



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

Report No.: 50-261/92-09

Licensee: Carolina Power and Light Company
 P. O. Box 1551
 Raleigh, NC 27602

Docket No.: 50-261

License No.: DPR-23

Facility Name: H. B. Robinson

Inspection Conducted: April 13-17, 1992

Inspector: *J. J. Lenahan*
 J. J. Lenahan
 Reactor Inspector

5/11/92
 Date Signed

Accompanying Personnel:

- G. Bagchi, Chief, Structural and Geosciences Branch, NRR
- Y. Kim, Structural Engineer, Structural and Geosciences Branch, NRR
- H. Wang, Structural Engineer, Special Inspection Branch, NRR
- J. Braverman, Research Engineer, Brookhaven Natural Laboratory
- R. Morante, Senior Research and Development Engineer, Brookhaven National Laboratory

Approved by: *J. J. Blake*
 J. J. Blake, Chief
 Materials and Processes Section
 Engineering Branch
 Division of Reactor Safety

5/11/92
 Date Signed

SUMMARY

Scope:

This special, announced inspection was conducted in the areas of a structural design criteria audit and a site inspection of structures by a team from the NRR Structural and Geosciences Branch. The inspector also reviewed the instrument maintenance program.

Results:

In the areas inspected violations or deviations were not identified. Two inspector follow up items were identified - paragraph 2.c. A strength was identified in the licensee's piping improvement program and cooling pond dam inspection program paragraph 2.a. The following weaknesses in material conditions were identified: missing/loose nuts, bolts and washers in structural connections; lack of full thread engagement; defects in coatings on the containment building basement floor slab; and miscellaneous other structural defects. Some of these items had been identified and evaluated by the licensee, but repairs had not been made to restore the original design margin - paragraph 2.c. In addition the lack of written procedures to cover the installation and inspection of compression fittings is considered a weakness - paragraph 3.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *C. Baucom, Acting Manager, Regulatory Compliance
- *R. Beverage, Manager, Quality Control
- *S. Billings, Technical Aide, Regulatory Compliance
- *J. Bradshaw, System Engineer
- *R. Chambers, Plant General Manager
- *G. Comer, System Engineer
- *R. Crook, Senior Specialist, Regulatory Compliance
- *J. Curley, Manager, Robinson Engineering Support, Nuclear Engineering Department (NED)
- *D. Dyksterhouse, Project Engineer, NED
- W. Farmer, ISI Engineer, Technical Support
- *C. Jones, Senior Onsite Civil Engineer, NED
- E. Lear, Manager, Maintenance Support
- *M. Payne, Manager, Technical Support
- *L. Williams, Chief Civil Engineer, NED

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

NRC Resident Inspector

- *L. Garner, Senior Resident Inspector

*Attended exit interview

2. NRR Structural Audit and Inspection of Site Structures - 37701

The inspector accompanied three structural engineers from the Office of Nuclear Reactor Regulation (NRR) and two consultants from the Brookhaven National Laboratory while they performed an audit of structural design criteria and inspected site structures. Details of the audit/inspection are stated below.

a. Structural Audit

NRC structural engineers and consultants met with licensee engineers and discussed the following topics:

- Design criteria, including seismic, wind, flood protection, pile

foundation design, and load combinations

- Containment building design parameters including the results of the five year tendon surveillance testing, and discussion of the preliminary results from the 20 years structural integrity test, completed the week prior to this inspection.
- Support Anchorages.
- Spent fuel pool racks.
- Intake structure.
- Masonry wall design, including original IEB 80-11 program review, and the update pertaining to discovery and repair of penetrations in safety-related structures which were found to be filled with masonry block and/or brick.
- Ground water.
- Buried piping.
- Settlement issues and seismic instrumentation.
- Safety related water storage tanks.
- Design and construction of the cooling water dam. Results of periodic inspections performed on the dam.
- 10 CFR 50.59 evaluations and major structural modifications.
- Plant safety procedures for dealing with hurricanes, tornados and seismic events.
- USI A-46/IPEEE, Seismic Qualification of Equipment.

