

U. S. NUCLEAR REGULATORY COMMISSION

REGION I

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Licensee: GPU Nuclear Corporation

Facility: Three Mile Island Station, Unit 1

Location: P.O. Box 480
Middletown, PA 17057

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EXECUTIVE SUMMARY

Three Mile Island Nuclear Power Station
Report No. 50-289/96-09

This integrated inspection included aspects of licensee operations, engineering, maintenance, and plant support. The report covers a seven week period of resident inspection.

Plant Operations

- In general, the conduct of operations was professional and safety-conscious. The operations and engineering departments implemented multiple detailed on-line safety risk assessments for planned safety related equipment outages. The shift Senior Reactor Operators made the appropriate entry into and exit from required Technical Specification limiting conditions of operation during surveillance testing and maintenance activities. (Sections O1 & M1)
- The use of overtime in the Operations department was minimal and well within the requirements of the administrative procedure 1031. (Section O1)
- Overall, licensee actions associated with the operability determination for the emergency core cooling system (ECCS) pumps were appropriate. Senior plant management recognized the safety significance of an NRC team finding regarding the ECCS pump swapover issue and dedicated ample resources to resolve the issue in a timely manner. The Plant Review Group's initial operability determination was correct based on the known information and displayed a conservative decision making approach for an important safety issue. The notification to the NRC and entry into the applicable Technical Specification shutdown limiting condition of operation were appropriate. (Section O1.2)
- The implementation, review and approval of the temporary procedure changes to the applicable borated water storage tank swapover procedures were technically correct and provided the operators with a significant amount of additional time to perform the key swapover evolution. The management decision to perform the new swapover evolution on the plant simulator was a good initiative to verify and validate the revised procedures in a real time environment. (Section O1.2)
- The Licensee Event Report regarding investigation of the seismic qualification of class 1E 4160 Volt AC Westinghouse circuit breakers adequately identified the root cause of the event and appropriate longer term corrective actions. (Section O8)
- The Plant Review Group (PRG) members were very effective in identifying weaknesses involving the root cause analysis and proposed corrective actions in the initial Licensee Event Report write-up regarding the seismic qualification of certain circuit breakers. However, the inspector questioned whether it was the PRG's function to review the quality into the document or if the engineers involved should

have provided a better product to the PRG. The PRG Chairman and other members of licensee management agreed that this was not the PRG's function and that a better product was expected. (Section O8)

Maintenance

- The surveillance test activities observed were performed satisfactorily and demonstrated that the associated systems could perform their design safety functions. Maintenance activities were also performed satisfactorily. The safety related work activities were reviewed in detail by the plant staff prior to scheduling and performing the job tasks. Good supervisory oversight of activities was observed. (Section M1)
- The coordination between operations, engineering, and maintenance for the decay river surveillance test and the heat sink protection system troubleshooting was excellent. (Section M1)
- The licensee exercised appropriate oversight and control of vendor activities associated with the leak seal repair of several balance of plant valves. (Section M1)

Engineering

- The quality of corrective actions identified in event or near miss capture forms (ENMCFs), as well as tracking of the actions, varied by department. The maintenance Quality Verification organization maintained a centralized tracking system for ENMCFs with specific, achievable action items assigned for longer term issues. In contrast, in the engineering department a formal mechanism was not in place to ensure that corrective actions were completed which resulted, for example, in Operations not knowing about an assigned corrective action. Also, identified corrective actions were not always specific and achievable. (Section E7.1)
- Overall, the licensee had an excellent procurement program which contained the three key elements described in the NRC Generic Letters Nos. 91-05 and 89-02. In addition, procurement engineering activities were performed with the applicable EPRI guidance and the site quality assurance plan. (Section E8.1)
- The Quality Receipt (QR) organization was a noted strength in the procurement department. The QR supervision and inspectors were professional, highly experienced, and dedicated in particular safety related work activities. Observations of receipt inspections noted an excellent use of procedures and a willingness to detect and evaluate deficiencies related to equipment and material. (Section E8.1)
- The procurement engineering documents were thorough and provided clear descriptions of each procurement item. With the exception of AP-1057, the procurement implementation procedures provided detailed and clear written guidance for the procurement personnel to follow for all work activities. (Section E8.1)

- The procurement engineering and receipt groups use the ENMCF system more than any other engineering group, have shown their willingness to be self critical, and have adopted a philosophy of continuously working to improve the procurement process. (Section E8.1)
- The Nuclear Safety Assessment audits, EPRI assessment, and procurement engineering self assessments were thorough and provided important feedback to improve the procurement program. Management support related to both internal and external audit and self assessment findings has been good and is important to ensure continued procurement program improvement. (Section E8.1)

Plant Support

- The licensee had on-shift dose assessment capability, supported by appropriate procedural guidance, and on-shift personnel were trained to perform the function. Therefore, the licensee met NRC requirements to be able to perform dose assessment at all times. (Section P8.1)

TABLE OF CONTENTS

EXECUTIVE SUMMARY	ii
TABLE OF CONTENTS	v
I. Operations	1
O1 Conduct of Operations	1
O1.2 Borated Water Storage Tank Level/Emergency Core Cooling System Pump Swapover Issue	1
O8 Miscellaneous Operations Issues	4
II. Maintenance	4
M1 Conduct of Maintenance	4
III. Engineering	6
E7 Quality Assurance in Engineering Activities	6
E.7.1 Review of Corrective Actions for Event or Near Miss Capture Forms ...	6
E8 Miscellaneous Engineering Issues	7
E.8.1 Procurement Program Review	7
IV. Plant Support	11
P8 Miscellaneous EP Issues	11
P8.1 Licensee On-shift Dose Assessment Capabilities	11
V. Management Meetings	11
X1 Exit Meeting Summary	11
X2 Meeting with GPU Nuclear Corporation Regarding Motor Operated Valve (MOV) Program Concerns	11
PARTIAL LIST OF PERSONS CONTACTED	12
ITEMS OPENED, CLOSED, AND DISCUSSED	13
LIST OF ACRONYMS USED	14
ATTACHMENT	15

Report Details

Summary of Plant Status

Unit 1 remained at 100% power throughout the inspection period.

