

U. S. ATOMIC ENERGY COMMISSION
DIVISION OF COMPLIANCE
HEADQUARTERS

Report of Pressure Vessel Inspection
CO Report No. 286/69-2

Vendor: COMBUSTION ENGINEERING COMPANY
CHATTANOOGA, TENNESSEE

Licensee: CONSOLIDATED EDISON COMPANY
INDIAN POINT 3
DOCKET NO. 50-286

Date of Inspection: January 16-17, 1969

Inspected By: William J. Collins
Metallurgical Engineer

2/19/69
(Date)

Reviewed By: H. R. Denton
Chief, Technical Support Branch

2/19/69
(Date)

Proprietary Information: Entire Report

SCOPE

An announced visit was made to the Combustion Engineering Company's (CE) Chattanooga, Tennessee plant to conduct an initial review of quality control records relating to the reactor pressure vessel for Consolidated Edison's (Con Ed) Indian Point 3 facility. The percent completion of other pressure vessels being fabricated was determined during the inspection.

SUMMARY

Based on CE production control charts, the fabrication of the reactor pressure vessel for the Indian Point 3 facility is essentially 90% complete. According to CE, the length of the recent labor strike has caused the vessel's scheduled delivery date of March 1969 to be set forward to May 1969. Otherwise, the fabrication of the vessel has proceeded with relatively few difficulties.

It was found that CE's quality control system, as established, was being used effectively in the fabrication of this vessel. The applicant's (Con Ed) independent inspection agency, U. S. Testing Company, Inc., was found to be auditing the vessel fabrication also.

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The specification deviation records were examined to assess the severity of problem areas experienced in fabrication of the Indian Point 3 reactor vessel. CE experienced no unusual deviations which could be defined as significant trouble areas. Prompt corrective action was taken on all deviations as evidenced by the records.

Supplier's material properties test data on major components entering fabrication of the Indian Point 3 vessel were examined. No deficiencies were uncovered which would indicate detrimental substitute, or rejectable materials entered the fabrication process.

Final heat treatment records and radiography of major welds were also examined during the visit. These were found to be within the specified requirements.

DETAILS

I. Persons Contacted

Persons participating in principal discussions and activities were:

E. S. Proctor, Manager, Quality Control, CE (Chattanooga)
E. L. Maclin, Chief Q.C. Engineer, CE (Chattanooga)
W. R. May, Resident Q.C. Representative, Westinghouse
C. H. McDonnell, Q.C. Engineer, U. S. Testing Laboratories, Inc.*

II. Status of Vessel

Based on information shown on CE production control charts, the fabrication of Indian Point 3 reactor vessel is 90% complete. Present schedules indicate hydrostatic pressure testing will be conducted in April 1969. Vessel proper and detachable upper head assemblies are complete. Final machining of the vessel proper was in progress and is the last major fabrication work to be completed.

Work is in progress on the pressure vessels listed below. The percent completion is based upon CE estimates taken from production control data.

* Independent inspection agency contracted to Consolidated Edison Company, New York

<u>Facility</u>	<u>Component</u>	<u>Percent Completion</u>
Omaha Public Power District (Calhoun 1)	Reactor vessel	80 - 85
	2 steam generators	70 - 80
	pressurizer	30
Public Service Electric and Gas Co. (Salem 1)	Reactor vessel	80
Consumers Public Power Dist. (Cooper Station)	Reactor vessel	40 - 45
Boston Edison Co. (Pilgrim Station)	Reactor vessel	40 - 45
Niagara Mohawk Power (Easton Station)	Reactor vessel	60
Pacific Gas & Electric Co. (Diablo Canyon 1)	Reactor vessel	50

III. Details of Records Review

A. Materials Certification Review

The suppliers' certification reports of material tests on the outlet and inlet nozzles, vessel plates, vessel closure studs and CRD stub tube materials were reviewed and compared with the applicable specifications. No deficiencies were uncovered which would indicate marginal or defective material entered the fabrication process for the reactor vessel. All deviations evolving from the CE receiving inspection program were promptly identified and corrected, according to the purchase order file and deviation report records.