The licensee discussed their piping improvement program with the team. This program is an enhancement of IEB 79-14, which will result in improved piping drawings, updated piping calculations, and additional hanger modifications were required to restore the original design margin, improve pipe support configuration, and reduce stresses in supports and piping. This program was rated as a strength by the NRR audit team.

The inspector reviewed the results of the cooling pond dam inspections conducted in 1980, 1985, and 1990. These inspections were performed in accordance with Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants. The inspector reviewed the following reports which document the dam inspection results:

- Safety Investigation of Cooling Lake Dam and Appurtenant Structures, dated October, 1980
- Safety Inspection of Cooling Pond and Ash Dam, dated September, 1985
- Safety Inspection of Cooling Pond and Ash Dam, dated December, 1990

The inspector noted that the inspections were performed by qualified engineers experienced in the design and construction of dams. The inspector also noted that recommendations contained in the reports for remedial measures and maintenance have been implemented by the licensee. The licensee's dam inspection program was identified as a strength.

b. Inspection of Safety Related Structures

NRC personnel and consultants, accompanied by licensee civil engineers and operations personnel, walked down the structures listed below, and inspected those structures for any signs of deterioration, including concrete cracking/spalling, corrosion of steel, or other defects, e.g. missing or loose nuts and bolts, etc. A summary of the areas inspected and preliminary findings are as follows:

- Cooling Pond Dam - Overall the structure is in good condition. Small voids were identified at the water line in the concrete in upstream retaining wall, on the left abutment of the spillway. The vertical seals on the spillway tainter gates are leaking, permitting water to flow onto the structural supports for the gates. If this problem is not corrected, deterioration/corrosion of the supports may occur.
- Class 1 Bay of the Turbine Building - Minor steel corrosion was noted on a few beams/columns.
- Control Room - No defects were noted.

- Roofs of control and auxiliary buildings - Corrosion was noted around the foundation of one diesel generator air intake.
- Auxiliary Building and Diesel Generator Rooms - Numerous examples were noted of lack of full thread engagement on nuts on concrete expansion anchors and missing or loose washers, bolts, and nuts on baseplates and supports for some plant equipment. Licensee engineers indicated that the majority of these deficiencies had been previously evaluated and found to be acceptable. The audit team also noted numerous instances where drilled holes in concrete surfaces for concrete anchors, which had been abandoned, had not been patched. Some minor cracking in concrete walls was also noted.
- Containment Building Exterior Walls - The audit team examined concrete crack mapping areas for the structural integrity test on the exterior walls of containment building. No significant cracks were observed. The team identified approximately 12 holes in the exterior wall concrete which should be patched (dry packed). The team also examined areas along a horizontal construction joint which had been repaired during the last refueling outage.
- Containment Building Interior - The coating on the floor of the basement was deteriorated in several areas. The coating was cracked, flaking, and chipping off. Licensee's engineers indicated that the coating would be repaired in accordance with Corrective Maintenance Procedure CM-613, Application of Protective Coatings Inside Containment. The audit team identified, and reported to licensee engineers, a section of a four inch diameter service water piping which was severely corroded.
- Intake Structure - Lack of full thread engagement on two of four anchor bolts for the "north" service water strainer was noted. The studs and nuts on the friction clamp on the south service water header were corroded. Rod hangers supporting the fire water supply line were corroded, bent, and had missing or loose nuts. Abandoned anchor bolt holes in the walls require patching. The service water piping adjacent to the pumps show signs of corrosion.

- Piping Penetration Area, Containment/Auxiliary Building Interface (Pipe Alley) Two pipe support baseplates anchored using concrete expansion anchors span the seismic gap between the auxiliary and containment buildings. The plates are anchored in both structures. Also three pipe supports which support piping adjacent to the containment wall are mounted on baseplates on the auxiliary building side of the seismic gap. The team questioned the design of these features.