I. Operations

O1 Conduct of Operations (71707)¹

O1.1 General Comments

Using Inspection Procedure 71707, "Plant Operations," the inspectors conducted frequent reviews of ongoing plant operations. In general, the conduct of operations was professional and safety-conscious. The operations and engineering departments implemented multiple detailed on-line safety risk assessments for planned safety related equipment outages. The applicable system Technical Specification (TS) limiting conditions for operation (LCO) were entered and exited correctly for the equipment outage times.

The inspectors reviewed administrative procedure (AP) 1031, "Nuclear Plant Staff Working Hours," which defines use of overtime for Unit 1 staff who are performing or assigned as immediate supervisors for the performance of safety related functions, and the overtime records for the weeks of October 14, 1996 through November 11, 1996 for operations personnel. The inspectors found that the use of overtime was minimal and well within the requirements of AP 1031.

O1.2 Borated Water Storage Tank Level/Emergency Core Cooling System Pump Swapover Issue

a. Inspection Scope (71707, 92700)

The resident inspectors reviewed a safety significant finding that was raised by an NRC design inspection team (NRC Inspection Report (IR) 50-289/96-201). The inspection team had identified errors in a 1992 calculation that resulted in a non-conservative setpoint used by the operators in emergency operating procedures during loss of coolant accidents to initiate swapover of emergency core cooling system (ECCS) pump suction from the borated water storage tank (BWST) to suction from the Reactor Building (RB) sump. During the initial phase of a large break loss of coolant accident (LBLOCA), the ECCS pumps would transfer water from the BWST into the reactor coolant system (RCS) to ensure adequate core cooling. As the contents of the BWST are injected into the RCS, the borated water would spill out of the postulated pipe break into the RB sump. As the BWST level reaches a low level setpoint, the plant operators would be required to swap the ECCS pump suction valves from the BWST to the RB sump before the level would result in vortexing in the BWST or air entrainment in the system.

¹Topical headings such as O1, M8, etc., are used in accordance with the NRC standardized reactor inspection report outline. Individual reports are not expected to address all outline topics.

In this inspection report, the resident inspectors specifically reviewed the licensee's operability determination for the ECCS pumps. The details of the calculation error will be documented in IR 50-289/96-201. Any potential enforcement action will be documented in a future NRC inspection report.

b. Observations and Findings

On December 20, 1996, the licensee held a Plant Review Group (PRG) meeting to address the operability of the ECCS pumps. Based on extensive evaluation of the issue including additional computer modeling, the PRG determined that the pumps were inoperable. Following this determination, the control room shift supervisor (SS) entered Technical Specification (TS) 3.0.1, "General Action Requirements." TS 3.0.1 states in part that "when a limiting condition for operation (LCO) is not met, within one hour, action shall be initiated to place the Unit in a condition in which the specification does not apply, by placing the Unit in: at least hot standby within the next six hours." The SS entered TS 3.0.1 at 4:05 a.m. on December 21, 1996. After the implementation, review and approval of temporary procedure changes (TCNs) to the applicable Abnormal Transient Procedures (ATPs) (the emergency operating procedures at TMI), the SS exited the LCO at 5:01 a.m. on December 21. The BWST swapover condition was also determined to meet the NRC reporting criteria per 10 CFR 50.72(b)(1)(ii) and 50.73(a)(2)(ii), "any event or condition during operation that results in the condition of the nuclear power plant being in a condition that is outside the design basis of the plant." All required notifications were made promptly to the NRC Headquarters, resident inspector and required site personnel.

The TCNs which were implemented, changed the setpoint used by the operators in the ATPs to initiate swapover of ECCS pump suction from the BWST to suction from the RB sump. Specifically, the TCNs were implemented to instruct the operators to open the RB sump recirculation valves (DH-V6A/B) at a BWST level of 9.5 ft. and to close the BWST isolation valves (DH-V5A/B) at the 6.33 ft. level. Previously, the operators did not initiate the swapover until the 6.33 ft. level. Other immediate licensee corrective action included management briefings of the on-shift crew to ensure control room personnel were aware of the air entrainment concern and the specific procedural changes being implemented to address the concern. Subsequent corrective actions included, briefing of oncoming shifts by plant management, and a real time checkout of the revised procedural steps conducted at the TMI-1 simulator.

The resident inspectors discussed the issue with licensee engineering and operations staff and management, attended portions of the PRG meeting on December 20, and reported to the site on December 21 to review the licensee's actions in response to this issue. In addition, a telephone conference call was held between NRC Region I and the Office of Nuclear Reactor Regulation (NRR) management and staff, and licensee management on December 21, 1996, to discuss the PRG determination.

