

U. S. Atomic Energy Commission
Region I
Division of Compliance

Report of Inspection

CO Report No. 247/71-2

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

Dates of Inspections: January 12, 15, 20, 21, 22, 28 and
29, 1971 and February 3, 1971

Dates of Previous Inspections: December 16, 1970 and January 6 and
7, 1971

Inspected By: G. L. Madsen 2/16/71
G. L. Madsen (Principal Reactor Inspector) Date

Reviewed By: R. T. Carlson for 2/17/71
N. C. Moseley, Senior Reactor Inspector Date

Proprietary Information: None

SCOPE

Announced inspections were made to the Indian Point No. 2 (IP-2) construction site on January 20, 21, 22, 28 and 29, 1971 and February 3, 1971. Major items reviewed included preoperational testing, power ascension programs, operating procedures, operator involvement in testing, and resolution of previously identified items. Apparent deficiencies in the preoperational testing, power ascension program and operating procedures were discussed with corporate management on January 12 and 15, 1971.

SUMMARY

Eighty percent of the Phase II preoperational test procedures have been approved for use by Wedco and Con Ed. The remaining 20 percent are in the final review status. Procedures required for the hot function program are available with the exception of some safety injection system coverage. (Section II. A. 1.)

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Hot functional testing was initiated on January 18, 1971. Problems encountered to date include RHR heat exchanger leakage, unequal RHR flow to the four loops, pressurizer relief valve control and diesel generator operation. Hot functional testing was interrupted on January 28, 1971 by an electrical separation between IP-2 and the Buchanan substation; the test was restarted and subsequently discontinued on February 3, 1971 to permit inspections of reactor coolant pumps. (Section II. A. 3.)

Con Ed has prepared a program for checkout of operating procedures and involvement of operators, and have agreed to provide a written description of Con Ed's involvement in Phase II preoperational testing, including the hot functional program. (Section II. A. 4.)

Corporate management contacts were made on January 12 and 15, 1971 to discuss apparent deficiencies in the preoperational coverage, power ascension program, and operating procedures. (Section II. B.)

The results of a preliminary CO review of IP-2 operating procedures revealed various deficiencies. Con Ed has agreed to make certain revisions in an attempt to resolve this issue. (Section II. C.)

IP-2 encountered an electrical separation from the Buchanan substation. As a result of the electrical disturbance, potential damage to the reactor coolant pump seals is suspected. Disassembly of two pumps is in progress. (Sections II. D. and E.)

Sixteen operators passed the written AEC operator examination. Twelve of these operators are assigned to shift duty and are involved in manipulations required for the support of preoperational testing and performance of operational maneuvers. (Section II. F.)

Discussions were held with Wedco and Con Ed regarding the status of plant construction and testing as it relates to CO recommending a finding of completion for operating license considerations. (Section II. G.)

The results of a field weld documentation verification program was reviewed. The available information is considered acceptable; except, additional clarification is required for welder qualifications for fourteen main steam line welds. (Section II. H.)

A list of items requiring resolution is included in this report. (Section II. I.)

DETAILS

I. Persons Contacted

Con Ed

*Mr. A. C. Husband, Vice President, Construction
**Mr. W. Cahill, Vice President, Engineering
**Mr. J. Grob, Chief, Mechanical Engineer
**Mr. J. Prestele, Manager, Nuclear Power Generation
Mr. A. Corcoran, Construction Project Superintendent
Mr. E. Dadson, Quality Assurance Supervisor
Mr. A. Kohler, Nuclear Engineer, Construction
Mr. R. Cosgrove, Mechanical Startup
Mr. J. Makepeace, IP-2 Startup Manager
Mr. S. Cantone, Superintendent Performance
Mr. S. Austin, Senior Mechanical Engineer
Mr. P. Leo, Assistant Project Superintendent

Wedco

Mr. B. Hooten, Project Manager

Compliance

**Mr. J. P. O'Reilly, Chief, Reactor Testing and Operations Branch, CO:HQ
**Mr. F. J. Nolan, Senior Reactor Inspection Specialist, CO:HQ
Mr. N. C. Moseley, Senior Reactor Inspector, CO:I

II. Results of Inspection

A. Preoperational Testing

1. Status of Procedure Preparation

Eighty percent of the Phase II preoperational test procedures have been approved by Wedco and Con Ed. The remaining 20 percent is in the final review status. Procedures required for testing scheduled prior to and during hot functional testing have been approved with the exception of two safety injection system (SIS) tests that are scheduled to be performed during cooldown, following the hot functional program.

