

U. S. ATOMIC ENERGY COMMISSION
REGION II
DIVISION OF COMPLIANCE

Report of Inspection

CO Report Nos. 50-270/70-7
50-287/70-7

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

Date of Inspection: November 23-25, 1970

Date of Previous Inspection: October 26-27, 1970

Inspected By: V. L. Brownlee 12-17-70
V. L. Brownlee, Reactor Inspector
(In Charge) Date

B. J. Cochran 12-17-70
B. J. Cochran, Reactor Inspector Date

Reviewed By: F. J. Long 12/17/70
F. J. Long, Senior Reactor Inspector Date

Proprietary Information: None

SCOPE

An 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.

Inspection efforts were directed toward a review of progress of construction, familiarization of the newly-assigned inspector, follow-on inspection of previously-reported problems, and determination of the scheduled onsite receiving dates for major mechanical components.

B. J. Cochran accompanied the inspector for inspection assistance and familiarization with the Duke organizational/functional alignment and field operations prior to implementation of the inspection program for the McGuire facilities.

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SUMMARY

Safety Items - None

Nonconformance Items - None

Status of Previously Reported Problems -

1. Low Strength Concrete (Ref: CO Report Nos. 50-270, 287/70-4)

This item is considered resolved. (See Section E.)

Other Significant Items -

1. Results of the Cadweld test program were reviewed. (See Section F.)
2. Unit No. 2 construction is estimated to be 53% complete. (See Sections D and H.)
3. Unit No. 2 major reactor coolant loop equipment will arrive onsite from December 1970 through March 1971. (See Section G.)
4. Unit No. 3 construction is estimated to be 18% complete. (See Section D.)
5. A survey of the onsite storage facilities alerted the inspectors to areas of concern for protection and storage of components. The areas were considered isolated cases, however, and immediate corrective action was taken by Duke. Close surveillance during subsequent inspections will be maintained. (See Exhibit A, Photo Nos. 6,7,8.)

Management Interview - The inspectors met informally with the licensee representatives.

The inspectors debriefed the licensee representatives on those areas covered by the inspection and the findings.

The inspectors debriefed four areas of concern. Since the areas of criticism could be considered isolated areas and quick-action response by the licensee was noted, the licensee was informed that no enforcement action was anticipated at this time. The four areas of concern are as follows:

1. Weld electrode box temperature control (See Section H.)

2. Tendon sheath caps (See Section H.)
3. Equipment storage, valves (See Section I and Exhibit A, Photo Nos. 6,7,8.)
4. Pipe storage (See Section I.)

The inspector requested, and the licensee confirmed, that main steam and pressurizer relief valve documents would be provided onsite for review during the next scheduled inspection.

DETAILS

A. Persons Contacted

Duke Power Company (Duke)

- *J. C. Rogers - Project Engineer
- *J. R. Wells - Principal Field Engineer
- *G. L. Hunnicutt - Senior Field Engineer
- T. G. Touchstone - Field Engineer (Civil)
- A. B. McCrary - Supervising Technician, Concrete
- D. L. Freeze - Field Engineer (Office)
- W. E. Martin - Assistant Field Engineer (Equipment)
- *D. G. Beam - Assistant Project Engineer

Greenville Concrete Company (GCC)

F. Cross - Plant Manager

B. Administration and Organization

There have been no changes in the licensee's administrative organization since the previous inspection.

C. Quality Assurance

Touchstone has assumed the duties of Field Engineer (Civil), replacing Hunnicutt who was promoted to Senior Field Engineer.

*Present at the management exit interview

D. Construction Progress

1. Unit No. 2

Construction is estimated to be 53% complete. Containment dome liner welding is complete. Reactor coolant loop components are scheduled for site arrival from December 1970 through April 1971. Estimated completion date remains at March 1972.

Containment internal structures and equipment support work remain at a virtual standstill until receipt of the reactor vessel and steam generators onsite. (See Exhibit A, Photo Nos. 1,2,3.)

Major construction efforts were being spent in preparation for handling the reactor vessel and steam generators when they arrive.

Concrete footings for the gantry crane that will handle the vessels were being poured.

2. Unit No. 3

Construction is estimated to be 18% complete. Containment liner erection and concrete work continue at a slow pace during installation of the large penetration areas. Erection of containment internal structures and equipment supports are in progress. Estimated completion date is March 1973. (See Exhibit A, Photo Nos. 2,4.)

E. Concrete

The inspectors performed a follow-on review of Duke's concreting QA program and the results of Duke's actions to determine and correct the causes of low strength concrete as previously noted (CO Report Nos. 50-270, 287/70-5, 70-4).

The inspectors reviewed the batch plant operations, laboratory operations and recordkeeping. No discrepancies were cited. Concrete placement could not be observed.

The previously-noted low strength concrete problems are to be considered resolved and no further action is anticipated. The concrete design mix C-2 (specified 28-day strength of 5000 psi) was redesignated C-2T (April 21, 1970). Under advisement of H. Mitchell of GCC and R. Millhouse of Universal Atlas Cement Company (UACC), the cement content was increased from 580 pounds per cubic yard to 600 pounds per cubic yard and the plastimite (set retarder) was increased from 12 to 13 ounces. The field change to the design mix provided the increased strength desired.

A QA visit was performed at UACC, Leeds, Alabama, by Wells and Hunnicutt on May 29, 1970. Review of the cement testing records reflected that cube strengths at 28 days for the month of March had fallen below 5000 psi and the April 28-day cube strengths were around 4800 psi to 4900 psi. The 28-day cube tests prior to March had been about 5200 psi to 5300 psi.

