

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-289/88-11

Docket No. 50-289

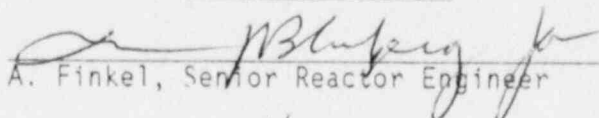
License No. DPR-50 Priority - Category C

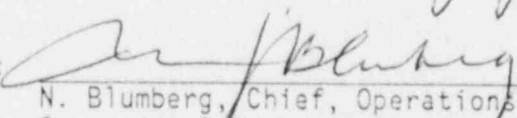
Licensee: GPU Nuclear Corporation
Post Office Box 480
Middletown, Pennsylvania 17057

Facility Name: Three Mile Island Nuclear Station, Unit 1

Inspection At: Middletown, Pennsylvania

Inspection Conducted: May 2-6, 1988

Inspector:  6/9/88
A. Finkel, Senior Reactor Engineer date

Approved by:  6/9/88
N. Blumberg, Chief, Operations Section date
Operational Programs Section, DRS

Inspection Summary: Inspection on May 2-6, 1988 (Report No. 50-289/88-11)

Areas Inspected: This was a routine unannounced inspection of the No. 7 refueling outage (7R) preparation, the maintenance backlog prior to entering the outage and the method of performing surveillances, preventing and corrective maintenance during the outage. In addition to the outage inspection, the inspector evaluated the status of outstanding items documented by the Performance Appraisal Team (PAT) in NRC Inspection Report No. 50-289/86-03.

Results: The preparation for the maintenance portion of the 7R outage including the modification packages reviewed were well planned with specific manpower and time estimates included in the overall pre-outage planning schedules. The backlog of items going into the outage appeared well within time and manpower schedules. The Licensee's report of May 2, 1988 indicates that their Job Ticket backlog and their Preventative Maintenance backlog have been declining to within an acceptable manpower/time level.

No violations, deviations or unresolved items were identified during this inspection period.

DETAILS

1.0 Persons Contacted

GPU Nuclear Corporation

- *D. Hassler, TMI-1 Licensing Engineer
- *C. Incorvati, TMI QA Audits Manager
- *R. Knight, TMI-1 Licensing Engineer
- *C. Smyth, Manager, Licensing
- *R. Troutman, Planning and Scheduling Manager

United States Nuclear Regulatory Commission

- *T. Moslak, Resident Inspector

In addition to the above, the inspector contacted and held discussions with other licensee personnel including plant engineering, supervisors and quality assurance and inspection personnel.

- *Denotes those individuals who were present at the exit meeting on May 6, 1988.

2.0 Licensee Actions on Previous Inspection Findings (Module 92701)

Note: This section addresses licensee actions on inspection findings issued by the NRC's Performance Appraisal team (PAT) inspection report 50-289/86-03. It was later determined that some findings in 86-03 required further clarification. The clarification of PAT 86-03 findings was issued as Inspection Report 50-289/86-12. This report closes items in Inspection Report 86-12 which also closed identical findings in 86-03.

2.1 (Closed) Violation 86-12-03 - ANSI N45.2.11, paragraph 6.1, requires, in part, that measures shall be applied to verify the adequacy of design. Technical Functions Division Procedure 5000-ADM-7311.02 (EP-009), Revision 1-00, dated July 31, 1985, "Design Verification," requires, in part, the verification of calculations, the preparation of verification checklists, and the verification of system designs. Contrary to the above, as of March 27, 1986, design verification requirements had not been fully adhered to for the following:

- Engineering calculation Nos. 1101X-322F-165 - Flow Rates for Two-Hour Backup Air Supply System, 1101X-322F-424-1 - EFW System Resistance; and Calculation No. 1302X-5320-A50 - Shielding Stress, had no calculation verification performed.

