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SUBJECT: Provides 120-day response to NRC GL 97-01, "Degradation of Control Rod Drive Mechanism Nozzle & Other Vessel Closure Head Penetrations."

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July 25, 1997

L-97-194
10 CFR 50.4
10 CFR 50.54 (f)

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

RE: St. Lucie Units 1 and 2
Docket Nos. 50-335 and 50-389
120-Day Response
Generic Letter 97-01

The purpose of this letter is to provide the 120-day Florida Power & Light Company (FPL) response to NRC Generic Letter (GL) 97-01, *Degradation of Control Rod Drive Mechanism Nozzle and Other Vessel Closure Head Penetrations*, for St. Lucie Units 1 and 2.

In our initial response submitted by FPL letter, L-97-117 dated April 25, 1997, FPL stated that we are continuing to participate with the industry through the Nuclear Energy Institute (NEI) task force and the Combustion Engineering Owners Group (CEOG) to evaluate the NRC request and to develop the response to the GL. In addition, our initial response stated that, FPL planned to utilize information from this industry effort and would submit a written response to items 1 and 2 of the Requested Information by July 30, 1997. As permitted by footnote 1 on page 7 of the NRC GL 97-01, FPL will reference previous submittals by NEI and the CEOG for portions of this response.

The attached information is provided pursuant to the requirements of Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f).

Please contact us if there are any questions about this submittal.

Very truly yours,

J. A. Stall
Vice President
St. Lucie Plant

A075 1/1

JAS/GRM

Attachment

310063

cc: Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, St. Lucie Plant

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P PDR



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STATE OF FLORIDA)
)
COUNTY OF ST. LUCIE) ss.

J. A. Stall being first duly sworn, deposes and says:

That he is Vice President, St. Lucie Plant, for the Nuclear Division of Florida Power & Light Company, the Licensee herein;

That he has executed the foregoing document; that the statements made in this document are true and correct to the best of his knowledge, information and belief, and that he is authorized to execute the document on behalf of said Licensee.




J. A. Stall

STATE OF FLORIDA
COUNTY OF St. Lucie

Sworn to and subscribed before me

this 25th day of July, 19 97
by J. A. Stall, who is personally known to me.



Name of Notary Public - State of Florida



MY COMMISSION # CC646183 EXPIRES
May 12, 2001
BONDED THRU TROY FAIR INSURANCE, INC.

(Print, type or stamp Commissioned Name of Notary Public)

Background

NRC Generic Letter 97-01 (GL), *Degradation of Control Rod Drive Mechanism Nozzle and Other Vessel Closure Head Penetrations*, was issued, to request licensees to describe their program for insuring the timely inspection of pressurized water reactor (PWR) control element drive mechanism (CEDM) and other reactor vessel head penetrations (RVHP). Utilities were also requested to assess and provide a description of any resin bead intrusion as described in NRC Information Notice (IN) 96-11 that would result in sulfate levels exceeding the Electric Power Research Institute (EPRI) primary water chemistry guideline recommendations.

This response provides the Florida Power and Light Company (FPL) information relative to the GL for St. Lucie Units 1 and 2. The Combustion Engineering Owners Group (CEOG) has prepared a report titled, "*CEOG Response to NRC Generic Letter 97-01, Degradation of CEDM Nozzle and Other Vessel Closure Head Penetrations*," CE-NPSD-1085, which describes the integrated inspection plan, responds to the questions in the GL, and is applicable to both St. Lucie Units 1 and 2. This report was transmitted by CEOG Letter, CEOG-97-244 from David F. Pilmer to USNRC on July 25, 1997. Where FPL has specific information that supplements the information in the CEOG response, it is provided below.

FPL has worked with the CEOG, EPRI and the Nuclear Energy Institute (NEI) to understand the operational experience, identify technical issues, cause factors, relative importance and solutions involving alloy 600 cracking of RVHPs since the industry became aware of the issue in 1991. One of these tasks was the development of safety evaluations that characterized the initiation of damage, propagation and consequences of both inside diameter (ID) and outside diameter (OD) initiated cracking. A report, *Safety Evaluation of the Potential for and Consequences of Reactor Vessel Head Penetration Alloy 600 ID Initiated Nozzle Cracking*, CEN-607 dated May 1993, is applicable to St. Lucie Units 1 and 2, and was submitted to the Staff along with evaluations from the other PWR owners groups through NEI (formerly NUMARC) on June 16, 1993. The NRC reviewed the safety evaluations and issued a safety evaluation report (SER) to NEI on November 19, 1993 (Ref. 3). The SER states, "...the staff has concluded that there is no immediate safety concern for cracking of the CRDM/CEDM penetrations. This is predicated on the performance of visual inspection activities requested in GL 88-05...". The CEOG addressed the issues raised with an OD initiated flaw in a report, *Safety Evaluation of the Potential for and Consequences of Reactor Vessel Head Penetration Alloy 600 OD Initiated Nozzle Cracking*, CEN-614 dated December 1993. This report was submitted to the NRC through NEI.

