

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 50-320/77-42

Docket No. 50-320

License No. CPPR-66 Priority -- Category B-1

Licensee: Metropolitan Edison Company

P. O. Box 542

Reading, Pennsylvania 19603

Facility Name: Three Mile Island Nuclear Station, Unit 2

Inspection at: Middletown, Pennsylvania

Inspection conducted: December 12-16 and 19-23, 1977

Inspectors: P. Kellogg

P. Kellogg, Reactor Inspector

1/13/78
date signed

W. Coleman

W. Coleman, Reactor Inspector

1/13/78
date signed

J. Rebelowski

T. Rebelowski, Reactor Inspector

1/13/78
date signed

Approved by: A. B. Davis

A. B. Davis, Chief, Reactor Projects
Section No. 1, RO&MS Branch

1/13/78
date signed

Inspection Summary:

Inspection on December 12-16 and 19-23, 1977 (Report No. 50-320/77-42)

Areas Inspected: Routine, unannounced inspection of licensee's action on previous inspection findings; preoperational test results evaluation; preoperational test results verification; review of vibration assessment program; witness of integrated safety features actuation test; thermal expansion and hanger inspection test results evaluation; precritical test procedure verification; low power physics test procedure review; power ascension procedures verification; power ascension test procedure review; and review of administrative controls. The inspection involved 100 inspector-hours on site by three NRC inspectors.

Results: No items of noncompliance were identified.

DETAILS

1. Persons Contacted

Metropolitan Edison Company

Mr. M. Benson, Assistant Reactor Engineer
*Mr. M. Bezilla, PORC Secretary
Mr. J. Brummer, Instrument and Controls Engineer
Mr. R. Dubiel, Supervisor, Radiation Protection and Chemistry
Mr. G. Hitz, Shift Supervisor
Mr. M. Ross, Shift Supervisor
*Mr. J. Seelinger, Unit Superintendent, Technical Support
Mr. B. Smith, Shift Supervisor

General Public Utilities Service Corporation (GPUSC)

*Mr. R. Fenti, Lead Site QA Auditor
Mr. J. Flint, Startup Test Engineer
Mr. C. Gatto, Lead Mechanical Engineer
Mr. T. Hawkins, Assistant Test Superintendent
Mr. S. Levin, Project Engineer
*Mr. M. Nelson, Technical Engineer
Mr. I. Porter, Lead Engineer
*Mr. R. Toole, Test Superintendent

*denotes those present at the exit interview.

2. Licensee Action on Previous Inspection Findings

(Closed) Unresolved Item (320/76-04-01): Preoperational testing of GE Motor Control Centers. The licensee has completed preoperational testing of the circuit breakers in the GE Motor Control Centers. The satisfactory results of this testing were documented in a letter dated December 12, 1977.

(Closed) Inspector Follow Item (320/76-SP-01): ACRS Concerns. NRR addressed each area of concern expressed by the ACRS in their October 22, 1976, letter in Supplement No. 1 of the Safety Evaluation Report (SER), Three Mile Island Nuclear Station, Unit 2. No additional inspection followup is required at this time. Any items which require followup by IE will be identified in later supplements to the SER.

(Closed) Inspector Follow Item (320/76-HQ-01): W - RHR Pump motor bearing failures. The inspector determined that the pumps referenced were not similar to those installed at this facility.

(Closed) Open Item (320/77-28-03): Incorporate loose parts monitor testing in HFT. The licensee incorporated the loose parts monitor testing (SP365/2) into the Hot Functional Test Procedure (600/28) by writing a test change (exception).

(Closed) Unresolved Item (320/77-40-04): Condenser air extraction test results. The licensee had recalibrated and retested the pressure switches activating the standby pump.

(Closed) Open Item (320/77-41-10): Procedure Review. The pseudo ejected rod worth and stuck rod worth measurements procedure has been reviewed and is discussed in paragraph 9 of this report.

(Open) Unresolved Item (320/77-29-03): Initial Fuel Load Procedure Items. The inspector reviewed Procedure 2E01-4.01, Revision 2, dated December 21, 1977, and noted that all of the inspector comments had been incorporated into the recent revision with the exception of including precautions, such as valve lockouts, to preclude inadvertent dilution. The inspector discussed this item with a licensee representative; he stated that a revision 3 to this procedure will require the appropriate precautions. This item will remain open until inspector review of revision 3.

