ENCLOSURE 2

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket Nos.:	50-498 50-499
License Nos.:	NPF-76 NPF-80
Report No.:	50-498/97-18 50-499/97-18
Licensee:	Houston Lighting & Power Company
Facility:	South Texas Project Electric Generating Station, Units 1 and 2
Location:	FM 521 - 8 miles west of Wadsworth Wadsworth, Texas
Dates:	July 21-24, 1997
Inspector:	I. Barnes, Technical Assistant
Approved By:	Arthur T. Howell III, Director Division of Reactor Safety

ATTACHMENT: Supplemental information

EXECUTIVE SUMMARY

South Texas Project Electric Generating Station, Units 1 and 2
NRC Inspection Report 50-498/97-18; 50-499/97-18

Engineering

- The Westinghouse material specifications applicable to procurement of pressure boundary materials were found to generally conform to ASME Section III Code and the technical and quality requirements contained in licensee Specification 4R129NS1014, Revision 0. A violation was, however, identified in regard to the approval by the licensee of the use of a different pressure boundary material to that permitted by Specification 4R129NS1014, Revision 0, without concurrent specification revision to reflect the design change (Section E1.1).

- No deficiencies were noted in the majority of vendor certifications reviewed. However, prod method magnetic particle examination records from Ansaldo for steam generator upper shell courses indicated use of amperage values, during examination of longitudinal weld joint preparation surfaces and the ground root of the initial welds, which appeared to exceed the maximum permitted by Article 7, paragraph T-743.2, of the ASME Section V Code (Section E1.1).

- The licensee has established comprehensive technical and quality requirements for the Unit 1 replacement steam generators. Numerous requirements were included in the specification to minimize the vulnerability of the replacement steam generator tubing to intergranular attack and intergranular stress corrosion cracking at the tube sheet and tube support locations, preclude significant erosion/corrosion degradation of the feedring, and minimize tube bundle wear (Section E1.2).

- Licensee engineering staff efforts to assure that Inconel 690 tubing meets current Electric Power Research Institute requirements and has a high eddy current signal to noise ratio were considered impressive (Section E7.1).

- Overall, the licensee quality organization was considered proactive in its scope of monitoring of Unit 1 replacement steam generator manufacture, with surveillances performed or planned at all Westinghouse major sub-component vendors and a resident inspector located at the Westinghouse, Pensacola plant (Section E7.1).

- The effectiveness of licensee engineering representatives at Westinghouse, Monroeville and Westinghouse, Pensacola could not be assessed due to the absence of a work plan and documentation of their activities (Section E7.1)

Report Details

This inspection was the first performed (using Inspection Procedure 50001) in regard to planned oversight of Unit 1 replacement steam generator design, manufacture, and installation activities. The primary purposes of the inspection were to review the technical and quality requirements imposed on the steam generator vendor (Westinghouse), ascertain the scope of planned licensee oversight of design and manufacturing activities, and make an initial review of Westinghouse procurement activities.

Summary of Plant Status

Units 1 and 2 were at 100 percent power during the inspection period.

III. Engineering

E1 Conduct of Engineering

E1.1 Westinghouse Steam Generator Procurement Activities

a. Inspection Scope (50001)

The inspector reviewed the Westinghouse technical and quality requirements that were imposed on the vendors selected for manufacture of the steam generator upper and lower shell courses, the transition cone, the elliptical upper head, and the tubesheet. In addition, the inspector examined vendor certification for the above pressure boundary items that had been received and accepted by Westinghouse for use in manufacture of the first Unit 1 steam generator. The vendor certification reviewed by the inspector was requested by the licensee from the Westinghouse Pensacola plant, the location of manufacture of the Unit 1 steam generators.

b. Observations and Findings

The inspector reviewed the technical and quality requirement that were contained in Westinghouse Material Specifications A533C07, "SA-533 Type B Class 2 Plate (Section III-NB)," Revision C; A508C20, "SA-508 Class 3a Tube Plate Forgings (Section III-NB)," Revision D; A508C23, "SA-508 Class 3a Shell (Ring) Forgings (Section III-NB)," Revision C; and A508C24, "SA-508 Class 3a Elliptical Head Forgings (Section III-NB)," Revision C. With one exception, the material specifications were found to conform to the applicable ASME Section III Code (i.e., 1989 Edition, no Addenda) requirements and the technical and quality requirements contained in licensee Specification 4R129NS1014, "Replacement Steam Generators," Revision 0. The exception pertained to the material selected by Westinghouse for the manufacture of "H" and "J" upper shell courses by Ansaldo, Italy. Westinghouse Material Specification A533C07, Revision C, which pertained to SA-533, Grade B, Class 2 plate, was selected for the shell courses (Purchase