- Three design verifications, Calculation No. 11014-322B-003 - Air Consumption for EF-V-30 Valves; Calculation No. 1101X-322F-157 - EFW Pump Turbine Relief Valve Setpoint; and Calculation No. 1101X-322B-004 - Air Consumption by MS-V-6, did not have required verification checklists prepared.
- System Design Descriptions 424 A, B, C, D, and E, Division I and II, involving the EFW system, its backup instrument air supply, and supporting instrumentation, had not been design verified.
- Nine shielding installations were installed prior to the calculations to support the shielding having been verified.

The licensee has taken the following three actions to correct the conditions that were identified above. The inspector verified each of the following actions and determined them to be adequate to correct the violation.

- (1) Procedures were revised to provide clearer direction and correct deficiencies;

The licensee revised two key design procedures: EP-006 - Calculations and EP-009 - Design Verification.

EP-006 - Calculations

The main revision to EP-006 changed the purpose of the procedure requiring a specific method of reviewing the calculation as described in ANSI N45.2.11-1974 and paragraph 4.6.2 which requires the calculation to be reviewed to ensure that the standard methods for review were properly applied. Other procedures that were revised to support these procedures are listed in Attachment 1 of this report.

EP-009 - Design Verification

Changes in this procedure were made to the paragraphs dealing with the package verification subject. Also, the Design Verification Summary, Exhibit 4, which documents the results of the design verification has been changed.

- (2) A Training/Instruction program was developed for all technical functions personnel; and,

The licensee conducted a training program on August 18, 1986 which discussed the NRC PAT inspection finding and the changes that were made to their existing procedures. The training course stressed that this was not a procedure problem, but an implementation problem using existing procedures. The procedure changes issued were to correct the designer understanding of how

and who is to review design calculations. The inspector's review of the procedure revisions, training lecture and the attendance list of personnel indicates that the licensee complied with their actions as stated in their letter of October 13, 1986 from H. D. Hukill to Dr. T. E. Murley.

- (3) Appraisal type audits were performed to determine effectiveness of program improvements

Licensee Audit Report No. O-TMI-86-11 issued April 9, 1987 was performed September 8, 1986 to March 12, 1987 at TMI to determine whether the PAT findings documented in Inspection Reports 50-289/86-03 and 86-12 were generic to other modifications planned for the 6R outage. It consisted of a review of the history of selected projects, a partial technical review of the engineering produced and a determination of whether the design process had identified and resolved technical mistakes. The inspector's review of the audit report indicated that the major focus of this audit was in the areas of control of design criteria, completeness of baseline engineering at the time of approval, and the consistency and frequency of conduct at their review committee meetings. The recommendations identified in the Executive Summary section of the Audit Report have been incorporated into the licensee procedures and are reflected in the documents reviewed by the inspector that are listed in Attachment 1 of this report.

Based on the review of the documents referenced in Attachment 1 of this report for this violation and the actions taken by the licensee to resolve future reoccurrence of the subject items, the inspector considers this violation to be closed.

2.2 (Closed) Violation 86-12-04

This violation has three areas identified as having problems, they are:

- (1) Mini-Mods EFW Air Lines
- (2) Shielding for Letdown Prefilters
- (3) Design Calculation of Bottle Rack

The inspector reviewed each of the following examples of the above violation to determine if the licensee had taken corrective action to correct the finding and prevent recurrence.

(1) Mini-Mods EFW Air Lines

Documents associated with two Mini-Mods (additional limit switches for the fuel handling crane and removal of instrument air line from EFW pump recirculation valves) were incorrectly

marked as no change being required to the FSAR when, in fact, changes to the FSAR were required. For these and other important-to-safety mini-mods, not all the design information required to be addressed by EMP-002 was included.