3. Preoperational Test Results Evaluation

The inspector conducted an evaluation of the following tests.

- TP 201/2 Core Flood System Functional Test (MTX 40.5)
- SP 320/1 ICS Pre-Op Calibration (MTX 91.1)
- TP 600/7 Intermediate Closed Cooling System Operational Test (MTX 92.7)
- TP 600/17 Control Rod Drive Operational Test (MTX 38.8)
- TP 600/23 Reactor Protection System Functional Test (MTX 151.5)

The test results were evaluated to verify that:

- Test changes had been approved in accordance with administrative procedures, properly entered into the procedure, accomplished if actions were necessary, and did not change the basic objectives of the test;
- Test deficiencies had been resolved, accepted by appropriate management, retest conducted if required, and any system or process changes necessitated have been properly documented and reviewed;
- Test summaries and evaluations had been performed by the cognizant engineers, and test results had been compared with established acceptance criteria;
- "As-run" copies of the test procedures contain completed data sheets (sample), data are recorded where required and are within acceptance tolerances (sample), test deficiencies noted receive appropriate review and evaluation, and individual test steps and data sheets have been properly initialed and dated;
- Quality Assurance inspection records have been completed to document the adequacy of the test package contents, to indicate independent review of test records and data package contents, and an independent audit was performed during test performance as required by administrative procedures; and,
- Approval of the test results by those personnel charged with responsibility for review and acceptance has been documented, and if the off site review committee has audited the test package, that their comments are included and corrective action has been taken if required.

The inspector used one or more of the following acceptance criteria for the above items.

- Final Safety Analysis Report
- Proposed Technical Specifications
- Test Instruction 7, GPU Startup Problem Report

- Test Instruction 9, Conduct of Test
- Test Instruction 13, Test Interface Instructions
- Test Instruction 18, Test Procedure Documents
- Regulatory Guides
- Inspector Judgment
- Quality Assurance Program

Findings were acceptable.

4. Preoperational Test Results Verification

The inspector conducted a review of the following test results.

- TP 175/2 River Water Pump House Ventilation (MTX 156.6)
- TP 200/9 OTSG Secondary Hydro Test (MTX 98.6)
- TP 202/7 Makeup and Purification System SF Test (MTX 99.7)
- TP 203/1 BWST Functional Test (MTX 47.8)
- TP 235/4 RB Spray Pump Room and DHR Pump Room Sumps Test (MTX 45.6, 142.6)
- TP 235/5 Circ. Water Pump House Sump Test (MTX 19.6)
- TP 235/7 Contaminated Drain Tank Room Sump Test (MTX 36.6)
- TP 235/8 Chlorination House Sump Test (MTX 37.6)
- TP 235/10 Condensate Polisher Regeneration Sump Test (MTX 28.6)
- TP 235/11 Control and Service Building Sump Test (MTX 34.6)
- TP 235/12 Sludge Collection Sump Test (MTX 177.6)
- TP 235/14 Turbine Building Floor Drain Sump Test (MTX 183.6)

- TP 235/15 Water Treatment Sump Test (MTX 200.6)
- TP 240/3 Intermediate Closed Cooling System Functional Test (MTX 92.6)
- TP 265/4 Circ. Water Chlorination and Chemical Addition System Function Test (MTX 17.6)
- TP 276/4 Condensate Polishing System Functional Test (MTX 24.6)
- TP 279/3 Mechanical Draft Cooling Tower Functional Test (MTX 100.6)
- TP 280/1 Lube Oil Purification and Transfer System Functional Test (MTX 93.6)
- TP 280/2 Turbine Lube Oil Pumping System Functional Test (MTX 193.38)
- TP 280/3 Hydrogen Seal Oil System Functional Test (MTX 193.38)
- TP 280/4 Turbine High Pressure Fluid System Functional Test (MTX 193.39)

The test results were reviewed to verify that:

- Test summaries and evaluations had been performed by the cognizant engineers, and test results had been compared with established acceptance criteria; and,
- Approval of the test results by those personnel charged with responsibility for review and acceptance has been documented, and if the off site committee has audited the test package, that their comments are included and corrective action has been taken if required.

The inspector used one or more of the following acceptance criteria for the above items.

