

U. S. ATOMIC ENERGY COMMISSION  
DIVISION OF COMPLIANCE

REGION I

CO Inspection Report No. 50-247/71-12

Subject: Consolidated Edison Company

Indian Point No. 2

License No. CPPR-21

Location: Buchanan, New York

Priority B

Category

Type of Licensee: PWR-873 Mwe (Westinghouse)

Type of Inspection: Routine, Announced

Dates of Inspection: August 12, 17, 18 and 25, 1971 &  
September 2, 1971

Dates of Previous Inspection: June 8, 1971

Principal Inspector: *EJ Brunner*  
*for* G. L. Madsen, Reactor Inspector

9/28/71  
Date

Accompanying Inspectors:

Date

Date

Other Accompanying Personnel: B. K. McLeod

Reviewed By: *EJ Brunner*  
Eldon J. Brunner, Senior Reactor Inspector

9/28/71  
Date

Proprietary Information: None

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## SECTION I

### Enforcement Action:

- A. The installed containment purge valves do not conform to the requirements of the FSAR. (Paragraph 8)
- B. A review of Wedco, QC reports indicates that steam generator clad repair was performed with welding machine amperage other than that specified in the weld procedure. (Paragraph 6.d.)

### Licensee Action on Previously Identified Enforcement Matters - None

### Unresolved Items - None

### Status of Previously Reported Unresolved Items

- A. Preparation of the initially proposed preoperational test procedures has been completed; however, four additional test procedures are being prepared. (Paragraph 5.a.)
- B. Con Ed proposes to amend the FSAR to reflect the actual operating times for the boron injection tank valves.
- C. Repair of the steam generator tube sheet cladding is in progress. Con Ed has agreed to submit a report to DRL on this subject. This item is considered resolved. (Paragraph 6.)
- D. Additional power ascension loss of flow testing is being considered. (Paragraph 9.)

### Unusual Occurrences - None

### Persons Contacted

#### A. Con Ed

- A. Kohler, Construction Project Superintendent
- J. Makepeace, Startup Manager, IP-2
- P. Leo, Asst. Construction Project Superintendent
- W. Mont, Asst. Operations Superintendent
- S. Cantone, Superintendent, Performance
- E. Dadson, Quality Assurance Supervisor
- S. Austin, Senior Mechanical Engineer
- V. Perry, Startup Engineer
- J. Dean, Quality Assurance Inspector
- H. Kerns, Mechanical Engineer
- R. Cosgrove, Startup Engineer
- R. Schuster, Quality Assurance Inspector

B. Wedco

M. Snow, Manager, Quality Assurance  
W. Diebler, Manager, Quality Control  
D. Hughes, Pipe and Structural Engineer, Quality Control  
F. Bargess, Field Engineer

Management Interview

The following subjects were discussed with Messrs. Makepeace and Kohler at the conclusion of the inspections:

A. Pipe Supports

Mr. Kohler stated that pipe supports and restraints within containment, or on systems which will be heat affected during the next heatup, will be completed prior to core loading. (Paragraph 2)

B. Preoperational Testing

Mr. Makepeace confirmed that additional preoperational test procedures will be prepared (Paragraph 5.a.). The need for performance of the residual heat removal and recirculation system flow tests, prior to core loading, was presented by the inspector. Mr. Makepeace stated that these tests will be performed during the filling of the reactor coolant system in preparation for core loading. (Paragraph 5.b.) Findings relative to the initial review of preoperational test results were discussed. (Paragraph 5.c.)

C. Steam Generator Clad Repair

Mr. Makepeace confirmed Con Ed's position relating to NDT to be performed beyond that specified in the existing procedure for the steam generator clad repair. (Paragraph 6.b.(5)).

The apparent violation of the weld procedure requirements and weakness in the QC program for the steam generator cladding was discussed. Mr. Makepeace indicated that this item would be investigated. The inspector stated that this item will be handled as an item of nonconformance with the welding procedure requirements and 10 CFR 50, Appendix B, Criterion IX. (Paragraph 6.d.)

D. Steam Generators

Mr. Makepeace stated that checking of each steam generator tube for clearance is scheduled. (Paragraph 7.)

E. Containment Purge Valves

The inspector related that the installed containment purge valves do not conform to the FSAR requirements. Mr. Makepeace indicated an awareness of this condition and stated that Con Ed plans to amend the FSAR to reflect the actual condition. The inspector indicated that this item will be handled as an item of nonconformance. (Paragraph 8.)

F. Power Ascension Program

Mr. Makepeace stated that Con Ed is evaluating the value of the additional loss of flow testing. Con Ed is not prepared to take a position on this matter at this time. (Paragraph 9.)