The inspectors found that the operations engineer promptly recognized the need to address the operability of the ECCS pumps upon becoming aware of the calculation errors and brought the issue to the attention of the PRG Chairman. In addition, the licensee evaluations and associated BWST level change to open DH-V-6A/B at 9.5 ft. versus 6.33 ft., adequately addressed the concern and provided the control room operators with

sufficient time to perform the ECCS pump swapover before the system would experience vortexing or air entrainment. The procedure changes relaxed the previous time constraints related to the BWST swapover and resulted in a much better human factored solution to the original design issue.

The notification to the NRC and entry into the applicable TS shutdown LCO were appropriate. At the day shift turnover on December 21, 1996, the Operations Director provided a detailed and thorough review of the BWST swapover issue with the control room personnel. The review included the PRG evaluation results, entry into TS LCO 3.0.1, reportability, alarm setpoint changes, and the ATP procedure changes. The operators understood the significance of the issue and asked some clarifying questions to ensure that they understood management's new expectations related to a postulated LBLOCA. A written summary was provided to all of the operators for their own reference.

The inspectors observed the LBLOCA (hot leg failure) at the TMI simulator on December 23, 1996. The scenario was coordinated by operations and engineering to determine the plant response and operator response time using the new BWST level swapover procedures. The simulator response was representative of the actual plant response and included initial plant values based on the worse case accident conditions. The operators had ample time to perform the new swapover actions with a significant amount of extra margin before the BWST level reached potential system vortex limits. The operations and training personnel recommended several changes to enhance the operators' ability to perform the BWST swapover evolution including adding a red stripe to the BWST low level overhead alarm annunciator window so the alarm is easier to see and carries a higher priority and adding a colored mark to the BWST control panel level indicator to mark the low level setpoint value. In addition the simulator and associated training materials would be changed prior to the next training cycle. Also, the inspectors verified that the BWST swapover evolution is a mandatory job performance measure (JPM) that is performed by all licensed operators each training cycle. The JPM task is in addition to the unannounced LBLOCA simulator transients that are performed on a routine basis during licensed operator training.

c. Conclusions

Overall, licensee actions associated with this operability determination were appropriate. Senior plant management recognized the safety significance of an NRC team finding regarding the ECCS pump swapover issue and dedicated ample resources to resolve the issue in a timely manner. The PRG's initial operability determination was correct based on the known information and displayed a conservative decision making approach for an important safety issue. The notification to the NRC and entry into the applicable TS shutdown LCO were appropriate. The implementation, review and approval of the TCNs to the applicable BWST swapover procedures were technically correct and provided the operators with a significant amount of additional time to perform the key swapover evolution. The management decision to perform the new swapover evolution on the plant simulator was a good initiative to verify and validate the revised procedures in a real time environment.

O8 Miscellaneous Operations Issues

- O8.1** (Closed Licensee Event Report (LER) 50-289/96-01): investigation of the seismic qualification of class 1E 4160 Volt AC Westinghouse circuit breakers. This event was discussed in Inspection Report 50-289/96-07. Immediate corrective actions implemented by the licensee at that time were found to be excellent. During this inspection, the inspector found that the LER adequately identified the root cause of the event and that the licensee had identified appropriate longer term corrective actions. The licensee noted that when the breakers are placed in the test position for short periods to perform surveillance testing, preventive maintenance tasks, and troubleshooting activities, the breakers are also not seismically qualified. The licensee plans to further evaluate this situation and issue a supplement to this LER by March 31, 1997. The licensee stated that no breakers in the class 1E 4160 volt buses are currently in the test position and none of the breakers will be moved to the test position before the evaluation results prescribing the actions necessary to attain seismic qualification for the breakers in the test position are available. The inspectors will review this issue further upon issuance of the LER supplement.

As part of the LER review, the inspectors attended two Plant Review Group (PRG) meetings during which the LER was reviewed and discussed. The inspector noted that the PRG members were very effective in identifying weaknesses involving root cause analysis and proposed corrective actions in the initial LER write-up. However, the inspector questioned whether it was the PRG's function to review the quality into the document or if the engineers involved should have provided a better product to the PRG. The inspectors discussed this issue with the PRG Chairman and other members of licensee management, who agreed that this was not the PRG's function and that a better product was expected.

II. Maintenance

M1 Conduct of Maintenance (62707, 61726)

M1.1 General Comments

a. Inspection Scope

The inspectors observed all or portions of the following maintenance and surveillance work activities:

- Job Order No. 126703, "Heat Sink Protection System Switch Contact Resistance Checks."
- Job Order No. 121608, "'C' Travelling Water Screen Repairs."
- Job Order No. 118488, "Auxiliary Building Sump Modification."
- Job Order No. 128793, "Repair MO-V-9A Body to Bonnett Leak by Leak Sealing."