Both safety evaluations, CEN-607 and CEN-614, are summarized in the CEOG response to GL 97-01, CE-NPSD-1085 (Ref. 2). The CEOG response concludes that these evaluations remain valid. CEN-607, CEN-614, and the NRC SERs are applicable to St. Lucie Units 1 and 2 and establish the basis for their continued operation.

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Based on the referenced evaluations and the St. Lucie Unit 1 and Unit 2 inservice inspection (ISI) programs (approved by NRC SERs dated April 7, 1989, and May 4, 1995, respectively), St. Lucie Units 1 and 2 are in compliance with 10CFR50.55a and 10CFR50 Appendix A, GDC 14.

Generic Letter 97-01 Questions and Responses

Question 1.1: *(Regarding inspection activities:) A description of all inspections of CRDM nozzle and other VHPs performed to the date of this generic letter, including the results of these inspections.*

Response to Question 1.1:

To date FPL has performed visual inspections on the top of the reactor vessel head for leakage at both St. Lucie Units 1 and 2 as part of the ASME Section XI examinations and the commitment to GL 88-05. No evidence of any leakage from the alloy 600 portion of the reactor vessel head penetrations has been discovered.

The CEOG GL 97-01 response, CE-NPSD-1085 (Ref. 2), is applicable to St. Lucie Units 1 and 2. Please refer to Section 2.1 of that response for additional information regarding CEOG inspection results and activities.

Question 1.2: *(Regarding inspection activities:) If a plan has been developed to periodically inspect the CRDM nozzle and other VHPs:*

- a. *Provide the schedule for first, and subsequent, inspections of the CRDM nozzle and other VHPs, including the technical basis for this schedule.*
- b. *Provide the scope for the CRDM nozzle and other VHP inspections, including the total number of penetrations (and how many will be inspected), which penetrations have thermal sleeves, which are spares, and which are instrument or other penetrations.*

Question 1.3: *If a plan has not been developed to periodically inspect the CRDM nozzle and other VHPs, provide the analysis that supports why no augmented inspection is necessary.*

Question 1.4: *In light of the degradation of CRDM nozzle and other VHPs described above, provide the analysis that supports the selected course of action as listed in either 1.2 or 1.3, above. In particular, provide a description of all relevant data and/or tests used to develop crack initiation and crack growth models, the methods and data used to validate these models, the plant-specific inputs to these models, and how these models substantiate the susceptibility evaluation. Also, if an integrated industry inspection program is being relied on, provide a detailed description of this program.*

Response to Question 1.2-1.4:

The CEOG GL 97-01 response, CE-NPSD-1085 (Ref. 2), is applicable to St. Lucie Units 1 and 2. Please refer to Sections 2.2, 2.3, and 2.4 respectively for responses to these questions.

Question 2: *Provide a description of any resin bead intrusions, as described in NRC IN 96-11, that have exceeded the current EPRI PWR Primary Water Chemistry Guidelines recommendations for primary water sulfate levels, including the following information:*

- 2.1 *Were the intrusions cation, anion, or mixed bed?*
- 2.2 *What were the durations of these intrusions?*
- 2.3 *Does the plant's RCS water chemistry Technical Specifications follow the EPRI guidelines?*
- 2.4 *Identify any RCS chemistry excursions that exceed the plant administrative limits for the following species: sulfates, chlorides or fluorides, oxygen, boron, and lithium.*
- 2.5 *Identify any conductivity excursions which may be indicative of resin intrusions. Provide a technical assessment of each excursion and any follow up actions.*
- 2.6 *Provide an assessment of the potential for any of these intrusions to result in a significant increase in the probability for IGA of VHPs and any associated plan for inspections.*

Response to Question 2.1 through 2.5:

FPL has reviewed the plant historical records to determine if any incident of resin ingress similar to those of 1980 and 1981 at the Jose Cabrera (Zorita) plant has occurred at St. Lucie. This data search was planned to identify all events of resin intrusion into the primary coolant system which were of a magnitude greater than 1 cubic foot (30 liters). This threshold of 1 cubic foot was chosen as a conservative lower bound since it represents less than a conservative 15% of the estimate for the volume of resin released into the reactor coolant system during the two events at the Jose Cabrera plant.

For the period of plant operation prior to the routine analysis for sulfate in reactor coolant, the data search was based on a review of the plant's reactor coolant chemistry records relative to specific conductance of the reactor coolant. An elevation of a 28 micro Siemens/cm (S/cm)

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increment in specific conductance was the value used as an indicator of cation resin ingress equivalent to a volume of 1 cubic foot.

