UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

Report Nos.: 50-327/94-03 and 50-328/94-03

Licensee: Tennessee Valley Authority
6N 38A 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: January 11-14, 1994 and January 24-28, 1994

Inspector: _____ 2/17/94
J. J. Lenahan Date Signed

Approved by: _____ 2/17/94
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 vibration of the elevation 706 slab in the Unit 2 turbine building, repair of a hydrogen leak in the Unit 2 turbine generator, review of procedures, repairs to the Unit 1 ice condenser, and operability reviews of Unit 1 civil/structural items which will remain open after Unit 1 restart.

Results:

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

A weakness was identified regarding documentation of deficiencies in Balance-of-Plant equipment in accordance with the licensee's corrective action program. (Paragraphs 2.0 and 3.0)

A continuing weakness was identified in preparation, review and approval of procedures. (Paragraph 4.0)

An unresolved item was identified regarding an apparent inadequate evaluation of the effect of bonding of grout on concrete expansion anchor installation torque. (Paragraph 6.2.6)

REPORT DETAILS

1.0 Persons Contacted

**J. Basraszewski, Compliance Licensing Engineer
#M. Burzynski, Site Engineering Manager
#M. Cooper, Acting Maintenance Manager
#R. Driscoll, Site Quality Manager
*R. Fenech, Sequoyah Site Vice-President
D. Lundy, Technical Support Manager
J. O'Bannion, Predictive Maintenance Engineer
**D. Osborne, Lead Civil Engineer
*K. Powers, Plant Manager
R. Shell, Site Licensing Engineer
**F. Taylor, Civil/Structural Analysis Supervisor
#R. Thompson, Compliance Licensing Manager
#J. Ward, Engineering and Modifications Manager

Other licensee employees contacted during this inspection included craftsmen, engineers, technicians, and administrative personnel.

NRC Resident Inspector

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

*Attended January 14, 1994 exit interview
**Attended January 28, 1994 exit interview
#Attended both exit interviews

2.0 Review of Corrective Action to Reduce Vibration of Unit 2 Turbine Building Intermediate Slab. (37700)

In November 1991, operations personnel noticed that the Unit 2 intermediate turbine building, elevation 706, pedestal floor was vibrating. The floor slab is located directly below the main turbine deck. The amplitude of the vibration was measured at 7 mils (.007 inches). By August, 1992, the vibration had increased to 16 mils, and an investigation was started to determine the cause of the vibration, and to determine a solution to reduce the vibration.

Licensee engineers conducted a vibration survey on the Unit 2 elevation 706 floor slab. The survey was performed using a grid system. The survey data showed the highest vibration occurred at approximately the center of the slab and was 16 mils. The vibration data was analyzed and determined to be predominantly at 30 hertz (Hz) which is the operating speed of the turbine. The natural frequency of the floor slab was measured and found to be approximately 32.5 Hz; which showed that the floor was in resonance with the turbine generator.

The inspector reviewed the results of the licensee's investigation, summarized in Sequoyah Nuclear Plant Unit 2 Investigation Report, Turbine Building Elevation 706 Floor Vibration, dated October, 1992.

The inspector reviewed the vibration data for the floor slab, and the vibration data for the turbine and generator. The inspector also reviewed the licensee's engineering evaluation of the data and the corrective action proposed in the report.

The corrective action involved placement of approximately 25,000 pounds of weight on the slab at its center, where the amplitude was the maximum. DCN Q-08929B was issued to evaluate the strength of the existing slab to verify that it would not be overstressed by the additional weight, and to recommend the methods, sequence and acceptance criteria for weight placement. The weights were placed under work request WR C-081951. The vibration was monitored as the weights were placed in 3,500 pound increments. The amplititude of vibration decreased from 16 mils to 1.5 mils after placement of 24,500 pounds of weight.

On January 13, 1994, while Unit 2 was operating at approximately 35 percent power, the inspector observed measurement of the vibration of the elevation 706 slab. The vibration was measured to be 0.5 mils. The inspector examined the condition of the concrete slab, and noted that while some fine, hair-line cracks existed in the slab, the overall condition of the concrete slab was good. The inspector also reviewed the vibration data for the elevation 706 slab measured when the Unit was operating at 100 percent power on January 15, 1994. The maximum vibration was found to be 1.12 mils at 30 hertz.

