U.S. ATOMIC ENERGY COMMISSION

DIRECTORATE OF REGULATORY OPERATIONS

REGION I

RO Inspection Report No: 50-289/74-08 Docket No: 50-289

Licensee: Metropolitan Edison Company License No: CPPR-40

Three Mile Island - Unit 1 Priority:

Category: B.1

Location: Middletown, Pa.

Type of License: B&W, 871 MWe, PWR

Type of Inspection: Routine, Announced

Dates of Inspection: February 20, 22, 27, and 28 and March 1, 1974

Dates of Previous Inspection: February 19-22 and 25-27, 1974

Reporting Inspector: R. L. Spessard, Reactor Inspector — 3/21/74 Date

Accompanying Inspectors: None — Date

Date

Date

Date

Date

Other Accompanying Personnel: None — Date

Reviewed By: A. B. Davis, Senior Reactor Inspector, Reactor Operations Branch — 3/21/74 Date

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SUMMARY OF FINDINGS

Enforcement Action

A. Violation

Preoperational test data in TP203/4 and TP172/2B were reviewed and approved by the TWG in apparent violation of 10 CFR 50, Appendix B, Criterion XI. During the inspection, these items were reviewed by cognizant licensee representatives who considered the test results acceptable. The test data was re-evaluated and found acceptable by the TWG. (Management Interview Item B and Paragraph 2.c.(1) & (2))

This item is closed.

B. Safety Items

None identified

Licensee Action on Previously Identified Enforcement Items

A. Not inspected

Unusual Occurrences

A. The one remaining Nuclear Service River Water Pump ("A" Pump) failed during hot functional testing at normal operating temperature and pressure, and the backup system (Secondary Service River Water Pump) was put in service. No plant limits or precautions were exceeded. Preliminary examination revealed a cracked motor end bell, cracked coupling, sheared pump shaft, and displacement of the motor-pump foundation by one-fourth inch. Investigation is continuing, but it is believed that a foreign object caught between the impeller and the pump. Licensee considers this event reportable per 10 CFR 50.55(e). This matter will be reviewed during a subsequent RO inspection.

B. Both Diesel Generators could not be started in the Emergency Service mode during surveillance tests. Prior to these surveillance tests the Diesels had been started, warmed up, and shut down, and following shutdown there were no alarmed conditions relative to their standby (Auto) status. These startups had been previously performed on several occasions and have also been performed since the occurrence. Investigation is continuing, and this includes a design review of the circuitry by GAI. Licensee considers this event reportable per 10 CFR 50.55(e). This matter will be reviewed during a subsequent RO inspection.

Other Significant Findings

A. Current

1. All preoperational test procedures are final approved, and 4[illegible] of the preoperational tests have been completed. (Paragraps 2.a & b)

2. Several completed preoperational tests were reviewed by RO:I and found to be acceptable. (Paragraph 2.c)

3. Two preoperational tests were witnessed by RO:I, and no deficiencies relative to test performance were identified although outstanding test deficiencies occurred. (Paragraph 2.d)

4. All initial startup test procedures are preliminary and/or final approved. (Paragraph 3)

5. Previous licensee commitments to RO:I relative to the ECCS Testing Program were reviewed and found to have been implemented. (Paragraph 5)

6. Hot functional testing at normal operating temperature and pressure has been completed, and plant cooldown was initiated to make preparations for the performance of the Reactor Building Structural Integrity and Integrated Leak Rate Tests. The overall results of hot functional testing were reviewed, and outstanding test deficiencies with proposed retest requirements were identified. (Paragraph 6)

B. Status of Previously Reported Unresolved Items

None relative to preoperational testing activities.

