U. S. NUCLEAR REGULATORY COMMISSION
REGION I

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Licensee:	GPU Nuclear Corporation P.O. Box 480 Middletown, PA 17057
Facility:	Three Mile Island Station, Units 1 and 2
Location:	Middletown, Pennsylvania
Inspection Period:	January 19, 1993 - February 22, 1993
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3/8/93
Date

Inspection Summary

The NRC Staff conducted safety inspections of Unit 1 power operations and Unit 2 cleanup activities. The inspectors reviewed plant operations, maintenance and surveillance, radiological controls, emergency preparedness, and security as they related to plant safety.

Results: An overview of inspection results is in the executive summary.

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EXECUTIVE SUMMARY

Three Mile Island Nuclear Power Station
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Plant Operations

Overall, the inspection found that shift turnovers were comprehensive and accurate, and adequately reflected plant activities and status. Control room operators effectively monitored plant operating conditions and made necessary adjustments. Housekeeping was satisfactory. Overall, the licensee conducted Unit 1 plant operations in a safe manner.

During the performance of a surveillance to test the engineered safety feature actuation system circuitry that starts the building spray pumps at 30 psig reactor building pressure, one pressure switch failed to operate. Reactor building pressure is sensed by 6 pressure switches that are divided into two trains with a two out of three logic. The failed pressure switch caused entry into Technical Specification (TS) 3.0.1 (General Action Requirement.) The licensee attempted to jumper the failed pressure switch to provide a one out of two logic. However, the licensee inadvertently jumpered only the pressure switch indication circuit rather than the building spray pump starting circuit logic. This resulted in the licensee remaining in TS 3.0.1 for four additional hours until this situation was discovered and corrected. The safety significance is considered minimal because only one building spray system train was affected. The inspector concluded that the licensee's review of plant drawings to determine how to jumper the failed pressure switch was weak.

The Unit-2 accident generated water (AGW) evaporator continues to operate and approximately 1,617,000 gallons of AGW have been vaporized to the atmosphere at the close of the inspection period. The licensee failed to sample the Unit 2 borated water storage tank (which is used to store AGW) after each 100,000 gallons of AGW processed as required by the evaporator procedure. The purpose of the sample is to assure there is no significant change in the BWST radionuclide concentration. The safety significance is considered minimal and this issue is characterized as a non-cited violation.

The licensee did not log when the Auxiliary and Fuel Handling Building ventilation flow decreased below the Technical Specification (TS) band. Since the licensee still performed the TS action statements associated with an inoperable set of ventilation fans, the inspector concluded that regulatory requirements were met but log keeping practices were weak. In addition, one set of ventilation fans that was previously demonstrated to be inoperable was not tested to verify operability before exiting the associated TS action statement. Since the operations staff discussed the appropriateness exiting the action statement with the Operations Director, the inspector determined that the communications between the Operations Director and the operations staff were not effective in ensuring the proper restoration and verification of equipment operability.

Due to an inadequate procedure and poor communications between an Auxiliary Operator and a Control Room Operator, the licensee isolated/bypassed both trains of the decay heat river water system to the decay heat closed cooling water system heat exchangers for about three hours. This issue remains unresolved pending further licensee evaluation of the effect of the misalignment on plant equipment during a postulated loss of coolant accident.

Radiological Controls

During each Auxiliary Building tour the inspector paid particular attention to ensure radiological surveys were current and that proper warning signs were posted. The inspector noted no discrepancies and concluded that overall radiological controls were good.

Maintenance and Surveillance

The inspector inspected the licensee's Limitorque training for electrical technicians. The inspector concluded that the training provided was very comprehensive and overall the training was excellent. However, the inspector noted that the some preventive maintenance insight provided in the training should be incorporated into the applicable preventive maintenance procedure. The licensee agreed to incorporate the necessary additional detail.

Security and Emergency Preparedness

On February 7, 1993, the licensee declared a Site Area Emergency when an unauthorized vehicle crashed through the protected area fence and a Turbine Building roll-up door. The intruder was apprehended approximately four hours later. The NRC dispatched an Incident Investigation Team (IIT) to perform a detailed investigation into the incident. The IIT review of this event is expected to be completed in late March 1993, and will be documented in the form of a NUREG report.

DETAILS

1.0 SUMMARY OF FACILITY ACTIVITIES

1.1 Licensee Activities

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

The Accident Generated Water (AGW) evaporator continued to vaporize AGW to the atmosphere and at the close of the inspection period approximately 1,617,000 gallons had been vaporized.

1.2 NRC Staff Activities

This inspection assessed the adequacy of licensee activities for reactor safety, safeguards, and radiation protection. The inspectors made this assessment by reviewing information on a sampling basis. The inspectors obtained information through actual observation of licensee activities, interviews with licensee personnel, and documentation reviews.

The inspectors observed licensee activities during both normal and backshift hours: 69 hours of direct inspection were conducted on backshift and 40 hours were conducted on deep backshift. The times of backshift hours were adjusted weekly to assure randomness.