- Final Safety Analysis Report
- Test Instruction 18, Test Procedure Documents

- Regulatory Guides
- Inspector Judgment
- Quality Assurance Program

Findings were acceptable.

5. Vibration Assessment Program

- References: (1) FSAR Supplement 2 41.7/14.1.1
 (2) FSAR Supplement 2 11.6/3.9
 (3) TMI-2 Procedure No. 2502-1.15, Inspection of Reactor and Vessel Internals
 (4) RG 1.20, Section D.2, December 1971

The licensee's procedure No. 2502-1.15 "Inspection of Reactor and Vessel Internals" has been partially completed. The areas completed include (1) inspections of interior of core support assembly, (2) inspections of exterior of core support assembly, and (3) inspections of interior of reactor vessel.

A review of the test results indicates the licensee has evaluated the discolorations and wear patterns attained during the Hot Functional Test Program. Normal wear was identified and slight sanding or stoning of affected areas were accomplished. The procedure will be reviewed after inspection of the Plenum Assembly is complete. The inspector has no further questions at this time.

6. TP 600/21 Integrated Safety Features Actuation Test

The inspector witnessed the following parameters during the total integrated test portion of TP 600/21.

- Procedure Availability. The inspectors verified that the official copy of the approved procedure, TP 600/21, was available in the control room and used by test personnel.
- Crew Manning. The inspectors verified that crew manning was in compliance with the requirements of TP 600/21. Additionally, the inspectors attended the shift briefing held immediately prior to the test.

-- Prerequisites and Initial Conditions. The inspectors verified that prerequisites and initial conditions had been signed off or properly resolved by test exceptions.

The inspectors verified by independent effort that selected prerequisites of TP 600/21 had been accomplished. These included system valve lineups, equipment start switches, and circuit breaker control switches.

-- Special Test Equipment. The inspectors verified the special test equipment required by the TP was in use and that current calibration stickers were affixed to the equipment.

-- Test Performance. The inspectors verified through observations that the test was performed as required by the procedure.

-- Crew Performance. The inspectors observed test personnel actions under planned and unplanned conditions. These actions appeared to be conducted in an orderly manner.

-- Data Collection. The inspectors verified that the data required by the procedure was recorded and was complete to the extent allowable, based on the test completion status.

-- Test Results. The formal results of the testing had not been reviewed and approved by the licensee at the conclusion of this inspection. The apparent stopping of the Nuclear Services River Water pumps could not be explained at this time. The results of the test and the apparent discrepancy with the Nuclear Services River Water pump will be reviewed at a subsequent inspection (320/77-42-01).

The inspector had no further questions on the test except as noted in the above paragraph.

7. Thermal Expansion and Hanger Inspection Test Results Evaluation

a. Scope

The inspector reviewed and evaluated the results of the following tests.

(1) TP 600/14, Pipe and Component Hanger Hot Deflection and Inspection.

(2) TP 600/29, Thermal Expansion Functional Test.

The evaluation parameters included:

- Review of all test changes;
- Review of all test deficiencies;
- Review "As-run" copy of the test procedure;
- Verification of test results;
- Review of QA inspection records; and,
- Review of the Test Summary and Evaluation.

b. Findings

(1) TP 600/14

The completed procedure indicated that the Reactor Coolant Pump constant supports settings were changed in the hot condition and that the resulting cold settings were acceptable. The licensee stated that subsequent to the completion of this test several changes have been made to the installation to warrant a complete rerun of this procedure. The requirement will be made part of the controlling procedure for the next heatup - TP 710/2. This item will be reviewed during a subsequent inspection (320/77-42-02).

(2) TP 600/29

This procedure had not yet received final approval at the time of the inspection; however, the inspector did review the data, test exceptions, and deficiencies recorded in the procedure. The licensee stated that this procedure will be rerun (except the section for the Main Steam and Feedwater piping) during the next heatup due to several installation changes which are occurring. OP 710/2 will require the completion of this test. This item will be reviewed during a subsequent inspection (320/77-42-03).

8. Precritical Test Procedure Verification

a. Scope

The inspector verified that the licensee had procedures to cover the following Regulatory Guide 1.68 Precritical test requirements.

