


U. S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No. 50-289/89-24
License No. DPR-50
Licensee: GPU Nuclear Corporation
P. O. Box 480
Middletown, Pennsylvania 17057
Facility: Three Mile Island Nuclear Station, Unit 1
Location: Middletown, Pennsylvania
Dates: October 5, 1989 - November 7, 1989
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Approved by:


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12/29/89
Date

Inspection Summary: Inspection on October 5 - November 7, 1989
(Inspection Report No. 50-28/89-24)

Areas Reviewed: The NRC staff conducted routine safety inspections of power operations activities. The inspectors reviewed plant operations and maintenance/surveillance activities as they related to plant safety. Specific items reviewed included; an Engineered Safeguards (ES) actuation during Engineered Safeguards Actuation System (ESAS) testing, maintenance activities concerning an emergency diesel generator (EDG) cooling fan failure and licensee action on previous inspection findings.

Results: Operations activities continue to be conducted safely. One licensee identified violation was reported, concerning an ES actuation during ESAS surveillance testing. Licensee corrective action was adequate and timely. One unresolved item remained concerning licensee procedures for restoration from these actuations. Another unresolved item was identified concerning an EDG cooling fan failure that had implications for a common mode failure of both trains of a safety system. Inadequate maintenance activities for the EDG appeared to be the cause. Licensee action on previous inspection findings was satisfactory.

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DETAILS

1.0 Introduction and Overview

1.1 Licensee Activities

The licensee operated the plant at full power during the report period. No major plant transients occurred. As of November 7, 1989, the TMI reactor was at 100 percent power.

1.2 NRC Staff Activities

The purpose of this inspection was to assess licensee activities for reactor safety, safeguards and radiation protection. The inspectors made this assessment by reviewing information on a sampling basis through actual observation of licensee activities, interviews with licensee personnel, or independent calculation and selective review of applicable documents. Inspections were accomplished on both normal and back shift hours.

NRC staff inspections are generally conducted in accordance with NRC Inspection Procedures (NIPs). These NIPs are noted under the appropriate section in the Table of Contents to this report.

Back shift inspections were accomplished during the following periods:

<u>Day/Date</u>	<u>Time</u>
October 9, 1989	8:30 am - 12:00 am
October 14, 1989	7:00 pm - 9:00 pm
October 29, 1989	4:00 pm - 7:00 pm
November 5, 1989	1:00 pm - 4:00 pm

1.3 Persons Contacted

- G. Broughton, Operations/Maintenance Director
- *J. Colitz, Manager, Plant Engineering
- J. Curry, IOSRG Chairman
- J. Fornicola, Manager, Quality Assurance
- R. Harper, Manager Plant Material
- *H. Hukill, Vice President and Director, TMI-1
- C. Incorvati, TMI Audits Manager
- *B. Knight, TMI-1 Licensing
- M. Nelson, Manager, Safety Review
- M. Ross, Plant Operations Engineer
- *H. Shipman, TMI-1 Operations
- *D. Shovlin, Plant Material Director
- P. Snyder, Manager, Plant Material Assessment
- C. Smyth, Manager, Licensing
- D. Hassler, TMI-1 Licensing

* Denotes attendance at final exit meeting (see Section 7.0)

2.0 Plant Operations

2.1 Facility Inspection

The resident inspectors routinely inspected the facility to determine the licensee's compliance with the general operating requirements of Section 6 of Technical Specifications (TS) in the following areas:

- review of selected plant parameters for abnormal trends;
- plant status from a maintenance/modification viewpoint, including plant housekeeping and fire protection measures;
- control of ongoing and special evolutions, including control room personnel awareness of these evolutions;
- control of documents, including log keeping practices;
- implementation of radiological controls; and,
- implementation of the security plan, including access control, boundary integrity, and badging practices.

In general, the inspector determined that the licensee, from a house-keeping and fire protection perspective, was maintaining the plant in good condition. Overall, management attention toward plant safety continued to be noted.

2.2 Operations Summary

Operations continue to be conducted in a safe manner. Operator response to the inadvertent ES actuation discussed in section 3.2 was timely and prevented a plant transient.

3.0 Equipment Operability

3.1 Surveillance Observations

On a sampling basis, the inspector selected a surveillance and maintenance activity to ensure that specific programmatic elements described below were being met. Details of this review are documented in the following sections.

