

October 29, 1996

EA 95-238

Mr. James Knubel
Vice President and Director, TMI
GPU Nuclear Corporation
Three Mile Island Nuclear Station
Post Office Box 480
Middletown, Pennsylvania 17057-0191

SUBJECT: INSPECTION REPORT 50-289/95-16 REPLY

Dear Mr. Knubel:

This refers to your April 10, 1996, correspondence in response to our letter, dated March 11, 1996, regarding the Three Mile Island Nuclear Station, Unit 1 (TMI-1). This correspondence included your response to the two violations delineated in the subject inspection report. The violations dealt with your actions in addressing past problems with pipe supports on the reactor coolant system (RCS) drain lines. We have reviewed this matter in accordance with NRC Inspection Manual Procedure 92903, "Engineering."

With regard to the first violation, we concur with your root cause assessment. We understand the root cause is attributed to the failure to capture the recommended pipe support modification in a formal tracking process; failure of the GPUN staff and management to followup on the issue; and personnel errors in performing design calculations and design verifications. Further, we understand that the seven corrective actions described in your letter have been completed, and we concur that these actions provide reasonable assurance that a similar event will not occur in the future.

With regard to the second violation, we concur with part of your assessment, and associated corrective actions. Specifically, we understand the root cause of failing to meet the requirements of ASME Section III is attributed to a lack of understanding on the part of the individuals performing the design calculation and verification. Further, we understand that the five corrective actions described in your April 10 letter have been completed, and we concur that these actions provide reasonable assurance that a similar event involving failure to meet ASME Section III criteria will not occur in the future.

We disagree with part of your response to the second violation in which you suggest that the use of engineering judgement to evaluate nonconforming conditions, in lieu of specific ASME code requirements, is acceptable and within the guidance of ASME Section XI. We note that your current code of record, 1986 ASME Section XI, subsection IWF-3410, provides acceptance standards for inspecting component supports, and states that a

9611080023 961029
PDR ADOCK 05000289
G PDR

IEO1 1/

deformed pipe support is an unacceptable condition requiring repair, replacement or analysis. Your position, as stated in your April 10, 1996, letter, suggests that engineering judgement can be used in lieu of these acceptance standards for dispositioning deformed supports. We disagree with that position.

In your letter, you state that the use of engineering judgement to evaluate existing conditions is acceptable and within the guidance of the 1986 ASME Section XI code. Your letter does not specify where such guidance, allowing the use of engineering judgement in lieu of satisfying code acceptance criteria, is specified in the ASME code. We are concerned that your application of engineering judgement in lieu of code requirements could lead to situations similar to the RCS drain line in which nonconforming conditions are incorrectly dispositioned and returned to service with no corrective actions. Consequently, please provide within 30 days of this letter, a specific reference to the section of ASME Section XI that allows the use of engineering judgement in lieu of code specified acceptance criteria, and an explanation of how your current ASME Section XI implementation program precludes situations similar to the RCS drain line.

Sincerely,

James T. Wiggins, Director
Division of Reactor Safety

Docket No. 50-289
License No. DPR-50

cc w/encl:

E. L. Blake, Shaw, Pittman, Potts and Trowbridge (Legal Counsel for GPUN)
Commonwealth of Pennsylvania

J. C. Fornicola, Director, Licensing and Regulatory Affairs

M. J. Ross, Director, Operations and Maintenance

TMI-Alert (TMIA)

J. S. Wetmore, Manager, TMI Licensing Department

Mr. James Knubel

3

Distribution w/encl:

Region I Docket Room (with concurrences)

T. Kenny, DRS

P. Eselgroth, DRP

D. Haverkamp, DRP

M. Modes ~~M. McBrearty~~, DRS

NRC Resident Inspector

Nuclear Safety Information Center (NSIC)

PUBLIC

W. Dean, OEDO

J. Norris, PD I-4, NRR

P. McKee, PD I-4, NRR

Inspection Program Branch, NRR (IPAS)

DRS File (1)

DOCUMENT NAME: A: TMI9616.REP

To receive a copy of this document, indicate in the box: "C" = Copy without attachment/enclosure "E" = Copy with attachment/enclosure "N" = No copy

OFFICE	RI/DRS	RI/DRS	RI/DRS	RI/	RI/
NAME	MMcBrearty	MModes	JWiggins		
DATE	05/31/96	05/28/96	10/29/96	05/ /96	05/ /96