2.0 PLANT OPERATIONS (71707)

2.1 Operational Safety Verification

The inspectors observed overall plant operation and verified that the licensee operated the plant safely and in accordance with procedures and regulatory requirements. The inspectors conducted regular tours of the following plant areas:

--Control Room
--Switch Gear Areas
--Access Control Points
--Protected Area Fence Line
--Fuel Handling Building
--Auxiliary Building
--Turbine Building
--Intake Structure
--Intermediate Building
--Diesel Generator Building

The inspectors observed plant conditions through control room tours to verify proper alignment of engineered safety features; to verify that operator response to alarm conditions was in accordance with plant operating procedures; to verify compliance with Technical Specifications, including implementation of appropriate action statements for equipment out of service, and; to review logs and records to determine if entries were accurate and identified equipment status or deficiencies. These records included operating logs, turnover sheets, and system safety tags.

The inspector conducted detailed walkdowns of accessible areas to inspect major components and systems for leakage, proper alignment, proper lubrication, proper cooling water supply, and any general condition that might prevent fulfillment of their safety function. The inspector observed plant housekeeping controls including control and storage of flammable material and other potential safety hazards.

The inspector found that shift turnovers were comprehensive and accurate, and adequately reflected plant activities and status. Control room operators effectively monitored plant operating conditions and made necessary adjustments. Housekeeping was satisfactory. The inspector concluded that the licensee conducted overall plant operations in a safe and conservative manner.

2.2 Building Spray Pressure Switch Incorrectly Jumpered

At 4:03 a.m. on January 29, 1993, while performing Surveillance Procedure 1303-4.14, "Reactor Building 30 psig Analog Channels," the building spray pressure switch PS-286 failed to properly function. This surveillance procedure tests the engineered safety feature actuation system circuitry that starts the building spray pumps at 30 psig reactor building pressure. Reactor building pressure is sensed by 6 pressure switches (PS-283, 284, 286, 287, 289, and 290) that are divided into two trains with a two out of three logic. The PS-286 failure resulted in a two out of two logic for train 'A.' Technical Specification (TS) 3.5.1.1 states that "The reactor shall not be in a startup mode or in a critical state unless the requirements of Table 3.5-1, Column 'A' and 'B' are met. Specification 3.0.1 applies." Table 3.5-1, item 4a, Column B, Minimum Degree of Redundancy, indicates that the reactor building spray system 30 psig instrumentation channel shall have a minimum degree of redundancy of one. Since the minimum degree of redundancy with the failed pressure switch was not met, the Shift Supervisor entered TS 3.0.1. TS 3.0.1 requires the licensee to take action within one hour to place the reactor in hot standby. Therefore, the licensee had one hour to jumper the PS-286 logic circuitry contacts to restore the degree of redundancy and obtain a one out of two logic. At 4:37 a.m., after reviewing the appropriate drawing, the licensee believed they had jumpered the appropriate pressure switch contacts and the Shift Supervisor exited TS 3.0.1. After the jumper was installed, an I&C technician assigned to replace the failed pressure switch questioned if the pressure switch had been properly jumpered. At 8:10 a.m., the licensee determined that they had only jumpered the alarm/indication relay and that two additional jumpers in the logic circuit were required to satisfy TS 3.5.1.1. The two additional jumpers were installed at 8:30 a.m..

The inspector interviewed cognizant personnel to determine the extent of licensee review prior to jumper installation. Prior to the jumper installation, the Shift Supervisor, Shift Foreman, and Shift Technical Advisor reviewed drawing SS-209-526, "Electrical Elementary Wiring Diagrams Engineered Safeguards," and determined that only one jumper was required to jumper the logic contacts for PS-286. The Shift Supervisor specified a post-modification test of checking the PS-286 actuated indication in the control room, believing that the indication verified that the logic contacts were properly bypassed. After jumper installation,

the Operations Director and the cognizant Plant Engineer reviewed the drawing and also agreed that one jumper bypassed the logic contacts. After the I&C technician questioned the installation, the Manger of Electrical Engineering was consulted and determined that only the contact that provided control room indication and alarm was jumpered.

The inspector reviewed Administrative Procedure (AP) 1013, "Temporary Modifications and Bypass of Safety Functions." AP 1013 requires all temporary modifications to have: a Safety Evaluation concurred with by an SRO prior to installation; a Plant Engineering review prior to installation, which may be accomplished initially by telephone and followed up within 7 days, and; a Design Review to evaluate the effect on plant operation. The inspector found that the Safety Evaluation and Design Review had been completed in accordance with AP 1013. However, the Design Review indicated that one jumper was required. The Design Review specified a post-modification test of verifying the PS-286 actuation light in the control room.