The inspector observed performance of the following surveillance test to determine that: the test conformed to technical specification (TS) requirements; administrative approvals and tagouts were obtained before initiating the surveillance; testing was accomplished by qualified personnel in accordance with an approved procedure; test instrumentation was calibrated; limiting conditions for operations were met; test data was accurate and complete; removal and restoration of the affected components was properly accomplished; test

results met TS and procedural requirements; deficiencies noted were reviewed and appropriately resolved; and the surveillance was completed at the required frequency.

This observation included:

Receipt of New Fuel per SP 1503-1 on October 24, 1989;

HSPS Surveillances SP 1303-11.38 and 1303-11.39 on October 26, 1989;

Meteorological Tower Installation Calibration per SP 3303-SAI; and

H2 Recombiner Instrument Checks per SP 1302-19 on October 16, 1989.

3.2 Inadvertent Engineered Safeguards (ES) Actuation

On October 30, 1989 at 0830, while performance of SP 1303-5.1 "Reactor Building Cooling and Isolation System Logic Channel and Component Test", off-shift operators inadvertently generated a 4 psig "B" channel engineered safeguards actuation system (ESAS) signal. At the time of the event, the unit was at 100% power with the integrated control system (ICS) in automatic. The licensee verified the ESAS functioned as designed. As a result of the actuation, the "B" emergency diesel generator started and the letdown portion of the make-up and purification system isolated. The "C" high pressure injection (HPI) pump energized and started to inject water from the Borated Water Storage Tank (BWST) into the reactor vessel. The licensee estimates that approximately 80 gallons of water was injected. The on-shift operating crew, after verifying the signal was inadvertent, reset the ESAS in accordance with operating procedure (OP) 1105-3. The operator secured the HPI pump and the "B" EDG and established letdown flow using guidance outlined in OP 1105-3, attachment II. Operators also reduced reactor power to 95% to compensate for the boron addition.

The cause of the event was personnel error. Testing was being performed on the "A" train actuation ESAS Digital logic. (IAW 8.1 to 8.14 of SP-1303-5.1.) One 4 psig RB pressure bistable was tripped (BT-1), actuating "A" (RBIA) and "B" (RBIB) digital logic channels. After completing this portion of the test, bistable BT-1 was reset IAW 8.3.4. The operator then enabled (reset) channel "A" but failed to reset channel "B" (RBIA) as required by step 8.3.5. The operator also failed to perform the required verifications as specified in steps 8.3.5 and 8.3.6. At this time, the "A" logic was returned to 2 out of 3, however, the "B" logic was in a degraded 1 out of 2 logic condition. When the operators tripped the 4 psig bistable BT-2, this actuated channels "A" (RB2A) and "B" (RB2B). With RB1B and RB2B actuated, the "B" logic system met its 2 out of 3 logic requirements actuating "B" channel 4 psig equipment.

The licensee made the required one hour NRC notification in accordance with 10 CFR 50.72 b(1)iv. The licensee is also preparing a licensee event report (LER) as required by 10 CFR 50.73. The inspector will review this LER in a subsequent inspection report.

The inspector reviewed SP 1303-5.1 and the licensee's incident event report 1-89-01 issued November 7, 1989. The inspector concurred with the licensee's conclusion that this was due to operator error, caused by lack of attention to detail, and not procedural inadequacy. The inspector noted the on-shift operators' response to this event was timely, preventing a potentially more serious transient.

Although this is a violation of technical specification 6.8.1.b, based on the following mitigating circumstances authorized by 10 CFR 2, Appendix C V.G, a Notice of Violation will not be issued. The event was licensee identified, and is classified as a Level IV violation per 10 CFR 2, Appendix C, Supplement I.D.3. The licensee has met the reporting requirements as specified in 10 CFR 50.72. The inspector reviewed the licensee's corrective actions and concluded they are prompt and effective. The inspector noted this was an isolated occurrence, and therefore could not have been prevented by corrective actions implemented by a previous violation.

For administrative purposes, this item will tracked as a licensee identified violation, and will be given an open item number. This item is considered closed (89-24-01).