- Job Order No. 128795, "Repair MS-V-5B Body to Bonnett Leak by Leak Sealing."
- Job Order No. 129222, "Repair FW-V-1015 Body to Bonnett Leak by Leak Sealing."
- Surveillance Procedure 1301-1, "Shift and Daily Checks."
- Surveillance Procedure 1300-6B, "Decay River Leakage Exam for IST."
- Surveillance Procedure 1300-6G, "Steam Driven Emergency Feedwater System Leakage IST."
- Surveillance Procedure 1300-3G, "Steam Driven Emergency Feedwater Pump EF-P-1 Quarterly Run and Valve Stroke Test."

b. Observations and Findings

Troubleshooting related to the Heat Sink Protection System (HSPS), an automatic control system designed to isolate a faulted steam generator, was properly planned and coordinated to minimize the potential plant impact. A written on line risk safety assessment was performed prior to the start of work to ensure the plant conditions could support the work activity without an impact on the plant. The troubleshooting work was continuously supervised by the instrumentation and controls (I&C) foreman. The I&C technicians and supervisor were very knowledgeable about the work task and understood the switch contact resistance check interrelationship with the HSPS and plant operation. After troubleshooting, the HSPS was restored to normal operation.

The decay river (DR) water pipe integrity was checked for leak-tightness using Surveillance Procedure 1300-6B, "Decay River Leakage Exam for IST." The test frequency is three times in a ten year period to meet the requirements of TS 4.2.1. The tests were well coordinated between operations and engineering personnel and only one safety related train was removed from service to perform the test. The shift senior reactor operators (SROs) entered and exited the applicable TS LCO for the time that the DR system was considered inoperable. The pipe was verified to be leak-tight then returned to the normal standby alignment.

During the inspection period, the licensee decided to perform leak seal repairs of three balance of plant valves due to body to bonnett gasket leaks in each valve. The NRC has shown heightened interest in leak seal repairs as a result of industry problems in this area over the past several years. The inspectors reviewed activities associated with the leak seal repair of the valves including engineering evaluation request (EER) nos. 127874, 127925 and 128356 and Corrective Maintenance procedure 1410-Y-44, "Temporary Leak Sealing Repairs". The inspectors also discussed the licensee plans for repairing these valves with an NRC Office of Nuclear Reactor Regulation specialist. The inspectors observed the work activities associated with MO-V-9A and MS-V-5B. The inspectors found that the licensee had appropriate procedures in place for controlling the activity, that they exercised good control of the vendor's activities and there was good continuous oversight of the work by engineering and radiological control personnel and maintenance supervision.

c. Conclusions

The surveillance test activities observed during this inspection were performed satisfactorily and demonstrated that the associated systems could perform their design safety functions. Maintenance activities were also performed satisfactorily. The safety related work activities were reviewed in detail by the plant staff prior to scheduling and performing the job tasks. The shift SROs made the appropriate entry into and exit from required LCOs. Good supervisory oversight of activities was observed.

The coordination between operations, engineering, and maintenance for the DR surveillance and HSPS troubleshooting was excellent. The licensee exercised appropriate oversight and control of vendor activities associated with the leak seal repair of several balance of plant valves.

III. Engineering

E7 Quality Assurance in Engineering Activities (37551, 40500, 92903)

E.7.1 Review of Corrective Actions for Event or Near Miss Capture Forms

a. Inspection Scope

The inspectors reviewed a sample of Event or Near Miss Capture Forms (ENMCFs) for events occurring during September and October 1996 which had been evaluated by the licensee staff and were considered closed as of November 19, 1996. ENMCFs are documents used to capture events, near misses or positive performance from which lessons may be learned. Administrative Procedure (AP) 1080, "Human Performance Event or Near Miss Reporting" describes the use of the ENMCF. The inspectors were specifically reviewing the completed forms to evaluate licensee corrective actions, and to determine if the licensee had an effective method in place to ensure that identified corrective actions were tracked to completion.

b. Observations and Findings

AP 1080 does not address the tracking and closure of corrective actions identified as a result of ENMCF evaluations. The closed status of the list of ENMCFs provided to the inspectors for this inspection did not reflect the status of the corrective actions identified by the evaluators, but only that the evaluations had been completed. Instead, each department has the responsibility to provide for the tracking and closing out of corrective actions.

From the sample of ENMCFs reviewed, the inspectors found that the quality of corrective actions as well as tracking of the actions varied by department. The maintenance Quality Verification organization maintained a centralized tracking system for ENMCFs with specific, achievable action items assigned for longer term issues. Through review of files and discussion with Quality Verification personnel, the inspectors found that the corrective actions were appropriate and were either completed or being tracked.

In contrast, the inspectors found that in the engineering department, the individual evaluators identified corrective actions, however a formal mechanism was not in place to ensure that the corrective actions were completed. For example, in ENMCF 96-226, the engineer identified a corrective action for the auxiliary operators (AOs), but the operations department was not made aware of the recommended corrective action. Therefore, the action was not completed. For other ENMCFs, the identified corrective actions were not specific, achievable items. For these ENMCFs (for example ENMCFs 96-260 and 96-361), although corrective actions were identified as part of the ENMCFs, it was not clear what specific corrective actions the licensee completed or intended to complete. In addition, the completion of the corrective actions was not tracked or documented.

The inspectors discussed these observations with both licensee staff and management personnel. They are currently revising AP 1080 to address corrective action tracking and closure as part of their new Corrective Action Process (CAP) which they intend to implement by March 3, 1997. The licensee intends to include all 1997 ENMCFs in the new process for the purpose of tracking and closure of corrective actions.

c. Conclusions

The quality of corrective actions identified in ENMCFs, as well as tracking of the actions, varied by department. The maintenance Quality Verification organization maintained a centralized tracking system for ENMCFs with specific, achievable action items assigned for longer term issues. In contrast, in the engineering department a formal mechanism was not in place to ensure that corrective actions were completed which resulted, for example, in Operations not knowing about an assigned corrective action. Also, identified corrective actions were not always specific and achievable.