The inspector questioned licensee engineers regarding how the vibration problem was documented when it was identified. The inspector questioned whether a Significant Corrective Action Report (SCAR) or a Problem Evaluation Report (PER) had been written when the problem was initially identified. These discussions disclosed that no formal corrective action document had been prepared, though one should have been required by Sequoyah Site Standard Practice procedure SSP 3.4, Corrective Action. (Procedure SSP 3.4 describes the Sequoyah corrective action program, specifies the process for documenting and resolving deficiencies, and specifies trending requirements.)

The failure to write a PER or SCAR to document and resolve the elevation 706 floor slab vibration was not identified as a violation since the problem was documented in a technical report, and resolved using the design change notice process. In addition, the slab vibration did not affect a safety related structure. However, the licensee's failure to follow the corrective action program specified in the site standard practice for identifying and resolving deficiencies was identified as a weakness.

Violation or deviations were not identified.

3.0 Repair of Unit 2 Turbine Generator Hydrogen Leak. (62700)

A hydrogen leak in the Unit 2 turbine generator required shutdown of Unit 2 to find and repair the leak. The licensee determined the source of the leakage was around the neutral and main bushing pressure boundary flanges. The cause of the leakage was determined to be low torque on some of the flange bolts. Further investigation of the low torque problem disclosed that 3 of 24 bolts on C Neutral bushing flange were the incorrect material, and that numerous washers on all 6 flanges were the incorrect material.

The licensee issued work order number 94-00006-00 to verify the torque on the flange bolts, replace the incorrect bolts with the proper ones, and replace the washers. A locking device (a "pant leg" washer) was installed on each of the 24 bolts, on all six flanges. The inspector reviewed the work request and determined that the problems were corrected. Eleven of the 144 bolts in the six flanges had low torque. The inspector noted that the incorrect type bolts and washers and the bolts with low torque values were identified in the early AM on January 9, 1994, however, a PER was not initiated until January 13, 1994. The inspector questioned licensee personnel regarding the delay in writing a PER. TVA procedure SSP 3.4 states that PERs are to be written promptly. The four day delay between identifying the problem and writing the PER (number SQ 940021) is another example of the weakness discussed in paragraph 2, above.

Violations or deviations were not identified.

4.0 Review of Procedures. (37700)

The inspector performed a followup inspection to determine if procedure deficiencies and weaknesses identified during an inspection performed March 19-26, 1992, documented in NRC Inspection Report 50-327,328/92-10, had been corrected. The specific problems/concerns identified at that time were as follows:

- Procedure number M&AI 24, Revision 2, Installation, Inspection and Documentation of Instrumentation Feature After July 15, 1989. The effective date of this procedure was March 9, 1992. The inspector identified an error in paragraph 2.12 of Appendix F of this procedure which stated "Tube fittings shall be installed or reinstalled using the appropriate vendor's instructions supplied in Attachments 1 and 2 of this Appendix". However, there were no attachments to the Appendix. The inspector reviewed the current revision of M&AI 24, Revision 3, effective date June 21, 1993, and noted that this error had not been corrected. Since the appropriate vendor's instructions are included in Appendix F as Sections 3.0 through 7.0 in both Revision 2 and 3, this problem was not identified as a violation.

- Procedure SSP 12.7, Housekeeping/Temporary Equipment Control. The weakness identified with this procedure was that it was too lengthy, 51 pages long, and included housekeeping requirements which had no safety significance, for example, office area decor, and a color coded system to classify the adequacy of housekeeping. The current revision of SSP 12.7, Revision 10, effective date August 6, 1993, is 59 pages long, has not been edited to delete requirements of no safety significance, and contains references to six canceled procedures. The inspector questioned the need for the excessive requirements in this procedure, which results in the procedure being too complex, lengthy, and difficult to use and follow.

The inspector identified some other similar examples of administrative errors in current SSP procedures during the current inspection. These were as follows:

- Procedure SSP 12.5, Revision 0, Technical Specification Interpretations. This procedure, which was approved on September 13, 1991, has no effective date listed on the cover page.

- Procedure SSP 12.3, Revision 5, Equipment Clearance Procedure. One of three referenced developmental procedures, AI-3, was canceled in July, 1992. The current revision, Revision 5 of procedure SSP 12.3 was approved November, 1993.

