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

July 30, 2003

L-2003-186
10 CFR 50.4

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

RE: St. Lucie Unit 2
Docket No. 50-389
NRC Order EA-03-009 – Reactor Vessel Head and
Vessel Head Penetration Nozzle Inspection Results SL2-14

In April 2003, St. Lucie Unit 2 commenced a spring refueling outage (SL2-14). Two reactor pressure vessel head (RPVH) nozzles were repaired using an approved repair method that eliminated the indications identified. Based on the results of the visual examinations, UT examinations, leak path assessments (including PT of the vent), and inspection of the completed repairs, Florida Power & Light Company (FPL) concludes that the RPVH penetration nozzles that are returning to service are not degraded, and no wastage has occurred on the RPV head. The plant returned to operation on June 9, 2003.

In accordance with Section IV.E of the NRC Order (EA-03-009), the attachment submits the FPL inspection results for St. Lucie Unit 2 for the spring 2003 refueling outage (SL2-14). With this letter, FPL has complied with the requirements of the NRC Order for the St. Lucie Unit 2 spring 2003 refueling outage (SL2-14).

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

NRC Order EA-03-009: Reactor Pressure Vessel Head And Vessel Head Penetration Nozzle Post Outage SL2-14 Inspection Results For St. Lucie Unit 2

The NRC issued Order EA-03-009[1] on Februay 11, 2003 establishing interim inspection requirements for reactor pressure vessel heads of pressurized water reactors. In Section IV.E., the NRC required that the inspection results be provided within 60 days of the plant being returned to operation. The plant returned to operation on June 9, 2003. Florida Power and Light Company (FPL) hereby submits the inspection results for the St. Lucie Unit 2 spring 2003 refueling outage (SL2-14).

1. Plant Susceptibility Category: The St. Lucie Unit 2 reactor pressure vessel (RPV) closure head had approximately 14.0 effective degradation years (EDY) at the start of the spring 2003 refueling outage (SL2-14). The inspection category for this plant, as 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 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 and supplemented by a Relaxation Request[2] approved by the NRC on May 29, 2003[3]. The VT was performed under the insulation by delivering a video probe through nine, 2½" diameter holes in the support shroud and under the shroud support ring after removal of flashing panels. 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[4] conducted to discuss the NRC Order.

Limitations to the bare metal visual inspection were identified in the Relaxation Request[2]. These limitations included a partial area under 32 insulation support feet

(<118 square inches) and the inaccessible areas under the approximately 2¼" wide vertical leg of the reflective metal insulation that contacts the twelve 6-inch wide shroud lugs. The total area of limitation is less than 1% of the total reactor vessel head surface area available for inspection.

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 102 reactor vessel head penetration (RVHP) nozzles, which includes 91 control element drive mechanism (CEDM) nozzles, 10 incore instrument (ICI) nozzles, and 1 vent nozzle. The inspection included the nozzle base material from 2" above the J-groove weld, down to the bottom end of all of the penetrations for the 10 ICI nozzles and 1 vent nozzle as identified in Section IV.C.(1)(b)(i) of the NRC Order. The 91 CEDM nozzles have inside-threaded ends that are used to permanently attach externally-threaded guide cones, which prevent UT examination to the bottom of the nozzle. The UT inspection for the 91 CEDM nozzles included the nozzle base material 2" above the J-groove weld, down to the maximum extent practical. The details of the UT examination extent of coverage and justification for reduced coverage below the J-groove weld in the non pressure boundary portion of the RVHP nozzle was the subject of a Relaxation Request[2] that was approved by the NRC[3] on May 29, 2003. Supplemental dye penetrant examination (PT) was performed on selected nozzles, which had reduced UT coverage, to support the Relaxation Request.

As part of the UT examinations, the 101 RVHPs with interference fits (excluding the vent) were assessed to determine if leakage had occurred into the interference fit zone. This assessment used the Framatome-ANP proprietary "leak path" technique, which was described in the post outage inspection report from the previous FPL St. Lucie Unit 1 RPV head inspection[5]. 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 the liquid penetrant (PT) examination method.

3. Inspection Results Summary:

3.a. RPV Head Visual Results: The overall condition of the St. Lucie Unit 2 RPV head was clean with no evidence of leakage from the 102 RVHPs or wastage of the RPV head surface. The areas uphill and downhill of the areas of limitation identified above (support feet and shroud lugs) were visually examined and found to be free of any boric acid accumulation or wastage.

3.b. RPV Head Penetration Inspection Results: A single axial indication was identified in both CEDM penetrations #18 and 72. The details of those indications are provided in the Relaxation Request[2]. There were no indications identified in any of the other 100 RVHPs in the St. Lucie Unit 2 RPV head. Supplemental PT performed on selected nozzles with reduced UT coverage did not reveal any indications.

There was also no evidence of a "leak path" signature for any of the 101 interference fit RVHPs examined. The "leakpath" method 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. A PT was also performed as an additional confirmation of the visual assessment. There were no PT indications identified in the inspected area associated with the head vent line.

4. Corrective Actions: Penetrations #18 and #72 were repaired by removing the lower portion of the existing nozzle containing the flaw indication and relocating the pressure boundary weld between the RVHP and the RPV head to the mid-thickness of the RPV head. The ambient temperbead weld repair process, repair configuration, and post repair inspection is identified in Relief Requests 30 and 31. These relief requests were verbally approved on May 27, 2003 and documented by a safety evaluation and NRC letter on June 17, 2003[6].

5. Conclusion: FPL has complied with the requirements of the NRC Order (EA-03-009) for the St. Lucie Unit 2 spring 2003 refueling outage (SL2-14), based upon the performance of the RPV head inspection. Two RVHP nozzles were repaired using an approved repair method that eliminated the indications identified. Based on the results of the visual examinations, UT examinations, leak path assessments (including PT of the vent) and inspection of the completed repairs, FPL concludes that the RVHP nozzles that are returning to service are not degraded, and no wastage has occurred of the RPV head.

---

[1] US NRC Order 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.

[2] FPL letter L-2003-129, St. Lucie Unit 2 Order (EA-03-009) Interim RPVH Inspection Requirements, Revised Relaxation Requests 1 and 2 – Supplement 4, W. Jefferson to NRC, May 11, 2003.

[3] US NRC Letter, St. Lucie Nuclear Plant Unit 2 Order EA-03-009 Relaxation Requests Nos. 1 and 2, Regarding Examination Coverage of Reactor Pressure Vessel Head Penetration Nozzles, S.W. Moore (NRC) to J.A. Stall, May 29, 2003.

[4] 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.

[5] 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.

[6] US NRC Letter, St. Lucie Nuclear Plant Units 1 and 2 Relief Request Nos. 20, 21, 30, and 31, Revision 2, Regarding Reactor Vessel Head Penetration Weld Repair and Flaw Evaluation and attached Safety Evaluation, Allen G. Howe (NRC) to J.A. Stall, June 17, 2003.