Sulfate levels determined from analysis of reactor coolant were evaluated for plant operation from December, 1989 to the present. In this case a sulfate concentration of up to the range of 15 to 17 ppm peak concentration was used as the indicator of cation resin ingress, again equivalent to a volume of 1 cubic foot.

No evidence of resin ingress was identified. Had either specific conductance or sulfate increases indicated resin ingress to the magnitude of the threshold quantity identified above, additional data evaluation would have been conducted to ascertain a corresponding depression in pH or elevation in lithium as corroborating information of the incident. In the case, of the use of sulfate data as the indicator, specific conductance would also have been included as confirmatory data had a significant in leakage event been identified.

It is considered that it was unnecessary to review plant records for boron, chlorides, fluorides and oxygen in-leakage since these species are not viewed as valid indicators of cation resin ingress or degradation within the primary coolant system of a PWR. Borate, chloride, and fluoride anions could be associated with the anion portion of mixed bed resin (cation plus anion); however, if mixed bed resin leakage to the reactor coolant system (RCS) occurred, the cation portion of the resin would contain the sulfate indicator described above. Detectable dissolved oxygen in reactor coolant, during power operation with appropriate hydrogen overpressure (on the volume control tank) and specified residual dissolved hydrogen in the reactor coolant, could not occur and therefore, could not be associated with resin in-leakage.

The St. Lucie Plant Chemistry Department reviewed RCS chemistry logs for both St. Lucie Unit 1 and St. Lucie Unit 2. The beginning point for the data review was July, 1977 and July, 1983, respectively. The data review was performed via the chemistry laboratory information management system beginning in 1992 to present. The results of the data search indicated that there have been no resin ingress events at either St. Lucie Unit 1 or Unit 2 based on the review criteria above of a magnitude greater than 1 cubic foot(30 liters).

The parameters identified in the St. Lucie Unit 1 and Unit 2 Technical Specifications for RCS chemistry only address chloride, fluoride, and oxygen. The EPRI guidelines identify additional parameters, such as Lithium, Hydrogen, Conductivity, Boron, Sulfates, and Suspended Solids (which are not in the Technical Specifications). All of these parameters are identified, sampled, and controlled administratively within the EPRI guidelines by plant chemistry procedures.

EPRI Guidelines, by definition, must be more conservative than Technical Specifications as the Technical Specifications are more directed to safe operation of the plants and not chemistry controls.

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The CEOG GL 97-01 response, CE-NPSD-1085 (Ref. 2), is applicable to St. Lucie Units 1 and 2. Please refer to Section 3 of that response for additional information relative to these questions.

Response to Question 2.6:

The results of the FPL review of St. Lucie Units 1 and 2 historical RCS chemistry records indicate no resin intrusion was identified as described above. Based on these results and the information provided in section 3.6 of the CEOG GL 97-01 response, CE-NPSD-1085 (Ref. 2), there would be no increase in the probability for intergranular attack (IGA) of RVHPs and therefore, FPL has no plans to inspect for degradation as found at Zorita as described in NRC IN 96-11 and NRC GL 97-01.

References

- 1 Generic Letter 97-01, *Degradation of Control Rod Drive Mechanism Nozzle and Other Vessel Closure Head Penetrations*, Letter from NRC to all holders of operating licenses for pressurized water reactors; April 1, 1997.
- 2 Combustion Engineering Owners Group Report, *CEOG Response to NRC Generic Letter 97-01, Degradation of CEDM Nozzle and Other Vessel Closure Head Penetrations*, CE-NPSD-1085, Combustion Engineering Owners Group, July 1997.
- 3 NRC Letter, *Safety Evaluation for Potential Reactor Vessel Head Adaptor Cracking*, Letter from William T. Russell, NRC to William Rain, NUMARC, November 19, 1993.
- 4 Combustion Engineering Owners Group Letter, CEO-97-244, *CEOG Response to NRC Generic Letter 97-01, Degradation of CEDM Nozzle and Other Vessel Closure Head Penetrations*, CE-NPSD-1085, David F. Pilmer to USNRC, July 25, 1997.
- 5 Combustion Engineering Owners Group Report, *Safety Evaluation of the Potential for and Consequences of Reactor Vessel Head Penetration Alloy 600 ID Initiated Nozzle Cracking*, CEN-607, Combustion Engineering Owners Group, May 1993.
- 6 Combustion Engineering Owners Group Report, *Safety Evaluation of the Potential for and Consequences of Reactor Vessel Head Penetration Alloy 600 OD Initiated Nozzle Cracking*, CEN-614, Combustion Engineering Owners Group, December 1993.