

U.S. NUCLEAR REGULATORY COMMISSION

Region I


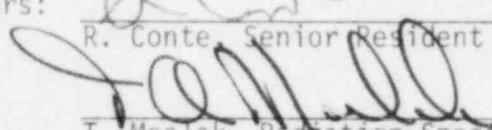
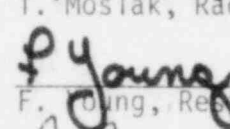
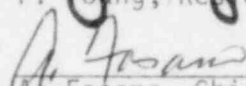
Report No. 50-289/82-10
Docket No. 50-289
License No. DPR-50 Priority -- Category C

Licensee: GPU Nuclear Corporation
P.O. Box 480
Middletown, Pennsylvania 17057

Facility: Three Mile Island Nuclear Station, Unit 1

Inspection at: Middletown, Pennsylvania

Inspection conducted: July 6, 1982 - August 7, 1982

Inspectors:  8/18/82
R. Conte, Senior Resident Inspector date signed
 8/18/82
T. Mosiak, Radiation Specialist date signed
 AUG 18, 1982
F. Young, Resident Inspector (TMI-1) date signed
Approved by:  Aug 19, 1982
A. Fasano, Chief, Three Mile Island Section date signed
Projects Branch No. 2

Inspection Summary:

Inspection conducted on July 6, 1982 - August 7, 1982, (Inspection Report Number 50-289/82-10)

Areas Inspected: Routine safety inspection by site inspectors of licensee action on previous inspection findings; plant operations including steam generator repairs; TMI-1 restart modifications; licensee radiological investigation report dealing with handling radioactive sludge; and maintenance control program. The inspection involved 112 inspector-hours.

Results: No violations were identified.

Details

1. Persons Contacted

General Public Utilities (GPU) Nuclear Corporation

- B. Ballard, Manager TMI Quality Assurance (QA) Modifications/Operations, Nuclear Assurance
- R. Barley, Lead Mechanical Engineer TMI-1
- D. Barry, Engineer Associate-I TMI-1
- *J. Burgess, Administrative Assistant, Technical Functions
- J. Colitz, Plant Engineering Director TMI-1
- T. Hawkins, Manager TMI-1, Startup and Test, Technical Functions
- R. Harper, Corrective Maintenance Manager TMI-1
- *W. Heysek, Supervisor Site QA Audit
- *H. Hukill, Vice President and Director TMI-1
- *S. Levin, Maintenance and Construction Director (TMI-1)
- F. Paulewicz, Mechanical Engineer TMI-1
- I. Porter, Supervisor, Startup and Test TMI-1
- M. Ross, Manager Plant Operations TMI-1
- D. Shovlin, Manager Plant Maintenance TMI-1
- C. Smyth, Supervisor TMI-1 Licensing, Technical Functions
- *K. Stephenson, Nuclear Licensing Engineer, Technical Functions
- R. Szczech, Licensing Engineer
- *R. Toole, Operations and Maintenance Director TMI-1

Other personnel in the operations, engineering, and quality assurance staffs were also interviewed.

*denotes those present at an exit interview.

2. Licensee Action on Previous Inspection Finding

(Closed) Unresolved (50-289/82-08-03): Inspection of licensee's Radiological Investigative Report (No. 82-038) in which a utility worker was permitted to handle radioactive sludge, reading 20 R/hr at contact, without being issued extremity dosimetry.

Based on discussion stated in paragraph 5, the inspector considered this item closed.

3. Plant Operations During Long Term Shutdown

a. Plant Operations Review

Inspections of the facility were conducted to assess compliance with general operating requirements of Section 6 of Technical Specifications in the following areas: licensee review of selected plant parameters for abnormal trends; plant status from a maintenance/modification viewpoint including plant cleanliness; control of documents including log keeping practices; licensee implementation of the security plan including access controls/boundary integrity and badging practices; licensee control of ongoing and special

evolutions including control room personnel awareness of these evolutions; control of documents including log keeping practices; and implementation of radiological controls.

