

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

Report of Inspection

CO Report No. 247/71-8

Licensee: Consolidated Edison Company
Indian Point No. 2 (IP-2)
License No. CPPR-21
Category B

Dates of Inspections: April 6, 7, 8, 21 and 22, 1971

Dates of Previous Inspection: March 19, 24 and 25, 1971

Inspected by: G. L. Madsen 5/13/71
G. L. Madsen, Reactor Inspector Date

Reviewed by: N. C. Moseley 5/17/71
N. C. Moseley, Senior Reactor Inspector Date

Proprietary Information: None

SCOPE

Announced inspections were made to the IP-2 construction site on April 6, 7, 8, 21 and 22, 1971. Mr. Fasano accompanied the inspector on April 21 and 22, 1971. Major items reviewed included preoperational testing, power ascension programs, pipe support installation, polar crane repairs, organizational coverage and resolution of previously identified items.

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SUMMARY

Ninety-two percent of the proposed Phase II preoperational test procedures have been written. The remaining six proposed procedures are in the final review status. Six additional test items are under consideration. (Section II.A.1)

Wedco evaluated the diesel generator test programs and have concluded that adequate data is available to prove satisfactory operation. Con Ed engineering is evaluating this item and will respond to Compliance relative to the proposed need for additional diesel governor speed control testing. (Section II.A.1)

Seventy-three percent of the Phase II preoperational testing, that is scheduled to be completed prior to core loading, has been performed. (Section II.A.3)

Major problems encountered during preoperational testing are unequal RHR flows to the RCS loops, slow SIS valve operation and IVSWS leakages which differ from predicted values. (Section II.A.4)

Wedco has presented 25 of 27 power ascension procedures to Con Ed for review. Nine of the 27 procedures have been approved for use by Con Ed. Compliance's review has identified apparent difference between the proposed program and PI 6000/1. Con Ed is in the process of making a comparison between the proposed power ascension program and the AEC Guide for Planning Startup Programs. (Section II.B.1)

A review of the pipe support installation programs indicates active involvement by Con Ed and Wedco. Con Ed indicated that additional surveillance of pipe movement is scheduled to be performed during the next heatup, however, a specific program has not been formulated. (Section II.C)

The damaged polar crane leg has been repaired. The polar crane was subjected to a 198.1 ton dead weight test. (Section II.D)

Electrical jumper and termination log books were not initiated until shortly after starting hot functional testing. The delay in starting the logbook raised questions relative to systems previously checked. Based on the limited number of systems tested prior to this date, subsequent testing, and specific day-to-day checking, Con Ed believes that adequate assurance of jumper and termination control exists. Con Ed indicated that a jumper log would be prepared for coverage of systems accepted by Con Ed. (Section II.E)

Resolution to seven of eight construction logbook review questions have been presented. The mill certificate for pipe spool piece SI-20A still has not been located. (Section II.F)

Ten SRO licenses have been issued for IP-2. Six additional individuals are presently seeking SRO or RO licenses. (Section II.G)

Testing relating to the fish collection problem at the circulating water intake screen continues. Evaluation of additional corrective approaches is in progress. (Section II.H)

Resolution of three previously identified items has been completed. Partial resolution for two additional items is included. (Section II.J)

A listing of items requiring followup is included in this report. (Section II.K)

DETAILS

I. Persons Contacted

A. Con Ed

Mr. A. Corcoran, Construction Project Superintendent
Mr. P. Leo, Assistant Construction Project Superintendent
Mr. E. Dadson, Quality Assurance Supervisor
Mr. A. Kohler, Nuclear Engineer, Construction
Mr. S. Austin, Senior Mechanical Engineer
Mr. J. Makepeace, Startup Manager, IP-2
Mr. R. Cosgrove, Mechanical Engineer, Startup
Mr. H. Kerns, Mechanical Engineer
Mr. G. Cowherd, Environmental Engineer

B. Wedco

Mr. W. Dibeler, Manager, Quality Control

II. Results of Inspection

A. Preoperational Testing

1. Status of Procedure Preparation

Preparation of proposed Phase II preoperational test procedures is 92 percent complete. The remaining six proposed procedures are in the final review status. Nine additional items were previously presented for test coverage consideration.* The resolution status for these nine items is as follows:

*CO Report No. 247/71-1, paragraph II.A.2

a. Resolution Completed

- (1) Measurement of rod drive speeds has been included in procedure 4.10.2.
- (2) IVSWS valve sequencing has been included in procedure 4.8.2.
- (3) Procedure 4.14 includes measurement of recirculation fan motor currents. This information plus fan curves for these fans will provide fan flows.

b. Procedures to be written for:

- (1) Boron line heat tracing
- (2) Voice communications
- (3) H₂ recombiner checkout
- (4) Filter testing

c. Under consideration by Con Ed and Westinghouse:

- (1) Con Ed and Westinghouse are evaluating methods for fulfilling the operability testing requirements for the pressurizer and main steam safety valves.*
- (2) Wedco collected data during the hot functional testing and is presently analyzing the data versus the FSAR** commitments for testing of the RCS leak rate detection instrumentation.

As previously reported, the proposed loss of AC power tests provides coverage similar to an at power test, however, additional load swing testing of the emergency diesel generator sets seemed desirable.*** Wedco has evaluated the diesel generator testing programs for these units in the vendor shops, site checkout, and during preoperational testing and have concluded that adequate testing has been performed to prove satisfactory operation. Con Ed engineering is presently evaluating the data presented and a Con Ed position relating to the adequacy of previous diesel generator testing or need for additional testing will be presented to CO in the near future.

*FSAR Table 13.1-1.

**Q 4.4.4.

***CO Report 247/70-6, paragraph II.A.1.a.

Data presented by Wedco indicates that the diesel generator set testing to date has included the following:

a. Vendor Shop

- (1) Load rejections of 1950 Kw resulting in a 20 rpm over-speed, 2 second recovery time, and 28 volt overshoot.
- (2) Load pickups of up to 1410 Kw resulting in a 225 rpm dip, 10 second recovery time, and 48 volt drop.

b. Site Checkout

- (1) All diesels subjected to the following load pickups:
0 - 500 Kw, 500 - 1000 Kw and 1000 - 1500 Kw.
- (2) All diesels subjected to the following load rejections:
1500 - 1000 Kw, 1000 - 500 Kw and 500 - 0 Kw.
- (3) Diesel No. 22 was subjected to a 1250 to 0 Kw load rejection.

c. Preoperational Test 4.26.3

During the loss of AC power and simultaneous safety injection test, the three diesels started and sequentially assumed loads of 780, 1050 and 1030 Kw. Subsequently, loads on the three diesels were changed to 850, 1500 and 900 Kw.

2. Review of System Functional Test Procedures

The following system functional test procedures were reviewed:

- 4.5.1 - Functional Test of Safety Injection System
- 4.5.4 - Filter Dousing Units
- 4.8.1 - Reactor Protection (I&C)
- 4.10.2 - Rod Drop Testing
- 4.39 - Weld Channel Pressurization

The procedure coverage was found to be acceptable. Procedure 4.10.2 includes an expanded rod drop testing program which conforms to previous commitments* and PI 5800/2. The inspector noted that the reactor trip breakers and interlocks have not been included in test procedures generated to date. Mr. Kohler indicated that this coverage would be included in an addendum to procedure 4.8.1.

*CO Report No. 247/71-4, paragraph II.B.1.

3. Status of Test Performance

The status of performance of Phase II system functional tests, scheduled to be completed prior to core loading, is as follows:

a. Tests to be performed	66
b. Tests completed	48 (73%)
c. Tests in progress	10 (15%)
d. Test results reviewed by Wedco	10 (15%)
e. Test results evaluated by Con Ed	5 (8%)

The service air and primary water systems have been accepted by Con Ed with exceptions noted on punchlists, approved by Wedco and Con Ed. Major noted exceptions are the need for additional pipe restraint and hanger installation, the checkout of boron heat tracing for the primary water system, and installation of some insulation. A review of the test results, by the inspector, indicates that the results of the tests and evaluations were generally satisfactory; however, the service air procedure data sheet was not fully completed. During subsequent discussions, Mr. Kohler stated that many values were recorded in the body of the procedure and duplicate numbers were not recorded on the data sheets. He also indicated that data required by the procedure is recorded. This item will receive additional followup during the next inspection.

