

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

September 18, 1967

CO REPORT NO. 247/67-3

Title: CONSOLIDATED EDISON COMPANY, INDIAN POINT NO. 2
LICENSE NO. CPRR-21

Dates of Visits: August 1, 16 and 22, 1967

By : *N. C. Moseley*
N. C. Moseley, Reactor Inspector

SUMMARY

The containment building liner has been erected up to the first course beyond the dome spring line. The reinforced concrete walls of the containment building have not been installed. Bulging up to a maximum deflection of 2-5/16 inches has developed in the containment liner in the vicinity of the fuel transfer penetration. A quality problem has been experienced with the Cadweld splices in the containment reinforcing steel.

A comprehensive quality control program is in effect for containment materials and workmanship.

Excavation blasting for a 21 Mw gas turbine generator and exploratory blasting for Unit No. 3 are scheduled to begin about September 15, 1967. The blasting vibration will be limited to a particle velocity of 1.36 inches/sec. as measured at vital Unit No. 1 and Unit No. 2 structures.

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DETAILS

I. Scope of Visits

The Consolidated Edison Company (Con Ed), Indian Point No. 2 (IP-2) site was visited on August 1, 16 and 22, 1967, by Mr. N. C. Moseley, Reactor Inspector, Region I, Division of Compliance. Mr. D. M. Hunnicutt, Reactor Inspector, Region I, Division of Compliance, accompanied Mr. Moseley on August 1 and 22, 1967, and Mr. G. L. Madsen, Reactor Inspector, Region I, Division of Compliance, accompanied Mr. Moseley on August 16, 1967.

The visits included the following:

- A. Tours of the construction site.
- B. Review of specifications, records and reports on quality control.
- C. Review of the dynamite blasting control program.

Discussions were held with the following people:

A. Consolidated Edison Company

Mr. J. A. Prestele, General Superintendent
Mr. A. Corcoran, Site Construction Engineer

B. Westinghouse

Mr. Homer Deakman, Resident Engineer
Mr. Edward Fitzgerald, Resident Engineer

C. United Engineers and Contractors (UE&C)

Mr. Earl Nagle, Project Superintendent
Mr. George Grey, Assistant Project Superintendent
Mr. James Fant, Quality Control Supervisor

D. Vibra-Tech Engineers, Inc.

Mr. J. S. Specht, Vice President

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II. Results of Visits

A. General Construction Status

The containment building liner cylindrical walls have been installed. The reinforced concrete walls of the containment building have not been erected. The concrete walls of the primary auxiliary building have been poured to the 80 foot elevation. Portions of the waste tank pits have been poured. The turbine pedestals are complete and most of the turbine building structural steel has been installed.

B. Construction Organization

The major responsibilities of subcontractors during the current phase of construction are as follows:

1. Westinghouse

Westinghouse has a "turkey" contract with Con Ed to construct the IP-2 station and, therefore, has overall responsibility for all construction activities.

2. United Engineers and Contractors, Inc.

UE&C is the subcontractor responsible for all architectural and piping work. The on-site representatives of UE&C include five people whose sole responsibility is quality control.

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

CB&I is the subcontractor for all steel work. The containment liner is being erected by CB&I but other steel work, such as the turbine building, is subcontracted to Karl Kotch Steel Erectors.

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Results of Visits (continued)

4. Vacca Company

The Vacca Company, as a subcontractor for UE&C, performs quality control on structural steel bolting and concrete mixing at the batch plant. Vacca also performs break tests of concrete cylinders.

5. U. S. Testing Company (UST)

UST, under a contract with Con Ed, performs quality control audit and inspection on concrete, welding and primary system components.

C. Containment Building Construction Problems

1. Liner

During a tour of the construction site on August 1, 1967, the inspectors observed bulges in the containment liner in the vicinity of the fuel transfer penetration. Subsequent measurements by UE&C indicated that the deflections exist over 28 feet of the perimeter of the liner at the 56 foot elevation. The maximum deflections are 2-5/16 inches inward and 1 inch outward. The liner fabrication specifications allow diameter deviations of ± 2 inches between elevations 43 and 95 feet. Mr. Deakman said that corrective action would be taken to bring deflections within the specifications. The method of correction, the cause of the deflection and the safety implications of this problem are under study by Westinghouse, UE&C and Con Ed. Further information on this problem will be obtained during the next inspection visit.

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Results of Visits (continued)

2. Reinforcing Bar Cadweld Splices

All splices in the reinforcing bars of the containment walls will be made using the Cadweld technique. The construction specifications require that the Cadweld splices be capable of withstanding a minimum tension of 75,000 psig*, 125% of the specified yield strength of the reinforcing bars. About the middle of May 1967, the quality control program indicated a marked reduction in the yield strength of the splices being tested. By June 1, 1967, several splices tested at less than 75,000 psig yield. Splicing of the reinforcing bars was halted to determine the cause of the quality reduction. Mr. Deakman said that the cause has not been determined and splicing will not be resumed until the quality problem is corrected.

This problem has not delayed construction because the schedule called for completing the liner installation prior to pouring the concrete walls.

D. Quality Control Program

The inspectors' review of records and specifications indicated that the quality control program includes the following:

1. Concrete

a. Test Cylinders - Slump Tests

Four test cylinders are taken for each 100 cubic yards of concrete in a pour. A slump test is made of each 25 cubic yards of concrete.