Random inspections of control room during regular and back shift hours were conducted. The selected sections of the shift foreman's log and control room operator's log were reviewed for the period July 12, 1982 to August 4, 1982. Selected sections of other control room daily logs were reviewed for the period from midnight to the time of review. Inspections of areas outside the control room occurred on July 14, 20, 27, 29, and August 3, 1982. Selected licensee planning meetings were also observed.

An emergency workup drill was conducted by the licensee on August 4, 1982. This drill was in preparation for the annual exercise to be monitored by the NRC on August 11, 1982. The site NRC staff participated in the workup drill to exercise the NRC site event response plan and to observe licensee activities in the implementing of the emergency plan and facility emergency procedures. The licensee's drill critique was also observed subsequent to an internal NRC critique. The inspector found that the licensee observers had identified the majority of the NRC comments on licensee activities.

No violations were identified.

b. Steam Generator Recovery Program

(1) Background

As a result of the presence of intergranular attack and stress corrosion cracking on the Once Through Steam Generator (OTSG) tubes identified in November 1981, the licensee has initiated an extensive investigation to determine the cause and repairs required to return the plant to service (see NRC Region I Inspection Report No. 50-289/82-07).

Foster Wheeler, under direction of the licensee and Babcock & Wilcox (B&W), will conduct the expansions. The repair method that is being evaluated is a process of Kinetic Expansion. This method involves using a controlled detonation of an explosive charge within the tube in the upper tube sheet and allowing the explosion to expand the tube into the tube sheet.

*

* EXEMPT INFORMATION
DELETED

This * process has been demonstrated on a B&W Once Through Steam Generator (OTSG) in Mt. Vernon, Indiana, for the licensee and the NRC.

Approximately 98% of all defects observed by eddy current testing and metalurgical analysis are within the top 2-3 inches of the tubes. Preliminary assessment is that a 6 inch area,

free of defects, is required to establish a seal able to withstand axial loads generated during normal and postulated accident events. The tentative plan is to expand the top 17 inches of all tubes allowing major portions of the number of tubes to be repaired by this technique. The remaining tubes (approximately 2 percent) with defects will either be removed from service by plugging or have an additional Kinetic Expansion of the top 23 inches of the tube within the tube sheet.

Additional testing for pullout strength, effect of neighboring detonation, effect of corrosion, leak rate testing and thermal cycling testing is ongoing and has not been evaluated. In addition, more full scale testing on the OTSG at Mount Vernon is required in order to determine the final step-by-step process that will be used.

From the demonstration at Mt. Vernon and projected completion of additional testing, it is estimated that the licensee will be able to commence OTSG repairs by mid-September 1982.

(2) Review

The inspector has continued to monitor the steam generator repair program to verify the following items.

- accuracy of information related to the event submitted to NRC
- procedures written in accordance with the specifications of the licensee programs
- adequacy of procedures used to control the activity

Selected sections of OTSG repair documents were reviewed and field operations of Kinetic Expansion preparation work were observed on several occasions. Licensee and contractor personnel demonstrated adequate control of the work being accomplished.

(3) Findings

No violations were identified.

4. TMI-1 Restart Modifications - Implementation

a. General

The inspector reviewed selected facility modifications (listed below) which are required to be completed prior to TMI-1 restart to verify that the new designs are provided consistent with the following items.

- licensee commitments stated in the TMI-1 restart report, Report in Response to NRC Staff - Recommended Requirements for Restart of Three Mile Island Nuclear Station Unit 1
- requirements delineated in NUREG-0680 (and supplements), TMI-1 Restart Evaluation Report, to comply with NRC Commission Order of August 9, 1979
- requirements delineated in ASLB Partial Initial Decision (PID), Procedure Background and Management Issues, dated August 27, 1981
- requirements delineated in ASLB PID, Emergency Planning, and, Plant Design and Procedures and Separation Issues, both dated December 14, 1981
- TMI-1 Operational Quality Assurance Plan, Revision 9
- Administrative Procedure (AP) 1043, Control of Plant Modifications, Revision 3