- Protective trip circuit and manual scram
- Mechanical and instrumentation tests on CRD's and position indication

b. Findings

The protective trip circuit requirement is covered by Met-Ed Surveillance procedure 2303-M6 - RPS Channel Functional Test, which is required to be done prior to going into Mode 4. However, the trip setpoints of the RPS system will be different for this phase of operation, thus, some precautions are needed to prevent the changing of the setpoints. The inspector discussed this item with the licensee representative and an arrangement will be made between Met-Ed and GPU to insure the proper RPS setpoints are verified during the test program. This item (320/77-42-04) is unresolved pending review of the licensee's completed action.

The manual scram test is discussed with comments on procedure TP 710/1 of this report.

The Control Rod drive system is tested by procedures TP 330/4, TP 330/3, TP 330/3A, and TP 330/5.

The inspector had no further questions on this item.

9. Low Power Test Procedure Review

TP 710/1 - Zero Power Physics Test

This procedure has been reviewed and the following inspector comments were discussed with the licensee representatives.

- Prerequisites should require a manual scram test within 24 hours of pulling for initial criticality.
- Step 9.1.15 should define who is responsible and authorized to allow continued operation if criticality is not achieved at the calculated boron concentration.
- Step 9.10.7 should contain an administrative group insertion limit to aid the operator.
- 24 hours prior to performing step 9.10.7 rod H-14 must be tripped to satisfy TS 4.10.4.2.
- TS 3.10.4.b indicates that the APSR height should be 35% withdrawn; this procedure requires the APSR height to be 27% withdrawn.
- Step 9.10.3 should contain precautions to prevent overshooting the required dilution.
- Step 9.10.31 should give the operator guidance concerning the expected CRA configuration.
- Page 71 acceptance criteria for MTC should be a "shall" vice a "should" requirement.
- Data sheet 12 acceptance criteria should be changed to a "shall" requirement and the H-14 worth should be subtracted from the total rod worth prior to comparing with the TS limit.

The inspector also stated that NRC review of the stuck rod worth and pseudo ejected rod worth measurements indicates that the worth of rod H-14 as an ejected rod must be analyzed prior to the execution of this test as written. This item (320/77-42-05) and the above inspector comments are unresolved pending review of licensee action on these items.

10. Power Ascension Procedures Verification

The inspector reviewed licensee procedures with respect to Power Ascension Testing requirements of Regulatory Guide 1.68. Management approval was consistent with the requirements of the Test Manual and the test objectives of these procedures are consistent with the test title.

The following procedures were reviewed.

- TP 800/14, Turbine/Reactor Trip Tests
- TP 800/36, Shutdown from Outside the Control Room
- TP 800/33, Pseudo Rod Ejection Test
- TP 800/23, Unit Load Transient Test
- TP 800/8, ICS Tuning at Power
- TP 500/3, Initial Radiochemistry Test
- TP 800/35, Effluent and Effluent Monitoring System Test
- TP 800/3, Biological Shield Survey
- TP 800/18, Power Imbalance Detector Correlation Test

The inspector noted that the natural circulation test and core internal vibration monitoring test will not be run by the licensee since these tests have been done at the prototype plant. All Regulatory Guide 1.68 Power Ascension tests are covered by licensee procedures.

The licensee representative stated that all power ascension procedures are complete except for the two controlling procedures TP 800/21 and TP 710/2. These procedures will be reviewed after they have been approved. This is open item 320/77-42-06.

The inspector had no further questions on this item.

11. Power Ascension Test Procedure Review

The inspector reviewed the approved procedures for conformance with ANSI N18.7 requirements and for technical content.

a. TP 800/5 - Reactivity Coefficients at Power

The procedure addresses:

- The comparison of test data with calculated data;
- Requirements to insure steady state conditions prior to data taking;

- Test plateaus consistent with FSAR commitments; and,
- Periods for stabilizing plant parameters to evaluate reactivity vs reactor power.

The inspector questioned the use of a constant doppler coefficient on data sheet 2, step 8. The number used does not seem to be consistent with the graph given as an enclosure to the procedure. This item (320/77-42-07) will be open pending licensee action on this item.

The inspector had no further questions regarding this procedure.

b. TP 800/11 - Core Power Distribution

The procedure addresses:

- Acceptance criteria for DNBR, LHR, hot channel factors, and quadrant power tilt;
- Measured values compared to predicted values as well as to Technical Specification limits;
- Initial conditions that insure the computer is inservice and necessary instrumentation has been calibrated; and,
- Power plateaus consistent with FSAR commitments.

