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

Report of Inspection

CO Report Nos. 50-270-70-3
50-287/70-3

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

Dates of Inspection: March 23-26, 1970

Date of Previous Inspection: February 19-20, 1970

Inspected By: C. E. Murphy — 5-4-70
C. E. Murphy, Reactor Inspector (In Charge) — Date

C E Murphy for — 5-4-70
W. D. Kelley, Reactor Inspector (Construction) — Date

F Bower — 5-4-70
F. U. Bower, Reactor Inspector (Construction) — Date

Reviewed By: W. C. Seidle — 5-4-70
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 and those relating to electrical/instrumentation by F. U. Bower.

Proprietary Information: None

SCOPE

An announced inspection was made of the 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) review the electrical/instrumentation QC program and work performance; (3) review records and work performance relating to mechanical equipment and piping and; (4) to review the preoperational testing program.

SUMMARY

Safety Items - None

Nonconformance Items - None

Status of Previously Reported Problems -

1. The valves previously identified as possibly having improper weld end preparations[1] have been placed in quarantine. (See Section I.)

2. The skimmer weir has been repaired and tested. No leaks were detected through the weir.[2]

3. The polar crane control circuit repairs that would prevent over travel of the hook on loss of power have not been completed.

4. Duke Welding Procedure DP-6[3] has now been properly qualified in accordance with the ASME Code, Section IX. (See Section C.)

5. The revising and rewriting of the welding procedures to eliminate the previously-reported deficiencies are in process. (See Section C.)

Other Significant Items -

1. The licensee does not presently have procedures that would ensure documentation that the installation of materials and equipment would meet FSAR commitments. (See Management Interview and Section F.)

2. There have been no significant changes in the plant construction schedule. (See Section E.)

3. Procedures have not been established to document that transducer sensors tubing will be routed to meet the single failure criteria for redundant systems used for safeguards and safety-related installations. (See Management Interview Section and Section F.)

4. The inspectors were advised by Wells that no ATAPCO piping was being used at Oconee.

1/ CO Report Nos. 50-270/70-2 and 50-287/70-2.

2/ CO Report Prescon 70-1.

3/ CO Report Nos. 50-270/70-1 and 50-287/70-1.

Management Interview - The management interview was held on March 26, 1970, and was attended by Dick and Wells.

1. Field Routing of Instrumentation Hydraulic Lines

The problems associated with the field routing as safety-related instrumentation sensor tubing were discussed in some detail. Dick stated that he could see the need for an engineering determination of the routing of those lines and that he would pursue this matter. (See Section F.)

2. Documenting FSAR Installation Requirements

The need for documenting that the installation of materials and equipment satisfied FSAR requirements was discussed. Dick agreed that formal documentation was needed and that procedures for obtaining the documentation would be developed. (See Section F.)

3. Alloyco Valves

Dick assured the inspectors that the Alloyco valves would remain in quarantine until the licensee received disposition from B&W. This item will be reviewed during the next audit. (See Section I.)

4. Arc Strike Procedure

Wells stated that work has started on a procedure for the detection and repair of arc strikes and that the procedure would be completed within a month. (See Section C.)

DETAILS

A. Persons Contacted

C. E. Watkins - Vice President, Production and Operation
R. L. Dick - Projects Manager
J. C. Rogers - Project Engineer
J. R. Wells - Principal Field Engineer
J. E. Smith - Station Superintendent
J. W. Hampton - Assistant Station Superintendent
M. D. McIntosh - Operating Engineer

E. D. Brown - Maintenance Supervisor
L. E. Summerlin - Technical Support Engineer
G. L. Hunnicutt - Field Engineer, Civil
R. E. Blaisdell - Welding Engineer
C. B. Aycock - Field Engineer, Electrical
K. E. Cater - Instrumentation Engineer
D. Kennedy - Prescon Corporation Field Supervisor

B. Administration and Organization

1. No significant changes have been made in the site construction QC staff since the previous inspection.

2. The licensee now has 75 people on the plant test and operations staff. These include the superintendent, assistant superintendent, 39 operators and supervisors, 10 maintenance men and supervisors, 20 technical support personnel, and 4 clerks. All key positions have been filled.