The inspector verified that each modification task was installed in accordance with the approved design based upon observation of completed work, review of related portions of the licensee's QA program, examination of installation records, review of nondestructive examination (NDE) and/or other inspection records, and other related documentation. Specific modification task observations and records reviewed by the inspector are identified below.

b. Modification Task NM-34, 480V Bus Undervoltage Trip

(1) Description

Task NM-34 modifies the in-plant electrical system to protect safety related electrical equipment from degraded voltage due to offsite grid voltage fluctuation and interaction of the offsite and onsite emergency power systems. In addition, the modification assures that the undervoltage relays are operable to adequately protect the safety related electrical equipment from reduced capability as a result of sustained degraded voltage from the offsite electrical grid system and during transfers from offsite to onsite power source. This modification was accomplished by replacing all electromagnetic relays on the 4160 volt safety buses with new solid-state instantaneous relays and timers. These relays will trip safety bus feeder breaker, initiate load shedding, and start the respective diesel generator. In addition, certain safety related valve gear ratios were changed to allow proper torque development at a degraded grid voltage.

(2) Review/Observation

The inspector reviewed selected portions of GPU Nuclear Corporation (GPUNC) Engineering Change Modification (ECM) 045, accepted December 12, 1981, and ECM 255, accepted December 12, 1981. The inspector observed the installed relays and verified the component location and installation was as described in applicable modification documentation.

(3) Findings

Based on the modification documents, the inspector determined that Task NM-34 was satisfactorily completed in conformance with the referenced commitments and requirements. The inspector noted that the maximum stroke time allowed by Surveillance Procedure (SP) 1300-3A A/B, Revision 6, for valve number Building Spray BS-V3A, was 60 seconds. BS-V3A is one of the suction valves to one of the building spray pumps that the gear ratio had been changed by Task NM-34. This valve is normally closed. The FSAR states in part that, "The reactor building spray system will deliver 3,000 gpm through the spray nozzels within 37.5 seconds after a Reactor Building pressure reaches setpoint." The inspector questioned whether the valve would be sufficiently open to provide the required flow in 37.5 seconds. The licensee is performing an evaluation and the inspector considered this item unresolved pending the completion of the evaluation (50-289/82-10-01).

No violations were identified.

c. Modification Task RM-14, High Pressure Injection (HPI) System Cross Connect and High Capacity Makeup

(1) Description

Task RM-14 mechanically interconnected the HPI injection legs and added a cavitating venturi in each HPI leg. The HPI interconnections allows mitigation of the effects of a small break loss of coolant accident occurring in an HPI line at or near its connection to the reactor coolant system (RCS) or in the RCS cold leg itself. This is accomplished by restricting HPI water losses to approximately one-fourth of the total flow rate using cavitating venturi and balancing the flow from the operating injection pump to the unbroken legs with HPI leg cross-connects. This flow control occurs without control room operator action.

Also, a means of quickly restoring pressurizer level following an overcooling of the reactor coolant without starting another makeup pump or thermal shocking an RCS HPI nozzle is provided by the addition of a larger capacity bypass makeup line and makeup valve.

(2) Review/Observations

The inspector reviewed selected portions of GPUNC Modification Turnover Package 4007, accepted December 11, 1981, which included Engineering Change Modification S-007, Revisions 0 through 6.

The inspector also conducted a system walkdown of the plant modifications associated with Task RM-14. The inspector observed the installed equipment and verified the component location and installation was as described in applicable modification documentation.

(3) Findings

No violations were identified.

d. Modification Task NM-47, Control Room Emergency Telephones

(1) Description

Task NM-47 places control room emergency telephone intercom between control room and shift supervisor's office and Radiological Assessment Offsite Dose Rate Computer (TRS-80) on regulated vital power supply. Task NM-47 was accomplished by the addition of an electrical receptacle installed in the shift supervisor's office supplied from 120 V regulated A.C. Distribution Panel, TRB.