*Contacted by N. C. Moseley, CO:I on January 12, 1971.

**Attended the January 15, 1971 meeting.

2. Review of System Functional Test Procedures

The following listed system procedures were reviewed by the inspector:

- 4.1.7 Reactor Coolant Expansion Test
- 4.1.11 Reactor Internals Measurement
- 4.3.4 RHR Heat Removal

The procedures were found to be generally acceptable; however, anticipated reactor coolant system expansion values are not included in procedure 4.1.7.

3. Status of Test Performance

Hot functional testing was initiated on January 18, 1971. Portions of 18 Phase II system tests have been performed. Discussion with Con Ed startup engineers indicates that the major problems encountered to date are:

- a. Leakage of RHR heat exchanger tubes was encountered during the early stages of hot functional testing. The heat exchangers were isolated and the leaking tube section was returned to the manufacturer for repair.
- b. RHR flow to the four reactor coolant loops is unequal. This item is being reviewed by engineering.
- c. The lag time in the pressurizer relief valve control mechanism appears to be excessive.
- d. The hot functional test program was interrupted on January 28, 1971 by an electrical separation of IP-2 from the Buchanan substation (Paragraph II. D. of this report). Potential damage to the reactor coolant pump seals was suspected. Subsequent inspections by Westinghouse personnel resulted in a recommendation that pumps 23 and 24 should not be operated pending internal inspections. Pumps 21 and 22 were considered acceptable for use. An attempt was made to continue the hot functional program, using two reactor coolant pumps. On February 3, 1971 hot functional testing was discontinued and the systems were cooled down in preparation for inspection and/or repairs to the reactor coolant pumps.

e. Operational difficulties with the emergency diesel generators centers around:

- (1) The electric governor overspeed control
- (2) Acceptability of the air start motors on Unit No. 23
- (3) An unexplained harmonic condition in the neutral ground.

f. The dc batteries and chargers tested out satisfactorily; however, the associated inverters have not been accepted.

The results of most of the 18 tests have not received final evaluation and/or acceptance by Wedco or Con Ed. These results will receive additional evaluation during future inspections.

4. Hot Functional Test Program

As previously reported, a review of the hot functional test procedure raised questions relating to Con Ed's involvement in the program*. Provisions for operator involvement, checkout of operating procedures, or checkout of Technical Specification requirements are not included in this procedure. As a result, Con Ed has compared their operating procedures to the context of the preoperational test procedures and consider that a consistency does exist. Additionally, Con Ed has prepared a program for checkout of operating procedures and involvement of operators. This program consists of the following:

- a. A training schedule for operator checkout of all operating and emergency procedures with an accompanying checklist which will indicate the status of completion for each operator.
- b. Operation maneuvers which each operator is to perform during hot functional testing. These maneuvers include manipulations associated with such things as:
 - (1) Pressurizer pressure and level controls
 - (2) Charging, letdown, and seal water control
 - (3) Boron makeup control
 - (4) Reactor coolant system temperature control by condenser steam dump, atmospheric release, and residual heat removal systems.
 - (5) Steam generator level control
 - (6) Purification system checkout

*CO Report No. 247/70-12, Paragraph II. B. 5.

A record of individual operator involvement in these activities is to be documented.

The above operator and procedure checkout is considered to be responsive. Additionally, Con Ed has agreed to prepare a document which will describe Con Ed's total involvement in the hot functional and other Phase II preoperational testing. This document is to be available to CO during the week of February 8, 1971.

B. Corporate Management Contacts

1. Mr. Moseley telephoned Mr. Husband, Vice President of Construction, on January 12, 1971 to convey the following apparent deficiencies in the testing programs resulting from positions taken by Con Ed in responding to questions previously conveyed*:
 - a. The proposed rod drop testing program is considered inadequate.
 - b. Functional testing of the safety injection system does not include verification of flow to the hot-pressurized reactor coolant system.
 - c. The testing program does not include provisions for performing a loss of AC power test at some reactor power level.
 - d. The hot functional program does not specify involvement of operators, checkout of operating procedures, and lacks detail in the areas of acceptance values and data sheets.

Mr. Husband stated that he was aware of the CO concerns, would pursue these items, and would provide responses.

