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January 16, 1992  
 C311-92-2007

US Nuclear Regulatory Commission  
 Attn: Document Control Desk  
 Washington, DC 20555

Dear Sirs:

Subject: Three Mile Island Nuclear Station, Unit 1 (TMI-1)  
 Operating License No. DPR-50  
 Docket No. 50-289  
 NRC Inspection Report No. 50-289/91-27  
 Response to Notice of Violation

In accordance with 10 CFR 2.201, attached is the GPU Nuclear Corporation (GPUN) response to the Notice of Violation (NOV) enclosed with Inspection Report 50-289/91-27, dated December 18, 1991, which was received by GPUN on December 23, 1991. The Enclosure requires a 30-day response from the date of your letter transmitting the Notice of Violation.

The attachment to this letter contains the GPUN response to the identified violation, which documents the completed short term corrective actions and includes a broad based approach to long term corrective actions. The long term corrective actions which were discussed with the NRC Staff representatives at the Enforcement Conference held on November 20, 1991, are based on a review of all 9R outage events and the overall performance of operations during the prior two re-allowing outages, as well as the specific incident addressed in the NOV. If any additional information is required, please contact Mr. R. E. Rogan, TMI Licensing Director, at (717) 948-8048.

Sincerely,

*T. G. Broughton*

T. G. Broughton  
 Vice President and Director, TMI-1

GMG

Attachment: Response to Notice of Violation

Signed and sworn before me this  
 16th day of January, 1992.

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

*Melody Kim Kulp*  
 Notary Public

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Notarial Seal  
 Melody Kim Kulp, Notary Public  
 Londonderry Twp., Dauphin County  
 My Commission Expires Aug. 21, 1993

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Notice of Violation

Part A

Technical Specification Limiting Condition for Operation 3.8.6, requires that during the handling of irradiated fuel in the Reactor Building, at least one door shall be closed on both the personnel and emergency hatches.

Contrary to the above, at approximately 10:40 a.m., on October 8, 1991, irradiated fuel assembly E-14 was handled when it was fully withdrawn from the core and then reinserted during testing of the Main Refueling Bridge "Fuel Hoist Fast and Slow Zones Over Core" interlocks. At the time, the inner and outer doors of both the personnel hatch and the emergency hatch were open.

Part B

Technical Specification 6.8.1 requires in part that written procedures shall be established, implemented and maintained covering surveillance and test activities of equipment that affects nuclear safety and refueling operations.

Technical Specification 6.8.2 requires in part that each procedure required by 6.8.1 shall be reviewed and approved as described in 6.5.1 prior to implementation and shall be reviewed periodically as set forth in administrative procedures.

Technical Specification 6.5.1.1 requires in part that each procedure required by 6.8 and other procedures which affect nuclear safety shall be reviewed for adequacy by an individual(s)/group other than the preparer.

Contrary to the above, Surveillance Procedure 1303-11.4, Refueling System Interlocks, Revision 24, was approved by the Plant Review Group (PRG) on August 7, 1991, without an appropriate review for adequacy. Specifically, this review was inadequate in that it did not assure that the procedure contained adequate warning that all prerequisites for fuel movement must be met before proceeding with the performance of Section 6.3.3.1 of the procedure, including a warning that irradiated fuel not be moved unless at least one door in both the containment personnel hatch and the emergency hatch were closed.

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GPUN Response:

(1) Reasons for the Violation

Part A

GPUN concurs with the violation as stated above. The event as described in the violation, and LER 91-004-00, occurred as a result of human error and procedural inadequacy. Part B below deals primarily with the procedural aspects. The focus of this part is on personnel accountabilities.

The principle cause of this event was the inadequate preparation by the licensed operators assigned as the Bridge Crew to perform the fuel handling interlock checks (SP 1303-11.4). Ancillary causes of this incident were attributable, in part, to the ongoing preparations for fuel handling, which were being coordinated by the Shift Supervisor and the Fuel Handling Troubleshooter who did not provide adequate oversight and supervision of the interlock checks. Communications between the Control Room and the Bridge Crew should have given the Control Room operations personnel notice that the event was about to occur, i.e., the question by the Bridge Crew concerning identification of the lead fuel assembly should have evoked a response from the Control Room operators, as this was an indication of intent to move fuel prematurely in the refueling sequence.

The fuel handling equipment interlock checks (SP 1303-11.4) had been performed by several crews over a period of several shifts. The prerequisites for fuel handling pursuant to RP 1505-01, "Fuel and Control Component Shuffles" were in progress, and both procedures were converging to a close. Of the prerequisites remaining to be completed, the only major items were closing the Reactor Building doors and establishment of direct communications with all refueling stations. Then the final "slow zone" interlock checks would precede the commencement of fuel movement. The operators involved in this incident had more than 10 years of experience and were aware of the requirements for handling irradiated fuel in the Reactor Building, by virtue of their experience and the extensive training which they had received prior to this event. (See Appendix A for a discussion of additional details.)