(2) Review/Observations

The inspector reviewed selected portions of GPUNC ECM S-136, Revisions 0 and 1, accepted March 6, 1982, by the plant staff.

In addition to the above documentation review, the inspector conducted a system walkdown of the plant modifications associated with Task NM-47. The inspector observed the installed equipment and verified the component location and installation was as described in applicable modification documentation.

(3) Findings

During a walk-through inspection in the shift supervisor's office, the inspector noted a label plate, above the newly installed receptacle, stated that the NRC Emergency Network System (ENS) line (a different circuit from the circuit of the subject modification) was to be powered from the receptacle. The inspector identified this discrepancy to the licensee and the licensee stated that the label plate would be corrected.

No violations were identified.

e. Modifications Task LM-2, Reactor Coolant System Wide Range Temperature

(1) Descriptions

Task LM-2 modifies the existing reactor outlet temperature range of 520°-620°F to 120°-920°F. The signal is derived from resistance temperature detectors (RTDs) which are of the same type and are located in the same thermowells as the safety related RTDs used in the reactor protection system. The modification provides a wide range (120°-920°F) output without changing the range or accuracy of the existing signal to the control system. This task was accomplished by installing a modified converter module across the output of the RTD bridge in parallel with the existing output module. The new signal is connected to the computer and is used as inputs to the saturation temperature instrument.

(2) Review/Observation

The inspector reviewed selected portions of ECM 032, accepted June 18, 1981. The inspector observed the installed circuitry and verified the component location and installation was as described in applicable modification documentation.

(3) Findings

No violations were identified.

5. Licensee Radiological Investigation Report No. 82-38

a. Description of Event

On May 17, 1982, two utility workers were assigned to clean the two floor (Zurn) drains in the Waste Compacting and Solidification Area of the Unit 1 Auxiliary Building per Preventive Maintenance Procedure U-17. A Radiation Work Permit (RWP) was issued for the job. Upon donning the protective clothing and obtaining a dose rate indicating instrument, the individuals entered the area and proceeded to remove two lead sheets, the drain grating, and lead brick from the drain. The first individual surveyed the open drain using a Portable Ion Chamber (PIC-6) and determined the radiation field to be between 500-600 mR/hr at contact with the drain. The second individual then proceeded to clean the drain by hand, reaching into the drain up to the middle of his forearm. While the drain was being cleaned, the first individual left the area and went to the valve room section of the radwaste solidification area to survey and clean another drain. He spent approximately 2-3 minutes at the second drain then returned to assist in the cleaning of the first drain. Upon reentering the work area, he observed an increase of 15-20 mR/hr on his PIC-6, but did not consider this significant. He then proceeded to the drain and assisted in bagging the removed debris by holding an empty plastic bag as the second individual placed the debris in the bag. Upon completing bagging, he attempted

to survey the bagged material but found his instrument went off-scale on the 10 R/hr scale. The bag of debris was then placed behind a shield wall and both individuals left the area to notify the radiological controls foreman. Radiological controls personnel returned with the individuals to the radioactive material, surveyed the material and found it reading 20 R/hr at contact. The radiological controls foreman issued finger rings, extremity badges, and a long handled reach tool to the workers. Using the long handled reach tool, the bagged debris was carried to the neutralizer tank room and placed in a lead liner 55 gallon drum for storage.

b. Licensee Action

The licensee held a critique of the incident within four hours of its occurrence. The thermoluminescent dosimeter (TLD) of the individual cleaning the drain was sent to the Dosimetry Group to be read. Results were 35 mrem gamma and 0 mrem beta dose. An analysis of the debris was performed and only Cobalt 60 was identified as being present. The TLD reading was considered representative of the whole body dose. The time that the utility worker handled the debris was estimated to be within a range of 5-10 minutes. The utility worker was assigned an extremity dose of 3,300 mrem based on the conservative time of 10 minutes. The other utility worker received an estimated whole body dose of 20 mrem based on his self-reading dosimeter. Since this worker did not physically handle the debris before bagging, his extremity dose was considered equivalent to his whole body dose. The causes of the incident were identified as not issuing a proper RWP with a corresponding radiation survey and ALARA review, specifying dosimetry and exposure controls, for the drains to be cleaned. Subsequent corrective actions included conducting ALARA reviews for those remaining drains that require cleaning and having the Radiological Field Operations Manager discuss the inadequacies of drain radiation surveys and RWPs with Radiological Control Foremen and Technicians.

