

U. S. ATOMIC ENERGY COMMISSION

REGION II
DIVISION OF COMPLIANCE

Report of Inspection

CO Report Nos. 50-270/70-5
50-287/70-5

Licensee: Duke Power Company
Oconee 2 and 3
License Nos. CPPR-34 and 35
Category B

Date of Inspection: May 23-28, 1970

Date of Previous Inspection: April 27-May 1, 1970

Inspected By: C. E. Murphy 6/19/70
C. E. Murphy, Reactor Inspector
(In Charge) Date

W. D. Kelley 6/24/70
W. D. Kelley, Reactor Inspector (Construction) Date

Reviewed By: W. C. Seidle 6/24/70
W. C. Seidle, Senior Reactor Inspector Date

NOTE: The sections of this report relating to welding and piping were prepared in the main by W. D. Kelley.

Proprietary Information: None

SCOPE

A routine, announced inspection was made of the two 2568 Mwt pressurized water reactors under construction near Seneca, South Carolina, known as Oconee Station Nos. 2 and 3. Purposes of the inspection were: (1) to determine the construction status and significant changes to schedule dates; (2) to review records and work performance relating to mechanical equipment and piping systems.

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SUMMARY

Safety Items - None

Nonconformance Items - None

Status of Previously Reported Problems -

1. The strength of the concrete placed in Units 2 and 3 as indicated by the 28-day tests, showed an increasing trend. On eight occasions since March 25, 1970, it has failed to meet the requirements stated in the FSAR. (See Section F.)
2. The defective forged stainless steel pipe fittings have been returned to the manufacturer for repair. (See Section M.)
3. More defective Gdweld sleeves have been found and placed in quarantine. (See Section F.)
4. The welding of the Unit 2 equipment hatch to the containment 1/2-inch stiffener plate has been completed. (See Section F.)
5. Weld Procedure S1 had been previously reported as having been qualified using 1/2-inch-thick material for the bend tests.^{1/} A second test has been run with specimens milled down to 3/8-inch as required by Section IX of the ASME Code. The procedure is now considered to be properly qualified and the inspector plans no further action.

Other Significant Items - The low-pressure injection pumps for Unit 2 have been returned to the manufacturer for repair. (See Section H.)

Management Interview - The management interview was held on May 28, 1970, and was attended by Dick, Rogers and Wells.

1. Dick was advised that although the 28-day tests indicated that there had been some improvement in the strength of the concrete placed in the reactor building, some breaks were still below the 5000 psi minimum permitted by the FSAR. The inspectors expressed concern that concrete placement operations were continuing even though the cause of the low-strength concrete had not been determined. Dick stated that they were continuing to try to determine the cause of the low-strength concrete, and that Wells and the manager of the concrete plant were to visit the cement manufacturer's facility in Birmingham on May 29, 1970. It was the opinion of the QC staff that the cement was the problem, but they had not as yet been able to establish this as a fact. Dick noted that the trend of the test results was toward increasing strengths and

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hopefully they would have no further breaks below the 5000 psi allowable. He stated analyses were being made of the effect of the low-strength concrete on the integrity of the structures and that the results of the analyses would be available to the inspectors. (See Section F.1.)

2. The inspectors advised the licensee that they had again noted that some of the electrode ovens were not at temperature. Wells acknowledged that this was a continuing problem, and that the QC inspectors were constantly reminded to check the ovens. He stated that the matter would again be brought to their attention.

DETAILS

A. Persons Contacted

R. L. Dick - Construction Manager, Duke Power Company
J. G. Rogers - Project Engineer
J. R. Wells - Principal Field Engineer
G. L. Hunnicutt - Field Engineer, Civil
R. E. Blaisdell - Welding Engineer
C. B. Aycock - Field Engineer, Electrical
K. E. Cater - Instrumentation Technician
A. B. McCrary - Supervising Technician, Concrete
W. d. Owen - Mechanical Engineer Supervisor

B. Administration and Organization

Dick, formerly Projects Manager, Keowee-Toxaway Projects, has recently been promoted to the position of Construction Manager, Duke Power Company. He advised the inspectors that he would transfer to Charlotte in approximately one month but expected to spend approximately one day per week at the Oconee site.

