U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-289/84-31

Docket No. 50-289

License No. DPR-50

Licensee: GPU Nuclear Corporation
P.O. Box 480
Middletown, Pennsylvania 17051

Facility Name: Three Mile Island Nuclear Station, Unit 1

Inspection At: Middletown, Pennsylvania

Inspection Conducted: October 1-5, 1984

Inspectors: E. Thomas Shaub
E. T. Shaub, Reactor Engineer — 10/22/84 date

Peter C. Wen
P. Wen, Reactor Engineer — 10/22/84 date

L. Bettenhausen
L. Bettenhausen, Chief
Test Program Section — 10/24/84 date

Approved by: J. G. Shaud
J. Shaud, Acting Chief
Materials Program Section — 10/26/84 date

Inspection Summary: Unannounced inspection conducted on October 1-5, 1984 Inspection Report No. 50-289/84-31

Areas Inspected: Licensee action on previous inspection findings; on site committee activities, organization and administration; QA shift monitoring; and the Nuclear Safety and Compliance Committee. The inspection involved 39 hours onsite and 8 hours in office by two region-based inspectors.

Results: No violations were identified.

DETAILS

1. Persons Contacted

GPU Nuclear Corporation

B. Ballard, Manager, QA Modification/Operations
J. Herman, Shift Foreman
R. Hurd, Manager, Independent Safety Review Group
D. Janes, Shift Supervisor
M. Nelson, Supervisor TMI-1 Review Program
J. Phadenhauer, Supervisor OQA Shift Monitoring
T. Seavers, OQA Shift Monitoring Engineer
* C. Smyth, Supervisor, TMI-1 Licensing

NUS

E. Hamarond, Nuclear Safety and Compliance Committee (NSCC) Staff Director
K. Meyer, NSCC, Staff Assistant

NRC

* R. Conte, Senior Resident Inspector
F. Young, Resident Inspector

* Denotes those present at the exit interview on October 5, 1984.

2. Licensee Action on Previous Inspection Findings

(Closed) Unresolved Item (289/83-26-11): Radioactive gas release of September 6, 1983. The licensee's Plant Review Group (PRG) was to review associated plant procedures for adequacy governing actions for a planned or unplanned release.

The PRG reviewed and revised 2 plant procedures: Emergency Procedure 1202-12, "Excessive Radiation Levels," Rev. 6, and Radiological Control Procedure 1676, "Radiation Control Responsibilities for Non Routine Releases," Rev. 21. The inspector reviewed the current revision of these 2 procedures and the associated procedure Change Request to ensure the procedures provided adequate definition for planned and unplanned release and delineated the responsibilities and duties of operations and radiation control personnel for both planned and unplanned or non routine release.

Based on the above, this item is closed.

(Closed) Inspector Followup Item (289/82-BC-04): HPI Test. The High Pressure Injection (HPI) test results were previously reviewed by the inspector (Report 289/84-22). Because of the inconsistent Controlatron ultrasonic flowmeter readings, the inspector informed the licensee that the test results were inconclusive. Specifically, no test data or followup analysis was available to address the design adequacy of cavitating venturis. The purpose of these cavitating venturis is to limit the flow through a ruptured HPI line, thus increasing the amount of fluid available

for core cooling through intact HPI lines. The licensee's Mechanical Systems Group performed a detailed analysis based on the available measured data. These results were presented to the inspectors during a meeting held onsite on October 2, 1984.

The results from the licensee's analysis indicated that:

A. RCS pressure below 600 psig (Venturis were in cavitating mode)

Although the temporarily installed ultrasonic flowmeters (Controlatron) did not provide meaningful data, the permanently installed nozzle-type flowmeters (MU-23 FE's) did provide useful information. The total measured pump flow (MU-P-1A) was 565 gpm. This flow rate is 15 gpm above the pump runout point of 550 gpm. Since pump 'A' has higher performance (more flow) than a nominal HPI pump, the extrapolated nominal pump flow under the same test conditions would be 548 gpm. This value is within the acceptable range (less than 550 gpm for pump run-out, and above 350 gpm for ECCS requirement). The licensee stated that the pump manufacture (Bingham Pump Company) was consulted (Memo MSS-84-264), and advised that since pump 'A' did not exhibit excessive vibrations or noise, slightly over the 550 gpm run-out limit is acceptable.

