UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

Report Nos.: 50-327/92-10 and 50-328/92-10

Licensee: Tennessee Valley Authority
3B Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Docket Nos.: 50-327 and 50-328 License Nos.: DPR-77 and DPR-79

Facility Name: Sequoyah 1 and 2

Inspection Conducted: March 18-21, 23-26, 1992

Inspector: _____ 4/21/92
J. J. Lenahan Date Signed

Approved by: _____ 4/21/92
J. J. Blake, Chief Date Signed
Materials and Processes Section
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope:

This special announced inspection was conducted in the areas of follow up on the licensee's investigation and correction actions regarding binding of ice condenser doors and review of instrument maintenance procedures.

Results:

In the areas inspected, violations or deviations were not identified.

The licensee took prompt action in identifying problems with the ice condenser doors on Unit 1 after the problem was identified on Unit 2. Decision making was at a level which ensured adequate management review.

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A continuing weakness was identified in the Unit 1 and Unit 2 containment building regarding housekeeping during outage activities (paragraphs 2.c and 2.d). A weakness was also identified in procedures which contained errors or references to canceled/ outdated procedures (paragraphs 2.d and 3). Material condition problems were identified which resulted from either past maintenance practices or construction deficiencies (paragraph 2.c).

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*R. Beecken, Plant Manager
*J. Byrum, Vice President, Nuclear Operations
J. Casey, System Engineer
*M. Cocher, Site Licensing Manager
*T. Flippo, Site Quality Manager
*D. Lundy, Supervisor, Nuclear Engineering
M. Maxwell, Supervisor, Civil Section, Nuclear Engineering
*J. Proffit, Compliance Licensing Engineer
*H. Rogers, Manager, Tech Support
B. Snider, Ice Condenser System Engineer
*R. Thompson, Compliance Licensing Manager
*P. Trudel, Manager, Nuclear Engineering
*J. Wilson, Vice President, Sequoyah
*J. Willis, BOP Section Supervisor

Other licensee employees contacted during this inspection included engineers, mechanics, and technicians.

Other Organizations

C. Scabis, Project Engineer, Westinghouse
*A. Wong, Chief Structural Engineer, Stone and Webster

NRC Resident Inspector(s)

*W. Holland, Senior Resident Inspector
R. McWhorter, Resident Inspector
*S. Shaeffer, Resident Inspector

*Attended exit interview

2. Follow-up on Licensee's Investigation of Cause of Movement and Cracking of Ice Condenser Floor Slab, Units 1 and 2 (93702)

a. Background

On March 16, 1992, after Unit 2 was shut down for refueling, inspection of the ice condenser doors disclosed that 27 of 48 doors were inhibited from opening. The cause of the problem was discovered to

be upward movement of the ice condenser floor slab which caused the flashing at the bottom of the doors to interfere with the door opening. An inspection was performed by the licensee on the Unit 1 doors while Unit 1 was operating at power. Similar problems were identified, although to a lesser degree, which affected 11 of 48 Unit 1 doors, inhibiting door operation. When this problem was discovered on Unit 1, an orderly shutdown of the Unit was conducted pending resolution of the observed problems with the ice condenser doors. The ice condenser is divided into 24 bays, with each bay having a pair of inlet doors, for a total of 48 doors. During design basis accident conditions, the ice condenser doors open to permit entry of the steam/air mixture into the ice condenser, where energy is removed by condensing of the steam by melting of the ice. The doors are designed to open at a differential pressure of 1 psf.

b. Ice Condenser Floor Design Description

A typical section of the ice condenser floor consists of an 18 inch thick reinforced concrete structural slab, covered with a copper sheeting which serves as a vapor barrier. The structural slab spans between the crane wall and columns adjacent to the steel containment vessel. The Unit 1 structural slab was post-tensioned. There is a three-inch gap between the ice condenser floor assembly and the steel containment vessel. The gap is closed with rubber seal attached to the bottom of the structural slab. A 15 inch thick insulating layer of foam concrete is poured over the vapor barrier. On top of the foam concrete, a one-inch layer of grout was placed as a leveling surface for a prefabricated metal floor assembly which is a ¼ inch thick steel plate with glycol piping attached to it. A four inch thick concrete wear slab was poured on top of the prefabricated floor assembly to provide a working surface and to protect the glycol piping. The glycol piping is ½-inch diameter schedule 80 carbon steel. Reinforcing steel was placed in the top of the wear slab.