The inspector witnessed the performance of a loss of AC power and simultaneous safety injection test. (Portion of test procedure 4.26.3) The procedure was followed on a step-by-step basis. The results of the test compared favorably with expected actions and included designed electrical breaker actions, emergency diesel startup and assumption of the safeguards loads. The inspector considers the test performance and results to be acceptable.

4. Major Problem Encountered

Discussion with Con Ed startup engineers indicated the following status for problems identified during preoperational testing:

- a. Procedure 4.3.2 - As previously reported, unequal RHR flows to the four reactor coolant loops continues to be reviewed by engineering.
- b. Procedure 4.26.3 - Operating times for some safety injection valves exceeded the FSAR limitation of 10 seconds. Mr. Kohler indicated that these valve operation times were measured using a stop watch, however, more precise measurements were obtained using a visicorder. The visicorder data is under review. Additionally, valves 822 A and B, in the component cooling water

lines to the RHR heat exchangers, have 120 second operating times, whereas, the procedure specifies 10 second operating times. This item is under consideration by engineering.

- c. Procedure 4.34 - Some Isolation Valve Seal Water System (IVSWS) measured leakages differed from predicted values. Wedco's review of test results indicated that the variance between measured and predicted leakage values was caused by the existence of open valves during the early phases of the tests and the associated flow through rather than leakage through the valves. This condition was reportedly not included in the predicted values. Wedco states that the final steps of the procedure were performed with valves in the closed position and the observed leakage was within acceptance values. Con Ed indicated that their review is nearing completion.

5. Punch List Control

The inspector asked Con Ed for a description of the control mechanism that is being employed for the control of system preoperational punchlists. Mr. Kohler indicated that several schemes are used and they include:

- a. Con Ed startup crew status listings
- b. Periodic reviews of the completed test packets
- c. Wedco issues updated status reports for completed systems which indicates items resolved and work that remains

Mr. Kohler indicated that in his opinion adequate controls exist. The inspector stated that he was concerned that some punch list items may be overlooked unless a rigorous effort is expended.

B. Power Ascension Program

1. Status of Procedure Preparation

Wedco has submitted 25 of 27 proposed power ascension test procedures to Con Ed for review. Nine of the 27 procedures have been approved by Con Ed. As previously discussed, a copy of the AEC Guide for Planning of Initial Startup Programs, dated December 7, 1970 was presented to Con Ed.* Compliance's review of proposed power ascension testing to the CO PI 6000/1 has identified apparent differences associated with loss of flow, generator trip, turbine trip, shutdown from outside the control room and reactor internals measurement testing.* The inspector asked if Con Ed had made a comparison of the AEC Guide to the

*CO Report No. 247/71-6, paragraph II.B.

proposed program. Mr. Makepeace indicated that this comparison is nearly complete and that he should be prepared to discuss apparent differences during the next inspection. Additionally, Mr. Makepeace confirmed that an administrative procedure for the power ascension program, which will fulfill the requirements of the AEC Guide and concerns previously related by the inspector,* is being prepared.

C. Pipe Supports

CO has previously voiced concerns relative to the performance of hot functional testing prior to installation of 100 percent of the pipe supports.** The Con Ed and Wedco control program for pipe installation and status of installation was previously reported.*** Since that time, considerable installation effort has been expended. Upon questioning the inspector was informed of the following information relating to pipe hanger and restraint installation in the containment building:

1. The addition, removal, or alteration of some 50 hangers in the vicinity of each reactor coolant pump remains.
2. About 50 seismic restraints to be completed.
3. A number of whip restraints to be completed.
4. If the present rate of installation continues, completion of installation will be attained about June 15, 1971.

The inspector requested updated numbers relating to status of pipe hanger and restraint installation for the entire plant. Recently, updated numbers were not readily available.