The inspector reviewed the additional Design Reviews for each of the two additional jumpers that were installed. The inspector determined that the two additional jumpers properly jumpered the PS-286 logic circuitry. However, the licensee specified the same post-modification test that was used previously, which was verifying that PS-286 indicated actuated in the control room. The inspector determined that this post-modification test was deficient because it was demonstrated earlier that the logic and indication circuits are separate and control room indication will not verify that the logic circuit had been properly jumpered.

The inspector reviewed drawing SS-209-526, which shows all three contacts that were required to be jumpered. Each contact was labeled "PS-286" and the contacts were numbered 1, 2, and 3. The PS-286 indication circuit contact had the number three beside it. The actuation circuit, which contains the two logic contacts for PS-286, is labeled "From Start Circuit of Spray Pump 'A' Circuit Breaker." The inspector determined that drawing SS-209-526 was correctly and adequately labeled.

The inspector reviewed the licensee's reportability determination. The Plant Review Group determined that this incident was reportable under 10 CFR 50.73 (A)(2)(1)(B), as an event or condition prohibited by the plant's Technical Specifications. The licensee voluntarily made an Emergency Notification System notification because a significant portion of the time clock for achieving hot shutdown (TS 3.0.1) had elapsed. The inspector agreed with the licensee's reportability determination.

The inspector evaluated the safety significance of having the 'A' train building spray in a two out of two starting logic for approximately 4.5 hours. The Technical Specification concerning the pressure switches is conservative because the pressure switch failure only affected one train and Technical Specification 3.3.2 allows removal of one building spray

pump for 72 hours. Even with the failed pressure switch, the logic circuitry (using a two out of two logic) could still have actuated the 'A' train building spray system. The inspector concluded that due to the short amount of time the licensee was in a two of two starting logic, the safety significance of this incident is minimal.

The inspector concluded that the I&C technician's performance in maintaining a questioning attitude and identifying that the pressure switch had not been properly jumpered was excellent. The inspector determined that the licensee's review of plant drawings to determine how to jumper the failed pressure switch was poor. In addition, the inspector concluded that the post-modification testing of the two logic circuitry jumpers was deficient because it was demonstrated earlier that the logic and indication circuits are separate and control room indication will not verify that the logic circuit had been properly jumpered.

2.3 Evaporation of TMI Unit 2 Accident Generated Water

The inspectors observed overall evaporator operation and verified that the evaporator was operated in accordance with licensee procedures and regulatory requirements. At the close of the inspection period, 1,617,000 gallons of the 2.3 million gallons of AGW had been evaporated. One concern was noted concerning the failure to sample the TMI-2 borated water storage tank (BWST).

On January 26, 1993, the TMI-2 engineering staff discovered that they had missed the required periodic sample from the borated water storage tank (BWST). The BWST stores accident generated water (AGW) which is vaporized to the atmosphere using the TMI-2 evaporator. TMI-2 Operating Procedure 4215-OPS-3185.05, "Processed Water Disposal System Process Control Procedure," requires that a source tank (i.e., the BWST) be recirculated and sampled after each 100,000 gallons. The engineering staff became aware of the missed sample when the plant operations staff asked when the next sample was due. The initial batch sample had been taken on October 27, 1992. As of January 26, approximately 221,000 gallons had been processed from the BWST but no subsequent periodic samples had been taken. Therefore, the 100,000 gallon and 200,000 gallon samples were missed.

The licensee immediately recirculated and sampled the BWST. The radiochemical analysis results of this sample indicated that the BWST remained suitable as a feed source for the evaporator system. The inspector attended the licensee's critique of the event on January 27, 1993. The licensee determined that the root cause of this incident was the failure to establish the sampling requirement in a formal tracking system. The licensee subsequently initiated procedure changes to incorporate sampling frequency reminders in the process instruction and data sheets and in the Shift Foreman's turnover sheet. The licensee also plans to evaluate whether other evaporator system requirements needed to be similarly controlled.

The inspector evaluated the safety significance of not performing the required BWST sampling by evaluating: the significance of the event against license conditions; the NRC staff's Programmatic Environmental Impact Statement related to decontamination and disposal of radioactive wastes resulting from the March 28, 1979 accident at Three Mile Island Nuclear Station, Unit 2 (PEIS) supplement 2; commitments made at the Atomic Safety and Licensing Board (ASLB) hearing on the evaporation of AGW, and; the licensee's technical evaluation report (TER) on the evaporator system. A portion of the basis for the NRC staff approval and the ASLB approval of the evaporator system was that effluents from the system other than tritium would be less than 0.1% of the values given in table 2.2 of the PEIS. This table listed the expected curie values and concentrations of radionuclides in feedwater prior to processing in the evaporator system. These concentrations are called base case concentrations. The licensee is allowed to exceed base case influent values provided that the decontamination factor of the evaporator system exceeds 1000 by a higher proportion than the influent exceeds the base case assumptions.