The inspector questioned the process of preparation review and approval of procedures. The procedural problems discussed above were identified to licensee management as a continuing weakness in this area, and indicated that procedure review and approval process is inadequate.

Violations or deviations were not identified.

5.0 Repairs to Unit 1 Ice Condenser. (62700)

In March, 1992, the licensee discovered that the ice condenser floors, the wear slabs, in both Units 1 and 2 had moved upward, causing the flashing at the bottom of ice condenser doors to inhibit opening of the doors. The inspector examined the ice condensers and observed that the upward movement of the slabs resulted in cracking of the concrete around the ice condenser support columns. The inspector also observed that some of the expansion joint seals had not been installed in Unit 1 during original construction. The results of this inspection are documented in NRC Inspection Report number 50-327,328/92-10.

The cause of the ice condenser floor movement was found to be expansion of the foam concrete below the ice condenser floor. The foam concrete moved upward because it absorbed water when maintenance was performed in the ice condenser and expanded when the ice condenser was refrozen. The water intruded into the foam concrete through openings in the wear slab during the maintenance activities.

The licensee initiated a plant modification under DCN-M08924C to seal all openings in the wear slab. This included application of a sealant at all expansion joints, repairs to areas where the concrete was cracked, and application of a sealant over the concrete repairs. Also included in the modification was installation of drains in the foam concrete, repairs to flashing around the door frames, raising the turning vanes, and installation of a system to retain the coatings (sealants).

The inspector, accompanied by licensee engineers, walked down the Unit 1 ice condenser and examined the work completed under the modification for DCN-M08924C. This included the new drains (stand pipes), concrete repairs, coatings, the coating retention system, and adjusting the turning vanes. The inspector noted that the modification had been completed in accordance with the details shown in the design drawings/sketches included in the modification package, except for those deficiencies identified by the licensee during a pervious walkdown. These items are listed on a punchlist which require completion before close out of the modification for restart. The only deficiency identified by the inspector which was not included on the punch list was a housekeeping concern, which involved a "flat" file which was lying under the door sill in bay number one, behind the coating retention system. The licensee indicated that the file would be removed before restart .

Violations or deviations were not identified.

6.0 Review of Post-Restart Modifications. (37700)

6.1 Background

The inspector reviewed civil-structural issues which had been previously identified by the licensee which may remain open after restart. These issues included open problem evaluation reports, and unincorporated design change notices. The inspector reviewed the licensee's justification for continued operation and/or technical evaluations for the open issues. Acceptance criteria utilized by the inspector were the following TVA procedures.

- Site Standard practice SSP-3.4, Revision 10, Corrective Action

- Civil Engineering Instruction SQN-CI-90.02, Revision 0, Piping, Pipe supports and Equipment Operability Criteria for SQN 1 and 2

6.2 Post-Restart Issues Review

6.2.1 Degraded Anchorage on Air Handling Units - PER 930742

Issue

During walkdown inspections performed under the individual plant examination for external events (IPEEE) program, degraded connections were identified on anchorages for air handling units (AHU) installed on the roof of the auxiliary building. The deficiencies included broken anchor bolts on the anchorage, missing anchor bolts or nuts and/or loose nuts on the anchor bolts. The AHUs provided cooling for 480 volt shutdown boards.

Discussion

The licensee issued work requests to repair the anchorages. The licensee also performed an operability review and determined that the degraded anchorages did not affect operability of the equipment. The inspector examined the AHUs and verified that repairs had been completed on all but two anchorages on one unit. The repairs remaining required installation of nuts on 2 anchor bolts. The licensee has determined that the equipment is operable, but the repairs were scheduled to be competed prior to Unit 1 restart.

Licensee engineers examined other HVAC equipment and identified some other minor deficiencies. Work requests were issued to correct any deficiencies. The condition of the anchorage was evaluated and determined to be adequate.

Conclusion

The repairs to the AHU anchorages are acceptable for resi This issue may remain open after restart, pending close out of documentation. However repairs to all hardware will be completed prior to restart of Unit 1.

