



Florida
Power
CORPORATION
Crystal River Unit 3
Docket No. 50-302

February 4, 1994
3F0294-01

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

Reference: NRC to FPC letter, 3N1293-21, dated December 20, 1993

Subject: Additional Information Regarding Once Through Steam Generator
Indications

Dear Sir:

Florida Power Corporation (FPC) has prepared (see Attachment) responses to several of the NRC staff questions and comments contained in the Reference letter. Responses to questions one and three will be completed and submitted in mid-February pending finalization of structural analysis and non-destructive evaluation (NDE) requested by the NRC staff. The February submittal will also contain a change to the Improved Technical Specifications (ITS) to allow indications consistent with those evaluated during Refuel 8 to be excluded from the plugging/sleeving limits required in the ITS.

Sincerely,

P. M. Beard, Jr.
Senior Vice President
Nuclear Operations

PMB/LVC

xc: Regional Administrator, Region II
Senior Resident Inspector
NRR Project Manager

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The following are FPC's responses to NRC staff questions/comments provided in the Reference letter.

NRC QUESTION:

1. The adequacy of a plugging limit depends largely on being able to demonstrate that sufficient margin to burst will be retained by the steam generator tubing during a cycle of operation. A methodology acceptable to the Staff in determining adequate structural integrity of steam generator tubing is provided in Regulatory Guide 1.121, "Bases for Plugging Degraded PWR Steam Generator Tubes." The staff, therefore, requests that the licensee submit a Regulatory Guide 1.121 evaluation that justifies that indications similar to the pit-like indications found during Refuel 8 are acceptable. This evaluation should include:
 - a) the technical basis for the non-destructive examination uncertainty and growth rate models used in the analysis.
 - b) a description of the physical parameter/signal characteristic from the non-destructive examination that will allow discrimination of pit-like defects from other forms of degradation. In particular, discuss the signal characteristics and/or other NDE parameters (length, depth, voltage, etc.) that can be used to characterize these types of defects.

If the conclusions from the Regulatory Guide 1.121 evaluation are limited due to the inability to accurately size the flaws and to determine crack growth rates, discuss bounding cases. The Regulatory Guide 1.121 evaluation should address the potential leakage from these indications.

FPC RESPONSE:

1. FPC is finalizing a structural analysis and an NDE evaluation based on the guidance of Regulatory Guide 1.121. Both the structural analysis and the NDE evaluation will be completed and submitted to the NRC by mid-February.

NRC QUESTION:

2. The Staff notes that several of the referenced reports are still under development and/or have not been submitted to the NRC. The staff requests that the licensee submit the final report describing the chemical and metallurgical examination of the pulled tubes (CE93-160, EPRI RP413-06, BWNS Report 51-1218868-00), a draft of which was made available to the Staff and placed in the Public Document Room.

FPC RESPONSE:

2. The final version of Report CE-93-160 "Examination of Crystal River Unit 3 Steam Generator Tube Sections" will be issued by EPRI in the next few months. However, the final report will reflect the same technical information conveyed during the September 9th, 1993 meeting. FPC will provide a copy of the Final Report when the document is received.

NRC QUESTION:

3. As a result of the analysis of the pulled tubes, the licensee concluded that the indications between the lower tube sheet face and the first support plate could not be accurately depth sized by the bobbin coil phase angle analysis method. Provide the basis for concluding that all tubes with SN signals between the lower tube sheet face and the first support plate are acceptable (with respect to Regulatory Guide 1.121 criteria) in light of the difficulty in sizing these indications. In addition, discuss the worst case indication detected by field eddy current testing and the expected burst pressure for this tube.

It was stated that the Crystal River Unit 3 tubes fall into the region of the burst pressure parameter curve where the burst pressure is not related to the depth of the degradation. This statement assumes that the length of the indication does not exceed a certain threshold. Describe the accuracy of sizing the axial and circumferential extent of these indications.

FPC RESPONSE:

3. The information requested regarding the basis for concluding that the indications between the lower tube sheet face and the first support plate are acceptable is related to the Regulatory Guide 1.121 evaluation being performed as part of the analysis/evaluation for question one. Therefore, the requested information will be provided in mid-February following the completion of the evaluation. A discussion of the accuracy of the axial and circumferential length threshold will also be provided in this submittal.