B. Deviation Records Review

At CE, any deviation from material requirements, design plans or in the planned fabrication schemes is identified as a deviation of record, irrespective of its significance or activity in which it occurred. As a continuance of the inspection, the deviation records were examined to evaluate the relative severity of problem areas experienced during fabrication of the Indian Point 3 reactor vessel. It was found that CE had experienced no unusual deviations which could be defined as significant trouble areas. All deviations were found to be promptly and adequately corrected as indicated by dated approval signatures of the responsible persons involved.

Some of the more significant deviations for the Indian Point 3 vessel are shown below. These also illustrate, in part, the overall effectiveness of the CE quality assurance system.

1. Insufficient cladding thickness was deposited on two of the four outlet nozzle projections. Cladding was machined out and redeposited to the prescribed thickness.
2. Some ten deviations reflected defective cladding in that chemistry or ferrite content requirements were not met. Correction included complete removal of affected areas, replacement and retesting.
3. Base metal laminations in one closure head segment were encountered during welding operations. Laminations were removed by arc-air gouging and grinding. Magnetic particle testing verified lamination removal prior to continuing welding operations.
4. Several Inconel CRD stub tubes were rejected in that purchase order requirements regarding linear surface indications had not been met. Satisfactory replacement was made by the supplier, International Nickel Company.
5. Charpy impact values of 30 ft-lbs @10°F were not obtained on several formed sections of the upper head following the final heat treatment. Since all affected sections measured above 30 ft-lbs @40°F, and satisfactory drop weight values @10°F were obtained, CE and Westinghouse considered them to be acceptable to ASME Code, Section III.

C. Radiography Review

The inspector examined, as representative samples, the radiography records of the lower vessel head to shell circle seam weld and two or the eight large nozzle welds. Radiographic examination reports which included film, techniques used, and film interpretation sheets were found to be consistent with Section III, ASME B&PV Code requirements. Quality of the radiographs, with regard to 2-2T penetrameter sensitivity, density and image contrast obtained was excellent. Weld soundness quality exhibited by the radiographs was well within the acceptance standards defined by ASME Code, Section III.

The radiographic examination reports indicated three independent parties reviewed the radiography and concluded the welds were acceptable--the CE radiography inspector, Mr. R. Wilson; the Westinghouse resident inspector, Mr. W. R. May, and the Hartford Insurance inspector, Mr. McClellan. Mr. McDonnell, as a representative of the applicant, participated in this radiography review.

D. Review of Final Stress Relief Heat Treatment

The inspector examined the final stress relief records for the reactor vessel and discussed the procedures employed with CE (Proctor) and Westinghouse (May). The following facts were obtained:

1. The prescribed stress relief temperature limit of $1150^{\circ}\text{F} \pm 25^{\circ}\text{F}$ (as for all A-302B vessels) was met.
2. Heatup rate was stabilized at 100°F/hr above 600°F in the vessel, as required.
3. Holding time at stress relief temperature totaled 13 hours. Holding time of 8 hours, or 1 hr/in of wall thickness was specified as minimum. Five thermocouples, attached to evenly distributed welds of the vessel, show a maximum temperature differential of 15°F was maintained during the stress relief treatment.
4. Vessel cool down rate was maintained at 100°F/hr to 600°F , then furnace cooled to 400°F followed by air cooling.
5. Both furnace and vessel thermocouples were found to be properly calibrated.

The quality control inspectors of CE, Westinghouse and Hartford Insurance have concluded the final heat treatment was satisfactory, according to approval signatures of record. The inspector agrees with this conclusion.