SECTION II

Additional Subjects, Not Identified in Section I, Where No Deficiencies Were Found

1. General

Construction and startup activities are being directed toward satisfactory completion of work required for core loading. Major limiting items are: The installation of pipe hangers, repair of the steam generators, and completion of the preoperational test data review.

2. Pipe Supports and Restraints

- a. Pipe supports and restraints scheduled to be installed prior to core loading.
- b. Records relating to pipe supports and restraints which remain to be completed.
- c. Preparation status of a pipe surveillance program for the next plant heatup.

3. Operating Procedures

- a. Status of completion.

4. Containment Overpressure Test

- a. Containment overpressure test strength report.

Details of Subjects Discussed in Section I

5. Preoperational Testing

a. Procedure Preparation

Preparation of the initially proposed Phase II preoperational test procedures is complete. Additional procedures are being prepared for the following:

- (1) Boron line heat tracing
- (2) Filter testing
- (3) Containment supply, exhaust, and purge valve closure time and fail-safe testing
- (4) Reactor coolant leak detection instrumentation

b. Testing - Prior to Core Loading

Con Ed personnel presented a listing of preoperational tests which are scheduled to be completed subsequent to core loading. The inspector indicated general agreement with the listing; however, the following tests are considered as prerequisites for core loading, when compared to the motion presented to the Atomic Safety and Licensing Board\*:

- (1) 4.3.2 - Residual Heat Removal System flow test, which is scheduled to be redone as a result of unequal measured flows to the four reactor coolant system loops.
- (2) 4.5.1, Section 6 - Low Head Safety Injection System relating to the recirculation flow checkout.
- (3) 4.14 - Heating and Ventilation. Portion relating to containment recirculation fan filter testing.

Mr. Monti stated that Items (1) and (2) above are scheduled to be performed during the filling of the reactor coolant system just prior to core loading. Additionally, he stated that the third item will be given further consideration. Subsequently, Mr. Makepeace indicated the containment fan filter testing will be performed prior to core loading, and that Items (1) and (2) above will be performed during the next filling of the reactor coolant system.

In conclusion, the inspector pointed out that all preoperational testing, with the exception of those previously discussed, will be expected to have been completed prior to core loading. The inspector also pointed out that completion of testing includes the evaluation of test results and the resolution of identified problems. Mr. Monti agreed to this interpretation.

c. Review of Preoperational Test Results

An initial review of preoperational test results was initiated. The results for several tests have been evaluated and approved by Wedco and Con Ed, with identified exceptions. These exceptions are contained on punchlists that have been approved by Wedco and Con Ed. Test results reviewed and the major identified punchlist items follow:

<u>Procedure No.</u>	<u>Title and Remarks</u>
4.4.1	Primary Sampling System. No major punchlist items.
4.5.1	Safety Injection System (Electrical). No major punchlist items.
4.8	Nuclear Instrumentation. Con Ed has requested a repeat of the plateau tests and a demonstration of the containment evacuation alarm. The installation of fire barrier material has not been completed.

\*Motion of Applicant for an Order to Permit Fuel Loading and Sub-critical Testing, dated June 18, 1971.

<u>Procedure No.</u>	<u>Title and Remarks</u>
4.8.1 and Addendum	Reactor Protection System. Items 5 and 28 remain to be tested.
4.8.2	Reactor Safeguards. Additional testing needed for containment purge valves, hydrogen recombiner isolation valves, equipment hatches, and main steam isolation valves.
4.17 and Addendum	Fire Protection. Construction of a drain barrier curbing at bottom of electrical tunnel. Complete installation of fire barriers.
4.26.1	Diesel Generators. No major punchlist items.
4.26.2	Batteries and Inverters. No major punchlist items.
4.26.3	Safety injection and loss of power. The checkout of the control room air conditioner is incomplete, and measured operating times, for certain safety injection valves, exceeded FSAR requirements.
4.34	Isolation valve seal water system. No major punchlist items.
4.35	Hot Penetration Cooling. The performance of the air blowers and heat exchangers for the residual heat removal and main steam lines did not meet the acceptance criteria. Repairs have been initiated. These items will be retested during a future plant heatup.
4.36	Auxiliary Steam. No major punchlist items.
4.39.1	VC Pressure Test. The final report has been issued.

The punchlists for most of the above tests also indicate the need for completion of pipe hanger and restraint installation.

The inspector audited the following test procedures to ascertain satisfactory completion of test prerequisites, data collection, and evaluation of test results:

<u>Procedure No.</u>	<u>Title</u>
4.8.1	Reactor Protection System
4.8.2	Reactor Safeguards System
4.26.1	Diesel Generators
4.26.2	Batteries and Inverters
4.26.3	Safety Injection and Loss of Power
4.34	Isolation Valve Seal Water System
4.35	Hot Penetration Cooling
4.39.1	VC Pressure Test

The individual acceptance punchlists were found to contain the items requiring additional consideration or which are considered to be problems. No specific deficiencies were identified.

