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

Region I

Report No. 50-289/78-14

Docket No. 50-289

License No. DPR-50 Priority -- Category C

Licensee: Metropolitan Edison Company

P. O. Box 542

Reading, Pennsylvania 19603



Facility Name: Three Mile Island Nuclear Station, Unit 1

Inspection at: Middletown, Pennsylvania

Inspection conducted: June 12-15, 1978

Inspectors: R. J. Conte, Reactor Inspector — date signed 7/6/78

D. R. Haverkamp, Reactor Inspector — date signed 7/6/78

W. H. Baunack, Reactor Inspector — date signed 7/6/78

Accompanied by: R. P. Zimmerman, Reactor Inspector — date signed

Approved by: for R. R. Keimig, Chief, Nuclear Support Section No. 2, RO&NS Branch — date signed 7/6/78

Inspection Summary:

Inspection on June 12-15, 1978 (Report No. 50-289/78-14)
Areas Inspected: Routine, unannounced inspection of administrative controls for Technical Specification (TS) surveillance requirements and for safety related maintenance; selected TS surveillance requirement test procedures including test data; documented activities associated with safety related maintenance; qualification records of selected individuals who performed safety related maintenance; the performance of selected surveillance tests; and, multiple rod drop incident on June 14, 1978. The inspection involved 56.5 inspector-hours onsite by 3 NRC inspectors.
Results: Of the six areas inspected, no items of noncompliance were identified in five areas; one apparent item of noncompliance was found in one area (Deficiency - failure to initiate a procedure change - Paragraph 3.c(3)).

## DETAILS

1. Persons Contacted

M. Beers, Shift Supervisor
W. Cotter, Supervisor, Quality Control
W. Herman, Test Coordinator
* G. Kunder, Supervisor Technical Support
L. Noll, Shift Foreman
* M. Ross, Operations Supervisor
W. Sawyer, Supervisor of Maintenance
H. Shipman, Operations Engineer

Other licensee employees including members of the technical, operations and administrative staffs were interviewed.

* denotes those present at the exit interview.

2. Administrative Controls for Surveillance Procedures

The inspector performed an audit of the licensee's administrative controls by conducting a sampling review of the below listed administrative procedures with respect to the requirements of the Technical Specifications, Section 6, "Administrative Controls," ANSI N18.7, "Administrative Controls for Nuclear Power Plants" and Regulatory Guide 1.33, "Quality Assurance Program Requirements."

-- Administrative Procedure 1001, Document Control, Revision 13, March 30, 1978.

-- Administrative Procedure 1007, Control of TMI Records, Revision 3, December 13, 1977.

-- Administrative Procedure 1010, Technical Specification Surveillance Program, Revision 12, November 8, 1977.

No items of noncompliance were identified.

3. Surveillance Testing

a. The inspector reviewed surveillance tests on a sampling basis to verify the following.

-- Tests required by Technical Specifications are available and covered by properly approved procedures.

-- Test format and technical content are adequate and provide satisfactory testing of related systems or components.

-- Test results of selected tests are in conformance with Technical Specifications and procedure requirements have been reviewed by someone other than the tester or individual directing the test.

b. The following surveillance tests were reviewed to verify the above.

-- Surveillance Procedure 1303-3.1, Control Rod Movement, Revision 2, December 4, 1974. Data reviewed for 11 surveillances performed January 14, 1978 to June 3, 1978.

-- Surveillance Check 1301-9.2, Control Rod Program, Revision 11, March 14, 1978. Data reviewed for tests performed May 9, 1977 and April 26, 1978.

-- Surveillance Procedure 1303-11.2, Pressurizer Code Safety Valve Setpoint Verification, Revision 4, March 22, 1978. Data reviewed for tests performed April 17-22, 1977 and April 24, 1978.

-- Surveillance Procedure 1303-1.1, Reactor Coolant System Leak Rate, Revision 7, May 25, 1976. Data reviewed for 21 surveillances performed May 18, 1978 to May 31, 1978.

-- Surveillance Procedure 1303-11.8, High and Low Pressure Injection, Revision 5, March 15, 1978. Data reviewed for tests performed March 20, 1977 and March 18, 1978.

-- Surveillance Procedure 1303-11.20, Reactor Building Access Hatch Interlocks, Revision 0, April 4, 1973. Data reviewed for test performed April 19, 1978.

-- Surveillance Procedure 1303-12.3, Venting of Makeup Pumps and High Pressure Lines, Revision 0, October 20, 1976. Data reviewed for tests performed March 26, 1978 and April 25, 1978.

