



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

Report Nos.: 50-269/91-17, 50-270/91-17, 50-287/91-17, and 72-04/91-17

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

Docket Nos.: 50-269, 50-270, 50-287,  
 and 72-04

License Nos.: DPR-38, DPR-47, DRP-55,  
 and SNM-2503

Facility Name: Oconee 1, 2, and 3

Inspection Conducted: August, 6-9, 1991

Inspector:

*J. J. Lenahan*  
 J. J. Lenahan

*8/30/91*

Date Signed

Approved by:

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

*8/30/91*

Date Signed

SUMMARY

Scope:

This routine, unannounced inspection was conducted in the areas of the reactor building tendon surveillance program, the snubber surveillance program, followup on a licensee identified item, and on licensee action on a previous inspection finding, and construction of additional units in the Independent Spent Fuel Storage Installation (ISFSI).

Results:

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

An unresolved item was identified regarding construction of the ISFSI - Paragraph 4.

A weakness was identified regarding problems with translation of pipe support design changes into design change (NSM) packages.

A strength was identified regarding well documented inspection results in the area of tendon surveillance and ISI pipe support data.

## REPORT DETAILS

### 1. Persons Contacted

#### Licensee Employees

- W. Adams, Civil Engineer
- \*E. Anderson, Design Engineer
- \*H. Barron, Station Manager
- T. J. Coleman, ISI Coordinator, QA
- \*T. Curtis, Compliance Manager
- \*W. Foster, Maintenance Manager
- M. Hemphill, Construction Engineer, CMD South
- O. Kohler, Compliance Engineer
- F. Linsley, Maintenance Engineer
- \*T. McClure, QA Engineer
- \*T. Mills, Construction Engineer, CMD South
- \*S. Perry, Compliance
- \*R. Sweigart, Operations Superintendent

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

#### NRC Resident Inspector

P. Harmon, Senior Resident Inspector

\*Attended exit interview

### 2. Snubber Surveillance Program, Unit 1 (70370)

The inspector examined procedures which control the Unit 1 snubber Technical Specification (TS) snubber surveillance program. Acceptance criteria utilized by the inspector are specified in TS 3.14 and 4.18. Procedures examined were as follows:

- a. Procedure number MP/0/A/3018/09, Snubbers - Hydraulic - Functional Testing
- b. Procedure number MP/1/A/3018/010, Snubbers - Hydraulic - Unit 1 Inaccessible Inspection
- c. Procedure number MP/1/A/3018/011, Snubbers - Hydraulic - Unit 1 Accessible Inspection
- d. Procedure number MP/1/A/3018/019, Snubbers - Mechanical - Unit 1 Inaccessible Inspection
- e. Procedure number MP/1/A/3018/020, Snubbers - Mechanical - Unit 1 Accessible Inspection

The inspector also observed functional testing of snubber RC HS 001050, which had been installed in the Unit 1 pressurizer cubicle. The snubber was found to have a low reservoir fluid level, practically empty, when it was inspected by the licensee in accordance with procedure MP/1/A/3018/010. The snubber was removed for functional testing under work request 9106594301. The testing was performed in accordance with procedure MP/0/A/3018/09 per criteria in TS 4.18.1.(3), by starting with the piston at the as found setting and extending the piston rod in the tension mode direction. The test results for bleed and lockup for the snubber met the functional testing acceptable criteria, and thus the snubber was determined to be operable. Licensee mechanics attributed the low reservoir fluid level to possible reservoir seal failure due to the high heat level in the area where the snubber had been installed. The snubber will be rebuilt and retested prior to return to service.