C. Quality Assurance

1. Welding

a. General

Blaisdale has revised the welding procedure identification system which separates the structural steel welding procedures designated by the prefix "S" and the pipe welding procedures designated by the prefix "P." The new welding procedure numbering identification is to be used on all records and testing effective March 2, 1970.

b. Structural Welding Procedures

Welding Procedure DP-6, which has been redesignated as Welding Procedure S-6, has been requalified in accordance with ASME Code, Section IX. It had been previously reported that only two bend tests had been performed for the qualification test where four were required by the code. A complete new qualification test was performed which included two tensile tests and four bend tests.

c. Pipe Welding Procedures

The Welding Procedures O-WPS 1, 2, and 8, which have been redesignated as Welding Procedures P-1, 2, and 8, have been revised. It had been previously reported that these welding procedure voltage and ampere values had not been followed in the welding of the procedure qualification test plate. The revised welding procedures voltage and ampere values now agree with the electrode manufacture's recommended range and the range used in the welding of the procedure qualification test plates. The procedures are considered by Region II inspector to be qualified in accordance with ASME Code, Section IX.

d. Consumable Inserts

It was previously reported that the use of consumable insert rings was not covered in the essential or nonessential variables in the ASME Code, Section IX, and that both the Grinnell type and EB type were permitted in Welding Procedure O-WPS-8 (now P-8). Blaisdale was asked on the previous inspection if the two consumable inserts were interchangeable. Blaisdale informed the inspector that he had investiated the use of the Grinnell versus EB consumable insert rings for the same welding procedure by running tests using the EB insert with the Grinnell insert weld preparation and vice versa. The difference in the weld preparation for the two types of consumable inserts is the thicker welding lands (or lip) for the Grinnell insert. Blaisdale was of the opinion that if the wrong consumable insert was used, it would be recognized by the welding inspector when he inspected the joint fitup as required for his signoff of quality control, Form QC-36. Should the inspector not observe that the wrong consumable insert was used, the weldor would recognize the difference in the welding characteristics when he started to weld the joint. Finally, radiographic examination of the weld would reveal unconsumed insert if an EB insert was used with the thicker lands of the weld preparation for the Grinnell insert and if a Grinnell insert was used with the thin lands of the EB weld preparation, the radiograph would reveal concavity or "suckup."

e. Arc Strikes

An arc strike removal procedure is being prepared by Blaisdale. The procedure will establish when the welding inspector is to visually inspect the equipment, valves, pipe, ard fittings in

a system for the detection of arc strikes and the method of repairing them and nondestructively testing the repairs. The inspection, arc strike repair, and nondestructive testing of the repair will be made before the hydrostatic test of a system.

f. Quality Control

An oxygen analyzer (Beckman Model D-2) has been purchased and is presently being used in the welding of stainless steel piping systems when making tie-in welds or closure welds in long runs of pipe. The maximum oxygen content permitted in the purge is 1.0%.

Welding inspectors have been assigned certain areas of the project for which they are responsible for inspecting for uncontrolled electrodes and electrode ovens being connected and at temperature.

2. Other quality assurance items are discussed under the individual inspection items.

D. Construction Progress

1. Placement of concrete for the Unit 2 containment is up to the eleventh ring.

2. Placement of concrete for the Unit 3 base slab continues.

3. All major equipment has been placed in the 100 kv emergency power switchyard. Stringing of the transmission line to this switchyard is in progress.

4. Construction progress photographs are filed in the Region II office.

E. Schedule Dates

It is now believed that Unit 2 will be delayed somewhat but that Unit 3 will be on schedule.

F. Electrical and Instrumentation

1. Implementation of QA Program (5105.03)

The QA program devised by Aycock for control of the electrical/instrumentation systems has not yet been completely implemented due to the minimal progress in the receipt a ' installation of

equipment for these systems. In those areas reviewed, however, evidence of program implementation was evident with inconclusive results since nothing had reached a completion stage.

A follow-on inspection will be required to confirm that QA program implementation is adequate.

2. QC Procedure Review (General)

The QC manual developed by Aycock contains a number of procedures that describe actions taken to ensure the installation quality for a number of systems and functions.

In fact, it can be stated that the actions they have taken in this regard probably exceed anything that can be considered a "requirement" since issuance of provisional construction permits for the Oconee units preceded the development of the QA concepts imposed upon present day applicants. The site QA manual is not, as a rule, completely specific since most of the chapters contained therein are better described as general descriptions of proposed actions with references to manufacturer's requirements rather than detailed procedures. Aycock recognizes this characteristic and plans to expand the procedures and provide more detail as engineering provides him with the specifics of the installation.

a. Special Handling and Storage Requirements (5105.04.b.6)