The feedwater tank (i.e., BWST) sample is one of several means that provides assurance that effluents will be less than 0.1% of base case feedwater. Additional sample points include gamma scanning of evaporator influent, testing of boron concentrations at several points in the evaporator system, continuous sampling of the vaporizer effluent, and continuous radiation monitoring of the vaporizer feed. The periodic samples provide assurance that stratification does not occur in the BWST and that additional radionuclides are not inadvertently added to the BWST after it has been isolated for use as a feed tank. Since no effluent limits were exceeded and other licensee monitoring systems were in place that would have detected a significant change in the radionuclide content in the feed from the BWST the inspector concluded that the safety significance of the missed sample was minimal.

Technical Specifications (TS) 6.8 and 3.9.13 require that procedures pertaining to disposal of AGW be approved by the NRC, maintained, and implemented. TMI-2 Operating Procedure 4215-OPS-3185.05 requires that a source tank (i.e., the BWST) be recirculated and sampled after each 100,000 gallons. The failure to take the required 100,000 gallon and 200,000 gallon samples of the BWST was in violation of these requirements. The inspector determined that this violation was isolated and that the licensee has taken actions to prevent its recurrence. For this reason, this violation was not cited pursuant to NRC Enforcement Policy, 10 CFR Part 2, Appendix C (1992), Section VII, B.

2.4 Auxiliary and Fuel Handling Building Ventilation System Low Flow

While reviewing Shift Foremen log entries, the inspector noted that the licensee did not log in the Shift Foreman's log that they had entered the appropriate action statements when Auxiliary and Fuel Handling Building ventilation flow was below the Technical Specification (TS) band. There are two pairs of Auxiliary and Fuel Handling Building exhaust fans, AH-E-14 A/C and AH-E-14 B/D. TS 3.15.3.2 states that each pair of fans AH-E-14 A/C and AH-E-14 B/D shall be shown to operate within plus or minus 11,881 CFM of 118,810 CFM (106,992 CFM to 130,691 CFM.)

TS 3.15.3.3.a states that with one pair of fans inoperable, verify that the redundant pair of fans is in operation and is discharging through its HEPA filters and charcoal absorbers within 8 hours. TS 3.15.3.3.b states that from the date that the Auxiliary and Fuel Handling Building Air Treatment System becomes inoperable for any reason during power operation, the system (at least one pair of exhaust fans discharging through its HEPA filters and charcoal absorbers) must be restored to operable conditions within 7 days.

On October 3, 1992, when taking shift and daily logs, a Control Room Operator (CRO), noted that the operating pair of fans, AH-E-14 B/D was reading 106,500 CFM, which was below the Technical Specification band. The licensee did not log in the Shift Foreman's log that AH-E-14 B/D were inoperable and enter TS 3.15.3.3.a. However, the licensee did perform the actions required by TS 3.15.3.3.a. At 1:17 a.m., the licensee secured AH-E-14 B/D and at 1:25 a.m., the licensee started AH-E-14 A/C. AH-E-14 A/C were reading 106,700 CFM which was also below the Technical Specification limit. At 1:45 a.m., the licensee entered a 7 day time clock per TS 3.15.3.3.b. The licensee wrote a Surveillance Deficiency Report (SDR) documenting the low flow condition.

The Operations Director was notified of the low flow condition in both sets of fans and he instructed the operators to clear the SDR and exit the 7 day Technical Specification time clock when the flow from AH E-14 A/C increased to 107,000 CFM. After making ventilation damper adjustments in both trains, the flow from AH-E-14 A/C increased to 107,000 CFM. Based on this flow the licensee cleared the SDR and secured the 7 day time clock at 5:58 a.m. The operations staff discussed with the Operations Director the appropriateness of securing the Technical Specification time clock on both sets of fans without verifying that AH-E-14 B/D flow was also within the Technical Specification band. The Operations Director determined that restoration of flow in one train would indicate correction for both trains. However, the inspector determined that since AH-E-14 B/D was reading 200 CFM less than AH-E-14 A/C, it is likely that the flow from AH-E-14 B/D would be below the Technical Specification band had the fans been operated. The licensee did not log that AH-E-14 B/D remained inoperable and did not enter TS 3.15.3.3.a. However, the licensee still performed the actions required by TS 3.15.3.3.a. The inspector determined that the communications between the Operations Director and the operations staff were not effective in ensuring the proper restoration and verification of equipment operability.

At 10:25 p.m. the same day, the licensee noted that AH-E-14 A/C was again below the Technical Specification band. The licensee secured the release of the 'A' waste gas tank but did not enter TS 3.15.3.3.b at that time. At 12:10 a.m., on October 4, 1992, the licensee made a late log entry to commence a time clock beginning at 10:25 p.m. on October 3, 1992. The log entry indicated that the licensee would enter TS 3.15.3 or 3.21.2 based on traverse readings being taken in the air ducts. TS 3.21.2 relates to Auxiliary and Fuel Handling Building ventilation flow instrumentation while 3.15.3 addresses actual low ventilation flow. On October 5, 1992, at 3:45 p.m., upon completion of traverse readings, the licensee determined that the instrumentation was reading properly and began a 7 day time

clock per TS 3.15.3.3.b. The licensee secured the timeclock at 12:40 p.m. on October 6, 1992, after changing out ventilation system filters and demonstrating that both sets of fans produced the Technical Specification required flow.