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

3. Reactor Containment Building Tendon Surveillance Program - Unit 1 (61701)

The inspector examined procedure number MP/1/A/1400/22, Surveillance of Reactor Building Tendons. The procedure specifies the requirements for inspection and surveillance of the tendons in the exterior wall of the reactor building. Acceptance criteria utilized by the inspector appears in TS 4.4.2. The inspector examined the results of tendon lift off data obtained in July 1991 for the three Unit 1 horizontal surveillance tendons. Review of the data disclosed that the lift off readings met design requirements. During an attempts to detension one of the tendons to remove a wire for tensile testing, the internal threads on one of the anchor heads failed, causing the stressing ram to become disengaged from the anchor head. The stressing ram was engaged to three-quarters of the internal thread on the stressing washer, which stripped off, resulting in thread failure. The licensee suspended further tendon surveillance operations pending the results of an investigation into the cause of the anchor head thread failure. The licensee was able to detension the tendon and remove the anchor head from the tendon for testing. The inspector discussed the preliminary findings of the investigation with licensee engineers. Licensee engineers indicated that metallurgical testing disclosed that the remaining threads on the anchor head, (approximately one-quarter remaining), had yielded. Corrosion was not a factor in the failure. The licensee's testing of the anchor head material showed the yield stress of the anchor was 58.9 ksi, versus the minimum required stress of 45.0 ksi specified by the vendor Prescon. The licensee will continue their investigation of the anchor head failure. The investigation will include stress analysis of the anchor head, further investigation of the thread design, and verification that the threads on the stressing-ram, pull bar properly engages the anchor head threads. The internal thread failures do not affect operability of the tendons. However, due to the large tensile forces in the tendons, the thread failure poses a personnel safety hazard to individuals performing the tendon surveillance

inspections. The licensee stated that cause of the thread failure will be determined and corrective action will be completed prior to restart of tendon surveillance activities.

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

4. Inspection of Horizontal Storage Modules for Dry Storage of Spent Nuclear Fuel (60848)

The inspector examined QA/QC controls and quality records and observed placement of concrete for Phase II of the horizontal storage module (HSM) construction. The HSM is a reinforced concrete structure for dry storage of spent nuclear fuel. Phase II is construction of an additional 20 modules, in addition to the 20 modules constructed under Phase I. The nuclear fuel assemblies are placed in stainless steel dry shielded canisters (DSC) which are stored in the HSM. These facilities provide interim dry storage for spent nuclear fuel. The HSM is classified as QA condition II, which although is not a category I structure, is still considered important to safety. The requirements for construction of the HSM are contained in the Technical Specification for Special Nuclear Materials license number SNM-2503, the licensee's Final Safety Analysis Report and the license application, Docket No. 72-04.

a. Review of Quality Assurance Implementing Controls

Quality Control/Quality Assurance implementing controls for the HSM construction examined by the inspector include the following procedure and drawings:

- (1) Specification No. OS-160-S, Specification for the Procurement of Concrete for QA Condition II Structures
- (2) Quality Control Procedure CS-1, Inspection of QA Condition Concrete.
- (3) Drawing No. 0-39.12.01, Horizontal Storage Modules Concrete - Plans
- (4) Drawing No. 0-39.12.02, Horizontal Storage Modules Concrete - Sections
- (5) Drawing No. 0-39.12.03, Horizontal Storage Modules Concrete - Sections
- (6) Drawing No. 0-39.13.01, Horizontal Storage Modules - Reinforcing - Plans
- (7) Drawing No. 0-39.13.02, Horizontal Storage Modules - Reinforcing Sections

- (8) Drawing No. 0-39.13.03, Horizontal Storage Modules Reinforcing - Plans and Sections
- (9) Drawing No. 0-39.14.01, Horizontal Storage Modules - Miscellaneous Steel Details
- (10) Drawing No. 0-39.14.02, Horizontal Storage Modules - Miscellaneous Steel Plans, Sections, and Details
- (11) Drawing No. 0-39-14-03, Horizontal Storage Module - Miscellaneous Steel Section and Details
- (12) Drawing No. 0-39-14-04, Horizontal Storage Modules - Miscellaneous Steel Sections and Details
- (13) Drawing No. 0-39.01-04, Yard Paving and Concrete Slab Layout, Plan, Section, and Detail
- (14) Variation Notice OC-5269