2. A meeting was held on January 15, 1971 to review the items included in II. B. 1. above and to discuss apparent deficiencies in the power ascension and operating procedures. Messrs, Cahill, Grob and Prestele were in attendance for Con Ed and Messrs. O'Reilly, Nolan and Madsen represented CO. Subjects discussed included:
 - a. Deficiencies identified in II. B. 1. above.
 - b. Apparent deficiencies previously identified in the power ascension program**.
 - c. Results of a preliminary evaluation of proposed IP-2 operating procedures which are considered to be too general in context and lacking coverage.

*CO Report No. 247/71-1, Paragraph II. D.

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

Mr. Cahill was receptive to the comments and stated that the necessary corrective action will be taken insofar as the changes do not present undue risks to equipment.

C. Operating Procedures

The results of the preliminary CO review of the IP-2 Operating Procedures was discussed with Messrs. Makepeace and Cantone. The inspector stated the following general comments:

1. All procedures reviewed are considered too general.
2. No references to other procedures are included.
3. No provisions for incorporating Technical Specification requirements or operating limits associated with various systems are included.
4. No provisions are included for correcting abnormal conditions.
5. Required checkoff lists were not included.
6. Additional coverage is needed for the following:
 - a. Abnormal condition alarm procedures
 - b. Administrative control procedures
 - c. Health physics procedures
 - d. Chemistry procedures
 - e. Maintenance surveillance procedures
 - f. Subsystem procedures
 - g. Check-off lists

Additionally, the inspector provided step-by-step comments on Operating Procedure O-1 entitled, "Plant Startup from Cold Shutdown to Hot, Critical, Zero Power Condition", and provided a listing of items to be considered for inclusion in the administrative control procedure.

Mr. Makepeace indicated that the existing operating procedure context is in accord with Con Ed's philosophy and desire to have procedures written in a generalized fashion and then relying on the presence of properly trained operators. In addition, it was pointed out that this approach is consistent with that employed at IP-1. Additionally, Mr. Makepeace indicated that pro-

cedural coverage for Items II. C. 6 c. through g. above, are contained in volumes which are separate from the operating procedures presented to CO for review.

The inspector pointed out that the existence of the additional volumes may well provide the necessary coverage; however, the apparent deficiencies in the individual procedures reviewed need resolution. Additionally, the inspector pointed out that the comments presented were based primarily on established CO criteria. After considerable discussion, Mr. Makepeace agreed to make revisions to Procedure 0-1 while giving due consideration to the comments presented for this particular procedure. He also stated that an additional procedure will be revised using the general comment made for all procedures and for Procedure 0-1 as a guideline. Upon completion of these revisions, the inspector indicated that CO was agreeable to making a review of the revisions and comment thereon in an attempt to expedite arriving at an acceptable coverage understanding. The inspector indicated that the availability of the proposed administrative control procedure and additional coverage for Item II. C. 6 a. through g. above, should also be available at this time. Mr. Makepeace stated that manpower availability was at a premium, in that hot functional testing and the desired involvement of operators deserves high priority; however, progress on resolution of the operating procedure issues would be pursued at an early date. The inspector indicated that it is CO's intent to cooperate fully in the expeditious resolution of this item. The inspector reminded Mr. Makepeace that completed operating procedures must be available prior to CO's findings relating to licenseability of the plant for operation.

D. Electrical

On January 28, 1971, the IP-2 encountered an electrical separation from the Buchanan substation, as previously reported*. Pertinent information follows:

1. Hot functional testing was in progress and the reactor coolant system was essentially at operating temperature and pressure.
2. The four reactor coolant pumps were in operation.
3. Electrical power was being supplied by way of the 138 Kv tie from Buchanan substation.
4. At 11:45 AM, January 28, 1971, IP-2 was electrically separated from the Buchanan substation.
5. At this time IP-2 was without electrical power, with the exception of the dc battery power.

*Memorandum to J. P. O'Reilly from N. C. Moseley, dated February 1, 1971

6. About 15 minutes later, electrical supply was furnished to IP-2 by closing the breaker in the 13.8 Kv tie to IP-1.
7. The emergency diesels were not immediately available, due to problems previously encountered in the diesel overspeed control mechanism.
8. The cause of the electrical separation is not conclusively known; however, bumping of control relays located on the backside of the IP-2 control room flight panel is suspected. Deliberate bumping of these components demonstrated that breaker actions were the same as encountered during the actual electrical separations.