Management Interview

An exit interview was conducted on March 1, 1974 at the conclusion of the inspection. Items discussed and personnel in attendance were as follows:

Licensee Representatives

J. Herbein, Station Superintendent, Met-Ed
G. Miller, Test Superintendent, GPUSC
M. Stromberg, Site Auditor, GPUSC
T. Sturgeon, QA Specialist, GPUSC

RO:I Representative

L. Spessard

DETAILS

1. Persons Contacted

Metropolitan Edison Company

J. Herbein, Station Superintendent
J. Floyd, Supervisor of Operations
J. Wallace, Shift Supervisor
M. Ross, " "
R. Porter, " "
M. Beers, " "

General Public Utilities Service Corporation

J. Barton, Startup and Test Manager
G. Miller, Test Superintendent
R. Toole, Assistant Test Superintendent
M. Nelson, Technical Engineer
W. Behrle, HFT and PET Program Coordinator
T. Faulkner, Senior Test Planner
S. Poje, Shift Test Engineer
T. Hawkins, " " "
C. Gatto, " " "

2. Preoperational Test Procedures

a. Status of Test Procedure Approval*

Based on a review of records and discussions with cognizant licensee representatives, the inspector determined that TP150/3 and SP267/5 had been approved for performance by the TWG and TP302/1 had been deleted from the MTX by TCN-44 which was approved by the TWG. With respect to TP302/1, the capability of the in-core monitor chopper is to be demonstrated and witnessed at the vendor's shop on March 20, 1974, and delivery of the chopper to the Three Mile Island site is scheduled for late April 1974. All preoperational test procedures have been approved for performance.

b. Status of Preoperational Testing

Preoperational Tests Completed and Accepted	32%
" " " " Under Review	12%
" " in Progress	36%
" " not Started	20%

* RO Inspection Report No. 50-289/74-02, Paragraph 2.a.

c. RO:I Review of Completed Preoperational Tests

The inspector conducted a detailed review of the following completed preoperational test procedures (Official Field Copy) which have been accepted by the licensee:

TP401/1 Diesel Generator Startup Test
TP203/4 Decay Heat Removal System Functional Test
TP172/2B Control Building Ventilation System Functional Test, Part B Chilled Water
TP200/6 Reactor Coolant Pump Initial Operation Test
SP123.8 In-Core Detector Handling Tests
TP301/3A Nuclear Instrumentation Pre-Op, Calibration (Source Range)
TP301/3B " " " " (Intermediate Range)
TP301/3C " " " " (Power Range)
TP204/3 Reactor Building Spray System Functional Test
TP600/1 Unit Heatup Test

No apparent deficiencies relative to Test Instructions No. 9 and 18 were identified, test requirements were satisfactorily performed, and test results were satisfactory with the following exceptions:

(1) TP203/4

The acceptance criterion for pump DH-P1B recirculation flow D/P at shut off head, as stated in the TP (Step 11.1.2.13) was 250 $\pm$ 15 ft. H_2O. Data recorded in the TP for this condition (Step 10.1.2.13.a) was 232 ft. H_2O. This variance was not identified as an exception, and its evaluation, if any, was not documented. Additionally, the inspector questioned the pump flow curve for both pumps, as drawn in Enclosure 3 of the TP, in that test data recorded in the TP did not appear to be fully supportive. For example, data at shutoff head conditions with recirculation flow were actually about 7 ft. below the design curve (418 ft. H_2O), but had been plotted slightly above the design curve, and data for pump flow conditions of about 3000 gpm were plotted above the design curve (352 ft. H_2O), but data for this condition were not contained in the TP. Data for intermediate points were plotted correctly.

These items were discussed with cognizant licensee representatives, and following their review the inspector was informed that the data at shutoff head conditions had been plotted incorrectly, that data obtained for the 3000 gpm flow conditions including the flow path used had apparently not been included in the TP,

and that the variance relative to recirculation flow D/P was an apparent oversight. The representatives were informed that these items constituted a violation of 10 CFR 50, Appendix B, Criterion XI, which requires test results to be documented and evaluated to assure that test requirements have been satisfied. The representatives stated that the test results were considered to be acceptable.