OFFICIAL RECORD COPY



GPU Nuclear Corporation
Route 441 South
P.O. Box 480
Middletown, Pennsylvania 17057-0480
(717) 944-7621
Writer's Direct Dial Number:
(717) 948-8005

6710-96-2024
April 10, 1996

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Gentlemen:

Subject: Three Mile Island Nuclear Station, Unit 1 (TMI-1)
Operating License No. DPR-50
Docket No. 50-289
Response to Notice of Violation

Reference: NRC Letter dated March 11, 1996, "Notice of Violation (NRC
Inspection Report No. 50289/95-16)".

The referenced letter enclosed a Notice of Violation containing two violations and states that "...the first violation involved GPUN's failure to control adequately a modification to the RCS drain line piping" and the "...second violation occurred when GPUN performed a more refined ASME Section III calculation to disposition the pipe overstress condition calculated in the 1990 B31.1 analysis".

Pursuant to the provisions of 10 CFR 2.201, Attachment I to this letter provides the GPU Nuclear response to each of the two violations contained in the Notice of Violation.

Sincerely,

J. Knubel
Vice President and Director, TMI

RTZ

cc: TMI Senior Resident Inspector
TMI-1 Senior Project Manager
Region Administrator

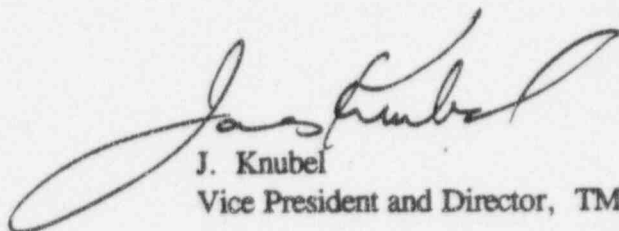
9604160001

METROPOLITAN EDISON COMPANY
JERSEY CENTRAL POWER AND LIGHT COMPANY
PENNSYLVANIA ELECTRICAL COMPANY
GPU NUCLEAR CORPORATION

Three Mile Island Nuclear Station, Unit 1 (TMI-1)
Operating License No. DPR-50
Docket No. 50-289

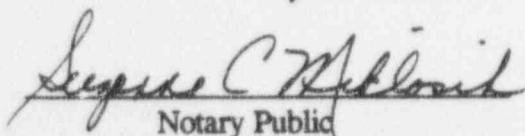
Reply to Notice of Violation (NRC Inspection Report No. 50-289/95-16)
transmitted by NRC Letter dated March 11, 1996.

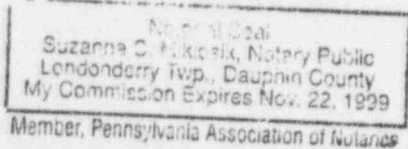
This letter is submitted in reply to the Notice of Violation (NRC Inspection Report No. 50-289/95-16) transmitted by NRC Letter dated March 11, 1996 which refers to the inspection conducted on September 25-29, 1995, at the Three Mile Island, Unit 1 Nuclear Station (TMI) facility and from October 10-11, 1995, at the GPU Nuclear (GPUN) Office in Parsippany, New Jersey. All statements contained in this reply have been reviewed, and all such statements made and matters set forth therein are true and correct to the best of my knowledge.


J. Knubel
Vice President and Director, TMI-1

Signed and sworn before me this

10 day of April 1996


Notary Public


Suzanne C. Mikolaj, Notary Public
Londonderry Twp., Dauphin County
My Commission Expires Nov. 22, 1999
Member, Pennsylvania Association of Notaries

ATTACHMENT I

NOTICE OF VIOLATION

(Violation A)

- A. 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," Section III, "Design Control," requires, in part, that measures be established for the identification and control of design interfaces and for coordination among participating design organizations. Appendix B also requires, in part, that licensees establish design control measures that provide for verifying or checking the design adequacy.

Contrary to the above, from 1990 through at least September 1995, measures were not established for the identification and control of design interfaces and for coordination among participating design organizations as required, nor did the licensee establish design control measures that provided for verifying or checking design adequacy.