Conclusion:

It appears that a problem existed with a procedure for defining a mandatory change. When the licensee's safety evaluation form was prepared for the jumpering of Main Steam (MS) V13B, a summary sheet check point is the FSAR. The question apparently arose as to the meaning of checking this block. The licensee has established the following position:

"if the FSAR contains any discussion of an item, then we would check "yes" to 1.2) and change the FSAR. This will be accomplished regardless of safety implications that otherwise would not require an FSAR change. Therefore, Task Request BT4470 has been issued identifying this change, and instructions have been provided to the Mini-Mod Engineers to insure that this happens."

In addition to the above direction, the licensee has revised their Technical Functions Procedure 5000-ADM-7350.05 (EMP-002), "Mini-Mods." The inspector review of procedure EMP-002 verified that the direction has been incorporated into the procedure which clarifies specific areas addressed by the NRC in inspection reports 50-289/86-03 and 86-12.

A licensee safety evaluation (S.E. 000424-05) was prepared to justify the temporary jumper installed to defeat the automatic opening of MS-V13B during work required by a Mini-Mod had checked the "No" block when the question asked "Does this change the FSAR?" Since this was a temporary change to allow the Mini-Mod work to be performed and at the completion of the work, the MS-V13B jumper was removed, the FSAR was not changed. A review of the safety evaluation report and the Mini-Mod task by the inspector indicated that the licensee filled out their safety evaluation correctly and that the FSAR did not require a change.

(2) Shielding For Letdown Prefilters

Installation specification for lead shielding around letdown prefilter's, MU-F2A and 2 B, required that the center of gravity of the top blocks be no more than 12 inches off the floor, the blocks be no closer than 2 feet to important-to-safety (ITS) equipment due to seismic considerations, and that a warning

sign be installed identifying the 2 foot requirement. The lead shielding installation on MU-F2A and 2B had the top block center of gravity 15 inches off the floor in some locations. ITS valves SF-V-77 and SF-V-71 were located within 6 inches and 19 inches of the blocks, respectively, and no warning sign was installed.

Conclusion:

All temporary shielding was removed from TMI-1 prior to startup from their 5R outage. However, after startup, only one temporary shielding installation was completed. The 50-289/86-03 PAT safety inspection identified that the installation of shield blocks to shield letdown prefilters (MU-F-2A and 2B) was not per the licensee procedure 9100-IMP-3282.01, "Installation of Temporary Shielding."

To correct the conditions identified in the NRC Inspection Reports 50-289/86-03 and 86-12, the licensee has revised their procedure 9100-IMP-3282.01. The changes to the procedure that should correct the NRC concerns identified in Inspection Reports 50-289/86-03 and 86-12 are listed below:

- To ensure that temporary shielding installations are appropriate, an engineering evaluation shall be performed prior to the installation of temporary shielding.
- In order to ensure that plant conditions are maintained consistent with possible restrictions imposed by a temporary shielding engineering evaluation, the Shift Supervisor shall provide final approval for proposed temporary shielding installations. As part of this approval, he shall establish the appropriate means of implementing such restriction (for example - use of equipment tagouts).
- On a semiannual basis, Radiological Engineering shall perform an inspection of existing temporary shielding installations. This evaluation will address the condition, adequacy and further need of each installation.
- Temporary shielding installations are to be installed only during the period for which they are required. A Technical Functions Work Request (TFWR) shall be submitted for the evaluation/resolution of each installation which remains in place greater than one fuel cycle.

In addition to the changes listed above, the Temporary Shielding Inspection Form, Exhibit 4, has been revised to require inspection of the work. The final acceptance of the installed is the Radiation Engineer who is required to verify the data recorded on Exhibit 4. The inspector review of the revised procedure and discussions with the Radiation engineering personnel indicate that the revised procedure and their retraining program should correct the conditions identified in Inspection Reports 50-289/86-03 and 86-12.

(3) Bottle Rack Installation

Design Calculation No. 609-0293, Revision 0, "Bottle Rack for RM-13H" (EFW Two-Hour Backup Instrument Air (TBIA) Subsystem), required that the air bottle chain restraints preclude vertical movement with turnbuckles attached to the chain to assure adequate tension. The chain and turnbuckle connection were to be made by open "S" chain links, which were to be closed after installation, the TBIA air bottle restraints had no turnbuckles, certain restraints were loose, and "S" links were not closed.