(2) TP172/2B

In steps 9.1.2.5 and 9.2.2.6 of the TP Purge System Tests for Chillers AH-C-4A/4B are performed, and following Steps 9.1.2.5.c and 9.2.2.6.c is a caution statement relative to condenser pressure, which states "OBSERVE CONDENSER PRESSURE GAUGE. DO NOT EXCEED 9 PSIG CONDENSER PRESSURE." Condenser pressure is recorded in Steps 10.1.2.5.b.4 and 10.2.2.6.b.4 of the TP; however, acceptance criteria relative to the Purge System Tests stated in Section 11 of the TP do not address condenser pressure, but do address temperature differential between condenser saturation temperature and flow control chamber temperature. Data recorded in Steps 10.1.2.5.b.4 and 10.2.2.6.b.4 indicated acceptance criteria (temperature differential) were met; however, condenser pressure recorded in Step 10.1.2.5.b.4 was 10 psig which exceeded the limit established by the caution statement. This variance was not identified and its evaluation, if any, was not documented.

This matter was discussed with cognizant licensee representatives, and after their review the inspector was informed of the following: During the Chiller AH-C-4A Purge System Test, the temperature differential was such that Steps 9.1.2.5.c, d. and e did not have to be performed, and the caution statements, which follows Step 9.1.2.5.c, was apparently overlooked; the caution limit of 9 psig was incorrect and should have been $\leq$ 15 psig; and lack of acceptance criteria relative to condenser pressure was an oversight. The licensee representatives were informed that this matter constituted a violation of 10 CFR 50, Appendix B, Criterion XI, which requires a test program to be performed in accordance with written test procedures which incorporate acceptance limits contained in applicable design documents and test results to be evaluated to assure that test requirements have been satisfied. The representatives stated that the test results were considered to be acceptable.

(3) SP123.8

The purpose of this test was to determine the suitability of the path which had been designed to provide for the replacement of failed In-core Monitor Detectors. The design path was from EL 305' of the Intermediate Building via a guide assembly to and thru the In-core Reactor Building Penetration (about EL 355') to the cable guide tubes. The test results disclosed that this path was unacceptable, and a field change request (FCR #308) was issued to correct this deficiency. The proposed fix is to relocate the guide assembly so that the cable is fed from the turbine floor, which is the same elevation as the Reactor Buildi[illegible]etration. FCR #308 is not expected to be completed p[illegible] closing the Reactor Building, so the first opportunity to test the method will be durin[illegible] the first refueling. The inspector made a visual inspection of the design path and the new proposed path. Based on these observations, the inspector concluded that the proposed path provided easier access to the penetration and that to demonstrate the suitability of the proposed path by testing should not be a problem. The licensee representatives were informed by the inspector that he had no further questions on this matter at this time.

The inspector verified that the following completed preoperational test procedures (Official Field Copy) have been accepted by the licensee in accordance with the requirements of the Test Manual:

TP254/2 Nitrogen Supply System Functional Test
TP210/12, Part 2 Nuclear Chemical Addition System Functional Test
SP320/1 Integrated Control System Pre-Op. Calibration
F1106/4 Aux Boiler Functional Verification

d. RO:I Review of the Performance of Preoperational Tests

(1) TP600/11 Emergency Feed System and OTSG Level Control Test

This test was conducted as part of the Hot Functional Test Program, and its purpose was to verify operations of the Emergency Feedwater System and the Integration Control System in accordance with desig[illegible].

The inspector w[illegible]tnessed the performance of Section 9.4 of this procedure namely the demonstration of the steam driven emergency feedwater pump to pump emergency feedwater to the hot OTSG's at a pressure of 1015 psig. Sections 9.1-9.3 and part of Section 9.5 of the procedure had been completed

prior to the testing witnessed by the inspector. Also, Section 9.4 had been previously conducted; however, a steam leak prohibited personnel from obtaining the required flow data from local instrumentation so a retest was necessary.