The inspector reviewed the record of HPI pump surveillance (SP 1303-11.8) performed on May 23 and 26, 1984 and noted that pump 'A' is a higher performance pump. The inspector also independently verified the licensee's calculation "HPI Flowrates for Selected RCS Pressures," C-1101-211-5360-009. The predicted total pump flow is 535 gpm which is based on pump 'B' running case. A revised value of 560 gpm based on pump 'A' running case was provided to the inspector via telephone conversation on October 11, 1984. This value is in close agreement with the measured flow rate of 565 gpm. In view of close agreement between the predicted and the measured flow rates, the inspector determined that the test result demonstrated the venturis acted as flow limiting devices under cavitating conditions.

B. RCS pressures at 800 psig and 1200 psig (Venturis were in non-cavitating mode)

As identified in the previous inspection (289/84-22), the Controlatron did not provide accurate flow monitoring in the absolute sense. The licensee's analysis concluded that the Controlatron readings were higher than the actual flow rates. However, all measured flow rates based on the nozzle type flowmeter (MU-23 FE's) exceeded the ECCS requirement. The flow distribution, even based on the worst Controlatron readings, still met the acceptance criteria in that flow in any one leg did not exceed 36% of the total flow. The required 64%/36% flow split is documented in GPU report GED0005 which was submitted in response to NRC TMI-1 Restart Question No. 1 (Supplement 1, Part 3). The inspector inquired about additional information of analytically

predicted HPI flow at tested RCS pressures. The inspector was provided the following information:

Test Conditions	Predicted Total Flow (gpm)	Measured Total Flow (gpm)
Pump 'A' running Pres = 800 psig	540	543
Pump 'A' running Pres = 1200 psig	495	503
Pump 'B' running Pres = 800 psig	510	506

The measured total flow rates were in close agreement with predicted flow rates. Since the analytical model did not indicate any abnormal flow distribution, it therefore provides additional confidence that the cross-connected HPI legs will function properly.

In summary, conclusions derived from the licensee's analysis were:

-- Cavitating venturis served as flow limiting devices in the cavitating condition (600 psig test).

-- Acceptable flow split was provided by the cross-connected HPI legs.

-- Delivered HPI flow was higher than that assumed in the ECCS analysis.

Based on the documents reviewed and discussion held, the inspector determined that the above conclusions are derived from a technically sound approach.

This item regarding to HPI test result review is closed.

Response to Generic letter 81-21, Natural Circulation Cooldown.

The licensee response to Generic letter 81-21 was reviewed by the NRC Division of Licensing. On June 5, 1984, a safety evaluation was written concluding the licensee response was adequate if the Natural Circulation Cooling Procedure was revised as described in the response.

The inspector reviewed OP 1102-16, "Natural Circulation Cooling Procedure" to ensure the following necessary revisions were completed:

-- Incorporate a curve which shows minimum pressure necessary to prevent reactor vessel upper head void formation

-- Include instructions for collapsing a steam bubble in the reactor vessel upper head and for reestablishing natural circulation should it be interrupted

-- Provide guidance to the operator to recognize and respond to an upper head void

The instruction and guidance for recognizing and responding to an upper head void formation and reestablishing natural circulation were adequately incorporated into the procedure. However, the minimum pressure curve was not. The licensee stated that the natural circulation cooling procedure referred the operators to the plant cooldown procedure and the associated Abnormal Transient Operating Guideline (ATOG) and that both of these documents include minimum pressure and temperature curves. Further review of the Pressure-Temperature curves in the cooldown procedure and the ATOG indicated that these curves were less conservative, in some instances, than the curve provided by the licensee in its submittal to the NRC. This issue was brought to the attention of the licensee for further evaluation. Until the licensee evaluates the curves and provides resolution, this item is unresolved (289/84-31-01).

