sup> The UT inspection essential variables, procedure demonstrations, and personnel qualifications that were described in Reference 7 remain unchanged.

### **3. Inspection Results Summary:**

**3.a. RPV Head Visual Results:** The overall condition of the Turkey Point Unit 4 RPV head was clean with no evidence of leakage from the 66 RVHPs, above the head, or wastage of the RPV head surface other than previously addressed from a conoseal leak in 1987.<sup>8</sup>

**3.b. RPV Head Penetration Inspection Results:** In accordance with UT procedures 54-ISI-100-09 and 54-ISI-137-02 (vent line), there were no indications identified in any of the 66 RVHPs in the Turkey Point Unit 4 RPV head. There was also no evidence of a "leak path" signature for any of the 65 interference fit RVHPs (excluding the vent) examined, which is the Framatome-ANP assessment to determine if leakage has occurred into the interference fit zone.

Since the vent line is a clearance fit nozzle, a clean visual inspection provides a direct determination that no leakage has occurred into the annulus. However, as an added conservatism, the flush pressure boundary surface inside of the RPV head associated with the vent line (the head vent line, alloy 600 attachment weld, and a portion of the adjacent stainless steel clad weld) was examined using a surface eddy current (ECT) examination method. A procedure and examination technique specification sheet (ETTS) was developed for the vent weld exam, which required all indications to be analyzed. The reporting criteria utilized for the ECT examination was to report all indications with response characteristics of degradation equal

to or greater than the 0.020 inch depth calibration notch as flaws, and the acceptance criteria utilized for this ECT examination was "no identified flaws." There were no flaws or degradation detected by the ECT technique in the inspected area of the weld associated with the head vent line. This examination provides additional confirmation for the assessment that the vent line has no leakage into the annulus.

**4. Conclusion:** FPL has complied with the requirements of the NRC Order (EA-03-009) for the Turkey Point Unit 4 October 2003 refueling outage, based upon the performance of the RPV head inspection and the NRC conditional approval of the relaxation request for the non-pressure boundary portion of RVHPs.<sup>6</sup>

Based on the results of the visual examinations, UT examinations, and leak path assessments (including ECT of the vent), FPL concludes that the alloy 600 RVHP nozzles are not degraded, and no wastage has occurred of the RPV head.

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<sup>1</sup> US NRC Letter EA-03-009, "Issuance of Order Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," from Samuel J. Collins (NRC) to all Pressurized Water Reactor Licensees, February 11, 2003.

<sup>2</sup> FPL letter L-2002-185, "St. Lucie Units 1 and 2, Docket Nos. 50-335, 50-389, Turkey Point Units 3 and 4, Docket Nos. 50-250 and 50-251, Response to NRC Bulletin 2002-02, Reactor Pressure Vessel Head Penetration Nozzle Inspection Programs" R. S. Kundalkar to NRC, September 11, 2002.

<sup>3</sup> US NRC Letter (ADAMS Accession No. ML030780413), "Summary of Meeting Held on February 24, 2003, with Nuclear Energy Institute and EPRI MRP to Discuss the Order Issued on Reactor Vessel Head Inspections," S.D. Bloom to A.J. Mendiola, March 21, 2003.

<sup>4</sup> FPL letter L-2003-272, "Turkey Point Unit 4, Docket No. 50-251, Order (EA-03-009) Relaxation Request, Examination Coverage of Reactor Pressure Vessel Head Penetration Nozzles," T.O. Jones to NRC, October 21, 2003.

<sup>5</sup> FPL letter L-2003-277, "Turkey Point Unit 4, Docket No. 50-251, Order (EA-03-009) Relaxation Request, Examination Coverage of Reactor Pressure Vessel Head Penetration Nozzles – Supplemental Data," T.O. Jones to NRC, October 23, 2003.

<sup>6</sup> US NRC Memo, "Turkey Point Unit 4 - Relaxation of the Requirements of Order (EA-03-009) Regarding Reactor Pressure Vessel Head Inspections (TAC No. MC1082) and attached Safety Evaluation by the Office of Nuclear Reactor Regulation," E.M. Hackett to J.A. Stall, October 31, 2003.

<sup>7</sup> FPL letter L-2002-233, "St. Lucie Units 1 and 2, Docket Nos. 50-335, 50-389, Reactor Pressure Vessel Head (RPVH) Inspection, NRC Bulletin 2002-02 Supplemental Response," D. E. Jernigan to NRC, November 21, 2002.

<sup>8</sup> FPL letter L-87-186, "Turkey Point Unit 4, Docket No. 50-251, Report on Instrument Port Column Assembly Leakage," C.O. Woody to NRC, April 27, 1987.