

February 18, 2004

Mr. Mark E. Warner, Site Vice President
c/o James M. Peschel
Seabrook Station
FPL Energy Seabrook, LLC
PO Box 300
Seabrook, NH 03874

SUBJECT: REVIEW OF STEAM GENERATOR TUBE INSERVICE INSPECTION REPORT
FOR THE 2002 REFUELING OUTAGE AT SEABROOK STATION, UNIT NO. 1
(TAC NO. MB8928)

Dear Mr. Warner:

By letters dated June 3, 2002 and April 24, 2003, FPL Energy submitted reports summarizing the steam generator tube inservice inspections performed during the 2002 refueling outage at Seabrook Station, Unit No. 1 (Seabrook).

As discussed in the enclosed evaluation, the Nuclear Regulatory Commission staff concluded that you provided the information required by the Technical Specifications for Seabrook and that no additional follow-up is required at this time. If you have any questions, please contact me at (301) 415-1484.

Sincerely,

/RA/

Victor Nerses, Senior Project Manager, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-443

Enclosure: Evaluation

cc w/encl: See next page

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NUCLEAR REGULATORY COMMISSION STAFF'S REVIEW
OF THE STEAM GENERATOR TUBE INSERVICE INSPECTION
SEABROOK STATION, UNIT NO. 1
DOCKET NO. 50-443

By letters dated June 3, 2002 (ML021640036)¹ and April 24, 2003 (ML031220028), FPL Energy (FPLE or the licensee), the licensee for Seabrook Station, Unit No. 1 (Seabrook), submitted reports summarizing the steam generator (SG) tube inservice inspections performed during their 2002 refueling outage.

Seabrook has four Westinghouse Model F SGs. There are 5626 thermally-treated Alloy 600 tubes in each SG. The tubes have an outside diameter of 0.688 inches, a wall thickness of 0.040 inches and are supported by stainless steel tube supports with quatrefoil-shaped holes and V-shaped chrome plated Alloy 600 anti-vibration bars (AVBs). The tubes in the first 10 rows were stress relieved to reduce residual stresses and improve corrosion resistance.

During the 2002 inspection, FPLE performed tube inspections in all four SGs A, B, C, and D. The scope of the inspections and results are discussed in the reports supplied by the licensee. The licensee plugged 13 tubes in SG "A" and 22 tubes in SG "D". Tubes in SG "A" were plugged for wear at the AVBs as the result of a foreign object (one tube for wear and seven preventatively surrounding the affected tube). Tubes in SG "D" were plugged for wear at the AVBs, a single volumetric indication attributed to wear from a loose part that exceeded the 40% through-wall plugging criteria, and for outside-diameter stress-corrosion cracking (ODSCC) at the tube-to-tube support plate intersections.

The ODSCC indications identified by the licensee are the first confirmed instances of cracking in thermally treated Alloy 600 tubing. The licensee identified the cracking in both the hot and cold legs and at a number of different tube support plate elevations. During the subsequent root cause investigation, the affected tubes were found to have a unique eddy current signature. The principal cause of the cracking was determined to be elevated residual stresses that made them more susceptible to corrosion. The affected tubes were plugged. Additional information regarding this issue may be found in NRC Information Notice (IN) 2002-21 (ML021770094), IN 2002-21 Supplement 1 (ML030900517), and in the licensee's root cause analysis (ML023300457 and ML023240524).

Based on the Nuclear Regulatory Commission (NRC) staff's review of the above mentioned documents, the staff requested additional information in three areas. These areas were addressed in a conference call with the licensee on September 11, 2003. The first request for additional information (RAI) requested that the licensee explain why the number of freespan dings and dents (greater than 5 volts) as outlined in a table in their April 24, 2003 report entitled, "Summary OR08 Inspection Results" had decreased from the previous refueling outage. The licensee indicated that the decrease was because some of the indications are at or near the threshold of the dent/ding reporting criteria and may not meet the reporting criteria

¹ Documents with ML numbers can be viewed in the NRC's Agencywide Documents Access and Management System (ADAMS) at www.nrc.gov/reading-rm/adams.html

from one outage to the next. The staff notes that this is not uncommon and is normally attributed to analyst and technique variability.

In the second RAI, the NRC staff requested that the licensee provide a breakdown of location, through-wall penetration, and a discussion of how the volumetric indications identified in the same table were dispositioned. The licensee provided the following information and indicated that tubes were plugged (dispositioned) based on the technical specification (TS) plugging limit of 40% through-wall:

SG "A"

R1C87 - 27% through-wall indication which resulted from sludge lance equipment

R49C29 - 27% through-wall (*)

R50C29 - 23% through-wall (*)

(*) These indications were attributed to a potential loose part (PLP); however, no part was identified during the foreign object search and retrieval inspection (FOSAR). These indications had no change in the depth of through-wall penetration from the previous outage.

SG "B"

R1C87 - 37% through-wall indication which resulted from sludge lance equipment

R1C87 - 37% through-wall indication which resulted from sludge lance equipment

SG "C"

R1C87 - 32% through-wall indication which resulted from sludge lance equipment

R1C87 - 31% through-wall indication which resulted from sludge lance equipment

SG "D"

R13C3 - 46% through-wall, this tube was plugged (**)

R13C4 - 30% through-wall (**)

(**) These indications were located in peripheral tubes and were attributed to a PLP; however, no part was identified during the FOSAR.

In the third RAI, the staff requested the location, through-wall penetration, and an explanation of how wear indications were dispositioned at the flow distribution baffle. The licensee indicated that the indication in SG "A" was located at R1C91, on the cold leg, and was 18% through-wall while the indication in SG "D" was located at R1C32, on the hot leg, and was 25% through-wall. These indications were left in service since they did not exceed the tube repair limits in the TSs.

Based on the staff's review of the information provided by the licensee, the staff concludes that the information required to be submitted by the TS was provided and that no additional follow-up is required. The staff notes that the RAIs were discussed with the licensee shortly before their 2003 outage and that additional discussions were held with the licensee to discuss the results of their 2003 outage (refer to ML033490139 for additional details). The NRC staff will review the reports that the licensee submits pertaining to their 2003 SG tube inspections when these reports are submitted.

Seabrook Station, Unit No. 1

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