6. Steam Generator - Clad Repair

a. General

As previously reported, UT revealed that the Inconel cladding for the tube sheet had separated from the base material in the area adjacent to the divider plates of the four steam generators\*. The repair is proceeding on 24-hour/day basis. Westinghouse Steam Generator Division personnel are directing the repair. Wedco is performing Quality Control, and Con Ed is providing surveillance on a 24-hour/day basis. Con Ed agreed to submit a report to DRL, relating to the steam generator clad separation problem.

b. Clad Repair Procedures

The Westinghouse approved clad repair procedure states that welding and testing will be performed to the requirements of ASME Section III and includes the following:

(1) Repair Program

Steps included in the repair program are as follows:

- (a) Installation of plastic plugs into the tube ends.
- (b) Removal of the cladding over the divider plate out to a line between the first and second rows of tubes on either side of the divider plate. Clad removal is to be accomplished by arc gouging and grinding.
- (c) Grinding off the first row of tubes flush with the tube sheet and plugging these tubes.
- (d) PT of the tube sheet base material after clad removal.
- (e) Replacement of the cladding overlay using a manual metal-arc technique.
- (f) PT of each layer of Inconel overlay welding.

\*CO Report No. 247/71-10, paragraph 13.a.



- (g) Heat treatment of the clad repair region.
- (h) Welding of the divider plate to the tube sheet.
- (i) Hydrostatic testing with a secondary side pressure of 800-900 psig and a zero primary pressure.
- (j) Final cleaning

(2) Welding Procedure

The weld procedure, NPT-11, for the cladding operation was qualified by Westinghouse and includes the following considerations:

- (a) Electrodes baked a minimum of one hour at  $525 \pm 25^{\circ}$  F.
- (b) Electrodes not exposed to air longer than 4 hours without rebaking.
- (c) Requirements relating to surface cleanliness.
- (d) Welding amperage of 80-90.
- (e) Electrodes - 1/8", Inconel 182
- (f) Weave of 2 1/2 times the electrode diameter permitted.
- (g) Bead treatment - remove all slag, no peening allowed, and stops and starts staggered.
- (h) Inspection by PT.

(3) Heat Treatment

The heat treatment parameters include:

- (a) Maximum rate of heatup of  $100^{\circ}$  F/hr.
- (b) Monitoring of tube sheet temperatures using 20 thermocouples.
- (c) Soak time:

1100-1150<sup>o</sup> F - one hour  
1050-1100<sup>o</sup> F - two hour  
1000-1050<sup>o</sup> F - three hours

If a 50<sup>o</sup>F temperature gradient cannot be maintained, a maximum of 100<sup>o</sup> F gradient for the 20 thermocouples is acceptable, provided the minimum temperature is greater than 1000<sup>o</sup> F and the maximum temperature is less than 1150<sup>o</sup> F.

(4) Quality Control

A master Quality Control signoff sheet is included for the repair program. A signoff is included for each step in the repair procedures. This activity is to be coordinated by the Wedco, Quality Control organization.

(5) Additional Nondestructive Testing

The inspector indicated that the above repair procedure is considered deficient because the following types of nondestructive testing are not included:

- (a) U.T. of the clad repair
- (b) Primary hydrostatic testing at a minimum pressure of 2300 psi and secondary pressure of zero.
- (c) U.T. examination of the circumferential weld and heat affected zone, which attaches the lower head casting to the tube sheet.

Mr. Dadson indicated that Con Ed had similar concerns and each of the above NDT items was under consideration. Subsequently, the inspector was advised by Messrs. Makepeace and Dadson that the following additional NDT will be incorporated in the clad repair program for the steam generators:

- (a) U.T. of the clad repair will include a spot check of the cladding at the interface between the (original) explosive and the (new) manual applied Inconel cladding and a U.T. of the tube sheet area on a 12-inch grid.
- (b) Performance of a 2700 psi primary hydrostatic test. Con Ed presently plans to perform this test after core loading.
- (c) U.T. examination of the circumferential weld which attaches the lower head casting to the tube sheet.