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(1) Reasons for the Violation - Continued

Part A

The Senior operator received a turnover briefing which included the interlock checks remaining to be completed and the portions of the procedure not to be performed. However, the Bridge Crew assigned to the surveillance failed to adequately prepare for performance of the interlock checks, i.e, they failed to read and understand the portions of the procedure they were to perform prior to beginning. In addition, they failed to confirm the surrounding plant conditions to ensure that all prerequisites were completed prior to engaging and handling the fuel. When the assembly was withdrawn from the reactor and the interlock procedure directed that it be moved per the refueling procedure, the crew realized that the procedural step was performed before all preparations for the movement of fuel had been completed.

Part B

GPUN concurs with the violation with respect to the inadequacy of the subject procedure. Section 6.3.3.1 of SP 1303-11.4 contained the following NOTE: "The following steps should be performed just prior to initiating the fuel shuffle per RP 1505-1." RP 1505-1 is the procedure which governs the fuel shuffle and contains all the prerequisites to ensure closure of containment and other fuel handling requirements. The Note in SP 1303-11.4 did not provide an adequate warning that all prerequisites for fuel movement must be met before proceeding with the performance of Section 6.3.3.1 of the surveillance procedure.

The procedure has been reviewed at least once every two years by the designated procedure owner in accordance with Technical Specification 6.8.2. The Note in SP 1303-11.4 has existed in the procedure for many years and had not been a cause for misunderstanding during previous performances of this procedure. For this reason, the note was not recognized by the procedure owner as being inadequate during the biennial reviews and was not changed.

Each substantive change to SP 1303-11.4 was reviewed by a qualified individual(s)/group in accordance with Technical Specification 6.5.1.1. In most cases, such reviews are performed individually by one or more members of the Plant Review Group qualified in accordance with Technical Specification 6.5.1.14, rather than in a committee meeting. Since the Note was not changed in previous biennial reviews, and was not included in the changes made in each proposed revision of the procedure, the Note did not receive additional review by members of the Plant Review Group.

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(1) Reasons for the Violation - Continued

Part B

SP 1303-11.4 was revised (in Revision 24) prior to the refueling outage to reflect modifications made to the Spent Fuel Handling Bridge. This revision did not affect Section 6.3.3.1 of the procedure. Since this section was not changed, the Plant Review Group review of changes to the procedure did not include review of the subject Note to determine adequacy. This most recent revision (Rev. 24) was reviewed in a committee meeting by four members of the Plant Review Group and a member of the Startup and Test Group familiar with the modification.

(2) Corrective steps that have been taken and the results achieved

Part A

- (a) Immediately following the incident, the Director, Operations and Maintenance, acting as the "Outage Manager," halted all fuel handling activities.
- (b) The Director O&M personally discussed the event with the operators who were directly responsible for the incident. Initially, the focus was on determining why the fuel assembly had been moved. When it was determined that the operators had focused solely on the performance of the surveillance, without taking into account existing plant conditions and the overall affect of their actions on the plant, the importance of maintaining cognizance of the overall plant status was addressed, and the need to determine what affect pending actions could have on a component, system, or the entire facility prior to the performance of physical manipulations was emphasized.
- (c) The incident was reviewed and discussed with all operators involved in fuel handling activities, and a Plant Incident Report was prepared.
- (d) All licensed operators received a subsequent briefing on the importance of reviewing and understanding the total impact of a surveillance to be performed, prior to commencing the surveillance, with emphasis on consideration of the current plant conditions. This is particularly relevant for an infrequently performed surveillance procedure with which operators are not currently familiar.
- (e) A training action item has been generated to ensure that this event will be included in the Lesson Plan for "Fuel Handling and Outage Incident Review and Responses."

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- (2) Corrective steps that have been taken and the results achieved  
(continued)

Part 3

- (f) A Temporary Change Notice to Surveillance Procedure 1303-11.4 was issued to incorporate the following changes:
- An additional precaution was added in Section 3.0, Limits and Precautions, which requires that a fuel assembly from the reactor shall not be handled unless all refueling prerequisites are met and signed off, including containment integrity.
  - At the beginning of Section 6.3.3.1, the NOTE was revised to clarify that this section of the procedure will require actual movement of fuel and that this section should be scheduled to be done at the beginning of the actual fuel shuffle activities.
  - Following the note, a WARNING was added which states that this test requires the actual movement of a fuel assembly. The SRO in charge of fuel handling should ensure that all the prerequisites for fuel movement are met prior to proceeding with this test.
  - Immediately before step 6.3.3.1.h, which calls for grapping onto a fuel assembly, a WARNING was added which states that the following steps actually grapple and withdraw a fuel assembly from the core. Ensure compliance with refueling Tech Specs and 1505-1 prerequisites.
  - The changes made in section 6.3.3.1 for the Main Bridge were also made in section 6.4.6 for the Auxiliary Bridge.