1. Specifically, GPUN failed to control adequately a modification to the Reactor Coolant System (RCS) drain line piping. The modification was developed as a result of a 1990 GPUN structural analysis that demonstrated that the drain line piping was overstressed due to an improper support configuration. The modification was described in a letter, dated August 27, 1990, transmitted from GPUN Headquarters in Parsippany, New Jersey to the TMI site. However, the modification was not implemented as of September 1995, and GPUN could provide no documentation to demonstrate that the modification was ever properly dispositioned.
2. GPUN's design verification process failed to identify a significant error in the 1990 analysis that resulted in underestimating the level of stress in the pipe. Specifically, the analysis indicated thermal expansion stresses approximately 4% above the allowables specified in the design code of record (USAS B31.1 1967). However, when the analytical error was corrected in 1995, the stresses were approximately 100% above the code allowables. (01013).

This is a Severity Level III violation (Supplement I).

GPU NUCLEAR RESPONSE TO THE NOTICE OF VIOLATION (Violation A)

GPU Nuclear acknowledges that the violation occurred as stated in the notice of violation. The first part of the violation, i.e., Part 1, occurred because the recommendation was not captured in any formal tracking system and there was no follow-up action on the part of staff or cognizant management.

GPU Nuclear has implemented the following corrective actions for Part 1 of this violation:

- 1) GPU Nuclear has implemented a modification to the RCS drain line supports which satisfies B31.1 Code requirements.
- 2) All individuals involved were counseled that a lack of follow up action leading to a proper disposition of the recommendation is not acceptable.
- 3) Since 1990, the Project Approval and Management Process has been reengineered. Specifically, the process today requires that the responsible System Engineer be involved with all proposed modifications, and that the System Performance Team reviews all modifications involving multi-disciplinary reviews where and when appropriate.
- 4) Management has emphasized to the staff that proper close out of recommendations is an essential part of the engineering process.
- 5) With respect to the practice of proposing modifications in informal communication systems, GPU Nuclear has conducted a search of documents generated by the Engineering and Design Department where such recommendations may have existed. In particular, all memoranda and Technical Data Reports from the years 1988, 1990 and 1993 were reviewed, as well as Technical Functions Assigned Action Items from 1990. In all, over 4,000 documents were reviewed. It has been concluded from this review that the specific incident identified in the violation is an isolated case.

All the above actions have been completed as of the date of this response. GPU Nuclear believes the actions taken provide reasonable assurance that a similar event will not occur in the future.

The second part of the violation, i.e. Part 2, occurred due to personnel errors on the part of the preparer and verifier of the calculation. The Mechanical Analysis Staff within GPU Nuclear, which performs the pipe stress analyses, is located in the corporate offices in Parsippany, NJ. In 1995 the group consisted of five engineers with an average of 20 years nuclear experience. Four of the five engineers hold Masters Degrees and four hold a Professional Engineer License. The engineer who prepared the calculation and the engineer who verified the calculation are and were technically qualified to perform their functions.

GPU Nuclear identified this error during its investigation of the crack in the drain line during the Three Mile Island Unit 1 Cycle 11 Refueling (11R) outage in 1995. As stated in the violation, when the specific error was corrected the calculated stresses were approximately 100% above the allowable specified in the design code of record (USAS B31.1 1967). That was an interim result. Further analyses, which more accurately represent the actual conditions for the pipe, conclude that the stresses were 40% above the allowable. These analyses also demonstrate that these stress conditions were not contributory to the initiation or propagation of the crack. The modifications made during the last refueling outage have reduced these stresses to values well below code allowable.

GPU Nuclear has implemented the following corrective actions for Part 2 of this violation:

- (1) The individuals involved were counseled; the verifier was temporarily restricted from performing verifications until he was retrained on the enhanced design verification procedure; and management has emphasized that both the preparer and verifier of a calculation must perform their functions with appropriate focus on technical quality. Further, a sample of previous verifications performed by the verifier was reviewed. It has been concluded that the incident noted in the violation is isolated.
- (2) GPU Nuclear has reviewed the governing procedures in an effort to identify programmatic issues that may have contributed to the cause of the calculation and verification error. Further, GPU Nuclear consulted with others in the industry including two utilities and two architect engineering companies to learn about other design verification programs and practices. Although GPU Nuclear has concluded that our existing procedures did not contribute to the cause of the incident cited in the violation, these procedures were updated and enhanced to provide more complete guidance and direction. The corporate headquarters engineering staff, including management, involved with design calculations and verification were retrained on the procedure enhancements.