Conclusion:

The inspector verified that the chain restraints holding the bottle for the RM-13H TBIA Subsystem were tight and that the "S" links were closed by using the tension of the restraint tie down design. The original design calculation 6098-0293, Revision 0, required that turnbuckles be installed in addition to the "S" links and the restraint tie downs. Field change request (FCR) No. C001591 issued February 2, 1982 eliminated the requirements for the turnbuckles.

Based upon installation inspections and a review of documents in Attachment 1 of this report and the corrective actions taken by the licensee, this violation is closed.

2.3 (Closed) Unresolved Item 86-12-05

Licensee's procedures did not appear to be in conformance with ANSI N45.2.11-1974 "Quality Assurance Requirements for the Design of Nuclear Power Plants," paragraph 7.1.2, "Document, Preparation, Approval and Issue." Also the licensee did not identify in their procedures how and what documents conform with ANSI 45.2.11 and ANSI N18.7-1976 as stated in their FSAR.

A review of the documentation referenced in Attachment 1 of this report indicates that the licensee program is in conformance with the intent of ANSI N45.2.11-1974. Also, the requirement of ANSI N18.7-1976 for identifying licensee documentation and procedure paragraphs with FSAR commitments is identified in the TMI-1 Operational Quality Assurance Plan.

Based on the review of the documents referenced in Attachment 1 of this report, the inspector considers this unresolved item to be closed.

2.4 (Closed) Unresolved Item 86-12-06 - Report 50-289/86-03-04
Level Quality Control List identified the following concern:

Paragraphs III.A.1.f(1) and (2) identified that the various subsystems of Emergency Feed Water (EFW) system had different quality classification. The licensee Quality Control List (QCL) (ES-011) provides for three basic classifications (nuclear safety related, important to safety, and not important to safety). The QCL did not break down the classification into component levels. 10 CFR 50, Appendix Criterion II requires, in part, that the licensee identify structures, systems, and components to be covered by the quality assurance program. Based on the licensee's response letter, dated June 27, 1986, to the PAT report, the component level QCL is to be issued by the end of 1986. This item was updated in report 50-289/86-12 and assigned No. 86-12-06.

The licensee updated their Nuclear Safety-Related (NSR) and Regulatory Required (RR) portions of the Quality Classification List (QCL) on October 3, 1986 and issued it on October 10, 1986. The QCL standard for components refers to a licensee data base program which contains approximately 9000 components in 101 systems. Procedure EP-11, Quality Classification List which provides the methodology used in the backfit and for future changes, was issued in August 1986. EP-011, provides the direction for establishing quality classification for new and retrofitted GPUNC station structures, systems and components by using a Quality Classification Checklist instructions. The inspector's review of the EP-011 procedure and checklist guidance and discussions with various engineering, maintenance, and quality control personnel indicated that they were using the guidance of EP-011.

To determine if the system components have been classified, the inspector used the TMI-1 QCL Summary Data program to select components of the Emergency Feedwater System. The inspector queried the system from the component level using the component Tag No. and the System No. In both approaches, the computer listings identified the following parameters of the selected components:

- Functional Class
- Seismic Function
- Functional Mode
- QA/QC Basis
- Classification
- QA/QC Requirements

Additional data is listed, which is required by engineering, but was not part of the search criteria. The inspector and the plant engineer ran the Emergency Feedwater System and verified the computer generated list against the component tag numbers for this system. No discrepancies were noted.

Based on the review of the documentation referenced in Attachment 1 of this report, the QCL Summary Data Computer Listing, and discussions with site personnel, the inspector considers this unresolved item to be closed.

3.0 Pre-Outage Maintenance Planning (Module No. 37702)

3.1 Scope

The inspector reviewed the licensee pre-outage maintenance program plan for the pending 7R outage that is scheduled to begin approximately June 17, 1988. The inspection reviewed the following subject areas as well as the maintenance planning for two major modifications.