Timing of this site visit was fortuitous in that this inspector was able to observe the receiving inspection and site handling of electrical equipment as it came to the site as well as review receiving procedures and observe the received equipment stored at the site. Based on those observations and reviews, a finding can be made that the requirement of the referenced inspection point was met. The specific equipment and materials observed were the Unit No. 1 main transformer and sixteen 4000-foot reels of control cable.

b. Quarantine of Nonconforming Components (5105.04.b.7) (5105.06.b.1)

A receiving and storage procedure exists for quarantine of nonconforming components. Evidence of implementation of this procedure was observed by visual inspection of the storage facility wherein a number of instruments were isolated and tagged as quarantined. The QC-31 document (receiving inspection) revealed that these instruments were discrepant because they had not yet

been certified through the regular channels as suitable for installation. Aycock stated that these instruments would be released for regular storage when the documentation was cleared through the procedures established.

c. Handling and Installation Specifications (5105.04.c.1)

A procedure has been established for QC inspection and documentation for pneumatic and hydraulic instrument systems installation. This procedure was reviewed for suitability and for implementation since it has been implemented for the conventional portions of the plant where some system installation work has commenced.

What is considered to be a weakness in the installation procedures, with the potential of creating a nonconformance in the installed system hardware, was identified. This weakness is the dependancy placed on the site staff to field route the sensor lines for transducers and/or instruments requiring tubing. The problem associated with this concept is the difficulty of meeting, with assurance, the single failure criteria for redundant and/or multiple systems used for safeguards and safety-related installation.

The licensee was quick to recognize the problem when it was pointed out to them and agreed that only a thorough engineering design effort could provide the necessary routing information for those systems that must meet the single failure criteria. They agreed to resolve this discrepancy prior to installation of any related systems and implied that this procedure would be altered to confirm that pertinent installations met the single failure criteria requirement. A reinspection will be required to qualify this inspection point. This item was reviewed in detail in the management meeting.

d. Material Certifications (5105.05.b.1)

Discussions with Aycock regarding material certifications and a review of the site QC procedures revealed that the entire program related to providing these certificates is within the purview of the engineering group. Engineering is charged with the responsibility of identifying what certificates are required, inclusion of the requirement in the purchase documents, and ultimate procurement of the documents themselves.

The site procedure requires that engineering sign the QC-31 form which certifies that all such documents are within its control. This engineering signature indicates to the field that all QC provisions have been fulfilled and the component cleared for installation.

Aycock stated that all such documents will eventually be available at the site, but at this time none of them are available. He has verbal notice that a large number of such documents, presently in Charlotte, will be sent to the site in the immediate future. Completed copies of a few of these forms had been noted by the inspector during a previous inspection of records maintained at Charlotte. This inspection point can be considered complete, since the procedures as implemented by the field cover the point adequately.

e. Installation Inspection (5105.05.a.3)

Since some cable trays and a few miscellaneous instrument rack and motor control centers had been installed in the conventional portions of the plant but only a small quantity of tray for the safeguards systems had been installed, the discussion with Aycock and Cater was directed toward the detailed QC inspection procedures to be used for the remainder of the safeguards equipment.

One feature not included in the procedure was the requirement for the inspector to document his acceptance of all installations that must meet requirements as set forth in the licensee's application and FSAR. The particular requirement associated with cable trays and assemblies of electrical equipment, such as panel boards, that could and should be certified as acceptable, are those special features provided to meet seismic events.

Aycock confirmed that he had not considered this item and agreed to try to develop some type of form or procedure that would produce a certified record of acceptance that would confirm that all requirements, particularly those in the FSAR, had been fulfilled. The need for such a procedure was discussed in the management meeting, and was expanded to include mechanical items as well as electrical items. The progress made in establishing such a procedure will be reviewed during the next inspection.

3. Discrepancy Disposition System

Aycock and Cater have developed an informal system for tracking and disposing of identified electrical and instrument discrepancies. This system, as described, incorporates the use of a form created by Aycock for this purpose known as a "Discrepancy Worksheet" (DW). The DW is used to identify the deficiency and related reference documents and as a log of the actions taken to dispose of the deficiency and the names of those contacted.

The system as presently implemented has weaknesses, the most serious being the initiation of changes and corrective action on the strength of telephone agreements as logged on these DW's.

The merit of preparing a procedure to regulate this activity and provide more formality in the decision-making cycle was discussed with Aycock. He did not feel that the number of active discrepancies would warrant this action. He had developed the system more or less as an expedient and did not foresee any difficulty administering the system as long as it remained with 10-15 items open at any one time. He did admit that it probably could not be managed in its present form if an appreciable number of items were involved.