All the above actions have been completed as of the date of this response. GPU Nuclear believes the actions taken provide reasonable assurance that a similar event will not occur in the future.

NOTICE OF VIOLATION
(Violation B)

- B. 10 CFR 50.55a, "Codes and Standards", paragraph (g), "Inservice inspection requirements," requires that licensees of nuclear power plants meet applicable criteria in Section XI, Division 1, of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code "Rules for Inservice Inspection of Nuclear Power Plant Components." ASME Section XI requires, in part, that licensees perform inservice examinations of class 1 components, including supports. If the components or supports do not meet the examination acceptance criteria, Section XI requires that the licensee perform a repair or replacement, or perform further evaluation to demonstrate the adequacy of the components or supports.

Contrary to the above, in 1988 and 1990, GPUN did not meet the applicable requirements in 10 CFR 50.55a, in that, during the performance of inservice inspection (ISI) examinations of pipe supports on the RCS drain lines, a class 1 component, GPUN identified distorted supports and failed to repair or replace or perform an adequate evaluation to establish the adequacy of the piping and supports. GPUN performed a structural analysis of the drain lines that demonstrated that the configuration of the supports did not allow for adequate pipe thermal expansion. Consequently, stress levels in the drain line piping exceeded the allowable stress values specified in the piping design code of record, USAS B31.1-1967, "Power Piping". GPUN utilized a later code, Section III subsection NB-3653.6, to disposition the overstressed piping. Paragraph NCA-1140 of Section III allows the use of specific provisions of the code but requires that all related requirements be met. The analysis performed by GPUN did not incorporate all related requirements of NB-3653.6 and was inadequate to demonstrate the adequacy of the piping and associated supports. (02014).

This is a Severity Level IV violation (Supplement I).

GPU NUCLEAR RESPONSE TO THE NOTICE OF VIOLATION (Violation B)

GPU Nuclear acknowledges that the violation occurred as stated in the notice of violation. This violation consists of two parts, one relates to support inspections and evaluations performed in 1988 and 1990, and one relates to a pipe stress calculation performed in 1990. The supports were evaluated under the ASME Section XI 1977 Code through the 1978 Summer Addenda. The acceptance standards portion of this code, Section IWF 3410, was in the course of preparation. Therefore, Engineering was requested to determine if the support configuration was acceptable for continued service or required repair, replacement or further evaluation. Engineering determined that since the observed distortions were minor, the supports were acceptable as is and would perform their intended function. The engineer used his judgment based upon his knowledge of materials and the design conditions to arrive at his conclusion. GPU Nuclear maintains that the use of engineering judgment to evaluate existing conditions is acceptable and within the guidance of ASME Section XI 1978 and 1986 (the current version for TMI).

The pipe stress analysis issue relates to the full use of the appropriate guidance in ASME III when evaluating an issue from a B31.1 analysis. GPU Nuclear agrees that not all related requirements were satisfied. This situation occurred because both the preparer and verifier were not fully aware of the relationship between the requirements of ASME III and B31.1.

As a matter of perspective, the applied number of thermal cycles for this pipe is 240. If the B31.1 allowable stress had been met the allowable number of cycles per B31.1 would have been 7000. The overstress that the engineer was attempting to resolve was 4% beyond the B31.1 code allowable. Therefore it was his conclusion before he began the reconciliation, that the stresses would be acceptable because the difference in applied stress vs. allowable stress was so small.

GPU Nuclear has implemented the following corrective actions for this violation:

1. The engineers involved were counseled that it is imperative that when issues are dispositioned, the technical logic leading to conclusions must be clearly documented.
2. Engineering and Design department management has emphasized to engineers that adherence to all relevant code provisions is required.
3. An outside consultant was retained to investigate and explain the issues in applying ASME III when evaluating a B31.1 analysis.

4. The calculation procedure has been revised to ensure management concurrence is obtained when specialized methods are used to satisfy the design code of record, i.e., ASME Section III or B31.1 evaluations. Management has stressed that adherence to the design code of record is a design basis requirement.
5. GPU Nuclear reviewed the stress analysis files and found no other instance where ASME III was used to reconcile design basis issues.

All the above actions have been completed. GPU Nuclear believes the actions taken provide reasonable assurance that a similar event will not occur in the future.