-- Surveillance Procedure 1303-12.4, Venting of Decay Heat Pumps and Low Pressure Injection Lines, Revision 0, October 26, 1976. Data reviewed for test performed April 14, 1978.

-- Surveillance Procedure 1303-6.2, Hydrogen Purge Operating Test, Revision 2, April 15, 1977. Data reviewed for test performed April 16, 1978.

c. As a result of the above review, the following items were identified:

(1) Surveillance Procedure 1303-11.20, Reactor Building Access Hatch Interlocks, written to satisfy requirements of Technical Specification 4.4.1.6, does not verify the operability of the control room annunciator circuits for the personnel and for the emergency access hatch door interlock. The switches installed to monitor interlock operability only provide indication that both hatch doors are open; they do not provide interlock status indication. This matter will be reviewed further by RI and the licensee. This item is unresolved. (289/78-14-01)

(2) Surveillance Procedure 1303-12.3, Venting of Makeup Pumps and High Pressure Injection Lines, written to satisfy requirements of Technical Specification 4.5.2.1, does not provide for venting of the high points in the high pressure injection lines. Vents are provided on the pumps and the pump suction line high point; however, no vents are installed on the high point of the pump discharge lines. The pump discharge lines are the highest points in the system. The licensee representative stated that the operating fill and vent procedures adequately fill and purge these lines. This matter will be reviewed further by the licensee. Pending completion of this review, this item is unresolved. (289/78-14-02)

(3) Surveillance Procedure 1303-3.1, Control Rod Movement, Step 6.10 could not be performed as specified by the procedure due to a change in Technical Specification rod insertion limits imposed following the last refueling which ended April 26, 1978. The surveillance was performed on four occasions following the refueling (April 26, May 4, May 20, and June 5, 1978) with no procedure change initiated to reflect the steps actually performed to satisfy the surveillance requirements.

Failure to initiate a procedure change to document a deviation from an approved procedure is considered to be contrary to Technical Specification 6.8.1 and is considered to be an item of noncompliance (289/78-14-03) at the deficiency level.

4. Inspector Witnessing of Surveillance Tests

a. The inspector witnessed the performance of surveillance testing of selected components to verify the following.

-- Surveillance test procedure was available and in use.

-- Special test equipment, if required by procedure, was calibrated and in use.

-- Test prerequisites were met.

b. The inspector witnessed the performance of:

-- Surveillance Procedure 1301-6.7, Monitoring of Silt Build-up in River Water Screen House, Revision 3, March 7, 1978. Performed June 12, 1978.

-- Surveillance Procedure 1303-4.16, Emergency Power System, Revision 12, June 28, 1977. Performed June 14, 1978.

No items of noncompliance were identified.

5. Administrative Controls for Safety Related Maintenance

Administrative controls were reviewed to determine the licensee's program for implementing requirements associated with the conduct of safety related maintenance as specified in Technical Specification Section 6; Regulatory Guide 1.33; Quality Assurance Program Requirements; and, ANSI 18.7, Administrative Controls for Nuclear Power Plants.

The following documents were reviewed:

-- 1021, Plant Modification, Revision 1, January 17, 1978;

-- 1026, Corrective Maintenance and Machinery History, Revision 6, May 1, 1978; and,

-- 1027, Preventative Maintenance, Revision 4, February 3, 1978.

No items of noncompliance were identified.

6. Review of Safety Related Maintenance Activities

a. The inspector reviewed safety related maintenance conducted by the licensee on a sampling basis to verify that:

-- Technical Specification Requirements were met while equipment was out of service, and a Licensee Event Report was submitted for maintenance associated with a reportable occurrence;

-- Required administrative approvals were obtained to perform the work;

-- An approved procedure was used where appropriate;

-- Required inspections were performed; and,

-- Records to substantitate quality of work and parts used were available (this includes documentation associated with procurement, inspections and test results).

b. Documentation of the following maintenance activities were reviewed:

-- 22479, Boric Acid Lines (7% Tank to 4% Tank), unblocked, performed March 31, 1978;

-- 22498, Control Rod Drive Mechanisms - cleaning and tightening of selected terminal connections, performed March 23, 1978.