NRC QUESTION:

4. In Attachment B to a report dated August 31, 1993 (Draft Final Report, #CE-93-160), several observations were made. These observations include:
- o The 1989 eddy current signal quality was superior in comparison to the 1992 data despite the smaller probe size. The latest eddy current data was noisier. Please explain the reason for the elevated noise levels and the degradation in the signal quality. Discuss the guidance given to the eddy current analysts with respect to acceptable noise levels. Describe actions being taken if any, to reduce the noise levels in the eddy current data so as to improve the quality of the signal.
 - o Given the noisier data, the 400 Khz bobbin coil channel is better suited for identifying IGA patches than the 600 khz channel. The 600 khz channel, however, should still be used for sizing the indications. Discuss and provide the technical basis for the inspection frequencies to be used in the upcoming outage.
 - o Since the 600 Khz channel is recommended for sizing, high frequency probes which operate optimally at 600 khz should be used after factoring the known length of the probe extension cable. Adding extension cable without considering its effect on probe performance will result in the lowering of the optimal operating frequency and reduced eddy current sensitivity. Describe the basis for this comment and how it is being dispositioned.

FPC RESPONSE:

4. The following discussion addresses the observations made by the NRC staff regarding Attachment B to the report dated August 31, 1993 (Draft Final Report, #CE-93-160) and offers clarifications to those observations.

Data graphics from the 1989 and 1992 eddy current inspections have been reviewed. The signal quality from data graphics is comparable with the marginal noise present in 1992. FPC has requested that BWNS perform a side by side comparison of eddy current tapes from 1989 and 1992. This comparison will be used to quantify the 1992 noise level and attempt to identify its source. A possible explanation for the differences in noise level could be that the 1989 data was obtained using a mid-range probe versus the high frequency probe used to obtain the 1992 data. Another potential cause to be considered is the performance of water slap on the OTSG secondary side during the 1992 eddy current examination of tubes. Prior to Refuel 9, eddy current analyst guidelines will be revised to provide instruction on identifying acceptable noise levels. A training database will be established to include noisy data that affects signal quality with examples of indications that would be considered rejectable.

During both the 1989 and 1992 examinations, flaw detection was performed with the 400 khz differential channel which operates nearly equivalent for both probe types (mid-range or high frequency). Flaw sizing, however, was more accurate for the 1992 examination since the high-frequency probe was used with a 600 khz primary analysis frequency. This analysis frequency meets the requirements of the ASME Section V, Article 8 for system calibration by operating closer to the optimum test frequency for OTSG tubing (730 khz) and provides better phase separation for flaws of varying depths. FPC plans to use the standard design high frequency probe in the Refuel 9 eddy current examination, with the same channel combinations as in the 1992 examination.

The reduced sensitivity of eddy current due to adding cable length is a known fact that was expressed in attachment B of Draft Final Report CE-93-160 as a precautionary comment. However, the cable length has remained the same during previous inspections and will be kept the same for consistency.

NRC QUESTION:

5. In the September 30, 1993, submittal, a brief description of the leak rate monitoring program was provided. Clarification of the following items is requested. Discuss how the alarm setpoints for the condenser off-gas radiation monitor are set (i.e., specific value of leakage, 3 times background, etc.). Describe the setpoints of these monitors in terms of gallons-per-day (GPD) for typical levels of reactor coolant system radioactivity. Over the past several years, many utilities have adapted primary-to-secondary administrative leak rate limits on the order of 50 to 150 gpd. If primary-to-secondary leakage exceeds this administrative limit, the plant is shut down. Discuss your plans, if any, in enhancing your leak rate monitoring program (include in the discussion potential benefits of using 16 monitors) and the related administrative procedures.

FPC RESPONSE:

5. The alarm setpoint for the condenser off-gas radiation monitor, RM-A12, is set to allow the operations crew to evaluate primary-to-secondary leakage at levels less than 0.3 gallons per minute (gpm). CR-3 has an administrative limit for plant shutdown at 0.3 gpm or approximately 430 gallons per day. The condenser off-gas monitor has a lower range of sensitivity capable of detecting primary-to-secondary leakage at levels of 50 to 100 gallons per day. There are no plans to change the steam generator leak rate administrative limits for plant shutdown. FPC is investigating the potential benefits of using N-16 monitors. Results of this investigation will be completed within the next six months.