Florida Power & Light Company, 6501 S. Ocean Drive, Jensen Beach, FL 34957

June 22, 2004

L-2004-136
10 CFR 50.4

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

RE: St. Lucie Unit 1
Docket No. 50-335
First Revised NRC Order EA-03-009 – Reactor Vessel Head
and Vessel Head Penetration Nozzle Inspection Results SL1-19

The First Revised NRC Order EA-03-009 was issued on February 20, 2004, modifying the interim inspection requirements for reactor pressure vessel (RPV) heads of pressurized water reactors. In section IV.E. of the Revised 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 St. Lucie Unit 1 (PSL-1) for the spring 2004 (SL1-19) refueling outage (RFO).

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.

Please contact George Madden at 772-467-7155 if there are any questions about this submittal.

Very truly yours,

William Jefferson, Jr.
Vice President
St. Lucie Plant

WJ/GRM

A101

FIRST REVISED NRC ORDER EA-03-009: REACTOR PRESSURE VESSEL HEAD AND VESSEL HEAD PENETRATION NOZZLE POST OUTAGE INSPECTION RESULTS FOR ST. LUCIE UNIT 1

The First Revised NRC Order EA-03-009[1] was issued on February 20, 2004, 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 St. Lucie Unit 1 (PSL-1) for the spring 2004 (SL1-19) refueling outage (RFO).

1. Plant Susceptibility Category

The St. Lucie Unit 1 reactor pressure vessel (RPV) closure head had approximately 16.7 effective degradation years (EDY) at the start of the March 2004 refueling outage. The inspection category identified in the Order is High.

2. Inspection Scope and Method

2.a. RPV Bare Metal Head Surface Visual: A bare metal visual inspection of the RPV head top surface, including 360° around each RPV head penetration nozzle, was performed as identified in section IV.C.(5)(a) of the NRC Order. The VT was performed with the head shroud raised and the periphery RPV head insulation panels removed to allow access under the horizontal panels to view 100% of the head surface upslope of the outer most head penetration. Both direct and remote visual examination techniques were used.

The ½-inch thick shroud support ring provided limitations where the ring comes in close contact or is intermittently welded to the sloping RPV head outside of the RVHP nozzles. The area downslope of the outer most penetrations, leading into the shroud support ring, was visually examined to be free of boric acid deposits or wastage. This area of exclusion represents less than 1% of the surface area of the RPV head and is addressed in the First Revised NRC Order.

The scope of the inspection did not include the inside surface of the 54 RPV stud holes as clarified in the summary of the February 24, 2003 NRC meeting[2] conducted to discuss the NRC Order. However, the flange surface area leading into the stud holes was visually examined and determined to be free of evidence of leakage, boric acid deposits, or wastage.

2.b. RPV Head Penetration Inspection: The ultrasonic (UT) examination technique option, identified in section IV.C.(5)(b)(i) of the First Revised NRC Order, was performed on all of the 78 reactor vessel head penetration (RVHP) nozzles, including the vent line. The inspection was planned to include the nozzle base material 2 inches above the J-

groove weld, down to the bottom end of all of the penetrations. The examination met the First Revised Order exam area for all but 17 RVHP nozzles. Limitations prevented UT scanning greater than 1.65 inches to 1.95 inches above the weld root for 17 RVHP nozzles. These limitations were the subject of a relaxation request[3,4] and corresponding NRC approval[5] of the relaxation based on the actual examination results.

As part of the UT examinations, the 77 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.[6]

The UT inspection procedure and essential variables used on the 77 RVHPs with interference fits has been demonstrated as part of the industry demonstration program conducted by the EPRI NDE Center. The personnel qualifications that were described in Reference 6 remain unchanged.

An eddy current examination (ECT) was performed on the vent nozzle weld surface to ensure weld integrity in lieu of the UT method to assess if leakage has occurred into the clearance fit annulus between the vent nozzle and RPV head steel. The ECT procedure had been successfully demonstrated on RVHP J-groove attachment welds as part of the industry demonstration program conducted by the EPRI NDE Center. All essential variables (Examination Technique Specification sheets, ETSS) and procedural requirements used during the vent nozzle weld examination remained the same as those previously demonstrated.

3. Inspection Results Summary:

3.a. RPV Head Visual Results: The overall condition of the St. Lucie Unit 1 RPV head surface was clean with no evidence of leakage from the 78 RVHPs, or wastage of the RPV head surface.

As part of the boric acid inspection program walkdown inspection of pressure boundary components above the head, trace amounts of dried boric acid were noted at the mechanical Swagelok fittings on the instrument columns. Dry boric acid was also noted at a vent fitting at the top of CEDM #65. All the boron residue (dried boric acid) identified was associated with these mechanical connections and did not result in boric acid corrosion products coming in contact with the carbon steel components of the RPV head surface or insulation. There was also a small dry boric acid stain, having an area of a few square inches and no thickness, below the outer shroud ring on the RPV head surface near stud hole #2. There was no degradation of the RPV head surface associated with the boric acid stain and it was isolated from any nozzle. These conditions were addressed as part of our boric acid corrosion control program and the corrective action program.

3.b. RPV Head Penetration Inspection Results: There were no indications identified in any of the 78 RVHPs in the St. Lucie Unit 1 RPV head. There was also no evidence of a "leak path" signature for any of the 77 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, the 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 examination method. The reporting criteria utilized for the ECT examination was to report all indications. 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 nozzle. This examination provides additional confirmation for the assessment that the vent nozzle has no leakage into the annulus.

4. Conclusion: FPL has complied with the requirements of the First Revised NRC Order (EA-03-009) for the St. Lucie Unit 1 Spring 2004 refueling outage (sl1-19), based upon the performance of the RPV head inspection and the NRC conditional approval of the relaxation to examine 17 RVHP nozzles to a distance of 1.65 inches or greater.[5]

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.

---

[1] US NRC Letter EA-03-009, Issuance Of First Revised NRC Order (EA-03-009) Establishing Interim Inspection Requirements For Reactor Pressure Vessel Heads At Pressurized Water Reactors, from William Borchardt (NRC) to all Pressurized Water Reactor Licensees, Dated February 20, 2004.

[2] US NRC Letter, 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.

[3] FPL letter L-2004-085, St. Lucie Unit 1, Order (EA-03-009) Relaxation Requests 1 and 2, Examination Coverage of Reactor Pressure Vessel Head Penetration Nozzles, Supplement 2, W. Jefferson, Jr. to NRC, April 6, 2004.

[4] FPL letter L-2004-088, St. Lucie Unit 1, Order (EA-03-009) Relaxation Requests 1 and 2, Examination Coverage of Reactor Pressure Vessel Head Penetration Nozzles, Supplement 3, W. Jefferson Jr. to NRC, April 8, 2004.

[5] US NRC Letter, St. Lucie Unit 1 – First Revised Order EA-03-009 Relaxation Requests Nos. 1 and 2 Regarding Examination Coverage of Reactor Pressure Vessel Head Penetration Nozzles and Attached Safety Evaluation by the Office of Nuclear Reactor Regulation, E.M. Hackett to J.A. Stall, April 15, 2004.

[6] FPL letter L-2002-233, St. Lucie Units 1 and 2, Reactor Pressure Vessel Head (RPVH) Inspection, NRC Bulletin 2002-02 Supplemental Response, D. E. Jernigan to NRC, November 21, 2002.