On November 3, 1989 at 0414 am, an operator in the control room attempted to manually transfer the power supply of 1C ES valves from the 1S to the 1P 480 V bus. This attempt and a second attempt failed. The operator then depressed the reset push button, and the power supply transferred. The automatic bus transfers (ABT) for the 1C ES valves motor control center (MCC) and the DC bus 1M are prevented from auto transfer on an ES signal. This is to prevent loading these units on a faulted bus. The lockout relays were energized during the inadvertent ES actuation on October 30, 1989. The licensee reviewed the recovery procedure OP 1105-3 and found these relays not to be addressed in the recovery procedure. The licensee noted this in the plant incident report 1-89-01, and committed to review and correct OP 1105-3, and review other procedures that could address these lock out relays. This item is unresolved pending completion of licensee's corrective actions. (89-24-02)

3.3 Maintenance Observations

The inspector observed portions of the Emergency Diesel Generator Maintenance on November 3, 1989 to determine that the work was conducted in accordance with approved procedures, regulatory guides, technical specifications, and industry codes or standards. The following items were considered during this review: limiting conditions

for operation were met while components or systems were removed from service; required administrative approvals were obtained prior to initiating the work; activities were accomplished using approved procedures and QC hold points were established where required; functional testing was performed prior to declaring the particular component(s) operable; activities were accomplished by qualified personnel; radiological controls were implemented; fire protection controls were implemented; and the equipment was verified to be properly returned to service.

3.4 Emergency Diesel Generator Cooling Fan Failure

At 5:19 am on November 4, 1989, the licensee declared the "A" emergency diesel generator (EDG) inoperable. The diesel was being run in preparation for performance of SP 1303-5.2. The auxiliary operator, locally stationed at the EDG, noted smoke in the radiator housing and immediately reported the condition to the control room. The EDG was secured. Inspection in the radiator housing found the centrifugal clutch for the cooling fan shaft drive to be hot as evidenced by the paint being blistered on the drum of the clutch. The licensee believed the clutch shoes to be worn. A job order (JO #000015458) was processed to inspect and repair the clutch.

Inspection of the clutch found the shoes to be intact with sufficient material on the shoes to perform as designed. There appeared to be no other defects noted in the centrifugal clutch.

The licensee then inspected the angle drive gear box. This unit converts the horizontal shaft rotation to vertical shaft rotation to drive the radiator fan. The upper bearing on the vertical shaft was found to be dry and immovable. The oil was drained from the gear box and the unit was disassembled to determine the cause.

A small positive displacement oil pump, mounted on the upper casing of the gear box, supplies lubrication to this bearing. A small lift check valve in the suction line of this pump was found to be clogged with a sludge like material. This check valve maintains the suction line of the pump filled solid to ensure the pump maintains its prime. This problem with the check valve and the amount of sludge found in the suction is evidence that the pump did not supply lubrication to the upper bearing. This is the probable cause of the bearing failure. The licensee is still investigating the root cause.

The inspector noted good working interfaces with the maintenance, operations, engineering and quality assurance departments in the troubleshooting and disposition of the failure. The inspector reviewed the annual EDG preventative maintenance (PM) (SP 1301-8.2 EDG Annual Inspection) program. The PM inspects the gears through an inspection cover located on the upper gear box casing and changes the gear box oil. The inspector concluded this was not adequate to prevent occurrence or recurrence of this problem. The licensee is

reviewing the PM program for this component. Due to the potential of common mode failure in the "B" EDG, the licensee will inspect the gear box on the "B" EDG during its annual overhaul scheduled November 13-17, 1989. This item remains unresolved pending review of licensee evaluation of the EDG PM program for this component and root cause analysis. (89-24-03)

3.5 Equipment Operability Summary

Maintenance activities were carried out in a safe manner. The inspector concluded that proper site management attention and coordination aided in disposition of the EDG job and timely action in returning the component to service.

4.0 Licensee Action on Previous Inspection Findings

The inspector reviewed licensee action on previous inspection findings to ensure that the licensee took appropriate action in response to the findings or by self-initiative and that the licensee's action was timely.

4.1 (Closed) Bulletin 87-02 and Temporary Instructions 2500/26 and 2500/27 "Inspection Requirements for Fastener Testing"

The final action on this item that remained from previous inspections was to determine NRR action for various utilities based on the results of the initial bolt/nut testing. Licensee sampling and bolt testing did not reveal any significant percentage of sub-standard nuts/bolts in TMI stocks. Based on these results, no further action was required in accordance with Temporary Instruction (TI) 2500/27. All of the required action of TI 2500/26 has been completed and action documented in previous NRC inspection reports. Licensee response to the initial bulletin and both subsequent supplements was satisfactory. No regulatory or safety concerns were noted.