6.2.2 Possible Contamination of Diesel Fuel in Seven Day Tanks with Water - PER 930288

Issue

Small quantities of water had been detected in the seven day diesel fuel tanks. The licensee determined that the apparent source of water was through the vent lines. The tops of the vent lines are enclosed in a missile shield which trapped water. When the water level rose above the vent lines, the water flowed into the fuel tanks, contaminating the fuel.

Discussion

The licensee installed missile shields to protect the seven day tank vent lines on the roof of the diesel building. The missile shields consist of a small reinforced concrete box which enclose each vent line. The missile shield enclosure was installed under DCN M06558A. The licensee issued DCN F-09920A to provide drainage of the enclosed barrier, seal the missile shield to prevent entry of water, and modify the vent lines to reduce potential for moisture intrusion into the lines.

The inspector examined the in-process modification work. Weep holes had been installed in all four missile shields which will provide draining of the enclosures. Plates which cover the tops of the enclosure had been sealed on three of the four vent lines. Work was still in progress on the last enclosure.

Conclusion

The modification to resolve this problem will be completed by Unit 1 restart. The issue may remain open after restart pending closeout of documentation.

6.2.3 Seismic Qualification of 480 Volt MCC Boards in ERCW Building - PER 931558

Issue

During performance of the IPEEE inspection program, it was discovered that the 480 volt MCC boards in the ERCW were installed in the plant with a different configuration than used in seismic qualification testing.

Discussion

The results of the IPEEE inspection showed that the 480 volt MCC boards in the ERCW building were mounted to channels using two bolts per bay. The channels are welded to embedded plates in the ERCW building. Review of the seismic qualification test data showed that seismic simulation testing of these boards was performed with the boards mounted to the channels using four $\frac{1}{2}$ inch diameter bolts per bay. The inspector reviewed PER 931558 which documented this problem. The licensee made a comparison between the actual mounting of the boards with the test configuration mounting and determined that the ERCW MCC were qualified with the two bolt per bay mounting. However, DCN M-09859A was issued to install the four bolts per bay for MCC mounting to restore the original design margin. This work has been completed. The licensee inspected installation of other MCC cabinets under the IPEEE program and determined that the incorrect mounting of the ERCW MCC boards was an isolated occurrence.

Conclusion

This issue has been resolved. The final report for the IPEEE program will not be issued until 1995, after all work is complete. Discussions with licensee engineers disclosed that all field inspections have been completed and that no other similar problems had been identified regarding safety-related MCC boards.

6.2.4 Use of Incorrect Stress Intensification Factor in Small Bore Piping Analysis - PER 930542

Issue

A review of piping analysis calculations disclosed that a 2 inch diameter branch connection off a 24 inch diameter elbow was modeled using the incorrect stress intensification factor (SIF). The system affected was the ERCW piping.

Discussion

This problem affected Unit 1 only and is documented on PER 930542. The inspector reviewed the PER and the licensee's operability evaluation. The operability evaluation showed that the stress in the affected pipe is well below the code allowable limit. Review of piping drawings showed that this configuration was not a widely used design practice. Licensee engineers are currently revising the affected pipe stress analysis to incorporate the correct SIF. No modifications are likely to be required as a result of this problem.

Conclusion

This problem will not affect Unit 1 restart. The revisions to the piping analysis will be completed by March 1, 1994.

6.2.5 Component Cooling System Piping - PER 920345

Issue

Changes in operating modes for the component cooling system resulted in lower temperatures than considered in the original analysis. The revisions to operating conditions lowered the normal temperature of the component cooling water supply from 60° F to 40° F. The engineer responsible for the change did not realize that these temperature changes would affect the piping analysis. PER 92 0345 was written to document the problem.

Discussion

The inspector discussed this problem with licensee engineers and reviewed PER 920345. Reduction of the minimum temperature from 60° F to 40° F results in application of thermal stresses on the piping and pipe supports which had not been anticipated in the original piping design

analysis. All piping inside the Unit 1 containment affected by the operating mode change, and all Unit 1 and 2 piping between the containment penetrations and component cooling system heat exchangers were reanalyzed. These piping systems were the worst case configurations. The analysis indicated that all piping and associated supports meet operability criteria. The inspector reviewed the licensee's justification for continued operation and engineering evaluation. These evaluations show the piping is acceptable for restart. The licensee is presently completing final calculations to update the design analysis.