In the discussion with Aycock and Cater, the inspector stated that within his experience a system of this type, properly managed, is almost indispensible to a functional QC organization since it provides a documented procedure to dispose of the multitude of discrepancies identified by any viable QC organization. An attempt to handle large numbers of difficiencies informally invariably leads to a breakdown in the QC program.

This item was also discussed with Wells, both as to the work presently being done and also the applicability to the civil and mechanical systems. Although a "punch list" is planned for the future, Wells was noncommittal as to developing written procedures to ensure an adequate system for the civil and mechanical items.

G. Containment - Attachment C

1. Welding to Containment Liner

The inspector noted that temporary scaffold clips and knee braces had been welded to the liner plate and the inspector was unable to determine if this work had been performed by certified weldors using qualified procedures. Some of the clips and knee braces had been removed from the liner and these areas had not been properly repaired. Blaisdell and Hunnicut inspected the liner and stated that they would establish procedures for the detection, repair, and inspection of these weld areas.

2. Concrete Placement - Unit 3

The placement of concrete in the Unit 3 base slab, pour No. 4, was observed by the Region II inspector. Seven concrete mixing trucks were at the site; two were being unloaded and five were waiting. Although two inspectors were on hand, one inspector was testing the concrete for slump and air entrainment and preparing test cylinders for the concrete being placed by conveyor belt. The second inspector was witnessing the placement of concrete at the tendon trumpets. The Region II inspector observed the conveyor operator permitting the concrete to pile up approximately seven feet high which could conceivably have required transporting the concrete as much as ten feet with the vibrators. It was further noted that the counter on truck No. 64 was inoperative. This truck had arrived at 1:35 p.m. and was discharged at 2:23 p.m. The slump of the concrete was within permissible limits. It was observed that the counter on truck No. 92 had recorded 516 revolutions which would be in excess of that permitted by ASTM Standard C94. A comparison of the counter indication with the maximum drum speed and time of operation indicated that this counter probably had not been properly reset when the mix was loaded. When these items were brought to Hunnicutt's attention, he immediately investigated and found another truck whose counter was inoperative. He later informed the inspector that although four yards of concrete from truck No. 92 had been placed, the remainder had been dumped. Although C94 permits the user to waive the drum rotation count, Wells instructed his men to reject any truck with an inoperative counter or any truck whose counter indicated in excess of 300 revolutions. Although Wells and Hunnicutt considered the piling and transporting of concrete to be an isolated case, Wells did call the concrete inspector to his office and instructed him that this condition was not to be permitted again.

H. Primary Coolant Pressure Boundary - Main Coolant Loop - Attachment F PI 5000

1. Welding - Review of QC System (4805.04.a.1-4, b.1-6, c.1-6, d.1-4, e.1-2, and g.1-5)

a. Weld Procedures

A special welding procedure has been written for welding the main coolant loop piping. The procedure will be for welding both the carbon steel/stainless steel clad pipe welds to the vessels and the cold leg butt weld and the stainless steel safe end to the stainless steel pump volute. Since the procedure

is for Oconee main coolant loop pipe welds only, Blaisdale has decided not to include it as a Duke standard welding procedure. When all the procedure qualification tests are complete in accordance with ASME Code, Section IX, the procedure will be issued to the welding supervisor and inspectors. Only selected weldors who have been qualified to weld the carbon steel/stainless steel clad spent fuel tank and transfer canal will qualify in accordance with the special procedure for welding of the carbon steel/stainless steel clad pipe welds. The weldors who have been welding on the stainless steel safety injection welds will be qualified for welding of stainless steel safe end welds to the main coolant pump volute.

b. Inspection

The nondestructive technique and nondestructive technicians and welding inspectors will be the same as those used in the low and high pressure safety injection systems. These items were audited in Attachment G for the safety injection systems.1/ Each weld joint has been assigned a number and this number is used as the file number for the data sheets in the field weld inspection and NDT record book. The data sheet is a complete record of the welding and nondestructive test procedures used, the identification of the weldor that performed the welding, the nondestructive test procedure used, the NDT technician that performed the test, and the NDT results. The data from the visual inspection of the weld joint alignment, root gap, joint preparation, environmental control, root pass, and finally, the complete weld is furnished by the welding inspector and recorded on the data sheet. The preheat minimum base metal temperature during welding of the carbon steel welds is maintained by electric coils and must be checked by the welding inspector once per shift. The interpass temperature of the welding of the stainless steel safe ends and stainless steel cladding of the carbon steel weld will be checked by the weldor and welding inspector with temperature indicating crayons. The final carbon steel weld will be postweld heat treated in accordance with the special Duke welding procedure which meets the requirements of USAS B31.7.