As a result of these corrective steps, there was a renewed awareness on the part of all operators that certain prerequisites must be satisfied prior to fuel handling and that a fuel handling problem could have a significant impact on the plant. The remainder of the Surveillance Procedure 1303-11.4 and the remainder of the refueling operations were completed without incident.

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(3) Corrective steps to be taken to avoid further violations

Part A

Each licensed operator will receive training which will include a discussion of this incident prior to the 10R refueling outage and at each subsequent refueling outage. The training will include a discussion of the details of the event and will address the following factors which could have prevented such an event from occurring:

- (a) The responsibility of supervisors to (1) ensure proper preparation of personnel and understanding of the planned evolution prior to commencement, and (2) provide increased oversight during the performance of infrequently accomplished or complex tasks.
- (b) The responsibility of all personnel to understand the details of tasks to be performed, as well as the expected outcome and potentially adverse affects of actions to be taken when physical manipulations are performed during infrequently accomplished or complex tasks.
- (c) The need to be alert to indications of a potential problem or misunderstanding, and the importance of being able to act or respond to potential problems as they are identified, i.e., to ask the right questions and receive meaningful, and appropriate responses.

Part B

- (d) SP 1303-11.4 will be revised to clarify specified requirements and to incorporate human factors recommendations. The procedure will be permanently revised to include the changes described above for the Temporary Change Notice, and the sequence of testing will be changed so that the required interlock checks which involve actual handling of fuel will be performed at the end of the interlock checks, and after all prerequisites for fuel handling in containment have been met. The procedure revision is expected to be completed by March 31, 1992. This date is adequate since the procedure is used only during refueling outages; the next refueling outage is scheduled for September, 1993.

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- (3) Corrective steps to be taken to avoid further violations  
(continued)

Part B

- (e) Other surveillance procedures which are infrequently performed and which could result in potentially significant adverse consequences will be identified and reviewed as a special task. Each selected procedure (including SP 1303-11.4) will be reviewed by a team including: an individual knowledgeable in the technical area; an individual from the group which performs the procedure; and, an individual knowledgeable in the area of human factors/procedure writing techniques. The selected procedures will be revised as necessary based on the committee review. Procedure revisions identified by these reviews will be completed prior to the next refueling outage scheduled for September, 1993.
- (4) Full compliance with Technical Specification 3.8.6 was achieved immediately upon the full reinsertion of the fuel assembly which had been withdrawn. No further fuel handling activities were permitted until the corrective step described in (2), (b) above was implemented.

Full compliance with Technical Specifications 6.5 and 6.8 were achieved with issuance of the Temporary Change Notice to the Surveillance Procedure 1303-11.4 on October 13, 1991.



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APPENDIX A

At TMI-1 there is no previous history of fuel handling errors of this type. To help guard against personnel errors, key aspects of our program which have contributed to repeated success included but are not limited to the following:

- Provide classroom and OJT training to all operators involved in fuel handling operation. Since fuel handling is an infrequent operation, refresher training is essential and has been provided just prior to each refueling outage.
- Provide detailed briefings to all operators involved in fuel handling operations prior to commencing fuel movement to ensure that personnel are aware of any unique or unexpected conditions such as equipment problems or modifications to equipment since last used.
- Upper management involvement in fuel handling activities. In the past, the position of fuel handling troubleshooter (i.e., a Supervisor in addition to the fuel handling SRO) was manned around the clock by a senior shift supervisor or the Plant Operations Director.

Prior to this event during the 9R refueling outage, fuel handling activities at TMI-1 were approached in the same manner as during previous outages.

- All of the operations department personnel who were involved in fuel handling activities received refresher training on the aspects of fuel handling. Training included: equipment operation as outlined in the lesson plan entitled, "Fuel Handling Equipment;" and, administrative requirements as outlined in the lesson plan entitled, "Fuel Handling Limits & Precautions".
- Several of the specific objectives in the "Fuel Handling Limits and Precautions" lesson plan dealt directly with the requirements for handling irradiated fuel in the reactor building. The following lesson plan objectives were reviewed during classroom training with all operations personnel who would be involved in fuel handling, including those involved in this incident: (a) given a set of conditions, determine from memory if the containment requirements for refueling were met; and, (b) given a set of conditions pertaining to fuel loading and refueling, determine if any of the Limiting Conditions for Operation as listed in T.S. 3.8 are not met, and what corrective actions are required.
- Additionally, fuel handling incidents from TMI-1 and other plants were reviewed as outlined in lesson plan entitled, "Fuel Handling and Outage Incident Review and Responses," to increase operator awareness of previous incidents and the means to prevent recurrence of similar incidents.