The inspector determined that the communications between the Operations Director and the operations staff were not effective in ensuring the proper verification of equipment operability. Between the period of 5:58 a.m. and 10:25 p.m. on October 3, 1992, the licensee should have logged that AH-E-14 B/D were inoperable and entered 3.15.3.3.a or restarted AH-E-14 B/D to verify flow was above the Technical Specification band. Restarting AH-E-14 B/D was necessary to declare the fans operable since the previous operation demonstrated that the fans were inoperable. Based on previous flow readings, it is likely that flow would have been below the Technical Specification band for AH-E-14 B/D, demonstrating this pair was still inoperable. Administrative Procedure 1012, "Shift Relief and Log Entries," step 4.3.3.3, indicates that operators should log equipment or system problems which may place restrictions on plant operation. The inspector concluded that the failure to document the status of AH-E-14 B/D in the Shift Foreman's log is a weakness. The licensee did not violate the Technical Specifications since AH-E-14 A/C were in operation and discharging through the HEPA filters and charcoal absorbers.

2.5 Decay Heat River Isolated to the Decay Heat Closed Cooling Water Heat Exchangers (URI 50-289/93-03-01)

On January 29, 1993, while performing OPS S227, "DR-P-1A/B Periodic Surveillance," the licensee isolated and bypassed the decay heat closed cooling water heat exchangers, DC-C-2A/B for approximately 2 hours and 55 minutes. The purpose of OPS-S227 is to operate both decay heat river pumps at least one hour per week to minimize the silt buildup under the pump suction bowls.

The decay heat river water (DR) system uses river water to cool the decay heat closed cooling water (DHCCW) system which in turn cools the decay heat removal (DHR) system. The DR, DHCCW, and DHR systems consist of two independent trains with 100% decay heat removal capabilities. Each train has one DR pump that takes suction from the river and discharges through the DHCCW heat exchanger and back into the river via the mechanical draft cooling towers. The DHCCW system is a closed loop that provides cooling to the DHR heat exchanger; DHCCW pump bearings; DHR pump motor and bearings; building spray (BS) pump motor and bearings, and; the high pressure injection (HPI) pump motor, gear reducer, and bearings. The DHR system injects borated water storage tank (BWST) water into the core following a large break loss of coolant accident (LOCA) and provides a means of recirculating spilled reactor coolant for long term core decay heat removal. Each DHR pump discharges through the DHR heat exchanger and then into the reactor vessel. In

response to a large break LOCA, the DHR, BS, and HPI systems align to take suction from the 350,000 gallon BWST. When a low level in the BWST is reached, the DHR system is realigned to take suction from the reactor building sump for recirculation. The DR system, in combination with the DHCCW and DHR systems, would begin removing core decay heat during the recirculation phase.

For complex surveillances, the Control Room Operator (CRO) maintains the official copy of the procedure and conducts the testing from the control room. For simple surveillances the procedure is given to an Auxiliary Operator (AO) and the AO will ask for control room assistance as necessary. At the beginning of each shift the Foreman separates the surveillances that will be performed by the AO into three piles; one pile is for the primary AO, one is for the secondary AO and, one is for the outbuilding AO. OPS-S227 was placed in the primary AO pile. OPS-S227, step B, states that "If necessary to reduce temperature transient on DHR & DHCCW, bypass Decay Heat Cooler DC-C-2A/B by positioning the valves as follows: DR-V-2A(B) Open, DR-V-5A(B) Open, DR-V-3A(B) Closed, DR-V-4A(B) Closed." At 1:00 a.m. the AO performed this step which isolated and bypassed the river water supply (DR) to the DHCCW heat exchanger in both trains. The AO notified the control room that the valves were repositioned for OPS-S227 so the DR pumps could be started. A CRO acknowledged the message but did not realize the heat exchangers had been isolated.

A CRO, who had reviewed all the surveillances that were to be performed that shift, questioned the outbuilding AO when the DR pumps were going to be operated to support the OPS-S227. The outbuilding AO was not aware that OPS-S227 was to be performed because the procedure was not placed in his pile at the beginning of the shift. The CRO then noted that OPS-S227 was on the Shift Supervisor's desk and reviewed the partially completed procedure. At 3:30 a.m., the CRO noted that the step that isolates and bypasses the DHCCW heat exchangers was not N/A'ed as he expected and he informed the Shift Supervisor. The Shift Supervisor contacted the primary AO and found that OPS-S227, step B, had been performed. The valves were returned to their correct position at 3:55 a.m..