c. Inspector Findings

The inspector interviewed licensee personnel who were involved in the incident and critique; examined licensee investigative reports, procedures, surveys, training records, and ALARA reviews; performed independent measurements; and conducted a walk-through of the incident. The inspector identified the cause of the incident as a failure to follow Preventive Maintenance Procedure U-17, Inspection of Zurn Floor Drain Check Valves, and Radiological Controls Procedure 1613, Radiation Work Permits. Preventive Maintenance Procedure U-17 requires that an RWP be initiated for the floor drains to be inspected, and proper surveys be taken to establish the health physics requirements. The RWP used incorrectly addressed entry into the Waste Solidification and Compacting Area and not inspection and cleaning of a floor drain of unknown radiation fields located in that area. Radiological Controls Procedure 1613 requires that a dose rate instrument be issued for all entries into a high radiation area. The utility worker doing the work was left in a high radiation area without a dose rate instrument. The first worker went with the instrument to survey and clean another drain.

The inspector reviewed the licensee's corrective actions which included the following.

- modifying Preventive Maintenance Procedure U-17 with Procedure Change Request (PCR) No. 1-MT-82-4006 effective July 7, 1982, to require that Radiological Controls provide survey data on all drains with all shielding removed prior to initiating the RWP and that Radiological Controls personnel monitor the debris as it is being removed from the drain. This change explains in greater detail the radiation survey that must be performed by the Radiological Controls Department before the Preventive Maintenance Department is issued an RWP.
- performing ALARA reviews on all work involving Zurn floor drains

The inspector determined that the licensee had identified and taken adequate measures to correct the problem within a reasonable time and had instituted procedural changes to prevent recurrence.

The inspector had no further questions concerning this incident.

6. Maintenance Control Review

a. Background

Apparent violations in the maintenance control program were recently identified at TMI-2. It was found that a corrective action was performed contrary to plant drawing specifications and there was an apparent failure to timely collect and retrieve corrective maintenance test data. It was also identified that more engineering staff involvement in corrective maintenance actions was warranted. A review was initiated at TMI-1 to assure that a similar problem was not generic to the maintenance control program at TMI-1. This review was also a followup to the Atomic Safety and Licensing Board Partial Initial Decision in the management area on the control of maintenance.

b. Review

Selected sections of the following administrative procedures (AP), general maintenance procedures (MP) and licensee internal reports were reviewed.

- Procedure Index Report for TMI Unit 1, July 17, 1982
- AP 1026, Corrective Maintenance and Machinery History, Revision 12, September 22, 1981
- AP 1027, Preventive Maintenance, Revision 11, April 4, 1982
- MP 1407-1, Unit 1 Corrective Maintenance Procedure, Revision 8, October 27, 1981

- MP 1407-3, Assessment of the Adequacy of the Preventive Maintenance Program, Revision 0, January 16, 1982
- Inter-Office Memorandum (IOM), No. 3200-82-167, Retest After Maintenance, dated April 27, 1982
- IOM No. MGS 82-022, Assessing the Adequacy of the TMI-1 Preventive Maintenance Program as Required by M 1407-3, dated July 29, 1982
- AP 1001D, Procedure Preparation, Revision 2, June 22, 1982
- AP 1021A/B, Plant Modifications, Revision 7, November 18, 1979
- AP 1001G, Procedure Utilization, Revision 1, June 14, 1982

Approximately 20 completed job ticket (work request) packages were selectively reviewed to identify completed tasks in which drawing/material specifications were used. Of these 20 job tickets (JT), the below job ticket packages were selected for a more detailed review.