E8 Miscellaneous Engineering Issues

E.8.1 Procurement Program Review

a. Inspection Scope (38701, 38702, 38703)

The inspectors reviewed the procurement and commercial grade dedication programs using NRC inspection procedures 38701, "Procurement Program," 38702, "Receipt, Storage, and Handling of Equipment and Material Program," and 38703, "Commercial Grade Dedication." The inspection focused on TMI's implementation of the procurement and commercial grade dedication of safety related items. In addition, the inspectors reviewed TMI's conformance with regulatory requirements, licensee commitments, and industry standards related to the procurement process.

b. Observations and Findings

The TMI procurement program contained the three key elements described in the NRC Generic Letters Nos. 91-05, "Licensee Commercial Grade Procurement and Dedication Programs," and 89-02, "Actions to Improve the Detection of Counterfeit and Fraudulently Marketed Products." The three elements were: 1) involvement of the engineering staff in procurement and product acceptance; 2) effective receipt inspections and testing

programs; and 3) engineering based programs for review, testing, and dedication of commercial grade products for safety related applications. In addition, procurement engineering activities were performed with the applicable electric power research institute (EPRI) guidance and the site quality assurance plan. The inspectors noted a few items for improvement related to the program administrative procedure AP 1057, "TMI Purchase Requisition Review and Approval," and one event or near miss capture form (ENMCF).

Observation of Receipt Inspection and Commercial Grade Dedication Activities

The quality receipt (QR) organization was a noted strength in the procurement department. The QR supervision and inspectors were professional, highly experienced, and dedicated in particular safety related work activities. The inspectors observations of receipt inspections noted an excellent use of procedures and a willingness to detect and evaluate deficiencies related to equipment and material. The QR procedures were detailed and provided clear direction for the normal receipt of material, and more importantly, the disposition of material deficiencies. Two of the seven observations resulted in the detection and evaluation of minor equipment deficiencies. The problems were evaluated in detail and the QR inspectors provided thorough documentation to address the item.

The commercial grade dedication evaluations and documentation were detailed and comprehensive, no problems were noted. The onsite commercial grade dedication facility was maintained and controlled in excellent condition by knowledgeable personnel.

Procurement Engineering Evaluations and Documentation

The inspectors reviewed eight commercial grade dedication (CGD) packages, six technical evaluation and replacement item (TERI) documents, and four classification downgrade evaluations (CGEs). The engineering documents were thorough and provided clear descriptions of each procurement item.

An example of the inspectors findings was noted for the review of the engineering evaluations to down grade the safety related power operated relief valve (PORV) block valve body to bonnet gasket to a non-safety related status, CGE-T1-95-0013. The engineering evaluation and documentation were complete and detailed. The inspectors reviewed the documentation to support the gasket downgrade to a non-safety related status. The procurement engineer provided the EPRI reference guidelines that allowed the down grade of the PORV gasket. EPRI reference NP-6895, "Safety Classification Criteria," section 6.1.1, and EPRI technical evaluation No. CGIGA01, provided the functional description of the gasket and the evaluation to support the downgrade of the gasket to a non-safety related status. The inspectors concluded that the engineering documentation appropriately supported the gasket downgrade.

Administrative Controls

The inspectors reviewed the procurement program administrative procedure AP-1057, "TMI Purchase Requisition Review and Approval," and the following list of Plant Engineering Department Administrative procedures:

PEP-1A, "Review and Approval of Procurement Requisitions."
PEP-1B, "Safety Classification and Technical Evaluation."
PEP-1C, "Technical evaluation of Replacement Items (TERI)."
PEP-1D, "Dedication of Commercial Grade Items."
PEP-2A, "Quality Receipt Inspection Program at TMI."
PEP-3, "Plant Engineering Evaluations."

With the exception of AP-1057, the procurement implementation procedures provided detailed and clear written guidance for the procurement personnel to follow for all work activities. AP-1057, Rev. 11, contained outdated information that was initially reviewed and submitted for a procedure change request (PCR) in the May 1996 timeframe. The May PCR was cancelled due the engineering department integration review and re-organization. In December 1996, after the re-organization, the procedure was revised to correct the outdated program information and to update the new engineering organization titles and job responsibilities. In addition, a Nuclear Safety Assessment (NSA) review provided three procedure improvements which were addressed in the current procedure revision. The inspectors noted the importance of maintaining the procurement program procedure up to date because of the potential impact on safety related equipment and associated quality assurance (QA) commitments.

The inspectors reviewed the event near miss capture form (ENMCF) data base related to procurement program issues. The procurement personnel routinely submit ENMCFs to document and resolve minor problems. The procurement engineering and receipt groups use the ENMCF system more than any other engineering group, have shown their willingness to be self critical, and have adopted a philosophy of continuously working to improve the procurement process. One minor problem was noted for ENMCF No. 96-158, "Flapper for NR-V-22C Graded as Other, but Required NSR." The ENMCF was categorized as a category 3 problem, for trending only. Based on guidance in AP 1080, "Human Performance Event or Near Miss Reporting," section 4.4.1.b, the ENMCF should have been categorized as a category 2, which would have resulted in an evaluation requiring a more in depth review and root cause analysis.