- Plant Material Job Ticket Backlog
- Plant Material Preventive Maintenance Backlog
- Electrical Maintenance Job Ticket Backlog
- Electrical Maintenance Preventive Maintenance Backlog
- Instrumentation and Control Maintenance Job Ticket Backlog
- Instrumentation and Control Maintenance Preventive Maintenance Backlog
- Utility Maintenance Preventive Maintenance Backlog
- Mechanical Maintenance Preventive Maintenance Backlog
- Two Major Outage Packages (see paragraph 3.3)

3.2 Outage Backlog

The licensee's report for May 2, 1988 titled "Plant Material Workable Backlog," indicates that, except for the outage packages, the trend lines are going down below the goal line established for each of the above subject items. An example of this is the goal for Plant Material Preventive Maintenance Backlog established at 7086 items; as of May 6, 1988, the number of backlog items was 4907. Also, the goal for Electrical Maintenance Preventive Maintenance Backlog was established at 1711 items, while as of May 6, 1988, the backlog was 1230 items.

Using the present backlog numbers and the scheduled manpower projections, the licensee appears to have sufficient manpower scheduled to support their outage tasks and perform their scheduled surveillance testing and preventative maintenance tasks during the upcoming 7R outage. The inspector verified the backlog numbers by using the licensee's computer program status reports. The inspector also reviewed the TMI-1 Site Access Training schedule to determine that training supported the outage scheduled. The training scheduled was determined to be well developed to support the planned 7R outage.

Present procedures are in place to perform the planned surveillance and maintenance planned work. If the new or modified procedures are required to be written, there is sufficient manpower scheduled to support this task. Of the six major modifications planned for the outage, the inspector reviewed two of the six packages which included the test procedures as well as the material parts listing.

The expected backlog entering into the 7R outage appears to be well documented and sufficient manpower and time allocated to perform the required task assigned. Based on the manpower allocated to the backlog task and the licensee past history on these items, the inspector had no further questions in this area.

No violations, deviations or unresolved items were identified by the inspector.

3.3 Major Modifications Reviewed

Of the six major modifications planned for the 7R outage, two modification packages have been completed and ready for issuance. The inspector reviewed the following packages to determine if they complied with their outage plan site administrative procedures and that they did not violate technical specifications.

3.3.1 RC Pump Vibration Monitor Upgrade (A25B-G1915)

This modification is a permanent installation of a Bentley Nevada Data Manager System. The installation consists of a new rack of vibration monitors in the control room; sensors installed on the RC pump; and, cables from the sensors to the control room instrumentation racks.

Failures and potential failures of the Reactor Coolant Pump shafts due to cracks have been identified by the nuclear industry during the last few years. The licensee has been recording this type of data for the last few years using a temporary Bentley Nevada Data Manager setup in their 6.9 KV switchgear room. This modification replaces the temporary monitoring system with a permanently installed system.

The inspector reviewed the modification package to determine if the following areas were considered and documented by the licensee:

- A completed safety analysis of the design has been completed.
- Installation and test procedures have been prepared with inspection hold points identified.
- Radiation levels have been considered and factored into the planning considerations.
- Personnel training schedules have been established.

3.3.2 Motor Operated Valve Closed Position Indication (A25A-51208)

The purpose of this modification is to perform wiring changes in the motor operators to provide a positive closed indication. Also, changes are to be made in the starter circuits to provide loss of indication on thermo overload trips.

The inspector reviewed similar type data for this modification as was reviewed for the modification described above.

The documents that the inspector reviewed during the evaluation of these two modification packages are listed in Attachment 1 of this report. In addition to the document review, the inspector discussed these planned modifications with the supervisors and maintenance personnel who will perform the modification work.

3.4 Findings

No concerns were identified during the documentation review or the discussion the inspector held with the maintenance personnel. No violations, deviations or unacceptable conditions were identified by the inspector.

