April 9, 2003

Mr. J. A. Stall
Senior Vice President, Nuclear and
Chief Nuclear Officer
Florida Power and Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

SUBJECT: SAINT LUCIE PLANT, UNITS 1 AND 2 - REQUEST FOR ADDITIONAL INFORMATION REGARDING REQUESTS FOR RELIEF FOR REPAIR OF ALLOY 600 SMALL BORE NOZZLES WITHOUT FLAW REMOVAL (TAC NOS. MB7199 AND MB7200)

Dear Mr. Stall:

By letter dated January 8, 2003, Florida Power and Light Company submitted a request for relief from the repair/replacement requirements outlined in paragraph IWB-3132.3 of the American Society of Mechanical Engineers, Section XI Code. The U.S. Nuclear Regulatory Commission staff has reviewed the submittal and finds that a response to the enclosed request for additional information (RAI) is needed before we can complete the review.

This request was discussed with your staff on April 7, 2003, and Mr. George Madden agreed that a response would be provided within 30 days of receipt of this letter. If you have any questions, please feel free to contact Eva Brown at (301) 415-2315.

Sincerely,
/RA/

Brendan T. Moroney, Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-335 and 50-389

Enclosure: RAI

cc w/encl: See next page

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Mr. J. A. Stall
Florida Power and Light Company

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REQUEST FOR ADDITIONAL INFORMATION

REPAIR OF ALLOY 600 SMALL BORE NOZZLES WITHOUT FLAW REMOVAL

SAINT LUCIE, UNITS 1 AND 2

DOCKET NOS. 50-335 AND 50-389

These questions pertain to the Relief Request and to Reference 7 of the Request, "*CR-9417-CSE95-1102, Rev. 02, Structural Analysis of Replacement Instrumentation Nozzles for FPL . . .*"

1. The submittal is for the application of alloy 690 half-nozzles. The analysis in Reference 7 is applicable to nozzles and heater sleeves that are replaced by full alloy 690 nozzles and alloy corrosion liners.

   Provide justification showing that this analysis is also applicable to replacements with alloy 690 half-nozzles.

2. The submittal states that the maximum cumulative usage factor (CUF) at the outside surface of the nozzle repair is 0.124. This value is taken from Reference 7, page D14. This CUF is applicable to the Piping Measurement or Sampling Nozzles. For Pressurizer Unit 1 Lower Level Nozzle Inside Surface, the CUF at the inside surface is 0.742 as shown on page D9. However, Table 4-9, on page 25 of Reference 7, indicates CUFs of 0.137 for piping nozzles and 0.752 for pressurizer nozzles.

   Clarify what is meant by "inside surface" and indicate whether 0.752 is the highest CUF for all nozzle locations, as currently calculated.

3. Provide justification why the fatigue analysis does not include stress cycling due to pump vibration, as stated on page 2 of the submittal.

4. Provide justification for not including, in the fatigue analysis, the effects of the operating pressure transients acting on the nozzles (i.e., end cap loads), the bore hole surfaces, and the weld surfaces.

5. American Society of Mechanical Engineers (ASME) Section III, Paragraph NB-3338.2, stipulates increases in stress indices as a result of "hillside" connections. The finite element model of the pressurizer nozzles does not model the inclination of the innermost and outermost pressurizer nozzles with respect to the normal direction of the wall.

   Show how this effect was considered in the stress and fatigue calculations.

Enclosure

6. Regarding page C2, provide a detailed explanation of the “0.1Sy” analysis.

7. Page D1 states: “However, all instrument nozzles on the pressurizer, the measurement and sampling nozzle on the piping, and the primary instrument nozzles were specified to have significant applied external pipe loadings.” Based on the stress intensity values shown in tables C-1, C-2, and C-3, some of which exceed the yield strength of the material, the piping reactions also appear to be substantial.

   Provide clarification how the “0.1Sy” analysis shows that the applied external loads on the replacement instrument nozzles meet the intent of Paragraph NB-3337.3 of ASME Section III, which limits the use of partial penetration welds to nozzles having “substantially no piping reactions.”