Program Audits and Self Assessments

The NSA independent audits were thorough and provided important feedback about the procurement program. The audit findings were focused on improving a good program and correcting minor problems. An example of the NSA findings was noted for the AP 1057 procedure review. The review questioned the procurement programs ability to meet a site QA plan criteria. The NSA comment was documented and addressed during the two year procedure review and associated procedure change request.

In addition to the onsite procurement audit, an independent review was performed by EPRI personnel in the March 1994 timeframe. The assessment concluded that the overall quality of the TMI procurement engineering program was very good. A few minor issues were noted related to procedural enhancements and implementation discrepancies. The engineering procurement packages were of high caliber and reflected the engineering expertise within the procurement program. The inspectors reviewed the minor discrepancies and concluded that TMI addressed all of the EPRI findings.

The inspectors found that management support related to both internal and external audit and self assessment findings has been good and is important to ensure continued procurement program improvement.

c. Conclusions

Overall, the licensee had an excellent procurement program which contained the three key elements described in the NRC Generic Letters Nos. 91-05 and 89-02. In addition, procurement engineering activities were performed with the applicable EPRI guidance and the site quality assurance plan. The QR organization was a noted strength in the procurement department. The QR supervision and inspectors were professional, highly experienced, and dedicated in particular safety related work activities. The inspectors observations of receipt inspections noted an excellent use of procedures and a willingness to detect and evaluate deficiencies related to equipment and material.

The procurement engineering documents were thorough and provided clear descriptions of each procurement item. With the exception of AP-1057, the procurement implementation procedures provided detailed and clear written guidance for the procurement personnel to follow for all work activities. AP-1057, Rev. 11, contained outdated information that was initially reviewed and submitted for a procedure change request (PCR) in the May 1996 timeframe. The May PCR was cancelled due the engineering department integration review and re-organization. The inspectors noted the importance of maintaining the procurement program procedure up to date because of the potential impact on safety related equipment, associated quality assurance commitments, and to maintain program standards and consistency.

The procurement engineering and receipt groups use the ENMCF system more than any other engineering group, have shown their willingness to be self critical, and have adopted a philosophy of continuously working to improve the procurement process. One minor problem was noted for an ENMCF that was improperly categorized.

The NSA audits, EPRI assessment, and procurement engineering self assessments were thorough and provided important feedback to improve the procurement program. Management support related to both internal and external audit and self assessment findings has been good and is important to ensure continued procurement program improvement.

IV. Plant Support

P8 Miscellaneous EP Issues (71750, TI 2515/134)

P8.1 Licensee On-shift Dose Assessment Capabilities

During the week of October 7, 1996, a region-based inspector conducted an in-office telephone interview with the licensee in order to carry out the NRC's Temporary Instruction (TI) 2515/134, "Licensee On-Shift Dose Assessment Capabilities". The goal of the TI was to gather information on the licensee's capabilities to perform on-shift dose assessment. The inspector determined that the licensee had on-shift dose assessment capability, supported by appropriate procedural guidance, and that on-shift personnel were trained to perform the function. Therefore, the licensee met NRC requirements to be able to perform dose assessment at all times. The results of the evaluation were forwarded to NRC Headquarters personnel.

V. Management Meetings

X1 Exit Meeting Summary

At the conclusion of the reporting period, the resident inspector staff conducted an exit meeting with TMI management on January 10, 1997, summarizing Unit 1 inspection activities and findings for this report period. TMI staff comments concerning the issues in this report were documented in the applicable report section. No proprietary information was identified as being included in the report.

X2 Meeting with GPU Nuclear Corporation Regarding Motor Operated Valve (MOV) Program Concerns

On November 22, 1996, a public meeting was held between the NRC and GPU Nuclear Corporation at the NRC Region I Office in King of Prussia, Pennsylvania. The purpose of the meeting was to discuss the results of an independent review of the TMI-1 MOV program and deficiencies that were documented in NRC IR 50-289/96-05. GPU presented their planned corrective actions to address the MOV issues and program deficiencies. The handouts used at the meeting are attached to this report.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

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R. Keaten, Vice President Engineering
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R. Maag, Plant Maintenance Director
S. Mervine, Support Training Manager
J. Moore, NSCC - Staff
M. Nelson, Manager Nuclear Safety
L. Noll, Plant Operations Director
M. Ross, Director, Operations and Maintenance
J. Schork, Regulatory Affairs
G. Skillman, Technical Functions Site Director
P. Walsh, Engineering Director
J. Wetmore, Manager, Regulatory Affairs

* senior licensee manager present at exit meeting on January 10, 1997.

NRC

J. Norris, TMI Project Manager, NRR
B. Buckley, TMI Project Manager, NRR

INSPECTION PROCEDURES USED

IP 37551: Onsite Engineering
IP 38701: Procurement Program
IP 37802: Receipt, Storage, and Handling of Equipment and Material Program
IP 37803: Commercial Grade Dedication
IP 40500: Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems
IP 61726: Surveillance Observations
IP 62707: Maintenance Observation
IP 71707: Plant Operations
IP 71750: Plant Support Activities
IP 92700: Event Reports
IP 92901: Followup - Plant Operations
IP 92902: Followup - Maintenance
IP 92903: Followup - Engineering
IP 92904: Followup - Plant Support
TI 2515/134: Licensee On-Shift Dose Assessment Capabilities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

LER 50-289/96-01: "Investigation of the Seismic Qualification of Class 1E 4160 Volt AC Westinghouse Circuit Breakers."