IV. Miscellaneous Topics

A. U. S. Testing Company Activities

Mr. McDonnell accompanied this inspector during the examination of selective records of the Indian Point 3 vessel. He stated that Con Ed has contracted the services of his organization for both on-site and off-site Q.C. surveillance for the facility. Mr. McDonnell said that he had been auditing the Q.C. records and progress of the Indian Point 3 vessel by visiting the CE plant monthly. His firm is also providing vendor inspections for Con Ed for other Indian Point 3 components; such as steam generators, pressurizer and primary coolant piping. Mr. McDonnell indicated that Westinghouse was the principal supplier of these components.

With regard to CE fabrication of the Indian Point 3 pressure vessel, Mr. McDonnell stated he had found no discrepancies between the work and specifications. Mr. McDonnell indicated this was not true for the other components, particularly the steam generators, but would not elaborate on the true nature or significance of his audit findings.

B. Nondestructive Testing

To determine whether final stress relief or hydro pressure tests causes detrimental changes in existing quality, CE is performing the following nondestructive tests on the Indian Point 3 vessel:

1. After final stress relief; 100% magnetic particle test (MPT) of external surfaces of vessel and head, 100% dye penetrant test (DPT) of all cladding in these components.
2. Post-hydro inspection; Complete DPT of nonferrous pressure boundary welds. Complete MPT of ferrous pressure boundary welds.

The base metal of the entire core area will be ultrasonic tested (UT) through the cladding using the longitudinal wave mode, circumferential scan technique. A UT map will be developed for all indications exhibiting 40% loss of ultrasonic signal amplitude as calibrated on 1/2" diameter flat bottom hole using a 1-1/8" x 1/2", 2.25 MHZ transducer in a wheel-type mounting. The ultrasonic test results are to provide historical reference for in-service inspection only. No code acceptance criteria are factored into this test program, according to Mr. Proctor.

The results of the first tests after stress relief did not disclose any detrimental conditions in the materials. The post hydro inspection has not been accomplished at this time. Detailed results of the aforementioned inspections are to be submitted to the applicant with the Indian Point 3 vessel fabrication report and should be reviewed when this document is made available.

IV. Exit Interview

Persons contacted accompanied the inspector throughout the visit thus eliminating the necessity of an exit interview.



UNITED STATES
ATOMIC ENERGY COMMISSION
DIVISION OF COMPLIANCE
REGION I
970 BROAD STREET
NEWARK, NEW JERSEY 07102

201 645-3942

February 19, 1969

J. P. O'Reilly, Chief, Reactor Inspection & Enforcement Br.,
Division of Compliance, Headquarters

CONSOLIDATED EDISON COMPANY, INDIAN POINT NO. 3
DOCKET NO. 50-286

The attached report of visits to the subject facility on
January 20 and 24, 1969, is forwarded for information. No
items of nonconformance and no safety items were detected.

Since the construction permit for this facility has not been
issued, the inspectors confirmed that construction had not
proceeded beyond that authorized by 10 CFR 50.10 and the
exception granted by Mr. Price's letter dated November 15, 1968.

Construction is proceeding under the quality control organiza-
tion, using similar procedures and controls which have been
used for the Indian Point No. 2 plant.

N. C. Moseley
N. C. Moseley,
Senior Reactor Inspector

Attachment:

CO Report No. 286/69-1
by G. L. Madsen, dtd 2/11/69

cc: E. G. Case, DRS
R. S. Boyd, DRL (2)
S. Levine, DRL (6)
D. J. Skovholt, DRL (3)
L. Kornblith, Jr., CO
CO Directors
REG Files

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

Report of Inspection

CO REPORT NO. 286/69-1

Licensee: CONSOLIDATED EDISON COMPANY
Indian Point No. 3
License - Not Issued

Dates of Inspection: January 20 and 24, 1969

Dates of Previous Inspection: November 20 and 21, 1968

Inspected by: G. L. Madsen 2/7/69
G. L. Madsen, Reactor Inspector Date

Reviewed by: N. C. Moseley 2/11/69
N. C. Moseley, Senior Reactor Inspector Date

Proprietary Information: None

SCOPE

The Consolidated Edison Company (Con Ed), Indian Point No. 3 (IP-3) construction site was inspected on January 20 and 24, 1969. The purpose of the inspection was to evaluate the quality control program relative to the placement of the containment building base mat and the containment liner floor. Mr. D. E. Whitesell, Reactor Inspector (Construction) assisted in the inspections.