The inspector interviewed the AO who isolated/bypassed the DHCCW coolers. The AO reviewed the entire surveillance in advance and noted that there were only two steps that would be performed by the primary AO. Step B isolates/bypasses the DHCCW heat exchangers and Step F returns the valve to their normal alignment after DR pump operation. The fact that OPS-S227 was in the primary AO pile at the beginning of his shift lead the AO to believe that he was required to do something in the surveillance. The AO did not realize he was preventing the safety related function of the DR system. The AO interpreted OPS-S227, Step B, to mean that the coolers should be bypassed to prevent thermal shock to the coolers. The AO also thought the alignment was satisfactory because the DR system would have a complete flow path. The AO correctly indicated that there was no warning note in OPS-S227 indicating when step B is applicable. The AO indicated that if he had been notified of an engineered safeguards actuation system (ESAS) actuation while the heat exchangers were isolated, he would not have known to immediately unisolate the heat

exchangers. The AO indicated that the improper alignment would have to be identified by a CRO due to a high temperature alarm. The AO remembered performing the procedure in the past as the outbuilding AO. The outbuilding AO verifies that the DR pump discharge valves open and records pump discharge pressures.

The licensee determined that this event was reportable under 10 CFR 50.72 b.2.iii and 10 CFR 50.73 a.2.v, as an event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to mitigate the consequences of an accident; under 10 CFR 50.73 a.2.i.B, as an operation or condition prohibited by Technical Specifications, and; under 10 CFR 50.73 a.2.vii, as an event where a single cause or condition caused two independent trains to become inoperable in a single system designed to mitigate the consequences of an accident. The Four-hour report was made at 6:17 a.m..

Technical Specification (TS) Limiting Condition for Operation (LCO) 3.3.1.1.d requires two decay heat removal coolers and their cooling water supplies to be operable. When this LCO is not met then section 3.0.1, "General Action Requirements," applies. Section 3.0.1 requires that within one hour, action shall be initiated to place the unit in at least Hot Standby within the next 6 hours, in Hot Shutdown within the following 6 hours, and in Cold Shutdown within the subsequent 24 hours. Since the control room was unaware that the cooling water supplies were inoperable for 2 hours 55 minutes, no action could be initiated within one hour to place the Unit in Hot Standby.

The inspector reviewed past performances of OPS-S227 as far back as 1986. The inspector found no other examples where DR supply to both DHCCW heat exchangers had been isolated/bypassed in both trains simultaneously.

A review of OPS-S227 revealed that Step B is no longer applicable and should have been removed from the procedure. The step was added to the procedure during the extended Unit 1 shutdown following the Unit 2 accident. The licensee jumpered the nuclear river (NR) system to the DHCCW coolers so that the DR pumps would not have to be operated continuously. During a normal shutdown, the cooldown rate is controlled by bypassing DHCCW flow to the DHR heat exchangers. OPS-S227, Step B, was added to allow DR pump operation without having to adjust DHCCW bypass flow around the DHR heat exchanger. Since the licensee does not plan another extended shutdown, Step B is no longer required.

The inspector reviewed OPS-S227 and found it was approved by the Plant Operations Director, the Plant Review Group Chairman, and the Operations and Maintenance Director in March, 1992. OPS-S227, as well as all other Operations Surveillances are not required by Technical Specifications and are generally used for data collection. Administrative Procedure 1016, "Operations Surveillance Program," step 4.2.2, states that in general, detailed procedural guidance for evolutions which can potentially affect safe and/or reliable plant operation should be contained in approved Plant Operating Procedures. Plant Operating Procedures are covered by Administrative Procedure 1001A, "Procedure Review and

Approval," which implements all Quality Assurance (QA) Plan requirements for procedure review and approval. The inspector questioned the licensee why OPS-S227, which has potential to affect safe plant operation, was not contained within an Operating Procedure. The licensee agreed to review all Operations Surveillances and incorporate the ones that can effect plant safety into an Operating Procedure or Surveillance Procedure, which meet all QA Plan requirements for review and approval.

The inspector reviewed Administrative Procedure 1029, "Conduct of Operations." Step 4.2.11 states that operation of equipment or systems shall only be accomplished with the knowledge and consent of the Shift Supervisor or Shift Foreman. In this regard, operations of systems and equipment in the plant by Auxiliary Operators shall be conducted only on the direct orders of the Shift Supervisor, Shift Foreman, or CRO on duty at the panel, except in cases of emergency. Direction to Auxiliary Operators by the CRO on duty at the panel in no way relieves the Shift Supervisor or Shift Foreman of his responsibility. In this incident the AO notified the control room that the valves were repositioned for OPS-S227 so the DR pumps can be started. Even though the required communication was made, the communication was not specific enough for the CRO to understand exactly what the AO had done. The CRO did not review OPS-S227 to understand exactly what the AO had done when acknowledging the AO's communication.