The inspector's observations included performance of the Shift Test Engineers and Met Ed shift personnel before, during and after test performance, heatup of the Reactor Coolant System to establish test conditions, plant response during test performance (two attempts were made to accomplish test requirements), and a visual inspection of the Emergency Feedwater and Main Steam Systems. Additionally, the inspector reviewed the Official Field Copy of TP600/11. The inspector's findings were as follows:

(a) No deficiencies relative to Test Instruction No. 9 were identified.

(b) The test requirement contained in Section 9.4 of the procedure was not verified because of operability problems with valves in the Main Steam and Emergency Feedwater Systems and packing problems on the steam driven emergency feedwater pump. Additionally, during the second testing attempt, the two 3x6 inch Main Steam Safety Valves (Setpoint 1040 psig) apparently lifted prematurely and then reseated. The setpoint of all Main Steam Safety Valves had been tested prior to this test. These problems were documented in accordance with Test Instruction No. 9.

(c) Raw test data indicated that test requirements contained in Sections 9.1, 9.2, 9.3, and 9.5 of the procedure had been verified.

Resolution of identified problems and uncompleted test requirements contained in Sections 9.4 and 9.6 (demonstration of the steam driven emergency feedwater pump to operate at 15.2 psig steam throttle conditions and pump 370 gpm at 190 feet TDH) of the procedure were discussed with cognizant licensee representatives. The inspector was informed of the following:

(a) Valves MS-V10 A & B have a torque switch problem (setting provides too much force to close). This problem will be corrected following plant cooldown, and the valves will be retested during the post fuel load precritical testing program to verify proper stroke with full D/P.

(b) The steam driven emergency feedwater pump will be checked for proper shaft alignment with adjustments made as required following plant colddown, and pump performance using auxiliary steam will be verified prior to fuel loading. Additionally, Sections 9.4 and 9.6 of TP600/11 including demonstration of emergency feedwater pump acceleration time to governor speed (<30 seconds) will be rerun during the post fuel load precritical testing program to verify outstanding test requirements.

(c) The setpoint of all Main Steam Safety Valves will be checked and reset as required during the post fuel load precritical testing program.

(d) The proposed testing discussed in (a), (b), and (c) above is subject to the review and approval of the TWG since raw test data has not reviewed by this organization.

The inspector informed the licensee representatives that he had no further questions on the proposed testing program at this time and that data obtained during this testing would be reviewed during subsequent RO inspections following review and acceptance by the TWG.

(2) TP800/36 (HFT) Shutdown From Outside The Control Room As Modified For Hot Functional Testing

The purpose of this procedure was to demonstrate the ability to cool down the plant with control of all necessary systems remote from the Control Room and to familiarize the operating personnel with the basic method to accomplish the cooldown as established by Emergency Procedure No. 1202-37. Additionally, during the Initial Startup Testing Program, this test will be conducted at a reactor power level of 15%.

Prior to the performance of this test the inspector reviewed TP800/36 (HFT) and discussed the test requirements, which included a dry run of these requirements, with cognizant licensee representatives. During these discussions, particular attention was given to operator actions both inside and outside the Control Room and plant design features (control capability and instrumentation) remote to the Control Room, as described in Section 7.4.6 of the FSAR. The inspector's findings and licensee representative's commitments, as appropriate, were as follows:

(a) No deficiencies were identified with respect to the test requirements of TP800/36 (HFT).

(b) Operator actions prior to departing the Control Room could be accomplished from outside the Control Room in the unlikely event that it became necessary to do so. Cognizant licensee representatives stated that Emergency Procedure NO. EP 1202-37 would be revised to provide alternate actions from outside the Control Room for those operator actions normally taken prior to departing the Control Room.

(c) Instrumentation for vital plant parameters located at the alternate control station consisted of a digital readout system with corresponding conversion graphs. Cognizant licensee representatives stated that appropriate indicators were on order and should be installed by June 1, 1974. Additionally, interim measures consisting of periodic comparison checks are to be instituted for this temporary instrumentation until the permanent instrumentation is installed.