SUMMARY

Construction is progressing within the provisions of 10 CFR 50.10 and the authorized exemption.

The on-site organizational responsibilities are similar to those employed for Indian Point No. 2.

Procedures and records indicate that the containment building base mat concrete and liner plate work is being performed in compliance with applicable codes and the PSAR.

DETAILS

I. Persons Contacted

The following individuals were contacted during the visit:

Con Ed

Mr. A. Corcoran, Site Construction Engineer

Mr. J. Verbst, Site Construction Engineer Assistant

Mr. J. Dragosits, Welding Inspector

II. Results of Visit

A. General Construction Status

1. The base mat concrete for the containment building was complete with the exception of the reactor vessel cavity walls. The bottom liner plate installation was in progress.
2. Concrete forms were being erected for the turbine pedestals.
3. Records and observations indicated to the inspector that the provisions of 10 CFR 50.10 and the authorized exemption* had not been exceeded.

B. Construction Organization

The major responsibilities for site construction for IP-3 are essentially the same as was employed for IP-2,** and include the following:

*Letter to W. D. Crawford, Vice President, Con Ed from H. Price, DRL dated November 15, 1968.

**CO Report No. 247/67-3, Paragraph II.B.

1. Con Ed

Con Ed has a permanently assigned on-site staff whose function is to ensure that the site construction work is accomplished within contractual and quality control requirements. The staff has the authority to stop work in areas that could affect the technical adequacy or safety of the plant.

2. Westinghouse

Westinghouse has a turnkey contract with Con Ed for the construction of IP-3 and thus is responsible for all construction activities.

3. United Engineers and Constructors (UE&C)

In the capacity of Architect-Engineer, UE&C manages all construction activities. The on-site representatives of UE&C include a quality control staff which performs receipt, storage, and erection inspections.

4. Chicago Bridge and Iron Company (CB&I)

CB&I is the subcontractor for all steel work. The work on the containment liner is being performed by this organization.

5. Pittsburgh Testing Laboratory (PTL)

PTL is a subcontractor for UE&C and performs quality control on structural steel and concrete mixing and placement.

6. U. S. Testing Company (UST)

UST, under a contract with Con Ed, performs vendor and construction site quality control audits.

The above organizational structure complies with the requirements of the PSAR.*

*Supplement I, Section 5.

C. Concrete

United States Testing (UST) inspection reports and United Engineering and Construction (UE&C) records indicated that concrete work is being performed in compliance with the recommendations of ACI, ASTM, and the PSAR. Additional information on this subject is included in Section I of Addendum I to this report.

D. Reinforcement Bars

The reinforcement bar receiving inspection procedures, cadweld break strength records, and the mill certificates for the containment liner anchor bolts were reviewed. The details of the review are included in Section B, Addendum I of this report. No deficiencies were identified.

E. Containment Liner

Mill certificates for the liner plate, cover channels, and supporting angles indicated that the materials conform to the requirements of the PSAR.*

Nine welders were qualified in accordance with the requirements of Section IX of the ASME code.

Additional information relative to the containment liner construction is included in Section C of Addendum I of this report.

**Supplement II, Table 5.1-1.

ADDENDUM I

CO REPORT NO. 286/69-1

Licensee: CONSOLIDATED EDISON COMPANY
(Indian Point No. 3)
License - Not Issued

Dates of Inspection: January 20 and 24, 1969

Dates of Previous Inspection: November 20 and 21, 1968

Inspected by: *D. E. Whitesell* 2/7/69
D. E. Whitesell, Reactor Inspector
(Construction) Date

Reviewed by: *N. C. Moseley* 2/11/69
N. C. Moseley, Senior Reactor Inspector Date