Order E52891). The inspector noted, however, during review of licensee Specification 4R129NS1014, Revision 0, that the specification permitted only SA-533, Grade B, Class 1 (a lower minimum yield and tensile strength material than Class 2) plate for steam generator pressure boundary material. The licensee approved the use of the Class 2 plate material by Letter ST-W2-HS-000040 dated June 4, 1996. The failure to reconcile the use of a different pressure boundary material to that permitted by Specification 4R129NS1014, Revision 0, is a violation of Criterion III and Criterion V of Appendix B to 10 CFR Part 50 (50-498/9718-01).

No problems were noted during review of vendor certification for the tubesheet, lower shell course, transition cone, and elliptical head forgings. The vendor documentation was, in general, comprehensive and was found to comply with ASME Section III Code and Westinghouse material specification sampling and testing requirements.

However, during review of the Ansaldo certification for the upper shell courses, the inspector observed that the reported magnetic particle examination data appeared to not conform to ASME Section V Code prod amperage requirements. Specifically, Article 7, paragraph T 743.2 of ASME Section V Code requires an amperage range of 100-125 amperes per inch of prod spacing be used for conducting magnetic particle examinations of section thicknesses 3/4 inch and greater. Ansaldo was required by Westinghouse Drawing 6488E61 to perform a magnetic particle examination of the longitudinal weld joint preparation surfaces, the dressed root of the initial weld prior to completion of the weld from the second side, and the final post weld heat treated surfaces. During review of Test Report 11581 dated January 15, 1997, which pertained to magnetic particle examination of the root of a "J" shell (Item 006, Purchase Order E52891) longitudinal weld seam after grinding, the inspector observed that the recorded amperage and prod spacing values were, respectively, ~1000 amperes and ~180 mm. The maximum amperage permitted by the ASME Section V Code for this prod spacing was calculated by the inspector to be 886 amperes. The use of ~1000 amperes for the examination thus appeared to exceed ASME Section V Code requirements. The inspector reviewed the magnetic particle examination test report for the weld joint preparation surfaces for the "J" shell course and the corresponding test reports for the "H" shell course, and noted the same recorded values for amperage and prod spacing. The licensee requested Westinghouse to obtain a clarification from Ansaldo on the issue. Ansaldo indicated in response that the value used in the certificate was the maximum the operators could use depending on prod spacing. The inspector considered the reported practice to be atypical for preparation of a nondestructive examination report. Licensee management was informed at the exit interview that the transmittal letter for the inspection report would probably request the licensee to furnish the corrective actions taken by Westinghouse with respect to the potential Code violation.

The inspector requested the licensee to obtain information regarding the compliance by the foreign Westinghouse pressure boundary material subvendors with the requirements of ASTM E23 in regard to: (1) the design of their Charpy impact machines, and (2) the performance of annual calibrations using standard Charpy-V impact specimens. This request was made because of the awareness of the inspector that, in the past, there were differences in requirements for Charpy impact machines between various national standards which could affect the developed impact test values. Similarly, while reviewing drop weight test results, the inspector noted examples where different hardfacing electrodes were used in specimen preparation to those specifically identified in ASTM E208. Accordingly, the inspector requested the licensee to obtain information regarding compliance of the Westinghouse subvendors with the requirements of ASTM E208. The licensee indicated their intent to obtain the requested information. Review of the furnished information regarding compliance with the requirements of ASTM E23 and ASTM E208 is considered an inspection followup item (50-498/9718-02).

c. Conclusions

The Westinghouse material specifications applicable to procurement of pressure boundary materials were found to generally conform to ASME Section III Code and the technical and quality requirements contained in licensee Specification 4R129NS1014, Revision 0. A violation was, however, identified in regard to the failure of the licensee to reconcile the use of a different pressure boundary material to that permitted by Specification 4R129NS1014, Revision 0. No deficiencies were noted in the majority of vendor certifications reviewed. However, prod method magnetic particle examination records from Ansaldo for steam generator upper shell courses indicated use of amperage values, during examination of longitudinal weld joint preparation surfaces and the ground root of the initial welds, which appeared to exceed the maximum permitted by Article 7, paragraph T-743.2, of the ASME Section V Code.