Conclusions

The piping affected by the revised operating temperature range is acceptable for restart. Some modifications to pipe supports will be required. These are scheduled to be completed during the next Unit 1 refueling outage.

6.2.6 Torquing of Concrete Expansion Anchors after Baseplates are Grouted - PER 930329

Issues

A problem was identified by the NRC Resident Inspectors at TVA's Watts Bar Nuclear Plant regarding installation of concrete expansion anchors. The problem concerned installation of concrete expansion anchors in grouted pads. Specifically, the anchors were installed through the baseplates in holes drilled in the concrete, grout was poured under the baseplate, and the anchors were torqued after the grout hardened. Since this installation procedure was contrary to the requirements of TVA Specification G-32, a violation was identified at Watts Bar. The licensee then issued PER 930329 to document and evaluate this problem at Sequoyah.

Discussion

The normal installation sequence for expansion anchors installed in baseplates which are to be grouted is to install and set the anchors to their minimum torque requirements before grout placement. If the grout is placed before the concrete expansion anchors are torqued, the effect of the grout bonding to the anchor is unknown. The bonding of the grout could affect final installation torque applied to the anchor. The installation torque is the critical parameter required for establishing the load carrying capacity of various size and length concrete expansion anchors.

Because of the question regarding possible effect of bonding of the grout on the final installation torque, the licensee decide to reset and retorque all anchors installed in grouted baseplates at Watts Bar. This was done in the following sequence:

- The nuts in the anchors were loosened and backed off to the end of the anchor.

- The anchor was reset by driving it down in the drilled hole by striking it with a hammer.

- The anchor was then retightened to its minimum required torque value using a calibrated torque wrench.

The inspector reviewed PER 930329 which was written to evaluate the applicability of the problem to Sequoyah. Review of the PER showed that concrete expansion anchors at Sequoyah may have been installed in grouted plates, and that the anchors may not have been set to their final installation torque until after the grout had been poured. The PER had been closed out based on the results of an evaluation documented in calculation number CSG-93-CA11. The inspector reviewed this calculation. The conclusions of the calculation was that the grout did not bond to the anchors and that the anchors at Watts Bar had been set properly. This evaluation was based on data collected at Watts Bar when anchors which had been installed in grouted baseplates had been reset and retorqued.

The data considered in the calculation includes the "as found" and "as-left" projections of the anchors. The "as-found" dimension was measured before resetting the anchor. The "as-left" dimension was measured after retorquing the anchor. Licensee engineers concluded that if the difference between these two values was very small, or if the two values were equal, the grout did not affect the final installation torque.

The inspector reviewed the Watts Bar anchor retorquing data attached to calculation CSG-93-CA11. The inspector questioned the conclusions in the calculation and the interpretation of the data. The inspector determined that the data is inconclusive. For example, the torque value applied to the Watts Bar anchors prior to grout placement is unknown. These anchors may or may not have been set to their minimum required torque value prior to grout placement. In addition, the behavior of anchors is erratic. The effect of resetting the anchor on original versus final installation torque is unknown. The conclusions reached in calculation CSG-93-CA11 does not demonstrate that bonding of grout to the anchors does not affect installation torque. The inspector also questioned the meaning of the last sentence of the second paragraph in Section 2.0, "Background" in the calculation. This sentence states "However, a verified condition adverse to quality does not exist since no data is available to substantiate that bonding is resulting in an inadequate anchorage installation".

Conclusions

The apparent inadequate evaluation of the Watts Bar anchor data in calculation CSG-93-CA11 was identified to the licensee as an Unresolved item 327,328/94-03-01, Assessment of Concrete Expansion Installation Data and Effect of Bonding of Grout to Anchor Installation Torque, pending further review by NRC. This issue is not considered a restart Item.

6.3 Summary and Conclusion

The inspector concluded that the items which will remain open after restart of Unit 1 comply with the licensee's operability criteria. The Unresolved Item discussed in paragraph 6.2.6 above is not a restart issue.

No violations or deviations were identified.

7.0 Exit Interview

The inspection scope and results were summarized on January 14 and 28, 1994, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results listed below. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

Unresolved Item 327,328/94-03-01, Assessment of Concrete Expansion Anchor Installation Data and Effect of Bonding of Grout to Anchor Installation Torque.