E. Reactor Coolant Pumps

As a result of the electrical separation between IP-2 and Buchanan substation*, potential damage to the reactor coolant pump seals was suspected. Inspections by Westinghouse resulted in a conclusion that pumps 23 and 24 should not be operated until internal inspections are accomplished. Pumps 21 and 22 were declared acceptable for use. On February 3, 1971, disassembly of pumps 23 and 24 was initiated. The exact nature of damage is not known but is believed to be associated with the pump seals.

F. Operator Training

The inspector was informed that the AEC Senior Reactor Operator (SRO) and Reactor Operator written examination had been taken. Of the 17 employees taking the examination, 13 SRO's and 3 RO's passed and one RO failed. Mr. Makepeace indicated that the oral portion of the test is scheduled to be taken in early April, 1971.

Presently, 12 of the above operators are assigned to shift duty on a 12 hour per day schedule. Their present activities include manipulation of equipment required for the support of preoperational testing, checkout of operating procedures, and performance of operational maneuvers. Mr. Makepeace indicated that continued involvement and training of operators in preparation for startup is the intent of Con Ed.

G. Plant Completion Considerations

A meeting was held with Messrs. Hooten (Wedco), Corcoran (Con Ed), and Kohler (Con Ed) to discuss the status of plant construction, preoperational testing, and startup programs as it relates to CO recommending a finding of completion. The following items were discussed:

*Paragraph II. D. of this report.

1. The inspector asked Mr. Hooten for an indication of the earliest date that Wedco would be looking to CO for a positive finding relative to plant completion for operating licensing purposes. The answer was mid-March, 1971.
2. The inspector indicated that construction of all systems noted in the FSAR must be complete prior to CO recommending a finding of completion. It was emphasized that a rigorous definition of completion would be used.
3. The status of the preoperational test program was discussed. The inspector indicated a concern relating to the absence of approved test procedures for some tests. As an example, the inspector pointed out the absence of an approved safety injection procedure which is scheduled to be performed in conjunction with the hot functional testing now in progress. It was pointed out that the functional testing, review of results, and acceptance of systems must be completed prior to licensing.
4. The inspector indicated general satisfaction with the core loading procedures.
5. The power ascension program was discussed. The inspector pointed out that a limited number of procedures have been made available for review. The inspector pointed out that acceptable, completed, reviewed, and approved procedures for the power ascension program constituted satisfactory proof that the operating characteristics would be established prior to extended operation. This consideration is considered a key point in the determination that the plant can be operated without undue risk to the public.

The inspector pointed out that based on the present status of the items listed above and the suggested mid-March, 1971 completion date that an increased rate of activity would be necessary. Mr. Hooten indicated that efforts would be expended in this area and thanked the inspector for his frank comments.

H. Pipe System - Field Weld Documentation

The safety injection system field weld records were incomplete as previously reported*. As a result, a program was initiated by Con Ed and Westinghouse for verification of proper recordkeeping and a review by CO indicated evidence of independent checks having been performed and completion status was evident**. A final review of available field weld documentation was performed by Wedco in preparation for a Quality Control acceptance of systems included in the Hot

*CO Report No. 247/69-11, Paragraph II, B. 2.

**CO Report No. 247/70-8, Paragraph II, N. 2.

Functional Testing. Systems included in the review were the reactor coolant, safety injection, chemical volume control, boiler feed discharge, main steam and primary water. The review included verification relating to field and quality control records for radiographic, final PT, root PT, root visual, fit-up inspections and welder qualifications. The review resulted in some 250 individual deficiencies of a specific missing record. The majority of deficiencies were associated with records for root and final PT. Some cases of questions relating to welder qualification on boiler feed and main steam piping existed. Wedco embarked on a program to resolve each noted deficiency. The general modes of acceptance were as follows:

1. If either the field or QC record was available, the condition was deemed acceptable.
2. If both the field record and QC record were missing for RT or surface PT, the NDT was redone.
3. If the field and QC records were missing for root PT, the condition was deemed acceptable in that PT of the root is a specification requirement and not a code requirement.
4. Records do not indicate that PT of the surface for certain socket welds was performed. Wedco has taken the position that the condition is acceptable in that Code USAS B31.1 does not require PT of socket welds unless the design conditions are above 2500 psi or 950°F. They do, however, agree that PT of the socket weld should have been performed if the piping erection specification had been followed.