The inspector asked for a definition of pipe monitoring programs to be completed during future heatups of the reactor coolant system. Mr. Corcoran indicated that additional surveillance of pipe movement is scheduled to be performed at 100 degree intervals during the next heatup, however, a specific program has not been formulated. The inspector indicated Compliance's need for a definition of the monitoring program to permit evaluations relating to the acceptability of the pipe hanger and restraint installation and checkout activities. Mr. Leo indicated that a surveillance program will be devised and that Con Ed shares Compliance's concerns on this subject, however, the day-to-day progress followup is presently being given priority. The inspector indicated that he would be awaiting Con Ed's proposed program and reminded the parties that the adequacy of the pipe hanger and restraint installation and checkout is an area of deep concern within Compliance.

*CO Report No. 247/71-1, paragraph II.B.

**CO Report No. 247/71-4, paragraph II.B.7.

***CO Report No. 247/71-6, paragraph II.D.

D. Polar Crane

As previously reported, one of the four vertical polar crane support legs was damaged by an apparent differential pressure during the containment overpressure test.* Detailed inspection procedures were prepared and approved by Whiting Crane, Wedco and UE&C. Dimensional measurements were taken at strategic locations. A review of the inspection procedure retained by Wedco QC indicated completion of all steps of the inspection procedure. The length of the damaged leg was recorded to be 48.95 feet whereas the lengths of the other three legs were 49.03, 49.04 and 49.045 feet.

A replacement leg was procured and was replaced in accordance with approved installation procedures. Subsequently, the crane was subjected to an extensive checkout program. Records indicate that the crane was dead weight tested at 198.1 tons and the crane braking system was checked out at 175 tons. The design rating of the crane is 175 tons, the reactor head weights 168.3 tons, the lower internals weights 159 tons and all other anticipated loads to be handled by the polar crane are less than 100 tons.

The inspector considers that the inspection, replacement and checkout programs for the polar crane leg was conducted in an acceptable manner. The inspector asked if present plans call for drilling vent holes in the polar crane legs. Mr. Corcoran stated that holes will be drilled, however, the number and location of the holes has not been established.

E. Electrical

1. Control of Electrical Jumpers and Terminations

As previously reported, logbooks for electrical jumpers and terminations were not initiated until shortly after the start of hot functional testing.** The delay in developing this logbook raised questions concerning the acceptability of systems that were checked out prior to initiation of this program. Subsequent discussions with Messrs. Kohler and Makepeace revealed the following:

- a. A limited number of system functional tests were completed prior to initiation of the jumper logbook. Of most concern is the Instrument Air and portions of the Service Water systems. These two systems have been in operation and have performed satisfactorily during additional testing. A simultaneous loss of AC power and safety injection test, with the associated restart of three service water pumps, was included in the additional testing.

*CO Report No. 247/71-6, paragraph II.F.

**CO Report No. 247/71-6, paragraph II.I.2.

- b. The logic systems for the safeguard, protection and nuclear systems were performed after the initiation of the log book.
- c. Identification of spare cables is in progress. On completion of this work, cables that are not terminated should be so indicated in the jumper logbook. All differences will require specific resolutions.

Based on the above information and specific day-to-day checking by their startup personnel, Con Ed believes that adequate assurance of jumper and termination control exists. The question relating to the delay in developing jumper logbook is thereby considered to be resolved.

The inspector asked Mr. Makepeace if Con Ed had established a jumper and termination control program for systems that have been accepted by Con Ed. Mr. Makepeace indicated that only a few systems have been accepted by Con Ed and that a logbook is being established.

F. Construction Log Book Review

Audits of resolutions presented for questions relating to a construction logbook review revealed eight items which Wedco considered resolved, however, proper backup data was not available.* The resolution status of these items is as follows:

1. Items IV.A.3, 4, 5, 6, 7 and 10,** were considered deficient in that the welding procedure was qualified for P-1 to P-1 material, whereas P-1 to P-3 material was actually welded. A welding procedure for P-1 to P-3 was subsequently qualified. These items are thereby considered to be resolved.
2. Item IV.A.4 was also deficient in that welder qualification remains to be resolved. This condition is part of a previously reported item*** and will be handled in conjunction with 13 other weldments with a similar problem.
3. Item IV.A.11 was found to be deficient in that mill certification for spool piece SI 20A was not available. This item has not been resolved.

*CO Report No. 247/71-1, Summary.

