

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

Report of Inspection

CO Report Nos. 50-269/68-5
50-270/68-5
50-287/68-5

Licensee: Duke Power Company
License Nos. CPPR-33, 34, 35
Category A

Date of Inspection: November 15, 1968

Date of Previous Inspection: Initial Inspection

Inspected By: William C. Seidle 12/15/68
William C. Seidle, Reactor Inspector Date

Reviewed By: F. J. Long 12/16/68
F. J. Long, Senior Reactor Inspector Date

Proprietary Information: None

SCOPE

An announced visit was made to the Southern Boiler and Tank Works, Incorporated, Memphis, Tennessee, where the containment building liner plate and accessory steel including penetration sections are being fabricated for the three Oconee nuclear power plants.

The purpose of the visit was to review the shop QC program associated with the fabrication of the liner plate penetrations for Unit No. 1. Particular attention was given to recent shop QC program improvements initiated because of numerous weld defects observed in several penetration sections received at the site.

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SUMMARY

Safety Items - None

Nonconformance Items - None

Unusual Occurrences - None

Status of Previously Reported Problems - Initial inspection - not applicable.

Other Significant Items - Defective Southern Boiler Shop welds in eight Unit 1 liner plate penetration sections delayed erection of the containment building two months. The weld defects were detected at the site by Duke QC personnel. All welds were "certified" by the shop inspector and a third party, Law Engineering inspector prior to shipment from the shop (See Section C.1.).

Poor weld design, QC inspection practices, and welder performance were the principal causes for the defective welds. Measures have since been adopted to correct these deficiencies, e.g., several weld designs were changed, additional third party and Duke QC welding inspectors were assigned to the shop; welds are now 100% radiograph inspected; the fabricator has set up a financial incentive program for those certified welders producing work requiring 100% radiographic inspection (See Section C.2.).

According to Duke representatives, the quality of weldments in the steel components recently received at the site has greatly improved (See Section C.).

Management Interview - The inspector held a brief interview with Lea and Jackson at the conclusion of the visit. The following items were discussed:

1. Purpose of Inspector's Visit

The inspector explained to Lea that it is the policy of the Division of Compliance to spot check the QC program in many of the vendor shops that fabricate Class I structures and systems (Class I structures and systems were defined).

2. Mill Test Reports

The inspector stated that he had made a spot check review of several U. S. Steel Corporation mill test reports for steel plate used in the liner plate and penetration sections and found that many of the reports were not signed by a U. S. Steel representative; the certification signature line was blank. Jackson stated that Strong had advised him of his intent to notify U. S. Steel of this deficiency.

3. Record of Certified Welder's Work

The inspector pointed out that the shop QC inspectors do not keep written records that would associate a specific certified weld with the welder's name. The welder's mark stamped every 3' along the weldment is the only record. The inspector posed the question of how Duke could prove that a certified welder did, in fact, make a particular weld in a given penetration system after that section is embedded in the concrete wall of the containment building. Jackson stated that this is a deficiency in the shop QC record keeping program and that he would endeavor to correct it.

Lea appeared to be receptive to the inspector's comments and seemed willing to cooperate with Jackson in correcting the deficiencies discussed.

DETAILS

A. Persons Contacted

Southern Boiler and Tank Works, Incorporated

W. Lea, Executive Vice President and General Manager
J. T. Roberts, President and Company owner
J. Westmoreland, Chief QC Shop Inspector

¹/Duke Specification No. OS-139 (Rev. 4/8/68) entitled "Specification for Reactor Building Liner Plate and Accessory Steel" requires the use of certified welders on liner plate and penetration section fabrication.

R. Strong, Chief Engineer

Law Engineering Testing Company (Birmingham, Alabama)

K. E. Roberts, Department Manager - Metals Inspection Service

L. A. Williams, Shop Inspector

E. Prantl, Supervisor - Metals Inspection Service

Duke Power Company

F. R. Jackson, Staff Mechanical Engineer

B. Administration and Organization

1. Southern Boiler Shop QC Organization

The shop is a small family-owned operation which has been doing business in Memphis since the early 1920's.

