

U. S. NUCLEAR REGULATORY COMMISSION
REGION 1

Docket/Report No. 50-289/89-14

License: DPR-50

Licensee: GPU Nuclear Corporation

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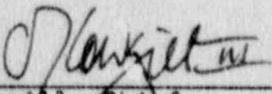
Facility: Three Mile Island Nuclear Station, Unit 1

Location: Middletown, Pennsylvania

Dates: July 15, 1989 - August 25, 1989

Inspectors: R. Brady, Resident Inspector, TMI
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Approved by:



C. Cowgill, Chief
Reactor Projects Section No. 4B
Division of Reactor Projects

Oct 6, 1989
Date

Inspection Summary: Inspection on July 15 - August 25, 1989 (Inspection Report No. 50-298/89-14)

Areas Reviewed: The NRC staff conducted routine safety inspections of power operations activities. The inspectors reviewed plant operations and maintenance/surveillance as they related to safety. Specific items reviewed included spent fuel ultrasonic examination, and licensee action on previous inspection findings.

Results: Plant operations were conducted in a safe manner. Operator response to the event that resulted in the loss of the "1F" circulating water pump was good. Licensee initiatives to identify potentially leaking fuel pins to preclude their use in future refuelings was noteworthy. Licensee action to resolve previous inspection findings was timely and adequate.

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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 August 25, 1969, 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). Those 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>
Sunday, July 16	2:30 pm - 9:30 pm
Sunday, July 23	8:30 pm - 10:30 pm
Sunday, August 20	7:00 pm - 9:30 pm
Tuesday, August 22	6:00 pm - 8:30 pm

1.3 Persons Contacted

- *G. Broughton, Operations/Maintenance Director
- J. Colitz, Manager, Plant Engineering
- J. Fornicola, Manager, Quality Assurance
- *H. Hukill, Vice President and Director, TMI-1
- *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
- J. Stacey, TMI Security
- J. Hassler, TMI-1 Licensing
- *C. Hartman, Manager Plant Engineering
- *T. Seaver, QA Auditor

* Denotes attendance at final exit meeting (see Section 6.0)

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 housekeeping and fire protection perspective, was maintaining the plant in good condition. Overall, management attention toward plant safety was noted.

Specific areas in the area of plant operations warranting closer review are addressed below.

2.2 Circulating Water Pump Failure

On August 11, 1989, the plant experienced a minor electrical upset due to the loss of one circulating water (CW) pump. Six CW pumps are employed at TMI-1 for main condenser cooling and normally, all are running. At approximately 1:06 am, the output voltage of the "B" auxiliary transformer momentarily dipped. This transformer normally supplies one of two vital 4160 volt buses; the "D" 4160 volt safety

related bus, and the "C" 4160 volt non-safety related bus. Several undervoltage relays on the vital "D" 4160 VAC bus tripped because of the voltage dip, however, voltage drop was not long enough or of a large enough magnitude to cause the associated diesel to start. It is postulated that the transient was less than 1.5 seconds. The turbine automatically ran-back to approximately 95% power and several other pieces of plant equipment were also lost. Several alarms were noted on secondary plant equipment such as the main generator stator coolant system, main generator hydrogen seal oil system, the station battery ground, and the IE inverter. Various ventilation system fans and the running spent fuel cooling pump stopped. The operators assessed the problem and restored the equipment that was lost except for the "1F" CW pump. Subsequently, reactor power was restored to 100% at 3:00 pm on August 11.

Licensee review of the event revealed that the "1F" circulating water pump, (CW-P-1F) experienced a phase to phase short. The CW pump failure caused the voltage drop noted above. Licensee review indicates that the electrical distribution system responded appropriately. However, the licensee initiated a review of this event to determine the root cause of the problem and assess plant performance.

The inspector attended the PRG meeting conducted to evaluate this event. The licensee preliminary conclusion is that insulation breakdown and the close proximity of lead conductors in the motor was the probable cause of failure.

The inspector discussed the event with plant engineering personnel. It was acknowledged that the CW pump (a non-safety grade load off a non-vital 4160 volt bus) was a significant load and that a large overcurrent condition could cause such a voltage drop. The inspector reviewed the plant response with operations personnel and observed a normal primary plant response to this transient. It was also observed by the inspector and the licensee staff that an almost identical transient occurred on the same pump when the motor developed a short in the motor wirings on November 8, 1987 with approximately the same result. Licensee and NRC staff evaluation of this previous problem concluded that plant response was as expected. Visual inspection of the damaged motor indicated that the motor was removed incorrectly. At one point all three phases had been wrapped together. Pump vibration had caused chafing of the wires at this point resulting in the phase to phase short. The licensee is planning to visually inspect the remaining circulating water pump motors to ensure proper motor winding. The inspector had no further questions regarding this event.

2.3 Operations Summary

Operations continue to be conducted in a safe manner. Operator response to the loss of the circulating water pump was good in that a major plant transient was avoided.