4.0 Exit Meeting

Licensee management was informed of the scope and purpose of the inspection at an entrance meeting conducted on May 2, 1988.

The findings of the inspector were periodically discussed with licensee representatives during the course of the inspection. An exit was conducted on May 6, 1988 (see paragraph 1) at which time the findings of the inspector were presented.

At no time during the inspection, did the inspector provide written material to the licensee nor did the licensee indicate that areas covered by this inspection contained proprietary information.

ATTACHMENT 1

1. The following documentation was reviewed by the inspector to support his justification for closing out the listed Violations and Unresolved Items listed in Inspection Report 50-289/86-12.

1.1 Violation 86-12-03

- EMP-002 - Mini-Mod Procedure
- EMP-016 - Configuration Lists
- EP-002/EP-025 - Drawings/As-Builts
- Operational QA Plan 1000-PLN-7200.01
- EP-009 - Design Verification
- EP-006 - Calculations
- QA Audit Report 0-TMI-86-11

1.2 Violation 86-12-04

- No. C001591 - Field Change Request (FCR), February 2, 1982
- No. 609-0293 - Design Calculation
- EFW Drawings for the Two-Hour Backup Instrument Air (TBIA) Subsystem

1.3 Unresolved Item 86-12-05

- 1000-PLN-7200.01 - TMI-1 Operational Quality Assurance Plan
- 1000-PLN-7200 01 - TMI-1 Operational Quality Assurance Plan, Appendix A, "Comparison Chart of Operational QA Plan Requirements with Those of Various Parts of the Code of Federal Regulations and Nuclear Industry Standards." Page 110.

1.4 Unresolved Item 86-12-06

- EP-011 - Quality Classification List
- Quality Control Starting Listing

- 2.0 The following documentation was reviewed by the inspector to support his analysis of the TMI-1 7R Outage that is scheduled for the second quarter of 1988.

2.1 RC Pump Vibration Monitor Upgrade Documentation

- TI-MM-413915-001, Revision 0 - RC Pump Vibration Monitor Upgrade Modification
- IE-601-18-1000 - Data Acquisition System Connector Diagram
- ID-601-14-1000-1002 - Data Acquisition System Conduit Layout
- ID-601-15-1000 - RCP Vibration Monitor Replacement

2.2 Motor Operated Valve Closed Position Indication Documentation

- 1C-420-17-1000 - Feedwater and Condensate System Electrical Elementary Diagram
- 1C-411-17-1000 - Main Steam System Electrical Elementary Diagram
- 1C-314-17-1000 - Gland Seal System Electrical Elementary Diagram
- 1C-220-17-1000 - Reactor Coolant System Electrical Elementary Diagram
- 1C-214-17-1000 - Reactor Building Spray System Electrical Elementary Diagram
- 1C-212-17-1000 - LPSI Decay Heat Removal System Electrical Elementary Diagram
- 1C-211-17-1001-1004 - HPSI Makeup and PRFCN System Electrical Elementary Diagram

2.3 Valve Maintenance Verified by Inspector

| <u>MOV No.</u> | <u>Non-Outage</u> | <u>Outage</u> |
|----------------|-------------------|---------------|
| BS-V-1A (EQ)* | X | |
| BS-V-1B (EQ) | X | |
| CO-V-4 | | X |
| DH-V-4A (EQ) | X | |
| DH-V-4B (EQ) | X | |
| FW-V-4 | | X |
| FW-V-8 | X | |
| FW-V-15 | X | |
| GS-V-1 | | X |
| GS-V-5 | | X |
| MS-V-10A | | X |
| MS-V-10B | | X |
| MU-V-16A (EQ) | | X |
| MU-V-16B (EQ) | | X |
| MU-V-16C (EQ) | | X |
| MU-V-16D (EQ) | | X |
| MU-V-217 | | X |
| RC-V-28 | | X |

*Environmental Qualification Requirements apply