E1.2 Licensee Steam Generator Technical and Quality Requirements

a. Inspection Scope (50001)

The inspector reviewed Specification 4R129NS1014, Revision 0, to ascertain the scope of the licensee technical and quality requirements for the Unit 1 replacement steam generators and to focus on whether the licensee had incorporated in the requirements lessons learned from the degradation mechanisms that had been experienced in earlier steam generator models.

b. Observations and Findings

The inspector noted from review of Specification 4R129NS1014, Revision 0, that the document contained comprehensive technical and quality requirements. Initial

review of the document indicated that it appeared to provide an appropriate set of baseline criteria for the steam generator replacement activities, with appropriate consideration given to control of modifications (including use of 10 CFR 50.59), accident analyses, design loads, materials and process selection, thermal hydraulics, and rigging and handling. During the review, the inspector focused on technical requirements that would affect susceptability to historical steam generator degradation mechanisms. The inspector noted that the licensee had included requirements in the following areas:

- Specification of use of Inconel 690 tube material to enhance resistance to intergranular stress corrosion and intergranular attack. The licensee also invoked the requirements of Electric Power Research Institute Document NP-6743-L, "Guidelines for PWR Steam Generator Tubing Specifications and Repair Specifications for Alloy 690 Steam Generator Tubing," Volume 2, for the tubing; established additional process control requirements for tubing manufacture; and imposed enhanced eddy current signal to noise requirements.

- Established requirements for tube supports that would minimize denting and promote more favorable chemistry conditions at these locations.

- Provided criteria for minimizing vibration and wear in the tube bundle.

- Included requirements for optimizing extent of subcooling at the tube sheet surface, which should improve chemistry environment at this location and reduce incidence of intergranular stress corrosion cracking and intergranular attack.

- Established feedring design criteria to preclude erosion/corrosion and thermal fatigue failure concerns.

The inspector considered the specific requirements implemented by the licensee were appropriate responses to known degradation mechanisms and, if appropriately responded to by Westinghouse, should significantly reduce the susceptibility of the replacement steam generators to stress corrosion, erosion/corrosion, and wear degradation mechanisms.

c. Conclusions

The licensee has established comprehensive technical and quality requirements for the Unit 1 replacement steam generators. Numerous requirements were included in the specification to minimize the vulnerability of the replacement steam generator tubing to intergranular attack and intergranular stress corrosion cracking at the tube sheet and tube support locations, preclude significant erosion/corrosion degradation of the feedring, and minimize tube bundle wear.

E7 Quality Assurance in Engineering Activities

E7.1 Oversight of Steam Generator Vendor Engineering and Manufacturing Activities

a. Inspection Scope (50001)

The inspector reviewed: (1) licensee Audit Report 96-043 dated May 28, 1996, which documented the licensee's initial audit of the Westinghouse, Pensacola plant; (2) licensee quality surveillance reports for Japan Steel Works, Kobe Steel, Ltd., and AB Sandvik Steel; (3) selected vendor inspection reports that were prepared by a licensee resident inspector at the Westinghouse, Pensacola plant; (4) resident inspector selection of process hold points at the Westinghouse, Pensacola plant; and (5) the AB Sandvik Steel Report MC 4601 PP, "Pre-Production Evaluation Report," Revision 1. In addition, the inspector interviewed Quality and Engineering personnel regarding current and planned oversight of Westinghouse activities.

b. Observations and Findings

The inspector noted that the licensee has either performed or plans to perform surveillances of all major Westinghouse subvendors for the Unit 1 replacement steam generators. The most significant licensee finding noted by the inspector pertained to inadequate performance by a subtier agency retained by Westinghouse to perform audits of their subvendors. The audit of the Westinghouse, Pensacola plant was viewed by the inspector as comprehensive. The inspector was informed by quality management that a licensee inspector was positioned at Westinghouse, Pensacola prior to the start of manufacturing of the Unit 1 replacement steam generators, thus providing an opportunity for the individual to familiarize himself with the manufacturing processes by observing work that was in progress on other steam generators. The inspector considered this a good decision, and noted from review of the hold point selections and the resident inspector's reports that the individual appeared to be very active in observation of Unit 1 replacement steam generator manufacturing activities. The inspector was informed, however, that a documented inspection plan had not been prepared to provide guidance to the resident inspector on the specific areas and subjects to focus attention on. The inspector considered this an area where improvement could be made, in that preparation of such a plan provided engineering and quality the opportunity to identify the areas of greatest significance and concern for inspection followup.