A. Concrete Work

1. Concrete work had been suspended during the time of visit due to rain and falling temperatures. During a walk through the work area the inspector observed the following:
 - a. Form work for the turbine pedestals were being erected.
 - b. Plastic wind breakers were being installed around the various placement location and heaters were being installed within the protected areas.
2. The inspector read a copy of a trip report made by U. S. Testing Company, Inc., dated December 27, 1968, in regard to their visit to the site to observe concreting operations and to check the quality control performance of Pittsburgh Testing Laboratories (PTL) at the location of the concrete placement and at the batch plant. The report indicated that no deviation from the quality control procedures were found, and that all work performance was observed to be in accordance with good practice as recommended by ACI and ASTM.
3. Reports of cylinder break tests were audited and found to be running 115% to 150% of the design strengths.

B. Rebars

1. The inspector investigated UE&C's procedures pertaining to the receiving inspection given to rebars. Mr. Fant, Quality Assurance Engineer for UE&C informed the inspector that each heat of rebar received is inspected for cracks, tears or separation due to low temperatures and a receiving report is completed for each inspection. The physical properties of each heat are verified by PTL. A sample of the receiving reports was reviewed and found to comply with the procedures.
2. The records for the cadweld splices that had been tested since the previous visit were audited and no deficiencies found.
3. The mill certificates furnished by the Jersey Bolt and Spike Company for the 1-1/4", 60" ± 24" hook anchor bolts were audited. The material was certified as conforming to AISI and SAE 1040 hardened at 1575° F for 40 minutes, oil quenched and tempered at 700° F for 90 minutes to a Rockwell C scale 19/25.

The PSAR specifies that the bolt materials shall conform to ASTM-A325. A comparison of the chemical analysis, and physical properties with a 19/25 Rockwell C hardness of the ASTM-A325, are found to be approximately the same as the properties of AISI and SAE 1040 steels as listed in the 8th edition of the ASM metals handbook. It therefore appears that the bolts used comply with the intent of the PSAR.

C: Containment Liner Plate

1. The mill certificates for the liner plate, cover channels and supporting tees and angles were audited and found to conform to the PSAR. The steel was furnished by Bethlehem, Lukins and United States and all applicable certifications showed the plate material to conform to ASTM-442A, Grade 60 Firebox, normalized per ASTM-A300 to fine grain. All the certifications gave the heat numbers, chemical analysis, physical properties, and three impact tests at -10° F. Rolled shapes conformed to ASTM 131 Grade C or ASTM-36.

2. United Engineers specification number 9321-05-225-1 for the erection, fabrication and testing of the containment liner was read. The specification provides for the following:
 - a. Establishes codes and standards for materials.
 - b. Erection, fabrication, welding and repair work.
 - c. Inspection and testing.
 - (1) Spot radiography
 - (2) Vacuum box tests where radiography is not possible.
 - (3) Strength test 54 psig pneumatic for 15 minutes.
 - (4) Leak test with halogen detectors and freon at 47 psig for 2 hours.
 - d. Post construction tests by others.
 - e. In locations where radiography of the finished weld could not be made, the specifications states that a 2" long overrun coupon shall be made and chipped off, marked for location and tested.
3. There were not test reports available for audit at the time of inspection but will be reviewed on a future visit.
4. UE&C's welding specification number 1 , - Rev dated January 16, 1968, providing for joining carbon steel base metals, using F3 and F4 electrodes with weld metal comparable to the base metal, was reviewed. The specification provided for the joint preparation, electrical current characteristics, welding technique, cleaning, repair of defects, preheating and temperature control, stress relieving, when required, as to the rate of heating and cooling and the soaking temperature and time. Inspection techniques were established as being in accordance with Appendix VIII of Section VIII - ASME code, the acceptance standards as defined by case N-10 of the ASA code. The specification had been qualified in accordance with Section IX of the ASME code.

5. CB&I had nine welders qualified in all positions on the procedures. Their qualification tests were audited, and found to conform to Section IX, ASME code. The tenth welder was preparing test coupons for qualification at the time of inspection.