J. T. Roberts is the owner, his son T. M. Roberts is in charge of sales. Lea, the General Manager, runs the shop fabrication operation.

Strong, Chief Engineer, is responsible for the shop QA program. He is a graduate M.E. from Georgia Tech and has been with the company since 1959 and in his present assignment for 1 1/2 years.

Westmoreland, chief QC shop inspector (and the only Southern Boiler QC shop inspector) reports to Strong. Westmoreland has worked at Southern Boiler for many years as a fitter, welder, and supervisor of clean-up, testing, and painting. He has been in his present capacity of inspector for about one year.

2. Third Party Shop Inspectors

The Law Engineering Testing Company, Birmingham, Alabama, has two full-time welding inspectors representing Duke in the Shop. The inspector's names are L. A. Williams and W. Rosco. Williams has 20 years of welding and QC inspector experience, according to his supervisor, Prantl; the past seven years have been with Law Engineering. At one time he was associated with the Redstone Arsenal, Huntsville, Alabama. Rosco is a young man with limited welding experience. His principal shop assignments are QC record keeping and preparing drawings for radiograph locations.

3. Duke Power Company Shop Inspector

Duke recently assigned Jackson to the Southern Boiler shop as a QC welding inspector on a part time basis, i.e., two-three days every other week. According to R. Dick, Project Manager - Oconee Project, Jackson was at one time the principal M.E. for Duke Construction; he brings into his present assignment years of QC experience in welding.

C. Weld Defect Problems in Penetration Sections - Corrective Measures Taken

1. History of Weld Defect Problems

During an inspection visit to the Duke construction site in March 1968, the inspector was informed by J. R. Wells, QA Engineer, that the field welding inspectors had discovered defective welds in many of the containment building steel components supplied by the Southern Boiler Shop Company. The weld defects were in thickened sections of floor liner plate fabricated in the shop. The weldment defect details and the action taken by Duke to correct the defects are discussed in CO Report No. 50-269/68-2.

During the last visit to the Duke site on 9/25, the inspector learned from Wells that the Duke on-site welding inspectors had discovered defective welds in 2 Southern Boiler shop fabricated containment building liner plate wall penetrations. Lack of penetration and slag inclusion were the principal weld defects noted; no cracks were detected. All of the penetration section welds had been "certified" at the Shop by the vendor and a third party welding inspector from the Law Engineering firm (Weld defect details and the repair status are discussed in CO Report No. 50-269/68-4, Section D.1.).

The weld inspection deficiencies discussed above promulgated the inspector's visit to the Southern Boiler Shop on 11/15.

2. Measures Taken to Correct Southern Boiler Shop Weld Deficiencies

According to Jackson and Strong the following corrective measures were recently taken to improve the quality of shop welds.

an hour. However, they lose the premium wage if their weld defects run greater than 5%. At the present time premium rates are being paid to six shop welders; they are all certified in MIG, TIG, gas shielded arc, and submerged arc welding.

d. Slag Inclusion Problem

Excessive amounts of slag has resulted in the rejection of several welds.

Corrective Action

The welders are frequently reminded by the QC inspectors to make a thorough cleaning between passes.

e. Additional QC Shop Inspectors

The fact that many weld deficiencies were found in the several shop fabricated penetration sections shipped to the site would suggest a breakdown in the show QC program.

Corrective Action

Duke has assigned Jackson to the Southern Boiler shop, on a part-time basis, for the purpose of auditing the QC program, and providing liaison between the shop and Duke Engineering when design and/or specification interpretation problems arise.

Law Engineering has added a second full time inspector to the shop to assist in QC record keeping. This enables the other inspector to devote more time to the actual inspection and testing of welds.

Jackson stated that since the above corrective measures were implemented a marked improvement has been noted in the quality of shop fabricated welds. The inspector will discuss these improvements with Rogers during the next site visit.