3.0 Surveillance and Maintenance Activities

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.

3.1 Surveillance Observations

The inspector observed performance of the following surveillance test to determine that: the test conformed to Technical Specification 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 Technical Specification and procedural requirements; deficiencies noted were reviewed and appropriately resolved; and the surveillance was completed at the required frequency.

This observation included:

-- Surveillance Procedure SP 1303-5.1 RB Pressure ESAS Testing On August 4, 1989

No unacceptable conditions were identified.

3.2 Maintenance Observations

The inspector observed portions of selected maintenance activities 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.

These observations included:

--Repair of NS-V-15A Motor Operator on August 1, 1989

No unacceptable conditions were identified.

4.0 Spent Fuel Ultrasonic Testing Equipment

During this inspection period, the licensee contracted Babcock & Wilcox Field Services to perform ultrasound (UT) inspections of spent fuel stored in the spent fuel pool. The UT technique is used to detect potentially failed or damaged fuel pins. This technique is based on sound attenuation. A damaged fuel pin will contain water in the cladding fuel interface. The water in this area will absorb much of the generated sound pulses such that the return signal will be necessarily weaker than that of an undamaged fuel pin.

The licensee intends to reuse nine fuel assemblies during the cycle 8 refueling outage. The UT inspection ensured that the fuel assemblies being reinserted into the core were not leaking. The nuclear engineering group has earmarked 26 assemblies from three batches, with keff ranging from 1.05 to 1.07, for potential reinsertion. Tests done on these assemblies showed no leaking fuel pins. The licensee tested an additional 127 assemblies (153 total) to collect more data to evaluate the fuel pin leakage model, and in conjunction with the B&W owners group core performance group, evaluate fuel performance.

Thirteen pins in ten assemblies were determined to be leaking. The licensee plans to perform visual inspections of these assemblies. The licensee is developing a color camera with zoom capabilities for this task. Also, the licensee plans to perform UT fuel inspections of all fuel to be loaded in the cycle 8 refueling outage.

Inspector observations of the fuel UT process found the licensee in control of the evolution. Conditions required by Technical Specification (TS) for fuel movements in the spent fuel pool were in place. Nuclear Engineering department verified all fuel movements. The inspector concluded that the licensee's initiative to locate leaking fuel pins and evaluation of fuel performance is notable.

5.0 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.

5.1 (Closed) NC4 (50-289/88-18-02) Technical Specification Violation Involving Pressurizer Cooldown Rate in Excess of Limits

This violation concerned an RCS heatup evolution where the allowable heatup rate was exceeded during a one hour period. The plant was being heated up using three reactor coolant pumps following an outage on September 25, 1988. The heat up rate was being calculated by both the control room operator and the STA using the plant computer and control room indications. The problem was basically due to the STA miscalculating the heatup rate using the computer indications. The problem was discovered after a shift turnover and a re-review of previous shift data. The heat up rate had increased to 55.6 degrees F per hour which is in excess of the allowable 50 degrees F per hour.

Licensee corrective action included additional training to sensitize operators and STA to utilize more formal communications when conducting plant evolutions that could potentially exceed setpoints. Additionally, procedures for plant heatup and cooldown were revised to be more specific on how heatup and cooldown rates were to be calculated. Finally, the computer displays were modified to display heatup rates on 30 minute averages and to specify the rates in degree F per hour vice per minute to eliminate unnecessary calculations.

The inspector reviewed changes to the appropriate procedures OP 1102-1 and 1102-11 plant heatup and plant cooldown, to verify that additional guidance was included. Additionally, the inspector verified that the computer displays matched the procedures. From discussions with several license operators the inspector noted a good understanding of the problem and the corrective action.

Based on the above, licensee corrective action for the plant heatup violation was adequately implemented and this item is closed.

5.2 (Closed) Violation NC4 (50-289/88-17-01) Failure to Review Temporary Procedure Change in Fourteen Days

This violation concerned a change made to a maintenance procedure 1410-1.4 for work on reactor coolant pump seals, which was not reviewed and approved in 14 days as required by technical specifications. The violation also noted that licensee procedures permit this practice. The licensee corrective action included retraining by maintenance personnel on the requirements of Administrative procedure AP 1001 A "Procedure Review and Approval" which specifies the above technical specification (TS) requirements. This was completed and the records review by the inspector indicated adequate completion of this action. The licensee noted in the violation response that the requirements for formal review and approval of changes is contained in AP1001A vice the maintenance procedure 1407-1. Therefore, no

procedure changes were necessary. The inspector considered licensee corrective action for this violation was adequate and this item is closed.

6.0 Management Meeting

The inspectors discussed the inspection scope and findings with licensee management weekly and at a final meeting on September 1, 1989. Those personnel marked by an asterisk in paragraph 1.3 were present at the final management meeting.