-- 21914, Reactor Protection System - operability check of Reactor Trip Module, Channel C and circuit breakers CB 1 and 2, performed November 14, 1977;

-- 22435, Reactor Building Spray Pump (BS-P-1A) Discharge Pressure Gage - recalibrated, performed January 16, 1978;

-- 21338, Reactor Coolant Pump (RC-P-1A) - replaced leads/ capacitors in motor controller, performed September 19, 1977;

-- 21514, Makeup Letdown Cooler (MU-C-1A) - hydrostatic test of removed cooler, performed January 3-5, 1978;

-- 22838, Engineered Safeguard Actuation System Cabinet B - replaced pressure transmitter and buffer amplifier, performed March 6, 1978;

-- 22625, Decay Heat Removal Pumps (DH-P-1A and 1B) - disassembled and renewed including shaft replacement, April 25, 1978;

-- 22083, Reactor Building Personnel Access Door - replaced cam follower, performed December 4, 1977;

-- 20336, Nuclear Service River Water Strainer (NR-S-2C) - work was in progress for replacement of strainer, initiated June 13, 1978;

-- 22792, Turbine Sampling - installation of a temporary vacuum gage, performed February 16, 1978;

-- 22621, Nuclear Service River Water Strainer (NR-S-1B) - cleaned and replaced overloads in motor controller, performed January 27, 1978; and,

-- 22793, Diesel Generator Relay (Service A) - relay appeared to be sticking - cancelled upon re-evaluation of problem as nonexistent, initiated February 1, 1978.

No items of noncompliance were identified.

c. Documentation of the following maintenance activities were reviewed specifically to verify compliance with respect to established administrative controls for the completion of "Work Request Approval" forms and for procedural coverage associated with the maintenance activity:

-- 22012, Waste Disposal Liquid Tank (WDL-T-8) - inspection, performed December 11, 1977;

-- 22054, Reactor Building Purge Supply Fan Flow Switch (PB-B-69) - replaced, performed February 6, 1978;

-- 22082, Main Feed Pump B Flow Orifice - Primary and Secondary Root Valves replaced, performed April 12, 1978;

-- 22098, Reclaimed Boric Acid Pump (WDL-P-13B) - tightened set screw on local control switch, performed February 1, 1978;

-- 22117, Inverter 1C - adjustments to running frequency and synchronization circuits, performed December 13, 1977;

-- 22122, Solenoid Valve for Letdown Block Orifice Isolation Valve (MU-V-4) - disassembled and cleaned, performed December 7, 1977;

-- 22169, Inverter 1C, adjustements to running frequency and synchronization circuits, performed December 15, 1977;

-- 22218, Decay Heat Removal River Water Pump (DR-P-2B) - packing adjustment, performed January 14, 1978;

-- 22877, Pressurizer Heater Resistance Readings Preventative Maintenance, performed April 5, 1978;

-- 23665, Reactor Building Personnel Access (Outer) Door - replaced limit switches, performed May 6, 1978;

-- 23649, Fire Service Deluge Valves in Cooling Tower B Area - selected valves reset, performed May 1, 1978; and,

-- 22783, Fire Service Deluge Valves in Cooling Tower B Area - reset deluge valve and opened associated isolation valve FS-V-188, performed February 15, 1978,

No items of noncompliance were identified.

7. Maintenance Personnel Qualifications

The inspector reviewed the qualification records of selected technicians and craft personnel who performed maintenance on safety related systems, and components to verify that the individual's experience level and training were in accordance with the guidelines of ANSI N18.1-1971, Selection and Training of Nuclear Power Plant Personnel, Section 4.

No items of noncompliance were identified.

8. Facility Tour

On several occasions during the inspection, inspection tours of the facility were conducted of both the turbine and reactor buildings. During the tours, the inspectors discussed plant operations and observed housekeeping, radiation control measures, monitoring instrumentation and controls for Technical Specification compliance. In addition, the inspectors observed control room operations on both day and evening shifts for control room manning, shift turnovers, and facility operation in accordance with administrative and technical specification requirements. A recovery from an unscheduled control rod group insertion, described in Paragraph 9 of this report was also witnessed.

No items of noncompliance were identified.

9. Multiple Rod Drop Incident

On June 14, 1978 the licensee reported to Region I that a violation of a limiting condition for operation had occurred that morning when seven of the nine control rods in safety group 3 inadvertently dropped into the core. This resulted in operation with more than one inoperable safety rod, which is a violation of T.S. 3.5.2.2.a and which also violates the safety rod limits of T.S. 3.5.2.5.e. During the transient, the quadrant power tilt limit of T.S. 3.5.2.4.a was exceeded, but the tilt was returned to within allowable limits within the four hour time limit of T.S. 3.5.2.4.e.

The seven safety rods in group 3 dropped into the core while performing an RPS surveillance, which required manually tripping two of the four DC power hold supplies for the rod group. The remaining two power supplies are normally sufficient to hold the rods. However, one of the power supplies had several blown fuses so that there was insufficient voltage to hold the rods. The cause of the blown fuses was being investigated.