The inspector was informed that an engineering representative was assigned for liaison and oversight of engineering activities at both Westinghouse, Monroeville and Westinghouse, Pensacola. These individuals were reported to be spending approximately 50 percent of their time at the Westinghouse facilities. The inspector was unable to meaningfully assess the role and effectiveness of these individuals, due to the absence both of a documented activity plan and a requirement to generate activity reports for licensee management information and review.

The inspector was impressed with the overall efforts made by licensee Engineering personnel to assure that the Inconel 690 tubing to be furnished by AB Sandvik Steel meets current Electric Power Research Institute requirements and has a high eddy current signal to noise ratio. These efforts culminated in a visit to Sweden for a pre-production evaluation of 20 tubes from another Westinghouse project with essentially identical tubing.

c. Conclusions

Overall, the licensee quality organization was considered proactive in its scope of monitoring of Unit 1 replacement steam generator manufacture, with surveillances performed or planned at all Westinghouse major sub-component vendors and a resident inspector located at the Westinghouse, Pensacola plant. The effectiveness of licensee engineering representatives at Westinghouse, Monroeville and Westinghouse, Pensacola could not be assessed due to the absence of a work plan and documentation pertaining to their activities. Licensee engineering staff efforts to assure that Inconel 690 tubing to be furnished by AB Sandvik Steel would meet current Electric Power Research Institute requirements and have a high eddy current signal to noise ratio were considered impressive.

V. Management Meetings

X1 Exit Meeting Summary

The inspector presented the inspection results to licensee staff on July 24, 1997, at the conclusion of the onsite inspection. The licensee acknowledged the findings presented. Westinghouse documents were reviewed during the inspection which were identified as containing proprietary information. The specific content of the documents that was considered proprietary was not identified. No information was included in the inspection report that was considered proprietary.

ATTACHMENT

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

T. Bosquez, Senior Nuclear Support Engineer, Central Power and Light
D. Chamberlain, Design Engineer,
T. Cloninger, Vice President, Engineering
J. Conly, Licensing Engineer
H. Domschke, Supervisor, Procurement Quality
A. Granger, Administrator, Engineering Quality
S. Head, Licensing Supervisor
J. Haning, Engineer
D. Hess, General Supervisor, Nuclear Contracts
M. McBurnett, Licensing Manager
A. McIntyre, Director, Engineering Projects
W. Redd, Director, Records Management System
R. Rehkugler, Director, Quality
S. Timmaraju, Design Engineer
D. Towler, Operations Quality Supervisor
D. Wohleber, Project Manager, Steam Generator Replacement Project

NRC

W. Sifre, Resident Inspector

INSPECTION PROCEDURES USED

IP 50001 Steam Generator Replacement Inspection

ITEMS OPENED

Opened

50-498/9718-01	VIO	Failure to update steam generator specification to reflect approval of use of SA-533, Grade B, Class 2 plate
50-498/9718-02	IFI	Compliance of material manufacturers with the requirements of ASTM E23 and E208 during mechanical testing of material samples

LIST OF DOCUMENTS REVIEWED

Licensee Specification 4R129NS1014, "Replacement Steam Generators," Revision 0

Operations Quality Assurance Plan, Section 7.0, "Procurement"

Westinghouse Material Specification A533C07, "SA-533 Type B Class 2 Plate (Section III-NB)," Revision C

Westinghouse Material Specification A508C20, "SA-508 Class 3a Tube Plate Forgings (Section III-NB)," Revision D

Westinghouse Material Specification A508C23, "SA-508 Class 3a Shell (Ring) Forgings (Section III-NB)," Revision C

Westinghouse Material Specification A508C24, "SA-508 Class 3a Elliptical Head Forgings (Section III-NB)," Revision C

Vendor certification packages for pressure boundary materials

Selected vendor inspection reports for Westinghouse, Pensacola

May 1996 Audit Report for Westinghouse, Pensacola

Surveillance Reports for Kobe Steel, Ltd., Japan Steel Works, and AB Sandvik Steel