This procedure is used to perform the power distribution measurements during various steady state and worst case conditions and is referenced by other power ascension phase procedures. The inspector noted that this procedure did not contain specific instructions to add TS uncertainties to values of hot channel factors prior to comparison with TS limits. The licensee representative stated that the controlling procedure which references TP 800/11 does contain provision for this correction. The inspector will verify this when reviewing TP 800/21 - Unit Startup and Power Escalation Test which has not yet been completed.

The inspector had no further questions regarding this procedure.

c. TP 800/31 - Pseudo Dropped Rod

The procedure addresses:

- Acceptance criteria for DNBR, LHR, hot channel factors, quadrant power tilt, and control rod drive system fault circuitry;
- Measured values extrapolated to worst case thermal conditions for comparison with Technical Specification limits;
- Initial conditions that require the computer inservice and necessary instrumentation has been calibrated; and,
- Test conditions that require the insertion of one rod to the 50% withdrawn and 0% withdraw position, a flux profile recorded at each rod position, worst case thermal conditions computed and compared to TS limits, and returning the rod to normal configuration.

The inspector discussed the addition of TS correction factors for hot channel factors in this procedure. The licensee representative stated that this change would be made. This item (320/77-42-08) is open pending review during a subsequent inspection.

d. TP 800/32 - Loss of Offsite Power Test

The procedure controls and documents the performance of the test to verify that the response of the reactor and auxiliary systems to a loss of offsite power results in the plant being controlled within acceptable plant limits. The plant will be brought to a condition ready for cooldown using only onsite power sources. The procedure conforms to the requirements of Regulatory Guide 1.68. The inspector noted that the diesel-loading sequence is not verified by this procedure; however, another test procedure (TP 600/20) does record and verify a proper loading sequence.

The inspector noted the following discrepancy with this procedure.

Step 8.1, prerequisite which isolates Auxiliary Transformer 2A from Class 1E distribution system, is a violation of TS 3.8.1.1.a - and action statement a is in effect. Specifically, the placement of Breaker 2-1E-2 and 2-2E-2 in P-T-L should occur less than one hour before test or the performance of TS 4.8.1.1.1.a and 4.8.1.1.2.a.4 should be performed.

The licensee representative stated that this procedure would be changed to clear this discrepancy. This item (320/77-42-09) is open pending review during a subsequent inspection.

e. TP 800/34 - Generator Trip Test

The procedure controls and documents the response after a generator loss of load from full power. This information will be used in verifying adequate Nuclear Steam Supply System design and optimizing the control systems performance. The inspector found no inadequacies.

12. Temporary Change Notices

During a review of the control room procedures, the inspector noted only one copy of TCN 2-77-152 in the file. A review of the TCN log indicated TCN 2-77-152 had been cancelled by the onsite review committee on November 23, 1977. The inspector discussed the importance of ensuring accurate procedures being utilized for plant operation. The licensee indicated that changes to the office procedures for control of TCN's would ensure the removal of cancelled TCN's. The inspector indicated that this item would remain unresolved pending a review at a subsequent inspection (320/77-42-10).

13. Equipment Tagout

During a sample review of the licensee's tagout system, the inspector noted there was no form of an index to indicate the active tagouts. A spot check of several tagouts indicated a need for some form of active tagout index. The licensee indicated that some form of index or record would be added to the tagout logs. This item will remain unresolved pending a review during a subsequent inspection (320/77-42-11).

14. Back Shift Inspection

This inspection began at 7:25 p.m., December 12, 1977. During this shift, the inspectors observed operations in the control room and monitored other activities. The activities included review of the following.

- Shift Test Engineer Log
- Tagout System
- Equipment/System Operation
- Operating Procedures

The two unresolved items of paragraphs 12 and 13 were identified during this review. Findings were otherwise acceptable.

15. Unresolved Items

Unresolved items are matters for which more information or additional time is required in order to ascertain whether they are acceptable, items of noncompliance, or deviations. Unresolved items identified during this inspection are discussed in paragraphs 8a, 9, 12 and 13.

16. Exit Interview

The inspector met with licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on December 16 and 23, 1977. The inspector summarized the purpose and scope of the inspection and the findings.