b. Observation of Work Activities

The inspector witnessed preplacement preparation and placement operations for concrete placement number ONS-103, Saddle walls 11-13, E&W, and 10 pre-cast plenum slabs. Preplacement observation included verifying that the forms were tight, level and had the proper dimensions, that the size, number, and spacing of reinforcing steel complied with drawing requirements, and that the placements had been properly cleaned. Observation of placement activities disclosed that the concrete placement activities were continuously monitored by construction QA/QC inspection, and that activities pertaining to concrete delivery time, free fall, flow distance, layer thickness, and consolidation met requirements. Samples of plastic concrete were tested in accordance with procedure requirements. Test results indicated that concrete slump, air content, and temperature met specification requirements.

c. Review of Concrete Quality Records

The inspector examined the following:

- (1) Results of slump, air and temperature tests performed on plastic concrete samples for placement numbers ONS-99, the Phase II basemat, ONS-101, Phase II wall pour 1, and ONS-103.
- (2) Results of mixer uniformity tests performed on June 27, 1991.

- (3) Results of certification tests performed on samples of concrete aggregate, sand, cement and concrete mix water.
- (4) Results of unconfined compression tests performed on 7 and 28 day concrete cylinders from placement numbers ONS-99 and ONS-101. All 28 day cylinders tested exceeded the minimum 5000 psi strength requirement.

Review of the above records disclosed the following unresolved item. License number SNM-2503, Technical Specification Section 5.5 specifies, in part, that the HSM reinforced concrete shall have a minimum density of 145 pounds per cubic foot (PCF), and that concrete aggregate shall meet the requirements of ASTM C-33. The result of LA Abrasion Test performed on the concrete aggregate showed abrasion losses of 58 percent for the sample of aggregate representing that used in the Phase II project. The inspector also reviewed LA Abrasion test data for a sample representing aggregate used in the Phase I construction. The sample had abrasion losses in the range of 53 to 56 percent. The maximum allowable abrasion loss permitted by ASTM C-33 is 50 percent. The licensee has issued an internal memorandum which permits use of aggregate with a maximum abrasion loss of 60% on Duke projects. However the licensee has not addressed the above referenced TS requirement. The inspector concluded that the use of aggregate with a 60 percent abrasion loss would not affect the serviceability of the HSM structure, considering that the concrete strength exceeds 5000 psi, and that the concrete will not be subject to abrasion type loads. The use of aggregate with LA abrasion losses of UP to 60% in HSM concrete has no safety significance, provided the minimum 5000 psi comprehensive strength is obtained. However review of in process test data and discussions with QA/QC personnel disclosed that the licensee has not performed unit weight/density tests on the concrete. The licensee has some unit weight data available from mixer uniformity tests. However this data indicates a unit weight for concrete mix C-2 (mix used to construct HSM) in the range of 141 to 143 pcf. However the inspector was unable to draw any conclusions regarding the concrete unit weight based on the insufficient number of samples, and the fact that the limited data available indicated concrete did not meet the minimum 145 pcf unit weight requirements. Pending further review by NRC and the licensee, this problem was identified to the licensee as Unresolved item 72-04/91-17-01, Density Requirements for HSM Reinforced Concrete.