The dropped rods resulted in a rapid power reduction from 100% to about 40% full power. While plant conditions were being stabilized, core power distributions and other core physics data were being analyzed. Licensee representatives determined from the Technical Specifications that operation with more than one inoperable rod was not allowed, but no time clock was provided for shutdown. Therefore, an orderly power reduction was begun. Meanwhile, all group 3 safety rods were aligned at 20% withdrawn within one hour after the rods had dropped, and were fully withdrawn within the next twenty minutes. The shutdown evolution was then stopped with reactor power at 30% full power and power escalation began when conditions stablized.

The inspector reviewed the licensee's actions regarding this incident for conformance with applicable requirements of license conditions, Technical Specifications and facility procedures. The circumstances of the occurrence and the corrective actions were discussed with licensee representatives, and the following items were reviewed.

-- Control Room Operator Log.

-- Computer printouts of reactor power, incore tilt, imbalance, rod insertion and fuel assembly to average fuel assembly power ratios.

-- Facility normal operating procedures, abnormal operating procedures and control rod operation procedure.

The sequence of events and licensee actions were as described below.

| Time | Event/Action |
|---|---|
| 10:06 am | Diamond Rod Control for "A&B" feedwater demands in manual for CRD breaker trip tests per SP 1303-4.1. |
| 10:07 am | Dropped rods 2, 3, 4, 5, 6, 8 and 9 in Group 3. Reactor power reduced from 100% to 40% F.P. |
| 10:23 am | Determined that +3.64% tilt limit was exceeded, when calculated incore tilt for ZW quadrant was +12.85%. |
| 10:24 am | Commenced trimming Group 3 rods. |
| 10:27 am | Initiated safety rods out bypass. Partially inserted rods 1 and 7. |
| 10:29 am | Commenced withdrawing dropped Group 3 rods one at a time to approximately 20% withdrawal. |
| ~10:30 am | Commenced power reduction. |
| 10:43 am | Verified shutdown margin - 4.66%. Commenced shimming in Group 3 rod 1 and 7 one at a time. |
| 11:07 am | All Group 3 rods trimmed. |
| 11:11 am | Withdrawing Group 3 rods, while shimming Group 7 rods into core, to maintain 30% power. |
| 11:13 am | Tilt in spec @ +2.97%. |
| 11:25 am | All Group 3 safety rods fully withdrawn. |
| 11:33 am | Exceeded +3.64% tilt limit, when calculated incore tilt for WX quadrant was determined to be +6.23%. |
| 12:03 pm | Tilt in spec @ +2.83%. |
| 12:06 pm | Commenced slowing increasing power to 100%. |

The inspector determined that the circumstances of the occurrence and the licensee's immediate corrective actions were as described above and that initial reporting requirements were met. The inspector found the licensee's actions acceptable, except as described below.

-- Technical Specification Limiting Condition for Operation (LCO) 3.5.2.2.a states that operation with more than one inoperable rod...in the safety or regulating rod banks shall not be permitted. Additionally, Technical Specification LCO 3.5.2.5.e states that safety rod limits (during power operation) are given in LCO 3.1.3.5, which requires safety rod groups to be fully withdrawn with certain exceptions. 10 CFR 50.36(b)(2) and Operating Procedure 1102-4 states that when an LCO of a nuclear reactor is not met, the licensee shall shut down the reactor or follow any remedial action permitted by the technical specification until the condition can be met; and the licensee shall notify the Commission, review the matter, and record the results of the review, including the cause of the condition and the basis for corrective action taken to preclude recurrence. Neither the above Technical Specifications, 10 CFR 50.36(b)(2), nor OP 1102-4 requires a time period within which the reactor shall be shutdown, when LCO's are not met. However, OP 1102-4 requires Plant Superintendent notification and approval for continued operation on an ad hoc basis when an LCO is not met. (Technical Specifications in the STS format are more specific in this regard, as facility operation is allowed to continue for only one hour when an LCO and conditions of associated action statements are not met.)

With respect to the occurrence described above, all safety group 3 rods were aligned to the same relative core positions one hour after the seven rods dropped, and all rods were fully withdrawn in the next 20 minutes. Licensee representatives stated that this occurrence would be reviewed as required, and appropriate measures taken to prevent recurrence would be described in the followup LER. This item is unresolved pending submission of the followup LER for this occurrence and completion of the licensee's specific and generic corrective actions to prevent recurrence. (289/78-14-04)

10. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance or a deviation. Unresolved items identified during the inspection are discussed in Paragraphs 3.c(1), 3.c(2) and 9.

11. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on June 15, 1978. The purpose, scope and findings of the inspection were summarized.