Each bay of the wear slabs is independent of the adjacent bays and separated by expansion joints. An expansion joint is also provided between the crane wall and the wear slab, and around steel columns which support the lower ice condenser structure. Design details specified sealing the expansion joints with a silicone sealer material. A 16-inch diameter drain line is provided in 20 of the bays to remove water from the ice condenser during maintenance activities or accident conditions. The drains discharge into lower containment.

The inspector reviewed the construction drawings which show details of the ice condenser floor construction. These drawings were as follows:

- TVA drawing numbers 41N733-1 through -7, Concrete Floor Reinforcement Details

- TVA drawing number 41N721-3, Concrete Crane Wall Outline

- TVA drawing numbers 48N995 through 48N998, Miscellaneous Steel, Ice Condenser Floor Embedded Parts, Sheets, 1 through 4

- TVA drawing number 41N734-1, Columns

- TVA drawing numbers 47W 462-9, -10, -11, Mechanical - Ice Condenser System

- Westinghouse drawing number 1185F54, Ice Condenser Containment Floor Structure Cover Plate Assembly

The inspector also reviewed Westinghouse specification number 952214, Foam Concrete for Ice Condenser Floor. This specification covers the properties of the insulating concrete. The foam concrete had a density of 35 pcf, a minimum 28-day compressive strength of 110 psi, and a thermal conductivity not exceeding 1.0 BTU-in/°F-hr-FT². The foam concrete supplied was a proprietary mixture. Structural concrete, reinforcing steel, and the post-tensioning system installed in the Unit 1 structural slab was constructed under TVA specifications.

c. Inspection of Unit 1 Ice Condenser Floor

The inspector performed walkdown inspections of the Unit 1 ice condenser. Prior to the inspector's initial walkdown inspection, the flashing which restricted door movement had been removed. The inspector checked all 48 Unit 1 ice condenser doors and verified that they were not restricted from opening. The inspector examined the wear slab and observed areas damaged (cracked) by the upward movement of the wear slab. The damage areas were generally around the ice condenser support structure columns. The inspector noted that the bags of insulation which had been previously enclosed behind the vertical flashing were loose and could potentially move during accident conditions. The inspector expressed concern to licensee

design engineers regarding the potential impact of the loose bags of insulation possibly effecting plant equipment operation during some accident conditions. The inspector also observed the following other problems during the walkdown:

- Four floor drain covers (gratings) were damaged. Two were cracked in half, while the remaining two had missing sections.

- Large amount of construction debris under the loose bags of insulation. Debris included sawdust, nuts, bolts, cigarette butts, etc.

- Some debris found on ice condenser wear slab, including nuts and washers from removed flashing pieces, pieces of plastic tie wraps, duct tape, etc.

- The expansion joint sealers had been omitted around the "C" line columns.

The inspector walked down the lower containment area and examined the underside of the structural slab which supports the ice condenser floor. The inspector noted one area along a construction joint which was stained white, which probably indicated leakage of borated water. No degradation of the structural slab was identified during the walkdown. However, the inspector identified a missing nut on an ice condenser "A" line column support anchor bolt in Accumulator Room 3, a damaged column near the seal table and a snubber, number SGBH-108, which appeared to be binding. These items were identified to licensee engineers who issued work requests to investigate/repair these problems. The above listed items were identified to licensee management as weaknesses in material conditions and as weaknesses in housekeeping.

During the walkdown inspection of lower containment, the inspector witnessed inspection of the steel containment vessel using a boroscope camera. This examination was confined to a small area of the vessel, but did not indicate any corrosion of the steel plate.

d. Inspection of Unit 2

The inspector performed a walkdown inspection of the Unit 2 ice condenser to examine the damage that occurred when the wear slab moved in the upward direction. The areas damaged were the same as those on Unit 1, but the damage/cracking was more severe. Licensee