1/ CO Report Nos. 50-270/70-1 and 50-287/70-1.

c. Radiographs

The quality of the radiographs has improved and Grier is insisting that all radiographs meet ASME Code requirements, especially the film density. The Level II radiographers have had enough experience on the Oconee site to be able to evaluate weld quality as meeting code; however, radiographs that they consider borderline are reviewed by a Level III radiographer from B&W.

d. Welding Rod Control

The welding rod control from receipt and storage through issue control and onsite control to final disposition of unused material has been audited in previous inspection of main steam piping for the carbon steel welding electrodes and the safety injection systems for stainless steel welding electrodes, wire, safety injection systems for stainless steel welding electrodes, wire, and gases.1/

2. Piping - Review of QC System (5005.04.b.1-3, c.4, d.2, d.3, and f.3)

a. Inspection

The material certification and nondestructive testing records of the fabricated spool pieces are at B&W and will be sent to the Duke Charlotte engineering office. The spool pieces are inspected by Duke upon delivery and a receiving report, Form QC-31, issued.

b. Installation

The piping system is designed as a free system suspended from reactor vessel and steam generator nozzles. No bellows are used in the system; however, a spring hanger and snubbers are currently being designed which will support the weight of the pump motor for seismic protection. The pipe will support the weight of the pump volute. An allowance has been made in the field for shrinkage during welding of the main coolant loop piping. Blaisdale estimates this will amount to approximately 3/8-inch weld for the stainless steel welds and 1/4-inch weld for the carbon steel welds.

1/ CO Report Nos. 50-270/69-8 and 50-287/69-8.

c. Safe Ends

The main coolant loop piping has safe ends for welding to the stainless steel pump volute. These safe ends were added by B&W in their shop after stress relief of the carbon steel welds.

I. Alloyco Valves (Attachment G, PI 5005.05)

The Region II inspector requested that he be shown the B&W supplied Alloyco 2-1/2-inch stainless steel valves. A review of the drawings for these valves during a previous inspection at the licensee's engineering office[1/] had indicated that the weld end preparations were not in accordance with ASA B16.25 as required by the FSAR. The site piping engineer was not aware that the valves might be discrepant, and it was determined that some had been issued for installation. When it was determined by the licensee that the valves' weld ends were not in accordance with the applicable code, the valves were returned to the warehouse and placed in quarantine. The inspectors were advised at the management interview that the valves would remain in quarantine until the problem of the weld end preparations had been resolved.

J. Test Program

1. Test Specifications

Test, or systems, specifications are being prepared by B&W, Bechtel, and the licensee for the Oconee Stations. These specifications are being used by the operations group in the preparation of test procedures. The inspector reviewed the specifications for the "High Pressure Injection System Hydrostatic Test and Functional Operation," and the "Reactor Coolant System Hydrostatic Test." In general, the specifications were very detailed and well written. It was noted, however, that calculational methods were not always presented to indicate how required computations were to be made and that the points for making measurements were not always identified. In addition, in a few cases, the specifications were vague with respect to values and limitations. These weaknesses were brought to the attention of Hampton who assured the inspector that when the test procedures are prepared, care would be taken to correct such items.

1/ CO Report Nos. 50-270/70-2 and 50-287/70-2.

2. Test Procedures

During a discussion of the test program, Smith stated that as a means of expediting the review of the test procedures, he planned to place the inspector on the distribution list to receive most of the test procedures. He also stated that the inspector could obtain a copy of any other procedure that he wished to review. The inspector had previously received a preliminary index of all the plant test procedures. The inspector was given copies of preliminary procedures entitled, "New Fuel Inspection and Storage" and "Equipment Hatch Leak Rate Test."

3. Test Program (5805.01 and .02)

The inspector was given preliminary copies of the "Oconee Test Program Index and Schedule" and the "Guide for Conducting the Oconee Initial Test Program." It would appear from a review of these documents that the licensee has included those tests to which he is committed and that he has a suitable method for recording, reviewing, approving, and retaining test data and results and for identifying and correcting deficiencies.

K. Work Observation

1. Housekeeping

The inspectors noted some improvements in housekeeping in the construction and storage areas. In particular, scrap pipe was being removed from the pipe storage areas. Wells stated that an attempt was being made to segregate all scrap from the pipe storage areas.

2. Other Observations

For other observations, refer to sections relating to the particular items.