Duke's conclusion is that the low strength concrete experienced at the site is a result of the loss of cement strength as manufactured. The manufacturer advised that he would make every effort to increase and maintain the 28-day cube strength above 5000 psi without violating his company's standard of 3000 psi (+) or (-) 150 psi at 7 days. The company's standards exceed the ASTM requirements. Duke does not intend to reduce the C-2T mix design proportions.

Review of concrete strength records for the C-2 and C-2T mixes were as follows:

	Dates <u>01/01/70</u> <u>04/17/70</u>	Dates <u>01/01/70</u> <u>05/29/70</u>	Dates <u>04/21/70</u> <u>08/31/70</u>
Number of Cylinders	101	146	81
Average Strength of all Cylinders	5382.68	5434.21	5872.66
Standard Deviation	489.125	486.785	526.804
Coefficient of Variation	9.087%	8.957%	8.970%
Lowest Break	4173	4173	4202
Highest Break	6703	6703	7056
Range	<u>2530</u>	<u>2530</u>	<u>2794</u>
	13 cylinders	19 cylinders	4 cylinders
	Broke below	Broke below	Broke below
	5000 psi	5000 psi	5000 psi

F. Cadweld

A survey was made of the Cadweld records for Units 1, 2 and 3 containment buildings to determine the rate of Cadweld rejects. Unit No. 1 Cadwelding is 100% complete, No. 2 is estimated to be 50% complete, and No. 3 is estimated to be 20% complete.

Total No. of Cadwelds reviewed - 25,281.

	<u>No. 11 Bar</u>	<u>No. 14 Bar</u>	<u>No. 18 Bar</u>
Total	4,396	12,130	9,211
No. of Tests	88	259	197
No. of Test Failures	0	1	0
No. of Visual Rejects	66	272	365
Reject Percentage	.14%	.10%	.44%

G. Mechanical Components - Site Arrival

1. Crane valves - 95% onsite
2. Velan valves (1/2 inch to 4 inches) - 95% onsite
3. Reactor vessel - December 7, 1970
4. Steam Generator A - December 18, 1970
5. Steam Generator B - February 15, 1971
6. Primary Coolant Pumps - Due testing November 23, 1970 (mfg.)
7. The 28-inch pipe arrival is pending pump testing decision.
8. The 36-inch pipe - April 1971
9. Pressurizer safety valves - February 1971
10. Core flood tanks - in route
11. Pressurizer - April 16, 1971
12. Main steam relief valves - onsite
13. High pressure injection pumps - installed
14. Low pressure injection pumps - installed

15. Purification demineralizer - installed
16. All RWDS tanks for Unit 2 - installed

H. No. 2 Unit Containment Dome

Unit No. 2 containment dome liner final closure welds were being completed during the inspection. The weather was cold, windy and was considered as marginally-acceptable weather for exposed welding. The work area was curtained off for weather protection. The inspectors witnessed weldor cleaning, grinding, welding and stamping of symbols for weldor identification. The welding was assessed to be adequate. The inspectors were advised that PT inspection of the completed welds would be delayed until the temperature is higher than 45°F as recommended by the manufacturer.

Two areas of concern were noted at the management exit interview.

1. The weld rod hot box located on the dome was not at full temperature, though the thermostat was at 225°F. The apparent problem was that heater capacity was not sufficient to maintain the set temperature due to the cold windy weather.
2. Some vertical tendon sheaths were uncapped. Comments to Duke QC personnel produced immediate corrective action. (See Exhibit A, Photo No. 3.)

I. Equipment Storage

The inspectors performed an inspection of the onsite storage facilities. Two areas of concern were noted at the management exit interview.

1. Duke has been receiving large numbers of valves in the limited storage area and several instances were noted where improper protection was provided for valves placed in field storage. Some valves lacked end covers and others lacked overhead protection. One location existed where valves were located that lacked both end caps and overhead protection. (See Exhibit A, Photo Nos. 6,7,8.)
2. The stainless steel storage yard was criticized for numerous pieces of piping that lacked pipe end cover protection.

Comments from the inspectors were accepted as legitimate comments and provoked immediate response from the licensee personnel for corrective action. Since the areas of criticism may be considered isolated areas and quick, corrective-action response by the licensee was noted, enforcement action is not anticipated. Followup inspection efforts will be emphasized during subsequent inspections.

J. Main Steam Relief, Pressurizer Relief and Electronic Bypass

The inspector attempted to review the purchase specification, purchase orders, and vendor quotes for the specified valves. Duke maintained no onsite records for the units. Contact was made with Duke home offices, Charlotte, North Carolina, for arrangements to review the documents during the January inspection. The inspector was unable to determine to what code requirements the valves were to be tested.

K. Documents Reviewed

1. Specification No. OS-134-2, Specification for Splicing Reinforcing Bar using the Cadweld Process.
2. Specification No. OS-139, Specification for Reactor Building Liner Plate and Accessory Steel.
3. Specification No. OS-139-4, Specification for Field Welding of Reactor Building Liner Plate by Manual Metal Arc Process.
4. Specification No. OS-194-4, Supplemental Specification for the Erection and Inspection of Liner Plate.
5. Specification No. OS-160, Specification for Concrete for the R Reactor Building.

In addition to the above referenced specifications, 49 quality control forms, 24 quality-related forms, and 20 additional miscellaneous forms were reviewed.

Attachments:
Exhibit A (CO:HQ copy only)