4.2 (Closed) Unresolved Item (50-289/87-10-03) Region 1 to Review I.A.W. 50.109, Emergency Diesel Generator Air Start Check Valves for I.S.T. Program Applicability

This item concerned a potential deficiency in the licensee in-service testing (IST) program concerning EDG air start check valves EG-V-10's. The licensee submitted a letter dated June 7, 1988 that presented a justification for not including these four valves in the IST program. This evaluation concluded that the valves had no safety function. The Office of Nuclear Reactor Regulation (NRR) is in the process of formally evaluating this request along with other concerns for valve testing in the IST program. The NRR safety evaluation will address the issue of the ED-V-10 valves along with other related requests. Since this item is being evaluated by NRR, no further regional action is required and this item is closed.

4.3 (Closed) Unresolved Item (50-289/87-11-04) NRC Evaluate Licensee Append R Fire Protection Verifications

This item concerned review of the Appendix R fire protection program that was conducted by the licensee to verify as built documentation for compliance with the the licensee's own fire hazards analysis (FHAR). The licensee had reported several discrepancies between as built conditions and the requirements of the FHAR in a letter dated July 27, 1987. An additional licensee submittal dated October 16, 1987 reported the completion of this as-built review and the notice that the licensee was performing additional testing which would form the basis for Appendix R exemption requests. These requests and supporting test data were submitted to the NRC staff in a letter dated May 5, 1988. The NRC staff issued an SER and granted the licensee requests for exemption. This formal NRC acceptance completes the review of licensee compliance with Appendix R.

4.4 (Closed) Unresolved Item (50-289/87-19-02) Allegation Concerning Operations/Maintenance Personnel Accomplishing the Same Work

This allegation remained open due to the fact that the alleege had implicated that an additional potential safety concern existed concerning operations personnel, accomplishing work normally done by maintenance personnel. Operations personnel normally accomplish minor work items in accordance with Administrative Procedure (AP) 1001G, Section 4.8. An example includes installation of caps and flanges on test connection that are normally isolated by valves. The licensee reviewed the individual's concern and determined that no safety issue existed. The inspector reviewed the licensee evaluation and grievance proceeding records to confirm this evaluation. The licensee indicated that a formal grievance proceeding had been completed. This item is closed.

4.5 (Closed) Unresolved Item (50-289/87-19-03) Licensee Complete Technical Support Self-Assessment

The licensee completed the final phase of a project, initiated several years ago to assess the performance of the technical functions organizations. The final conclusions were made and noted in a report issued on March 29, 1989. The NRC staff has followed this Self-Assessment and met with the licensee on several occasions which are documented in past NRC inspection reports. The final licensee report which documented the completion of phase III and IV of the assessment was reviewed by the inspector. Several programs and licensee actions were initiated as a result of the self assessment. The licensee generally concluded that the assessment was a valuable tool which improved communication and promoted changes within the organization.

Completion of the self-assessment concludes licensee action in this area and this item is closed.

4.6 (Closed) Unresolved Item (50-289/87-19-04) Licensee Evaluate "Replacement-in-Kind" Program

This item concerned an engineering/modification program weakness identified by performance appraisal team (PAT) inspection. This weakness was also discussed in the 1987 SALP report. The licensee committed to do an evaluation of this area of their engineering support process. A formal audit was completed and the results noted in an internal memorandum dated February 16, 1988. This evaluation noted several areas where improvement was needed in procedural instructions and definitions. Several modifications that were completed as "replacement-in-kind" as described in licensee procedure EMP-019 were viewed as not clearly meeting the intent of the procedure.

Subsequently the licensee eliminated the "replacement-in-kind" modification process and instituted a new definition of this process. This process was described in a new procedure EMP-002 as a "Corrective Change". The new process was more clearly defined as to what type of change to the facility can be made, and what the appropriate licensee procedure is to be used. Additionally, the requirements for when a safety evaluation and engineering evaluation were required was more clearly stated.

The inspector reviewed the licensee audit results and also reviewed the procedural changes to EMP-002. This licensee action appeared adequate to resolve potential safety concerns in this area. This item is closed.

4.7 Allegation Follow-up (Tracking No. RI-88-A-0078)

The resident staff reviewed the results of a formal investigation of allegations identified in an anonymous letter that had been forwarded to the resident office. Through this review, the site staff concluded that the accusations were without foundation.

5.0 Management Meeting

The inspectors discussed the inspection scope and findings with licensee management weekly and at a final meeting on November 7, 1989. Those personnel marked by an asterisk in paragraph 1.3 were present at the final management meeting.