**CO Report No. 247/71-1, Appendix A.

***CO Report No. 247/71-2, Section II.H.

G. Operator Licensing

Ten individuals have been awarded SRO licenses for IP-2. Mr. Makepeace indicated that activity towards additional licensing is as follows:

1. One individual passed the RO written examination. Subsequently, he took the SRO written examination and walk through. The results for this individual are being evaluated.
2. One individual passed the SRO written test and the result of his walk through have not been finalized.
3. One additional individual has passed the written SRO examination and needs to complete the walk through evaluation.
4. Three additional individuals have passed their written RO examination and are awaiting completion of a walk through examination.

Upon questioning, Mr. Makepeace indicated that the 10 SRO licensed individuals would permit fulfillment of the operator licensed requirements of the Technical Specifications,* however, he hopes to have six additional licensed operators prior to issuance of the reactor operating license for IP-2.

H. Circulating Water Pumps

As previously reported, orifices have been installed in the outlet boxes of three circulating water pumps to reduce flows and intake velocities** and that subsequent testing revealed that the rate of fish collection was significantly decreased. The inspector discussed the status of the fish collection problem with Mr. Cowherd. Information presented including the following:

1. Con Ed has been monitoring the rate of fish collection at varying inlet velocities and at different times of the year at IP-1 and IP-2.
2. A fish Advisory Board has been established and the membership consists of several consultants plus representation from the New York Division of Fish and Game.
3. The IP-3 intake construction has been expedited to permit evaluation of locating the traveling screen in front of the intake forebays versus the IP-1 and IP-2 traveling screens located in the forebay and behind fixed screens.

*Section 6.1-A.

**CO Report No. 247/71-6, paragraph II.K.

4. The deicing system has been used to further reduce inlet velocities.
5. Additional items being considered or implemented:
 - a. Installation of fish pumps to remove fish from the intake forebays and returning them to the river downstream of the site.
 - b. Providing fish guidance by angling the intake screens.
 - c. Collection of fish population data to permit evaluation of significance of fish collection.
 - d. Installation of a common intake device for IP-1, IP-2 and IP-3. The device would contain traveling screens of sufficient cross sectional area to provide intake velocities below that attained at the present intake structures.
 - e. Considering modification of the IP-2 circulating pump motors to provide two speed operation.

I. Plant Turnover to Nuclear Power Generation

Discussions with Messrs. Corcoran and Makepeace revealed that Con Ed's responsibility for the plant during the latter phases of completion are to be handled as follows:

1. The Con Ed Construction Department will retain control up to core loading.
2. The Nuclear Power Generation Department will assume control of the plant during and after core loading, with the Construction Department providing assistance as required. The Construction Department will retain the responsibility for contractual dealings with Westinghouse until completion of the plant acceptance run.

The major problem presently being encountered is the resolution of deficiencies identified after acceptance of a system by Con Ed. The basic questions requiring resolution, prior to correction of a deficiency, are:

1. Is the deficiency Con Ed's or Westinghouse's responsibility?
2. Who should make the investigative checkout to determine the cause of the deficiency?
3. Who makes the repairs and/or pays for the work performed?

The inspector asked Mr. Makepeace for a description of the system which Con Ed is using to control modifications or alterations to systems which have been accepted and have previously been subjected to preoperational testing. Mr. Makepeace indicated that a Work Permit program is presently in effect for this type of activity at IP-2. Additionally, he stated that modifications having a safety significance will be reviewed with the Nuclear Safety Committee in a manner similar to that which will be required after issuance of the operating license.

J. Resolution of Previously Identified Items
(CO Reference in Parenthesis)

1. 480 Volt Switchgear - Airlines and Air Compressors (247/70-1, Appendix A)

Additional pipe supports were installed on the instrument air lines and guards have been erected around the air compressor chamber and flywheel. The existing condition meets the FSAR requirements and is considered to be resolved.*

2. Alarm Arrangement on Protection Channels (DRL Report to ACRS dated July 2, 1970)

Opening of protection rack doors is annunciated in the control room and each protection set has an individual window indication. The conditions meet the requirements and are considered resolved.**

3. Repair - Polar Crane (247/71-6, Section II.F)

The resolution for this item is contained in Section II.D of this report.

4. Need for Additional Preoperational Tests (247/71-1, Section II.G)

The resolution for three of nine additional tests are contained in Section II.A.1.a of this report.