C. Quality Assurance

1. No changes have been made in the licensee's quality assurance organization or procedures.
2. Quality assurance items are discussed in the individual report sections.

D. Construction Progress

1. Concrete placement in the Unit 2 reactor building has been completed to the fifteenth ring. Installation of the polar crane girder is in process.

2. The final pour of the Unit 3 reactor building base slab is expected to be completed the first week in June. Installation of the liner plate floor structural members is in process.

E. Schedule Dates

1. The Unit 2 reactor vessel is scheduled for shipment in March 1971 but possibly may be shipped ahead of this date. Other shipping dates are unchanged.
2. The Unit 3 schedule has not changed.

F. Containment - Attachment G

1. Concrete (4600)

The inspector was advised by Hunnicutt and Wells that the cause of the low-strength concrete had not been determined.^{1/} Records reviewed by the inspector indicated that the strength of the concrete as indicated by the 28-day tests showed an increasing trend. On eight occasions, however, since March 25, 1970, it had failed to meet the requirements stated in the FSAR. The inspector expressed concern at the management interview that the licensee continued to place concrete in critical areas when the cause of the low strength had not been determined and corrected. The inspector was advised that Wells was inspecting the cement manufacturer's facility on May 29, 1970, in an attempt to determine if the cement is the cause of the low breaks. The inspector was further advised that the licensee was prepared to show by engineering analyses that the low-strength concrete placed to date had not compromised the containment integrity. The inspector will continue to review the concrete operations on future inspections.

2. Unit 2 Equipment Hatch

The welding of the equipment hatch to the containment liner plate from the 7 o'clock to the 10 o'clock position had been noted during the previous inspection to be incomplete.^{1/} These welds should have been completed prior to placing concrete in the area. The thickness of the existing weld was measured ultrasonically and found to be 0.482 inch. The weld was completed by building up to the required thickness in accordance with Procedure S1 by the same weldor that had made the initial weld. The licensee is reviewing the NDT records to determine if spot radiographs are required.

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3. Cadweld Sleeves

The licensee has continued to find defective Cadweld sleeves that were furnished by Southern Boiler and Tank Company. Included are sleeves for Nos. 11, 14, and 18 reinforcing steel. All defective sleeves have been placed in quarantine. The licensee has advised the inspectors that the defective sleeves will not be used unless they are properly repaired. Since the sleeves had been received as a part of the liner plate embedded material, the inspector asked if it was possible that any of the sleeves had been used. A visual inspection was made of Cadweld sleeves welded at Southern Boiler and at the site for Unit 3, and it was found that some were welded without root openings resulting in the lack of complete penetration. A review of the licensee's drawing O-62F revealed that no root openings were indicated in the weld symbols. Blaisdell checked the Erico Cadweld catalog which indicated that the Cadweld sleeves for welding to plates are normally furnished with a square end for attachment with a fillet weld. Hunnicutt called the Charlotte Engineering office and was advised by the design engineer that engineering was aware that this was not a full penetration weld. He stated that a "J" groove weld was sufficient for design strength; however, a fillet weld was added as a part of the design. Hunnicutt stated that the design stresses for these joints were 30 kips and the present tensile tests on the splices were between 90 and 108 kips with failure occurring in the reinforcing steel bars. On Unit 1 some failures had occurred at the weld but not below the allowable strength. This item is considered to be satisfactory and the inspector does not plan further action.

G. High-Pressure and Low-Pressure Injection Systems - Attachment G

Installation NDT Procedures (5005.04.f.5)

The high-pressure and low-pressure injection systems piping welds are being inspected in accordance with Oconee Nuclear Station General Procedure for Radiography. The procedure requires the use of film that meets ASTM E94-62T. The radiography is being accomplished using an iridium 192 source with single film technique. The change was made from the double film technique to the single film technique since the licensee had found by making test radiographs that the single film technique gave better sensitivity. The radiography is done in accordance with Specification Sheet, Specification No. RT-34 and 25, which requires an acceptance criteria in accordance with USAS B31.7, Appendix B, paragraph B.1.140. Liquid penetrant examination is done in accordance with Oconee Nuclear Station procedures, Specification No. PT-1,

Revision 2. The procedure requires that the penetrant examination meet the requirements of USAS B31.7, Appendix B. The requirements of 5005.04.f.5 are considered to have been met.