Mr. Dadson indicated these additional items will be incorporated in the existing repair procedures and Quality Control programs, by the issuance of an addendum to the existing procedures.

c. Status of Repair

As of September 2, 1971, the status of the steam generator clad repair was as follows:

SG

21	Clad welding complete - Heat treatment in progress
22	Clad welding complete - Final clad PT in progress
23	" " " " " " " "
24	" " " " " " " "

d. Review of Quality Control Records

A review of Quality Control repair records, for the outlet side of steam generator No. 21 was performed on September 2, 1971. The review of the master QC sign-off sheet revealed no deficiencies. A review of the Wedco, QC inspector daily reports revealed that periodic surveillance was being performed on welder qualifications, oven temperatures, welding rod control, welding machine amperage, and general adherence to the requirements of welding procedure NPT-11. Apparent deficiencies identified by the CO inspector, are as follows:

- (1) 8/21/71 - Welding to Procedure NPT-11, using 1/8", Inconel 182 electrodes, at a machine amperage of 70 amps. (Procedure NPT-11 specifies 80-90 amps).
- (2) 8/26/71 - Welding machine at 75 amps. Welding going well at this amperage. (NPT-11 calls for 80-90 amps)
- (3) No backup inspection data was included in the daily Wedco inspector reports for the final PT of the cladding. Mr. Hughes, indicated that Westinghouse Steam Generator Division personnel are performing the final PT inspection and are retaining the associated inspection sheets. The inspector indicated that these records will be audited during a subsequent inspection.

The inspector asked if cladding was performed with welding machine amperages other than specified in weld procedure NPT-11. Messrs. Hughes and Dean indicated that the machine readout amperage was noted to be lower than that measured at the welding handle, during welder qualification testing. The inspector asked if the welding machine readouts were calibrated, the QC inspectors were aware of existing differences between weld machine readout and welding handle amperage, and the existing amperage differences were recorded. Mr. Hughes was unable to answer in the affirmative. The inspector stated that the Wedco QC reports indicate apparent violations of the welding procedure and a weakness in the QC program, in that corrective actions for clearly documented violations were not initiated. Messrs. Hughes and Dean both indicated confidence that the welding quality was acceptable. A subsequent check of the two welding machines that might have been used for the clad repair of Steam Generator No. 21 revealed the following:

<u>Machine</u>	<u>Setting on Machine</u>	<u>Reading at Handle</u>
1	70 amps	85-90 amps
2	65 amps	85-90 amps

A review of weld procedure qualification documents revealed that the qualification was performed at 90-95 amps. The inspector was presented with a label which accompanied the welding rod for the cladding operation. This label indicated the materials to be 1/8", Inconel 182T rod with a recommended welding amperage range of 65-95. The inspector indicated the Con Ed should supply CO with an evaluation relating to the acceptability of the clad welding.

e. Field Observations

Field observation by the CO inspector included the following:

<u>Steam Generator</u>	<u>Observation</u>
21	Inconel overlay beads were uniform on the second layer. Starts and stops were staggered.
22	Grind out of cladding well controlled. Maximum estimated grind into tube sheet base metal was less than 1/4 inch.
23 and 24	Final cladding layer. No deficiencies observed.
21	Heat treatment temperatures were controlled to a 150° F gradient during heatup. At 11:00 PM, September 2, 1971, the recorded temperature range was 1000 to 1150° F. Trimming of temperatures to a 100° F temperature gradient, as required for the heat soak, was in progress.

A review of welder qualification documentation for four individuals, that performed Inconel clad welding on the outlet side of steam generator No. 21, revealed no deficiencies.

7. Steam Generators

As previously reported, a visual inspection of the steam generator tube ends revealed a piece of metal lodged in one tube\*. The inspector inquired as to the planned actions to be taken. Mr. Snow indicated that they presently plan to check each tube for clearance by blowing felt objects through the tubes. He indicated that procedures would be written and that the work would be accomplished after the steam generator cladding repair and associated cleanup have been completed.

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\*CO Report No. 247/71-10, paragraph 13 b.

8. Containment Purge Valves

During the review of preoperational test requirements for the containment purge valves, the inspector noted information which implied that these valves require air to close, whereas the FSAR\* specifies that these valves have spring returns for closure. Subsequent investigations by Con Ed confirmed that these installed valves are equipped with piston operators, with air reservoirs, and do not contain a spring return feature. The inspector indicated that the inconsistency between the actual installed valves and the description presented in the FSAR would need to be clarified. The inspector was shown internal correspondence which recommended that the FSAR be modified to reflect the installed condition.

9. Power Ascension Program

As previously reported, certain apparent deficiencies in the power ascension program were identified\*\*. The items were evaluated by Compliance and Con Ed was informed that additional loss of flow testing was essential. Mr. Cantone requested a definition of a loss of flow testing program which CO considers appropriate. The inspector indicated that testing to be considered should include:

- a. Loss of one pump when operating at 100% of rated power.
- b. When operating at about 50% of rated power, loss of one pump, if on three loop operation, or loss of two pumps, if on four loop operation.

Mr. Cantone was unable to make a commitment relative to the additional loss of flow testing; however, the inspector was informed that this item would receive serious consideration, and a Con Ed position on this matter would be forthcoming.

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\*Page 5.2-11

\*\*CO Report No. 247/71-10, paragraph 9.