5. Log Book Review Deficiencies (247/71-7)

The resolution for seven of eight deficiencies are included in Section II.F of this report.

*Volume V, Q 7.6(d)4.

**Volume IV, Q 7.12.

K. Items Requiring Followup

Resolution is required for the following items (CO Report reference in parenthesis):

1. SIS Valves - CF8 vs. CF8M (247/69-11, Section II.B.3)
2. Fuel Storage Building - completion of pre-ops (247/69-9, Section II.G).
3. Lateness of Preoperational Procedure Preparation (247/70-2, Section II.B)
4. Electrical Barriers Installed (247/70-5, Section II.B)
5. Cable Tray Loading Audit (247/70-5, Section II.B)
6. Pipe Support Installation and Clearance Review (247/70-6, Section II.C)
7. Single electrical penetration (247/70-1, Appendix A)
8. DRL Report to ACRS, dated July 2, 1970:
 - a. Tunnel fire protection installed
 - b. Installation of strong motion seismograph
 - c. Demonstration of hydrogen recombiner throttle back - preoperational test
9. Trip breaker annunciation and bypass interlocks (DRL Request)
10. Installation of modern fuel failure detection instrumentation (FSAR, Volume V)
11. DRL Report to ACRS, dated September 4, 1970:
 - a. Seismic reinforcement of buildings
 - b. Additional turbine overspeed protection
 - c. X-y stability test - power ascension
 - d. Iodine filters installed - recirculation fans - preceded by HEPA filters
12. Need for Additional Preoperational Tests (247/71-1, Section II.G and 247/71-8, Section II.A.1)

13. Modification of Hot Functional Program (247/71-1, Section II.D and 247/71-6, Section II.A.3)
14. Circulating Water Intake - Fish Concerns (247/71-1, Section II.G)
15. RHR Unequal Flows to Four Loops (247/71-2, Section II.A.3)
16. Operating Procedure Deficiencies (247/71-2, Section II.C)
17. Welder Qualification for 14 Main Steam Welds (247/71-2, Section II)
18. Power Ascension Program versus PI 6000/1 (247/71-8, Section II.B)
19. Log Book Review Deficiencies (247/71-7)
20. Electrical Jumper Control (247/71-6, Section II.I.2)

III. Management Interview

Management interviews were conducted with Mr. Corcoran at the conclusion of the visits. Items discussed included the following:

A. Preoperational Testing

The status of preoperational test procedure preparation was discussed. The need for prompt completion of the remaining procedures and resolution of outstanding questions was stressed. Mr. Corcoran assured the inspector that the items are receiving due consideration. The inspector pointed out that the review of a limited number of test results revealed omissions or data sheets and absence of explanations for some variances with expected values. Mr. Corcoran indicated that he was not aware of the specifics and that this item would be given additional attention.

B. Emergency Diesel Testing

Wedco's position relating to operational checkout of the emergency diesels was reviewed. The inspector indicated that he would be awaiting Con Ed's position on this matter.

C. Power Ascension Program

The status of the power ascension program procedures was outlined. The inspector emphasized the need for completion of the procedure preparation and resolution of differences between the proposed program and the AEC Guide for Startup Programs. Mr. Corcoran indicated that Con Ed is actively working on these subjects.

D. Pipe Supports

The inspector pointed out the need for Con Ed's definition of future pipe movement surveillance programs. Mr. Corcoran indicated that a program will be developed. The inspector indicated Compliance's continuing concern relating to the absence of some pipe supports during the hot functional program. Mr. Corcoran indicated that the present and planned engineering involvement should provide the necessary assurances.

E. Outstanding Items

The inspector indicated a need for resolution of various previously identified outstanding items including:

1. Completion of preoperational test procedure preparation.
2. Completion of electrical tray loading and barrier installation audits.
3. Resolution of Log Book review questions.
4. Resolution of welder qualification questions for MS welds.
5. Completion of the power ascension program.
6. Resolution of preoperational testing punchlist items.

Mr. Corcoran stated that he also is desirous of closing out these items.

F. Containment

The inspector indicated a noticeable improvement in the cleanliness of the containment was observed, especially above elevation 95 foot.