Safety-Related Water Storage Tanks - No defects were noted.

c. Conclusions/Findings

NRR will issue a summary report, in letter form, to the license, which list the audit findings, conclusions and recommendations. In addition to those stated above, other observation by the NRC team were:

- The plant is well maintained from a structural standpoint, although it appears that some repairs were completed only when those repairs were absolutely necessary.
- The licensee is considering the performance of periodic inspection of structures. A design guide, number DG-III.15, Periodic Structural Inspection of Seismic Category I Structures, has been prepared to implement this program. This program, if implemented, would provide baseline data useful in identifying pre-existing conditions in case of a seismic event, and would monitor the integrity of safety-related structures. The NRC audit team concluded that this program would serve to improve the overall condition of site structures.
- Repairs should be made to minor structural defects, such as those noted in paragraph 2.b, above, to restore the original design margin of the affected equipment.

The final NRR report may contain additional findings, and in addition some of the findings listed above may be revised. The minor defects listed in paragraph 2.b above, were identified to licensee management as a weakness in the material condition of the plant and in the maintenance program implementation. Two inspector followup (IFI) items were opened to track two of the more significant conditions observed by the team. These were as follows:

Pumps Due to Effect of Corrosion on Exterior Piping Surfaces. The team noted that there appeared to be pits on the surface of the service water piping. However since the piping had been recently painted, it was difficult to verify. The NRC Audit team discussed the above pattern with the licensee, who indicated that they had performed inspections in this area and the effect of pipe wall thinning had been evaluated. A report had been prepared to document the results of the licensee's service water line inspections. This report will be reviewed by a Region II NDE specialist inspector.

- (2) IFI 261/92-09-02, Adequacy of Pipe Support Baseplates Which Span Seismic Gap. Two pipe support base plates are supported on both the auxiliary building basemat and the containment building basemat spanning the seismic gap between the buildings. The inspector questioned the seismic response spectra used in analyzing these supports. The concrete in the containment basemat was cracked adjacent to one 4 bolt baseplate (two anchor bolts in auxiliary building basemat and two in containment building basemat. The crack width was approximately 1/8 inch, which makes these two anchors ineffective. Three additional supports which support valves on piping adjacent to containment wall penetrations are fixed to baseplates mounted on the auxiliary building side of the seismic gap. The support calculations will be reviewed by a Region II specialist inspector.

No violations or deviation were identified.

3. Instrument Maintenance Program (62704)

The requirements for installing and maintaining instrument tube compression fittings were discussed with licensee maintenance and quality control supervisory personnel. These discussions disclosed that the licensee does not have detailed written procedures to cover work and QC inspection activities for the installation of compression fittings. The licensee depends on the "skill of the craft" who receive training on the requirements for installing compression fittings. The specific work skill is covered in the craft training and development program. The licensee has also conducted special on-site training for this activity. The QC Manager stated that there were no specific requirements for QC personnel to inspect compression fittings. Discussion with maintenance personnel disclosed that holdpoints are not normally established in work packages for QC inspection of compression fitting installation. Licensee compliance personnel stated that they were

fitting installation. Licensee compliance personnel stated that they were reviewing Information Notice 92-15, Failure of Primary System Compression Fitting, and will evaluate the need for written procedures for compression fitting installation. The lack of detailed written procedures for installation and inspection of compression fittings was identified to the licensee as a weakness in their instrument maintenance program.

No violations or deviations were identified.

4. Exit Interview

The inspection scope and results were summarized on April 17, 1992, 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.

IFI 261/92-09-01, Evaluate Service Water Lines Adjacent to Pumps Due to Effect of Corrosion on Exterior Piping Surfaces.

IFI 261/92-09-02, Adequacy of Pipe Support Baseplates Which Span Seismic Gap.