H. Low-Pressure Injection Pumps - Attachment L

The inspector was advised that the pumps for the Unit 2 low-pressure injection system have been returned to the manufacturer. B&W had found that the shafts were binding after the pumps had been installed on their foundations. The inspector will review this item on the next inspection.

I. Reactor Vessel Support Structure, Units 2 and 3 - Attachment E

1. General

The QC procedures and the records relating to the reactor vessel support structures were reviewed in detail. The reactor vessels rest upon reinforced concrete slab. Bolts anchored in the concrete would restrict movement of the vessels in the event of an earthquake or other major incident. Since no structural steel is involved in the foundations, inspection items relating to structures (5400) and welding (4800) are not applicable.

2. Concrete (4600)

Initial Review of QC System (4605.03 and .04)

Although the licensee's QC system relative to concrete has been previously reviewed,^{1/} the inspector audited the procedures to determine if any revisions had been made that could have an adverse effect on quality. The licensee's Specification No. OS-160, "Reactor Building Concrete," was reviewed by the inspector. Section 1.5 of the specification details the requirements for the reinforcing steel and requires that certified test reports be submitted to the licensee for approval. The licensee, as a part of his Cadweld testing, also tests the reinforcing steel. The licensee purchases ready-mix concrete from the Greenville Concrete Company but specifies the source of raw materials and designs the mix. Sections 1.13 and 2.4 of Specification OS-160 details the testing and mix design requirements of the concrete. The requirements for testing Cadweld splices are included in Section 1.6 and concrete placement requirements are included in

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Section 1.8. The requirements relating to measuring, batching, mixing and delivery of concrete are included in Section 1.11. The inspector considers the applicable requirements of 4605.03 and .04 to be satisfied.

3. Followup Record Review (4605.05)

The inspector reviewed the drawings of the reactor foundation reinforcing steel and obtained the mark letters for the steel in the reactor foundation. The mill test reports for the reinforcing steel are listed on the bills of material for the steel. The inspector selected four heat numbers at random and reviewed the test reports for these heats. No discrepancies were noted. The inspector reviewed the Prepour Site Inspection Reports, Form QC-4, for the reactor base concrete pours. The forms had been properly completed and no discrepancies were noted. A review of the concrete compression test records indicated that the 28-day breaks were above 5000 pounds and the 90-day breaks ranged from 6614 to 7074 psi. The Records of Concrete Placed, Form QC-5, for the base slab pours were also reviewed and found in order as were the Concrete Batch Records, Form AC-1. The Records of Gdweld Splices, Form QC-10, were audited and found to be in order. The records for the analyses of sand, cement and aggregate were also reviewed, and no discrepancies were noted. The Reports of Chemical and/or Physical Properties for the reactor vessel anchor bolts were also audited. The chemical properties were noted to meet specifications. The tensile strength was not given but the Brinnell hardness numbers indicated the tensile strength to be in the range of 153,000 to 164,000 which is above the minimum required. The inspector considers that the applicable requirements of 4605.05 to have been completed.

4. Followup Observations of Work (4605.06)

The placement of concrete has been previously audited and it was observed that the requirements of 4605.06 were met. This item is considered to be complete.

M. Miscellaneous

Forged Stainless Steel

The S. K. Porter representative visited the site to inspect the defective fittings previously reported.^{1/} As a result, all the

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fittings from six heats that had not been installed were returned to the vendor's plant. These fittings will be dye penetrant tested and any fittings having indications of folds in the metal will be ground and retested to verify defect removal. Any fittings that must be ground to less than minimum allowable wall thickness will be rejected. The S. K. Porter representative recommended that all fittings that have been installed in the system be dye penetrant inspected and defects removed by grinding. If defect removal results in less than minimum wall thickness, it is to be cut out.