The inspector made spot checks of the present available documentation and deficiency resolutions. The available information was found to be comprehensive and is considered acceptable with the exception that additional clarification is required for the fourteen main steam line welds that apparently were partially welded by welders that had not been properly qualified.

I. 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. Pressurizer - Base Plate Question (247/70-8, Section II. K.)
5. Electrical Barriers Installed (247/70-5, Section II. B.)
6. Cable Tray Loading Audit (247/70-5, Section II. B.)
7. Pipe Support Installation and Clearance Review (247/70-6, Section II. C.)
8. In-Depth Quality Control Followup Items (247/70-1, Appendix A):
 - a. Pressurizer surge nozzles not UT
 - b. 480 switchgear - air lines and air compressor
 - c. Single electrical penetration
9. 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
 - d. Alarm arrangement on protection channels
10. DRL Requests:
 - a. Possibility of defeating manual trip with reset buttons
 - b. Trip breaker annunciation and bypass interlocks
11. FSAR, Volume V
 - a. Remote control and instrumentation outside of control room
 - b. Installation of modern fuel failure detection instrumentation.
12. 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

13. Need for Additional Preoperational Tests (247/71-1, Section II. G.)
14. Modification of Hot Functional Program (247/71-1, Section II. D.)
15. Circulating Water Intake - Fish Concerns (247/71-1, Section II. G.)
16. RHR Heat Exchanger Tube Leakage (247/71-2, Section II. A.3.)
17. RHR Unequal Flows to Four Loops (247/71-2, Section II. A. 3.)
18. Pressurizer Relief Valve Control Lag Time (247/71-2, Section II. A. 3.)
19. Emergency Diesels - governor overspeed, air start motors on unit 23, harmonics on neutral ground. (247/71-2, Section II. A. 3.)
20. Operating Procedure Deficiencies (247/71-2, Section II. C.)
21. Reactor Coolant Pump Problem (247/71-2, Section II. E.)
22. Welder Qualification for 14 Main Steam Welds (247/71-2, Section II. H.)

III. Management Interviews

Management exit interviews were conducted with Mr. Corcoran on January 22 and 29, and February 3, 1971. Subjects discussed included the following:

A. Preoperational Testing

The status of preoperational procedure preparation and test performance was discussed. The need for completion of procedures was stressed and the inspector pointed out that approved procedures for the SIS have not been completed and that an apparent need for additional procedure coverage exists. Mr. Corcoran stated his awareness of the problem and that the areas of concern are being pursued.

B. Corporate Management Contacts

The context of the January 12 and 15, 1971 corporate management contacts were discussed. The inspector indicated that CO is awaiting replies to the preoperational questions and that based on inspection findings, corrective actions with respect to operating procedures will be given due consideration. Mr. Corcoran indicated that the field personnel had forwarded recommendations to corporate management and that negotiations between Con Ed and Westinghouse are in progress.

C. Operating Procedures

The general context of the inspection coverage for the operating procedures was reviewed. Mr. Corcoran indicated that corrective action in this area is the responsibility of Mr. Makepeace. The inspector indicated his understanding of this point and his belief that appropriate actions will be forthcoming.

D. Electrical

The cause of the electrical separation of IP-2 from Buchanan substation was discussed. Mr. Corcoran had no further details than was presented during the inspection. The inspector voiced concern that the diesels were not operable even though hot functional testing was in progress and the hot functional program document specifies operability of the diesels. The inspector was informed that the decision was made by Wedco to proceed with hot functional even though the diesels were not actually operable. The inspector stressed a concern with relation to the degree of confidence this instills with relation to future adherence to the individual test procedure requirements.

E. Reactor Coolant Pumps

The reactor coolant pump experiences and the planned inspection program were reviewed. Mr. Corcoran indicated that Wedco contemplates that the necessary inspection and repairs will be completed on pumps 23 and 24 in about one week.

F. Operator Training

The inspector indicated satisfactory findings relative to progress toward involvement of operators in the preoperational test program.

G. Plant Completion Considerations

The requirements of plant construction and testing as it relates to CO's involvement and final findings was reviewed. Mr. Corcoran indicated an understanding of the items discussed.

H. Pipe Systems

The inspector indicated an acceptable finding relating to field weld documentation, except for welder qualification for fourteen main steam welds.