The inspector concluded that OPS-S227 was inadequate because it contained a step that was no longer applicable, the step disables both trains at once, and there was no warning step to alert an operator specifically when the step is required. The inspector concluded that OPS-S227 should have been incorporated into an Operating Procedure which meets all QA Plan requirements for procedure review and approval. The inspector also concluded that there was ineffective communication between the AO and CRO. The inspector requested the licensee to perform an evaluation of the effect this misalignment would have on plant equipment during a postulated large break loss of coolant accident. This issue will remain unresolved pending completion of the licensee's evaluation. **(50-289/93-03-01)**

2.6 Operator Tours and Log Keeping Practices (TI 2515/115)

The development of an industry-wide issue of the adequacy of operator tours and log keeping practices prompted the Vice President and Director of TMI to request a review of operator log taking practices at TMI in early 1992. The licensee completed an investigation for a three month period and forwarded the investigation report in a letter from GPUN to the NRC, dated July 24, 1992. The inspectors have held several discussions with licensee management in regard to management expectations and performance standards for operators during log taking. The inspectors accompanied auxiliary operators (AOs) on log taking rounds and reviewed the licensee's investigation report as documented in NRC Inspection Reports 50-289/92-13 and 50-289/92-14.

The licensee's investigation revealed one discrepancy for one AO. The inspectors review and assessment of this discrepancy is contained in NRC Inspection Report 50-289/92-13. Corrective actions taken by the licensee to prevent recurrence included disciplinary action and re-instruction for AOs on the purpose of taking logs and management expectations for proper log taking.

The licensee's investigation also identified 11 instances where control room operators (CROs) had failed to enter the area required to make a second shiftly check on the integrated control system (ICS) recorders. In all 11 of these instances, the required first check of the ICS recorders had been completed. The inspectors reviewed this issue with licensee management to determine the cause and corrective actions to be taken. The information required to be obtained during this second check of the ICS recorders was not required for technical specifications or as part of a surveillance. The information was being recorded to aid the troubleshooting of minor problems with the ICS system. Discussions with management and shift personnel indicated that management expectations on how to properly perform this second check were poorly communicated to the CROs. Corrective actions taken included reassessing and communicating to the operators management expectations on the proper method for obtaining these and similar types of operator log readings.

The inspectors have concluded that the licensee's investigation in response to the industry-wide issue of operator tours and log keeping practices was thorough and corrective actions should be effective in preventing recurrence of the discrepancies identified in the investigation report. This issue is closed.

3.0 RADIOLOGICAL CONTROLS (71707)

During entry into and exit from radiologically controlled areas, the inspectors verified that proper warning signs were posted, personnel entering were wearing proper dosimetry, personnel and material leaving were properly monitored for radioactive contamination, and monitoring instruments were functional and in calibration. The inspectors also reviewed extended Radiation Work Permits (RWPs) and survey status boards to verify that they were current and accurate. The inspectors observed activities in radiologically controlled areas and verified that personnel were complying with the requirements of applicable RWPs and that workers were aware of the radiological conditions in the area.

During each Auxiliary Building tour, the inspector paid particular attention to ensure radiological surveys were current and that proper warning signs were posted. The inspector noted no discrepancies and concluded that overall radiological controls were good.

4.0 MAINTENANCE AND SURVEILLANCE (62703, 71707)

4.1 Maintenance Observations

The inspector reviewed selected maintenance activities to assure that: the activity did not violate Technical Specification Limiting Conditions for Operation and that redundant components were operable; required approvals and releases had been obtained prior to commencing work; procedures used for the task were adequate and work was within the skills of the trade; maintenance technicians were properly qualified; radiological and fire preventive controls were adequate; and, equipment was properly tested and returned to service.

Maintenance activities reviewed included:

- Preventive Maintenance Procedure (PMP) IC-57, "Air Actuated Valve Stroking," was inspected on February 16, 1993.

- Preventive Maintenance Procedure IC-66, "Instrumentation System Preventive Maintenance," was inspected on February 16, 1993.

- Preventive Maintenance Procedure E-13, "Limitorque Valve Operator Inspection," was inspected on January 27, 1993.

Overall, the inspector found that individuals performing PMP IC-57 and IC-66 were knowledgeable, maintenance procedure quality was good, and proper QA documentation existed for replacement parts. The inspector concluded that overall performance of PMP IC-57 and IC-66 was good. The inspector observed licensee Limitorque training and had several concerns with PMP E-13 which are discussed below.

4.2 Limitorque Training

On January 26 and 27, 1993, the inspector inspected the licensee Limitorque training for electrical technicians. The training was designed to give the electrical technicians an understanding of how the tasks that they perform fit into the overall Limitorque program at TMI. The Maintenance Training Department discussed valve design, limitorque design, NRC Generic Letter 89-10, industrial experience related to Limitorque failures, and Limitorque preventive maintenance. Technical Functions gave a presentation on the engineering calculations involved in Limitorque operators. Plant Engineering discussed the evaluation of data obtained from Limitorque testing. The technicians then performed Limitorque preventive maintenance on valves in the maintenance training facility.