Updated

None

LIST OF ACRONYMS USED

AP	Administrative Procedure
ATP	Abnormal Transient Procedure
BWST	Borated Water Storage Tank
CAP	Corrective Action Process
CFR	Code of Federal Regulations
DR	Decay River
ECCS	Emergency Core Cooling System
EER	Engineering Evaluation Request
ENMCF	Event or Near Miss Capture Form
EPRI	Electric Power Research Institute
HSPS	Heat Sink Protection System
I&C	Instrumentation and Controls
IR	Inspection Report
IST	Inservice Testing Program
JO	Job Order
JPM	Job Performance Measure
LBLOCA	Large Break Loss of Coolant Accident
LCO	Limiting Condition of Operation
LER	Licensee Event Report
MOV	Motor Operated Valve
NRC	Nuclear Regulatory Commission
NSA	Nuclear Safety Assessment
PCR	Procedure Change Request
PORV	Power Operated Relief Valve
PRG	Plant Review Group
QR	Quality Receipt
QV	Quality Verification
RB	Reactor Building
RCS	Reactor Coolant System
SRO	Senior Reactor Operator
SS	Shift Supervisor
TI	Temporary Instruction
TS	Technical Specification

**THREE MILE ISLAND
MOTOR-OPERATED
VALVE INDEPENDENT
REVIEW
PRESENTATION**

NRC REGION I /GPUN
MANAGEMENT MEETING

NOVEMBER 22, 1996

JOHN C. FORNICOLA

MOV INDEPENDENT REVIEW

- **COMPLETE ASSESSMENT OF
PROGRAM INCLUDING:**

- » THE GPU NUCLEAR RESPONSE TO
SPECIFIC CONCERNS RAISED BY THE
NRC AND ASSOCIATED CORRECTIVE
ACTIONS
- » SPECIFIC CONCERNS IDENTIFIED BY THE
GPU NUCLEAR SELF ASSESSMENT AND
ASSOCIATED CORRECTIVE ACTIONS
- » CONCERNS IDENTIFIED BY THE REVIEW
TEAM MEMBERS BASED ON THEIR
RESPECTIVE AREA OF EXPERTISE

MOV INDEPENDENT REVIEW

MEMBERSHIP

Mr. John Fornicola, GPU Nuclear, Inc. - Team Leader

Mr. Paul Damerell, MPR Associates

Dr. Thomas Gerber, Structural Integrity Associates

Mr. John Hosler, EPRI

Mr. David Lewis, Shaw, Pittman, Potts & Trowbridge

Mr. Philip Moor, GPU Nuclear, Inc.

Mr. Julian Nichols, MPR Associates

Mr. Dann Smith, GPU Nuclear, Inc.

MOV INDEPENDENT REVIEW

● OVERVIEW:

- » CONDUCTED INTERVIEWS
REVIEWED DOCUMENTS
TECHNICAL REVIEWS
- » TMI REPORT ISSUED ON OCTOBER 7, 1996
- » MAJOR FINDINGS WERE IN THE TECHNICAL,
PROGRAMMATIC AND MANAGEMENT AREAS
- » CAUSAL FACTORS WERE IDENTIFIED
- » RECOMMENDATIONS WERE MADE IN TWO
CATEGORIES
 - RECOMMENDATIONS (19) CONSIDERED
NECESSARY FOR GL 89-10 CLOSURE
 - RECOMMENDATIONS(11) TO IMPROVE THE
GL 89-10 PROGRAM IN THE FUTURE AND TO
BENEFIT OTHER SIMILAR PROGRAMS

SIGNIFICANT TECHNICAL FINDINGS

- INADEQUATE BASIS FOR SELECTION OF VALVE FACTORS
- WEAK-LINK ANALYSES DO NOT COMBINE SEISMIC LOADS WITH VALVE THRUST
- UNWEDGING LOAD ANALYSES FOR GATE VALVES HAVE NOT BEEN PERFORMED
- TECHNICAL BASIS FOR BUTTERFLY VALVE TORQUE PREDICTIONS IS UNCLEAR AND UNREVIEWED BY GPUN

SIGNIFICANT PROGRAMMATIC FINDINGS

- INSUFFICIENT PROCEDURES FOR PROGRAM ACTIVITIES
- RESOLUTION OF TECHNICAL CONCERNS WILL REQUIRE SIGNIFICANT DOCUMENTATION AND DESIGN VERIFICATION

SIGNIFICANT PROGRAM MANAGEMENT FINDINGS

- INEFFECTIVE PROGRAM MANAGEMENT, CONTRACTOR OVERSIGHT AND CONFLICT RESOLUTION
- SIGNIFICANT ENGINEERING EFFORT REQUIRED TO COMPLETE THE PROGRAM

SIGNIFICANT CAUSAL FACTORS

- PROGRAM PROBLEMS AND INTERPERSONAL CONFLICTS WERE IDENTIFIED BUT NOT RESOLVED
- ACCOUNTABILITY FOR PROGRAM RESPONSIBILITY WAS LACKING. THIS HINDERED TIMELY RESOLUTION OF PROBLEMS
- SCHEDULE PRESSURE CONTRIBUTED TO LESS THAN ADEQUATE DOCUMENTATION PRACTICES AND QUESTIONABLE TECHNICAL JUDGMENTS

