



ENCLOSURE 1  
UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
101 MARIETTA STREET, N.W.  
ATLANTA, GEORGIA 30303

Report Nos.: 50-413/84-07 and 50-414/84-06

Licensee: Duke Power Company  
422 South Church Street  
Charlotte, NC 28242

Docket Nos.: 50-413 and 50-414

License Nos.: CPPR-116 and CPPR-117

Facility Name: Catawba

Inspection at Catawba site near Rock Hill, South Carolina

Inspector: J. R. Harris 1/19/84  
J. R. Harris Date Signed

Approved by: T. E. Conlon 1/19/84  
T. E. Conlon, Section Chief Date Signed  
Engineering Program Branch  
Division of Engineering and Operational Programs

SUMMARY

Inspection on January 9 - 13, 1984

Areas Inspected

This special, unannounced inspection involved 32 inspector-hours on site in the areas of structural concrete.

Results

In the one area inspected, no violations or deviations were identified.

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Q PDR

REPORT DETAILS

1. Persons Contacted

Licensee Employees

\*L. R. Barnes, Planning and Control Manager  
L. Davidson, Project QA Manager  
R. Morgan, Senior QA Engineer  
T. Robertson, Construction Engineer, Civil  
J. Warren, QC Engineer Civil  
J. Shropshire, QA Engineer, Mechanical  
J. Williams, Builder Foreman  
E. Lecroy, Utility Superintendent  
J. Hayes, Civil QC Inspector  
T. Summer, Civil QC Inspector  
W. Vassey, Civil QC Inspector

\*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on January 13, 1984, with those persons indicated in paragraph 1 above.

3. Licensee Action on Previous Enforcement Matters

Not inspected.

4. Unresolved Items

Unresolved items were not identified during this inspection.

5. Employee Concerns, Discussions and Findings

a. Concern-Honeycomb in Concrete

A concern was expressed indicating that dry concrete mixes used in design pours in the Unit 1 doghouse exterior walls may have caused honeycomb in the east outside wall. The worker was also concerned that when the forms were removed and the honeycomb discovered, that the forms were replaced in what could be an attempt to hide the honeycomb and poor workmanship. The worker was also concerned as to how the honeycomb was repaired.

### Discussion

Honeycomb is defined in Section 201 of the American Concrete Institute Manual of Concrete Practices as voids left in concrete due to failure of the mortar to effectively fill the spaces among coarse aggregate particles. Common causes of honeycomb are inadequate vibration, use of low slump concrete, and placements congested with reinforcing steel, embedments, and penetrations.

The inspector examined the concrete exterior walls of the doghouse, drawings, procedures, and specifications controlling placement of the concrete walls, pertinent records, and the nonconformance log. In addition, the inspector examined results of concrete placement number 2W72A made recently in the Unit 2 reactor building shell wall. The inspector also discussed honeycomb problems with responsible QC inspectors and removal and replacement of forms with responsible building foremen.

Observation of the doghouse walls and the recent placement in the Unit 2 shell wall showed that numerous repairs had been made to the east outside wall of the doghouse and an existing unrepaired area of honeycomb in the reactor building shell wall adjacent to the equipment hatch. Review of documentation showed that honeycomb in the doghouse had been identified in accordance with procedure M-2, Inspection of Design Concrete, and repaired in accordance with procedure CP-68, Concrete Repair. The existing honeycomb in the reactor building shell wall was identified in accordance with procedure M-2, but repairs had not yet been made. Review of the nonconformance log showed that both cases of honeycomb had been reported as nonconforming items as required by procedure CP-68 and procedure Q-1, Control of Nonconforming Items. Review of records for other structures showed numerous instances of minor honeycomb (designated as Case I in procedures) and several cases of severe honeycomb (designated as Case II) that have been identified and repaired in accordance with procedures. Discussions with QC concrete placement inspectors indicated that they are aware of the potential for honeycomb in concrete placements congested with reinforcing steel and indicated that during inspections they are looking for proper consolidation. Review of a memorandum dated January 5, 1982, attached to NCI 13227 indicated that management is also aware of honeycomb problems and has taken steps to minimize the honeycomb problems. Discussions with responsible building foremen indicated that forms are sometimes taken down and then replaced if they are needed to help support scaffolding for the next pour in the wall.