3. Onsite Organization and Administration

3.1 References/Requirements

-- FSAR, Chapter 12.0, Conduct of Operations

-- Technical Specifications, Section 6.3, Unit Staff Qualifications

-- Technical Specifications, Figure 6.1, Corporate Organization Chart

-- Technical Specifications, Figure 6.2, TMI-1 Unit Staff Organization Chart

3.2 Program Review

The inspector discussed the current organization with licensee personnel and verified that:

-- The onsite organization structure is as described in the facility Technical Specification

-- Personnel qualification levels are in conformance with codes and standards as described in Technical Specifications

-- Lines of authority and responsibility are in conformance with Technical Specification

-- Changes in the organizational structure have been reported to the Commission as required by Technical Specification

3.3 Implementation Review

The following procedures were reviewed to ensure the licensee had adequately delineated the responsibilities and duties of the onsite organization including policy on conduct of operations and staff working hours

-- A 1009, TMI - Unit 1 Organization, Revision 10, March 8, 1984

-- A 1029, Conduct of Operations, Revision 14, June 7, 1984

-- A 1031, Nuclear Plant Staff Working Hours, February 18, 1983

Overtime records for the licensed plant staff was reviewed for the calendar year 1984 to date to ensure there was no violation of the Technical Specification requirement or, if there were exceptions, that adequate justification was provided for each exception. Additionally, the records were reviewed to ensure there was not abuse of overtime for licensed individuals. No exceptions or abuses were noted.

3.4 Findings

No violations were identified.

4. Management Initiatives to Assure Safety and Compliance

4.1 Quality Assurance Shift Monitoring Program

4.1.1 Reference/Requirements

By letter dated June 10, 1983 from H. Dieckamp to N. Palladino, GPUN committed to provide full time shift operational quality assurance coverage by degreed engineers until the open issues are resolved.

4.1.2 Program Review

The OQA Shift Monitoring Program is specified in procedure 6110-QAP-7210.07. The procedure was reviewed to determine the adequacy of the training, experience and qualification/ certification requirements for OQA shift monitoring engineers.

4.1.3 Implementation Review

The following areas were reviewed to determine the effectiveness of the OQA shift monitoring program:

-- Training of the initial six OQA shift monitoring engineers

-- Shift Assessment Reports prepared by each OQA shift monitoring engineer

-- Quality Assurance Monitoring Reports completed by each OQA shift monitoring engineer

-- Quality Deficiency Reports and corrective actions

-- Discussion with Supervisor as to development of monitoring checklist

-- Training, Qualification and Certification Records for three OQA shift monitoring engineers

-- Training schedule for the OQA shift monitoring engineers for 4th Quarter 1984

-- QA Program Assessment for first year of OQA Shift Monitoring Activities

-- Interview with one OQA shift monitoring engineer

The interfaces for the OQA shift monitoring engineers were discussed with the supervisor. The OQA shift monitoring engineers perform routine monitoring activities and, when problems are identified, notify the lead OQA monitor for that area (i.e., electrical, mechanical, operations) to participate in the resolution of the problems. Additionally, the lead OQA monitors provide input to the routine schedule based on trending analysis of the findings in their areas.

Shift Supervision utilized the OQA monitors to verify proper execution of plant procedures and evaluations.

The shift monitoring checklists, from the initial issue to current revision 4, were examined. The checklist has become more and more detailed as the OQA shift monitoring engineers gain plant experience.

4.1.4 Findings

No violations were identified.

The licensee has developed a program that has already provided some relevant findings. The monthly assessment reports get wide spread management distribution, and management has established an adequate interface with the OQA shift monitoring group.

4.2 Nuclear Safety and Compliance Committee

4.2.1 Refere..ce/Requirements

By letter dated November 28, 1983, GPUN informed the NRC that it intended to form the Nuclear Safety and Compliance Committee (NSCC).

4.2.2 Program Review

The NSCC consists of three outside members of the GPUN Board of Directors. The committee's purpose and responsibilities are delineated in the NSCC charter. The committee utilizes a onsite staff (provide by contracted services) to perform independent observation of plant operational radiation safety including compliance with regulator requirements, license requirements and procedures.