The inspector witnessed the performance of this test from both the Control Room and the alternate control station. No deficiencies relative to Test Instruction No 9 were identified, and the test was performed in a safe and orderly manner. For test purposes the operating Reactor Coolant Pumps (RC-P1A, B & C) and the operating Makeup Pump (MU-P1B) were not tripped prior to evacuating the Control Room. Operator actions prior to departing the Control Room were performed in a slow, deliberate manner and were accomplished in 49 seconds (obtained by stop watch). The test was initiated at a Reactor Coolant System temperature of 510°F and the cooldown was terminated after 45 minutes when this temperature reached 470°F. During this test various cooldown rates were established to demonstrate adequacy of control including the ability to stabilize plant conditions.

3. Initial Startup Test Procedures

Based on a review of records and discussions with cognizant licensee representatives, the inspector determined that all of these procedures were preliminary and/or final approved. The representative stated all procedures would be final approved by March 31, 1974.

4. Shift Test Engineer's (STE) Log Book

The inspector reviewed the contents of this log for the period February 1-27, 1974. No deficiencies relative to Test Instruction No. 17 were identified.

5. ECCS Testing Program

Based on a review of pertinent preoperational test procedures, the inspector observed that previous licensee commitments to RO:I, as described in RO Inspection Report No. 50-289/73-22, Paragraph 3.f, had been completed or had been included in a procedure which was scheduled for performance following cooldown from hot functional testing. Licensee representatives were informed by the inspector that he had no further questions on this matter at this time.

6. Hot Functional Testing Program

During this RO inspection, Phase VI (532°F, 2155 psig testing) was in progress and completed and Phase VII (Second RCS Cooldown) was initiated. Plant conditions and Met Ed shift personnel were observed by the inspector on various occasions during the inspection, and the activities observed were accomplished in a safe and orderly manner. Inspection findings relative to specific tests witnessed by the inspector were previously discussed in Paragraph 2.d,(1) and (2).

The overall results of the program at the time of this RO inspection were discussed with cognizant licensee representatives, and the information provided to the inspector is considered to be preliminary since these test results had not been reviewed by the TWG. The overall results appear to be satisfactory; however, the following deficiencies have been identified.

a. The letdown isolation valve (MU-V3) will not fully close above 1550 PSID. This is an air operated valve, and a design change (add a stiffer spring) is to be made following cooldown from hot functional testing. This valve will be retested during the post fuel load precritical testing program to verify closure against maximum operational differential pressure.

b. Problems were identified with components in the Emergency Feedwater System. These problems and the retest requirements were previously discussed in Paragraph 2.d.(1).

c. Insulation on the Pressurizer head has been found to be inadequate by temperature profile measurements and heat loss calculations, i.e., temperatures in the range of 180-200°F have been experienced versus a design of 140°F. This has caused operating problems with isolation valve (RC-V2). The insulation requirements have

been re-evaluated by GAI, and modifications will be made following cooldown from hot functional testing. Heat loss tests will be rerun during the post fuel load precritical testing program to verify adequacy of the modifications.

d. Problems relative to pipe hangers and restraints were identified and corrected as they occurred. There are approximately 100 restraints which have not been installed. These will be installed, and the current program will be continued during the post fuel load precritical testing and the power ascension testing programs.

e. With respect to the control rod drive system, certain position indication tubes have been identified as problems and one CRD motor stator has failed. These items are to be corrected following cooldown from hot functional testing, and during this period a program involving megger tests of additional CRD motors is to be completed.

f. Reactor Coolant Pump (RC-P1D) was tagged out prior to completion of hot functional testing because of excessive vibration. Final balancing of this pump and the remaining 3 pumps, if necessary, will be accomplished during the post fuel load precritical testing program.

The inspector informed the licensee representatives that he had no further questions on the identified deficiencies and the proposed testing program at this time and that the hot functional test results would be reviewed during subsequent RO inspections following review and acceptance by the TWG.