The Electrical Foreman provided training on Preventive Maintenance Procedure E-13, "Limitorque Valve Operator Inspection." The foreman is the procedure owner and is very experienced with Limitorque preventive maintenance. However, the inspector found that some of the insight provided by the foreman should have been incorporated into PMP E-13. For example, step 8.3.3 states to torque the operator mounting bolts. The foreman indicated that prior to torquing the bolts, the valve must be off its shut seat or the torque values will be inaccurate. This information is something the technicians should not be relied upon to remember and should be incorporated into PMP E-13.

The inspector concluded that the training provided was very comprehensive and overall the training was excellent. However, some of the preventive maintenance insight provided by the maintenance foreman should be incorporated into PMP E-13. The licensee has agreed to review PMP E-13 and incorporate additional detail where necessary.

5.0 SECURITY AND EMERGENCY PREPAREDNESS (71707)

5.1 Entry of Intruder into Protected Area

The licensee declared a Site Area Emergency at 7:05 a.m., on February 7, due to a security event. An automobile had crashed through a Protected Area gate and a Unit 1 Turbine Building roll-up door, and the driver had entered the building. The NRC decided at about 7:25 a.m., to staff both the HQ and Region I Incident Response Centers. Site security staff and state police apprehended the individual, under the main condenser, about 11:00 a.m. The licensee terminated the event at 4:35 p.m., after completing security sweeps of Protected and Vital Areas. There was no impact on safety equipment or plant operation.

An NRC Incident Investigation Team (IIT) was established to thoroughly review the event. The scope of the IIT investigation includes: plant and security conditions preceding event; security event chronology; site security response; operational mode of the plant; interface with local and State law enforcement and FBI; emergency response (licensee and NRC); safety significance; background and threat characterization of the intruder; precursors to the event; and whether the regulatory process and activities preceding the event contributed to it. The IIT Charter requires their review of this event be completed in approximately 45 days from the date of the event. This review will be made publicly available in the form of a NRC NUREG report. The IIT independently investigates the event, but may delegate, to the NRC Regional Office, inspection of utility repairs to damaged equipment.

The intruder's vehicle damaged a Protected Area gate, and a Turbine Building roll-up door. It also bumped, and pushed several feet across the floor, an empty low specific activity (LSA) shipping container which was located inside the Turbine Building. These items were placed on a quarantined equipment list (QEL) and a troubleshooting action plan (TAP) was developed by the licensee and agreed upon by the IIT for the necessary actions to remove the equipment from the QEL. The licensee's TAP required that the gate be replaced with a new fabricated gate and on February 19, 1993, the licensee received and installed a newly fabricated gate. The resident inspector reviewed the licensee's work package (Job Order 069409), witnessed a portion of the installation and observed the post-installation testing of the gate.

The TAP required the licensee to develop an engineering evaluation to document the licensee's evaluation and proposed disposition of the damaged LSA shipping container. The LSA shipping container is used to ship spent resin that has been used in the condensate full flow ion exchanger system. The spent resin radioactive contamination level is normally below regulatory limits for unrestricted release. However, because of the potential of being radioactive, the licensee treats and processes this resin as LSA material. The IIT requested that Region I perform the necessary review and inspection to support the resolution of this QEL item. On February 9, 1993, the licensee supplied the resident inspector with their engineering evaluation. The initial NRC review of this evaluation indicated that the document did not properly evaluate whether the shipping container could still meet Department of Transportation shipping requirements. The evaluation did not address the basis of why the shipping container could be used "as is." A comparison to the original certificate of compliance or interface with the vendor was not conducted to determine the critical characteristic of the container requiring evaluation. For example, the potential for internal damage that might hamper the ability to dewater the container was not evaluated. The original document did not receive an engineering review but a review by radwaste operation management. The licensee retracted the document in order to properly address the NRC concern of an inadequate engineering evaluation. On February 19, 1993, the licensee supplied the resident inspector with a Material Nonconformance Report (MNCR) 93002 addressing the disposition of the damaged LSA shipping container. The resident inspector reviewed this document and witnessed a portion of the retest and inspection of the shipping container. The inspector determined that the licensee's evaluation adequately demonstrated that the shipping container could be reused for subsequent shipments. The damaged components associated with the filling mechanism were replaced and the container itself received minor surface scratches that did not affect the integrity of the shipping container. On February 23, 1993, the resident inspector informed the licensee that the NRC had completed its review and released the container to the licensee for subsequent use.

The inspector concluded that the gate repairs were adequate and restored the gate to its pre-event condition. The inspector concluded that the licensee's final engineering evaluation and testing of the LSA shipping container were acceptable.

6.0 NRC MANAGEMENT MEETINGS AND OTHER ACTIVITIES

6.1 Routine Meetings

At periodic intervals during this inspection, meetings were held with senior plant management to discuss licensee activities and areas of concern to the inspectors. At the conclusion of the reporting period, the resident inspector staff conducted an exit meeting with licensee management summarizing inspection activity and findings for this report period. No proprietary information was identified as being included in the report.