### Findings

Examination of completed work and records, and discussions with responsible engineers, inspectors, and craftsmen showed that numerous cases of minor honeycomb and several cases of severe honeycomb have occurred during concrete placements. Examination of procedures and

specifications showed that the licensee is aware of the problem and that adequate means have been provided to identify, document, and repair the honeycomb. This inspector did document an open item, Unresolved Item 414/80-33-01, Identification of Concrete Honeycomb, during an inspection conducted on October 27 - 31, 1980, because the licensee's methods were not clear as to the tracking and identification of honeycomb that occurred in concrete pours prior to 1979. As a result of this identified item the licensee is reinspecting concrete surfaces in Unit 1 and Unit 2. Reinspection of Unit 1 is to be completed by January 1984 and Unit 2 reinspection is scheduled for completion by May of 1984.

b. Concern - Early Removal of Concrete Forms

A concern was expressed that early removal of forms (16 days after concrete placement) from the bottom of the turbine building generator pier could affect the safety of the plant.

Discussion

The turbine generator pier is a non-safety related structure. However, the inspector examined the turbine building generator pier and discussed placement of shoring and time of removal of shoring from the turbine generator pier with responsible engineers. The inspector also examined controlling specification CNS-1109.00-1, Specification for Concrete for Category I Structures. The inspector reviewed strength data on laboratory test cylinders for the B2 mix used in the turbine generator pour and field cured test cylinders made and cured at the point of the turbine pier placement.

Specification CNS-1109.00-1 states that bottom forms and shoring can be removed when the compressive strength of the concrete is equal to or greater than 70% of the 28-day compressive strength as determined by tests of cylinders cured under similar field conditions. Discussions with responsible inspectors and examination of records showed that the B2 mix used in the turbine generator pier is designed for a 28-day compressive strength of 4000 psi. Review of laboratory cured test cylinder strength data for this mix showed that test cylinders broken at seven days have an average compressive strength of 4,516 psi and that 28-day breaks have an average compressive strength of 5,900 psi. Examination of test data for the test cylinders cured in the field for this placement and which were used as a guide for determining the form removal date showed that the cylinders were broken at 11-days and that the average compressive strength was 4500 psi.

Findings

The average 11-day breaks on test cylinder cured under similar field conditions as the turbine generator pier placement had a compressive strength greater than the 28-day design compressive strength. Removal



of bottom forms of the turbine generator pier 16 days after placement was in accordance with specifications and standard concrete practice.

c. Concern - Spacing of Rebar

A concern was expressed indicating that rebar was not spaced properly in the walls of the turbine building. The worker indicated that drawings called for a specified number of bars to be placed at a specified spacing and tolerances. He indicated that methods being used sometimes resulted in the last two bars being spaced too close together or with one bar falling outside the pour. He also indicated that when this happened they would have to take wall ties out and get steel back down in the right place because the inspector would notice a bar missing.

Discussion

The turbine building is not a safety related structure. However, the inspector examined reinforcing steel drawings for the turbine building and specification CNS-1109.00-1, Specification for Concrete for Category 1 Structures and Procedure M-2, Inspection of Design Concrete. Examination of these documents showed that the requirements for rebar type, number of rebar, rebar location, and rebar spacing are indicated in the drawings and specification and inspection and documentation requirements in the procedure. Discussions with responsible QC personnel indicated they were knowledgeable in these requirements and that problems with spacing sometimes arose. However, they indicated when these problems arose they were corrected. They also indicated that spacing requirements sometimes could not be met because of interference with other reinforcing steel, conduits, or embedded items. When these occasions arose they indicated they consulted with technical support or design engineering for resolution of the problem.

Findings

Examination of drawings, specifications, and procedures showed that requirements for placing reinforcing steel are adequate. Discussions with responsible QC inspectors indicated they were knowledgeable in these requirements and that reinforcing steel spacing problems did occur and were corrected in accordance with the requirements. Review of the concern expressed by the worker also indicated that the spacing problems were corrected. His chief concern appears to be with the inefficient methods used in placing the reinforcing steel.