engineers had identified areas in Unit 2 where the expansion joint sealer had been omitted. Licensee engineers were mapping the cracked areas and were in the process of evaluating methods to repair the Unit 2 ice condenser wear slab during the current refueling outage. Problems were also identified by the inspector with housekeeping practices during outage/maintenance activities in the Unit 2 ice condenser. Items were noted scattered on the floor throughout the ice condenser including 9-volt batteries, light bulbs, and duct tape. This problem was identified to the licensee as another example of the continuing weakness in housekeeping at the site. The inspector also noted potential problems with storage of tools and materials on scaffolding without kickboards, contrary to the requirements specified in paragraph 4.5.5, Appendix C, of Procedure SSP-12.7, Housekeeping/Temporary Equipment Control, and ladders which were secured with only two wraps of 14 gauge wire at two locations near the top support, not four wraps as specified in paragraph 9.2 of SSP-12.58, Criteria for Erection of Scaffolds and Ladders in Seismically Qualified Structures. While these problems have little safety significance, they are an indication of inadequate procedural compliance by licensee employees. This problems is exacerbated by excessive requirements in some procedures which make the procedures too complex, lengthy, and difficult to follow. Procedure SSP-12.7 is 51 pages long, specifying in addition to housekeeping requirements important to safety, office area decor, and color coded housekeeping rating systems. Procedure SSP-12.58, Revision 0, which was approved March 6, 1992, contains references to a procedure canceled in December 1991. The inspector identified these problems to licensee management as procedural weaknesses.

e. Review of Licensee's Evaluation of Unit 1 Ice Condenser Floor Operability

The inspector reviewed the licensee's evaluation of the acceptability of the condition of the wear slabs in the Unit 1 ice condenser for restart. The inspector reviewed calculation number B 87 921 321 001, Structural Inspection/Evaluation of Ice Condenser Components After Slab Lifting. This calculation evaluates loads acting on the turning vanes due to upward movement of the wear slab and any resulting downward loads imposed on the structural slab. The loads were within design allowable values. The inspector also reviewed the licensee crack maps which document location and extent of the Unit 1 wear slab cracking, and the licensee measurement of clearance below each ice condenser door. The inspector reviewed Temporary Alteration Control Form Number 1-92-16-061, which specified removal of

the loose bags of insulation from under the ice condenser door and placement of ARMAFLEX insulation on the crane wall as a replacement for the loose insulation. Documentation reviewed included the safety assessment and the 10 CFR 50.59 review. The inspector examined the new insulation after the majority had been installed, but prior to final work completion. The insulation was firmly adhered to the crane wall in most areas, with the exception of sections at the outer edgers in a few bays, which required additional adhesive. However, work was still in progress.

The inspector also reviewed the licensee's plans for monitoring the wear slab to assure that door operability would not be affected during plant operation due to additional wear slab movement. The inspector reviewed a draft copy of procedure O-PI-SXX-061-001.0, Ice Condenser Lower Plenum Floor Monitoring. The monitoring program provides for installation of two extensiometers in each bay to monitor floor movement periodically. The data can be read remotely as frequently as necessary during plant operation. Based on review of the licensee's evaluations and proposed monitoring program, the inspector concurred with licensee's corrective action plans for Unit 1.

Violations or deviations were not identified.

3. Instrument Maintenance Program - Units 1 and 2 (62704)

The inspector reviewed Appendix F of procedure number M&AI 24, Revision 2, Installation, Inspection, and Documentation of Instrumentation Features after July 15, 1989. This appendix specifies the requirement for installation of compression fitting on instrument lines. The procedure specifies prerequisite work instructions, QC inspection requirements and provides specific vendor recommendations for various brands of fittings used onsite. Overall, the procedure was very comprehensive. One weakness identified was in paragraph 2.12, which references Attachments 1 and 2 to Appendix F, when in fact there were no attachments 1 and 2. This is another example of overly complex/too lengthy procedures which apparently are not being thoroughly reviewed by procedure writers and the individuals approving the procedures. The inspector also questioned why the procedure users did not identify this problem.

The inspector also reviewed Section 6.3 of maintenance instruction O-MI-MRR-094-002.0, Retraction, Reinsertion, Removal, Replacement, Repositioning and/or Capping of Incore Flux Detector Thimbles. This section

of the procedure specifies detailed work instructions, precautions/ limitations, QC inspection hold points for reinstallation of Swage Lok fittings on incore instrument tubing at the Seal Table.

Violations or deviations were not identified.

4. Exit Interview

The inspection scope and results were summarized on March 26, 1992, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

The licensee was informed that any enforcement actions pertaining to operability of the ice condenser doors would be discussed in the Resident Inspectors' Report, Numbers 50-327/92-06 and 50-328/92-06, for reporting period ending April 7, 1992.