MOV INDEPENDENT REVIEW RECOMMENDATIONS

- **RECOMMENDATIONS NECESSARY FOR PROGRAM CLOSURE:**

- » **TECHNICAL IMPROVEMENTS**

- VALVE FACTOR DETERMINATION

- USE PPM WHERE POSSIBLE (OR SELECT 0.65)
 - ESTABLISH APPLICABILITY OF TEST DATA

- REVISE WEAK LINK ANALYSIS

- INCLUDE SEISMIC LOADS
 - REVISE ALLOWABLE STRESSES

- EVALUATE UNWEDGING LOADS

- CALCULATE MAXIMUM UNWEDGING THRUST (EPRI METHOD)
 - REVISE TEST PROCEDURE TO INCLUDE UNWEDGING THRUST MEASUREMENT

- JUSTIFY BUTTERFLY VALVE TORQUE

- OBTAIN AND REVIEW VENDORS' CALCULATIONS AND VALIDATION BASIS

MOV INDEPENDENT REVIEW RECOMMENDATIONS

» PROGRAM MANAGEMENT

- ASSIGN A DEDICATED
MANAGER/COORDINATOR**
- IMPLEMENT A PROJECT PLAN**
- ASSEMBLE A FULL-TIME CO-LOCATED
TEAM**
- CONDUCT TEAM BUILDING ACTIVITIES**

» PROGRAM CONTROLS

- UTILIZE A FORMAL, CONTROLLED
PROGRAM DOCUMENTATION
PROCESSES**
- IDENTIFY REQUIRED DOCUMENTATION,
DESIGN VERIFICATION, ASSESSMENT,
QUALITY VERIFICATION, MONITORING
ACTIVITIES**

MOV INDEPENDENT REVIEW RECOMMENDATIONS

- **RECOMMENDATIONS TO IMPROVE THE PROGRAM AND TO BENEFIT OTHER SIMILAR PROGRAMS:**
 - » STRENGTHEN PROBLEM IDENTIFICATION AND RESOLUTION
 - » USE THE GPUN PROJECT APPROVAL AND MANAGEMENT PROCESS
 - » ENSURE CONTRACTORS ADEQUATELY DOCUMENT THEIR WORK
 - » USE EXPERTS, AS APPROPRIATE, TO ASSIST IN ASSESSMENTS
 - » REVIEW THE GPUN CULTURE AND APPROACH TO TECHNICAL DECISION-MAKING



Response To Independent Review Recommendations

Program Management

- Full Time Dedicated Program Coordinator
- Detailed Plan Implemented - All tasks for closeout tracked
- A Team of Seven Full-time & Part Time Engineers (4 -10) As Necessary Located at TMI
- Weekly Status and Problem Discussion Meetings Plus Informal Team Building Activities

Program Controls

- New Program Description Will Be Developed (Topical Report)
- Changes To Program Description Require Design Verification
- Other Program Requirements Will Be Contained In A TMI Administrative Procedure (AP)
- Changes To AP's Require Safety Determination (50.59 screening)

Technical Improvements

- New Design Verified Valve Factor Report
 - Significant Number of Valves Justified By PPM (27 of 44 gate valves)
 - All VF Conservative, Well Defined and Document
 - Default VF - 1.0 Gate, 1.1 Globe, 1.4 Blowdown Globe

More Technical Improvements

- Review And Revise All Weak Link Analysis.
- Unwedging Loads Evaluated
- Reviewing Vendor Data for Butterfly Valve Torque
- EPRI Method For ROL Used Valves Without DP Test Data

More Technical Improvements

- Review And Revise All Thrust/Torque/Setpoint Calcs
- Review And Revise Design Basis DP Calculations

BenchMarking

- Program Supported and Reviewed By Duke Engineering Services (Vectra)
- Reviewed Program Documentation From Other Plants (Crystal River 3, Connecticut Yankee, Maine Yankee, Oyster Creek, ANO)

Long Term Program Improvements

- All Nuclear Employees Have Received Training on Reporting Safety Concerns
- Engineering Employees Are Participating in a Two Day Seminar On Handling Change
- Senior And Middle Managers Have Participated In Team Building Workshops

Long Term Program Improvements

Senior Staff Are Reviewing Methods to:

- Upgrade Performance from “Above Average” to “Excellent”
- Respond More Effectively To Signs Of Programatic Problems
- Remove Cultural Barriers To Improved Performance
- Improve Work Processes

11/22/96 NRC/GPUN Meeting on MOV Review

<u>NAME</u>	<u>TITLE</u>	<u>AFFILIATION</u>
A. Randolph Blough	DEP,DRS	DRS
Howard Crawford	Manager ER Program	GPUN
P. Damerell	Engineer	MPR
Doug Dempsey	Reactor Engineer	NRC
Peter Eslegroth	Chief, DRP-7,RI	NRC
John Fornicola	L&RA Dir	GPUN
Samuel Hansell	Resident Inspector,TMI	NRC
William Kane	Dep Reg Admin	NRC
R. W. Keaten	V.P. Engineering	GPUN
Gene Kelly	DRS Systems Chief	NRC
T. J. Kenny	SR Reactor Inspector	NRC
David Lewis	Counsel	Shaw Pittman
S. Maingi	Nuclear Engineer	PA-BRP
S. Queen	GPUN-Programs Eng.	GPU
P. S. Walsh	Dir Equip Reliability	GPUN
Jack Wetmore	Mgr-TMI Reg Affairs	GPUN

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