4.2.3 Implementation Review

The following areas were reviewed to determine if the NSCC onsite staff was discharging its responsibilities:

-- Six month activity schedule

-- NSCC staff guidelines, July 1, 1984

-- 2 reports by the NSCC staff and a follow-up report

-- Qualifications of three NSCC staff members

-- Discussions with the staff director regarding communications, interfaces and responsibilities

The onsite NSCC staff was in place and discharging its responsibilities by July 1, 1984. To date, they have completed 2 evaluations and followup reports. The NSCC staff meets with the committee on a monthly basis and will provide written reports on a monthly and semiannual basis.

Corrective actions were discussed with the staff director to determine how deficiencies noted during evaluations are treated. Unless a finding is considered a significant threat to safety, the findings and recommendations are communicated to the committee and appropriate corrective action is taken at that level. For the significant finding, the staff director communicates directly to the Vice President and Director of TMI-1.

4.2.4 Findings

No violations were identified.

5. Onsite Committees

5.1 Independent Onsite Safety Review Group

5.1.1 Reference/Requirements

Section 6.5.4 of the Technical Specification specifies the function, organization, authority and qualifications of the Independent Onsite Safety Review Group (IOSRG). The IOSRG consists of three onsite engineers and the Safety Review Manager, all of whom are assigned full-time to review nuclear safety programs, independent of the unit staff.

5.1.2 Program Review

The IOSRG program is specified in procedure 6310-ADM-1010.01, which the inspector reviewed for compliance with the Technical Specification requirements.

5.1.3 Implementation Review

The inspector reviewed the following areas to ascertain the effectiveness and compliance of the IOSRG:

-- Qualifications for the three assigned engineers and the Safety Review Manager

-- Interview with the Safety Review Manager

-- Ten IOSRG Safety Review Checklist for modifications

-- Eight IOSRG Monthly Reports

-- IOSRG Review Item Log.

5.1.4 Findings

No violations were identified.

5.2 Plant Review Group

5.2.1 References/Requirements

-- Technical Specifications, Section 6, Amendment 77

-- ANSI/ANS-3.1 - 1978, Selection and Training of Nuclear Power Plant Personnel

-- ANSI/N18.7 - 1976, Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants

-- Regulatory Guide 1.33, Revision 2, February 1978, Quality Assurance Program Requirements (Operational)

-- GPUNC Operational Quality Assurance Plan - TMI - Unit 1

5.2.2 Program Review

The inspector reviewed the following procedures to verify that the licensee has established an administrative system to control the safety review and approval process such that it meets the requirements of the documents referenced above.

-- 1000-POL-1291.01, GPU Nuclear Safety Review and Approval Policy

-- 1000-ADM-1291.01, GPU Nuclear Safety Review and Approval Procedure with Review and Approval Matrix

-- Unit No. 1 Administrative Procedure (AP)-1034, Plant Review Group

-- AP-1001A, Procedure Review and Approval

5.2.3 Implementation Review

The inspector reviewed the licensee's safety review and approval process to verify that the program had been implemented in accordance with applicable requirements and procedures listed in paragraph 5.2.1. The following areas were verified:

-- Technical and safety reviews are required to be completed and are being completed prior to procedure or modification implementation.

-- Interdisciplinary reviews were accomplished when required

-- Independent safety reviews as required by the Technical Specification were being accomplished

-- Personnel performing technical and independent safety reviews were qualified in accordance with Technical Specification requirements

-- Independence was maintained within the safety review process

-- Records of safety reviews are being maintained

Documentation of responsible technical and independent safety reviews for the following subjects were reviewed:

-- Site procedures

-- Design changes and modifications

-- Operational events/reportable occurrences

-- QA audits

-- Technical Specification/License changes

The review process and the rationale for interdisciplinary reviews were discussed with the supervisor of the Plant Review Group (PRG). Minutes for 1984 PRG meetings and associated follow up action were reviewed to ensure PRG findings and comments were incorporated into the appropriated documents.

5.2.4 Findings

No violations were identified.

6. Unresolved Items

An unresolved item is a matter about which more information is required in order to ascertain whether it is an acceptable item, an open item, a deviation, or a violation. An unresolved item is identified in paragraph 2.

7. Exit Meeting

The inspection scope and findings were summarized at a meeting on October 5, 1984, with those persons indicated in paragraph 1.

At no time during this inspection was written material provided to the licensee by the inspector.