- JT 8723, requested July 1, 1982, started July 10, 1982, completed July 10, 1982, restored July 19, 1982, Repack RC-V19, add packing/adjust
- JT 8722, requested July 2, 1982, started July 10, 1982, completed July 10, 1982, restored July 15, 1982, Repack RC-V-17, add packing, adjust as necessary
- JT 8752, requested June 28, 1982, started July 12, 1982, completed July 12, 1982, restored July 12, 1982, Miscellaneous Evaporation Vacuum Pump Suction and Discharge Valves WDL-V-294B and 295B diaphragms changed
- JT 8746, requested July 2, 1982, started July 10, 1982, completed July 10, 1982, restored July 12, 1982, drain valve on a anion unit leaks through filter neutralizer tank while in-service (WT-V-25A), inspection WT-V-14A, 15A, 29A

c. Findings

- (1) Based on the above review, it appeared that the problems identified in the TMI Unit 2 maintenance control program were not generic to TMI Unit 1. A key aspect in the Unit 1 maintenance program upgrading was the shift toward **proceduralizing the activities called for in the use of the general maintenance control form ("Job Ticket")**. If a maintenance activity is within quality control (QC) scope (nuclear safety related and important to safety classifications), the use of a procedure is the general rule and is mandated for activities affecting nuclear safety. The Director Operations and Maintenance approval is required if a procedure

is not to be used while the maintenance activity is within QC scope. Further, if testing is to be conducted following a maintenance activity that does not warrant step-by-step delineations (procedures), the acceptance criteria or test procedure is to be specified on the JT using the pre-implementation approvals.

Format/content requirements for maintenance procedures are specified in AP 1001D and are in accordance with ANSI 18.7-1976 which included post maintenance testing and restoration to normal requirements.

The review of completed JT's indicate specific information including test data that was being recorded or attached to the JT package.

With respect to engineering involvement in the performance of maintenance activities, interfacing between the two departments does occur. Informal discussions on maintenance work activities occur daily and more formally at the plan-of-the-day meetings. Maintenance supervisors are tasked with a review of maintenance work packages on a pre-implementation basis to assure repair activities are not using changes/plant modifications which do require a separate review with definite engineering department involvement.

A relatively new system called Plant Equipment Failure Profile is a periodic review of corrective maintenance on a yearly basis in accordance with MP 1407-3. This review is to identify system or component problems that are recurrent. The recent report on this profile did identify repetitive component failures and the action notices were initiated for engineering resolution.

- (2) AP 1000D and MP 1407-1 provide management guidance to plant personnel on how to write various plant procedures especially maintenance procedures. These two procedures require the listing of references used in the development of procedures in accordance with ANSI-18.7-1976. However, specific guidance to a procedure writer was not evident in AP 1001D and MP 1107-1 in terms of what references are to be used for the development of procedures such as a maintenance procedure, i.e., drawings, codes, standards, other procedures, technical specifications, etc. The licensee acknowledged the inspector's comment in this area and indicated that additional guidance would be considered in a subsequent revision to AP 1001D and MP 1407-1.

During a review of post maintenance review requirements by licensee personnel, it was noted that operations and maintenance personnel reviews are formally required by MP 1407-1. Specific engineering involvement in the review function was not defined although maintenance personnel

indicated cognizant engineers were frequently contacted informally for consultation to discuss possible off-normal trends. It appeared to the inspector that little guidance existed in the administrative controls for post maintenance review by maintenance department personnel on when to refer problems on off-normal trends to the Engineering department. The licensee acknowledged the inspector's comments and agreed to review this area.

Licensee disposition for providing addition guidance for procedure writing and post maintenance interfacing with the Engineering department will be followed by NRC (289/82-10-02).

7. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, violations, or deviations. Unresolved items are addressed in paragraphs 2 and 4.b(3).

8. Exit Interview

The inspectors met with the licensee representatives (denoted in paragraph 1) on June 11, 1982, and at the conclusion of the inspection on August 6, 1982, to discuss the inspection scope and findings.