8. Provide the basis for the ABB/CE interpretation that the requirement in ASME Section III, Paragraph NB-3337.3, is for limiting the stress intensity at the root of the weld only.

   Define what is meant by “the root of the weld.”

9. Provide an explanation of the terms “SI,” “Smn,” and “Smx” found on the stress contour plots.

10. On page D1, provide an explanation of the term “pressure mismatch interaction loadings.”

11. Provide the basis for the stress concentration factor on page D8. Why should this value not be applied to all stress components?

12. Provide the CUFs in the component walls, at the location of the new weld, prior to the nozzle replacements (at the surface of the pipe or pressurizer).

13. ASME Section III, Paragraph NB-3352.4(d), outlines requirements for fatigue analysis of partial penetration welds. The paragraph states: A fatigue strength reduction factor of not less than 4 shall be used in the fatigue analysis.

    Provide a discussion on the extent to which the finite element analyses, of the nozzle replacement welds, comply with the requirements of this paragraph.

The following questions pertain to Reference (2) of the subject relief requests, “CM-CI-02-69, Revision 0, Evaluation of Fatigue Crack Growth associated with Small Diameter Nozzles for Saint Lucie Units 1 and 2, dated October 9, 2002.”

14. In section 6.2.3, an alternate pressure/temperature (P/T) profile was developed for the cooldown transient. This P/T profile was developed because the ASME Section XI flaw stability criterion is exceeded when using the profile based on design specification transients.

    Confirm/discuss that the P/T transient profile, utilized for analysis of the normal pressurizer cooldown, is consistent with the P/T limits specified in the Technical

Specifications of Saint Lucie Units 1 and 2. Also, discuss what measures the licensee will implement to ensure that in the operation of the referenced units, the assumed pressure and temperature cooldown profiles in the pressurizer, will not be exceeded.

15. The U.S. Nuclear Regulatory Commission staff's safety evaluation (SE) for the topical report CE NPSD-1198-P, Revision 00, "Low-Alloy Steel Component Corrosion Analysis Supporting Small-Diameter Alloy 600/690 Nozzle Repair/Replacement Programs," was issued on February 8, 2002. The subject SE, currently under revision, requires the performance of plant specific thermal fatigue crack growth calculations for the worst-case existing flaw in the nozzles being assessed, including a comparison to the maximum allowed crack size (length and depth).

    Based on the thermal fatigue crack growth calculations for Saint Lucie Units 1 and 2, provide a comparison of the final crack size (length and depth), at the end of the evaluation period, to the maximum allowable crack size for the pressurizer nozzle locations and the hot leg piping nozzle locations.

16. Confirm/discuss that the methods used in your thermal fatigue crack growth calculations are more appropriate than what is specified in Appendix A to Section XI of the ASME Code. Identify any deviations; and provide the justification for each deviation.

17. In Section 6.3.4.2, for the evaluation of pressurizer lower shell axial flaws, it was stated that the Elastic-Plastic Fracture Mechanics analysis was used for the reactor/turbine trip transient because the subject transient does not meet the acceptance criteria based on Linear Elastic Fracture Mechanics analysis.

    Provide a discussion describing the method and material properties used in this evaluation; and confirm that they are consistent with ASME Code or regulatory requirements.

18. Attachment 1, Section 4, of the submittal states "[t]o remove all possible leak paths requires accessing the internal surface of the reactor coolant piping or pressurizer and grinding out the attachment weld and any remaining nozzle base metal. Such an activity results in high radiation exposure to the personnel involved. Grinding within the pipe or pressurizer also exposes personnel to safety hazards."

    Quantify the dose that would be received if required to remove the flaw. This should include a description of area dose rates, proposed stay times, and proposed measures to maintain personnel dose as low as is reasonably achievable. Provide the dose that would be received if the alternative was authorized. Additionally, identify what safety hazards personnel would be exposed to and how those hazards constitute a hardship or unusual difficulty.