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*Preliminary Safety Analysis Report, page 5-9.

Results of Visits (continued)

b. Aggregate

Daily tests are run at the batch plant, in Verplanck, New York, for stone sieve size, stone moisture content and sand moisture content. The weights of each constituent are verified at the batch plant by quality control personnel.

c. Cement

Chemical analyses are required from the manufacturer on each batch of cement received at the batch plant.

d. Reports

A daily concrete inspection report is prepared which gives results of slump tests, moisture and sieve tests, design compressive strength, numbers of test cylinders prepared and the number and locations of pours.

Test cylinder reports are prepared about weekly by Vacca on 7 day and 28 day compressive tests.

2. Reinforcing Bars

a. Bar Material

A chemical analysis is furnished by the supplier for each heat of bar material. The supplier also furnishes the yield and tensile strength of the material and certifies compliance with the ASME specifications.

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Results of Visits (continued)

Mr. Fant said that visual checks are made of reinforcing bar material as received. Deformation measurements are made on a sample basis. Mr. Fant said that during cold weather, quality control people will observe bars during bending and after bending for evidences of cracks.

b. Cadweld Splices

All splices in the containment building reinforcing bars will be made by the Cadweld technique. The construction specifications require that 1% of the splices made by each crew be removed and destructively tested. If any of these splices fail to meet the specified yield strength, the splice made immediately before or after the faulty one must be removed and tested. If the second splice fails to meet the specification, the five previous splices by the same crew are cut out and tested. If any of these five do not meet the specification, the crew must be requalified before making any further splices.

A splicing procedure qualification was made using production material. Five splices each were made and satisfactorily tested of horizontal and vertical splices in straight sizes and reducing sizes.

Crew qualification testing includes the performance of satisfactory splices on each of the four types of splices. Crews are numbered and each splice has an identification number affixed which identifies the crew number, date and hour the splice was made.

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Results of Visits (continued)

3. Containment Liner

a. Material

Mill test reports are supplied for all material delivered. Charpy test results are reported for each heat of material. The UE&C quality control people review all test reports for compliance with specifications.

b. Welding

Welders are qualified in accordance with ASME code requirements. The tests are administered by CB&I. All qualification records are reviewed and approved by UE&C inspectors.

Radiographs are made of the first 10 feet of a welder's work, followed by random radiographs of each 50 feet of weld as required by ASME Code UW-52. All radiographs are reviewed by UE&C inspectors.

Each butt weld is visually examined for defects. After leak detection channels are attached, a 54 psig overpressure test is made. During the overpressure test, soap bubble and halide leak detection techniques are used. Final confirmation of the absence of leaks is a four hour hold test on each leak channel group. The overpressure and leak tests are made by CB&I personnel and are observed by UE&C inspectors.

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Results of Visits (continued)

c. Studs

The studs to bond the liner to the concrete are Nelson type, i.e., they are attached with a gun type machine. The liner surface is cleaned by wire brushing as needed before attaching the studs. Quality control consists of 100% visual inspection in addition to bending, with a hammer, two of the studs installed by a crew each day. If the stud can be bent 45° and returned to normal without breaking, the stud is considered to be satisfactory. These quality control measures are in agreement with the license application*.

D. Blasting

About the middle of September 1967, dynamite blasting is expected to begin in preparation for the installation of a 21 Mw gas turbine generator and to make exploratory examinations at the site of Indian Point Unit No. 3. The control measures designed to protect both Units No. 1 and No. 2 are as follows:

1. Measurement of Vibration

Two Sprengnether "Velocity Recording Blast and Vibration Seismograph" type VS1000 instruments will be used. Mr. Specht said that these instruments will be placed in each case in the position determined to be representative of the shock received by the closest important structures. The sales literature for the vibration seismograph states that the instrument response characteristic is essentially flat from 2 to 200 cycles per second. The instrument gives a direct reading of velocity in each of the three components of motion.

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*Preliminary Safety Analysis Report, Third Supplement, Question 1.B.

Results of Visits (continued)

Mr. Specht said that the instruments have been calibrated on the McDonald Aircraft Company shaker table. He said that calibration data would be available at a later date for review by the inspector.

2. Vibration Limit

Mr. Specht said that the size of all blasts would be limited to that which would cause a particle velocity of 1.36 inches/sec. at important buildings. The components in each direction of motion will be added vectorially. It is noted that the current Pennsylvania State University limit for blasting is 2.0 inches/sec. in any of the three components. It is also noted that a particle velocity of 1.36 inches/sec. is equivalent to an energy ratio of 0.5, the limit used for control at Indian Point No. 1 during blasting for Unit No. 2.*

3. Physical Control

Audits on the amount of dynamite per hole, hole depth, hole spacing and other variables, will be made on a full-time basis by the UE&C field engineer and a Con Ed construction engineer.

Mr. Prestele said that blasting will be halted and the entire program reviewed if any blast exceeds the control limit.

E. Exit Interviews

At the conclusion of each visit, brief discussions were held with Mr. Prestele. During these discussions, Mr. Prestele said that Con Ed would pursue the problems concerning the containment liner bulge and the Cadweld problem. He also said that the calibration data for the vibration measurement instruments would be obtained for review by the inspector.