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

#### 5. Repairs to Unit 3 Turbine Bypass Pipe Supports (92705)

Following a reactor trip in June 1991, a water hammer occurred which damaged two pipe supports on the Unit 3 turbine bypass piping. The inspector examined work request numbers 33206C, 33207C and 28519C which

were issued to repair the damaged supports. The licensee attributed the water hammer to a modification which had been installed in the condensate/feedwater recirculation line to the turbine bypass line. This source of water in addition to leakage by the turbine bypass valves was postulated to be greater than the capacity of the one inch diameter drain line on the bypass line. The excess water accumulated at the bypass line low point. The licensee performed two temporary modifications to increase the capacity of the bypass line drain. The inspector examined the temporary modification documentation, mod numbers ONTM-885, and ONTM-905. Temporary Mod 885 installed an additional one inch diameter line to the turbine building drainage system, while temporary mod 905 installed a 1½ inch diameter drain line to the feedwater recirculation system to the condenser. The drain lines are sized to provide adequate drainage of the turbine bypass line. During review of the temporary modification documentation, the inspector verified that the licensee evaluated the mods in accordance with 10 CFR 50.59 criteria. The licensee will refurbish the bypass valves during the next outage to reduce valve seat leakage. The inspector walked down the bypass lines and examined the two drain lines installed by the temporary modifications.

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

6. Action on Previous Inspection Findings (92701)

(Closed) Unresolved Item 270, 287/90-31-01, Pipe Support Installation Problems. The licensee's in-service inspection (ISI) program continues to identify discrepancies between existing pipe supports and the details shown on the "As-Built" IEB 79-14 sketches. Most of the discrepancies identified involve minor installation details that differ from the 79-14 sketches. The licensee attributes this problem to the level of detail in the inspection used when preparing the IEB 79-14 sketches which was less than the detailed inspection performed during the current ISI program. The inspector reviewed procedure number QA-514, Procedure for Discrepancies Found During ISI Visual Exam of Supports. This procedure provides the program to evaluate and disposition pipe support discrepancies identified during ISI which are deemed "not significant". Significant discrepancies are resolved using the problem identification report (PIR), or some other program. The ISI discrepancies are documented on Form QAL-14A, ISI Visual Examination UT-3 and UT-4 Hangers, as unacceptable indications, and transmitted to design engineering for evaluation and disposition. The licensee's Design Engineering Department prepares a summary of the evaluation with recommendations for disposition. Dispositions involve either revision of the pipe support sketches, repairs to the pipe hangers to restore the original design margin, and/or calculation revisions. A table is attached to the Final ISI Report to document the disposition of each "indication". The inspector reviewed the final reports for Unit 1 Support Restraint ISI for EOC-12, dated December 12, 1990, and for the Unit 2 Support Restraint ISI for EOC-11, dated May 29, 1991. Three problems were identified which appear to be more serious in recent Unit 2 and Unit 3 support restraint inservice

inspections. One involved main steam hanger 2-01A-0-1441-RS which licensee ISI personnel discovered was missing. This problem was documented on PIR 2-090-0088. The inspector reviewed the PIR which disclosed that the licensee was unable to determine the cause for the missing support. Licensee design engineers evaluated the piping with this support missing and determined that the piping and adjacent supports were operable. Final disposition was to reinstall the support. Another problem identified was support number 3-54A-2-0-2435B-H31 which was installed as a sliding support instead of a spring can. This support was evaluated and found to be acceptable for service in its as-built condition and the sketch and calculations were revised to reflect as-built conditions. A third problem involved support number 3-54A-3-0-2435B-SR6 which was found by licensee ISI personnel to have two spring cans in place of two hanger rods shown on the drawings. Work Request 53549k was issued to replace the spring cans with the hanger rods indicated on the drawings. Although all piping/supports were determined to be operable and all conditions identified were deemed to be non-significant by licensee design engineers, the fact that pipe supports exist in the plant which have different configurations than shown on the design drawings indicate a weakness in the licensee's program for assuring the supports restraints comply with design requirements. Unresolved item 270, 287/90-31-01 is closed. However, NRC will continue to review and evaluate pipe support discrepancies in future inspections.

#### 7. Exit Interview

The inspection scope and results were summarized on August 9, 1991, with those persons indicated in paragraph 1. The inspectors 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 72-04/91-17-01, Density Requirements for HSM Reinforced Concrete