

May 9, 2001

EA-01-115

Mr. Mark E. Warner  
Vice President, TMI Unit 1  
AmerGen Energy Company, LLC  
Three Mile Island Nuclear Station  
P.O. Box 480  
Middletown, Pennsylvania 17057-0480

SUBJECT: THREE MILE ISLAND STATION-NRC INSPECTION REPORT  
05000289/2001-002

Dear Mr. Warner:

On March 31, 2001, the NRC completed an integrated inspection at your Three Mile Island Unit 1 facility. The enclosed report documents the inspection findings which were discussed on April 11, 2001, with Mr. George Gellrich and other members of your staff.

This inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, one preliminary finding of low to moderate safety significance (White) was identified. On February 12, 2001, the NRC inspectors found the bearing oiler on the 'A' motor driven emergency feedwater pump (EF-P-2A) empty. Subsequent investigation by your staff revealed an oil leak and vibrations on the pump shaft bearing of sufficient magnitude to cause the pump to be inoperable. Our assessment of your performance during the events leading up to this finding identified significant deficiencies in your staff's ability to identify and resolve equipment performance issues. In this case, the poor performance resulted in EF-P-2A being inoperable for longer than the technical specification allowed outage time. This failure to promptly identify and correct a significant condition adverse to quality is an apparent violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action" and is being considered for escalated enforcement action in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Action" (Enforcement Policy), NUREG-1600. The current Enforcement Policy is accessible from the NRC Web site at <http://www.nrc.gov>.

We believe we have sufficient information to make our final risk determination for the EF-P-2A corrective action issue. However, you have the opportunity to either request a regulatory conference to discuss your evaluation and any differences with the NRC evaluation, or to send us your position in writing. Please contact John Rogge at (610) 337-5146 within 7 days of the date of this letter to inform the NRC of your intentions. If we have not heard from you in 10

days, we will continue with our significance determination, and you will be advised by separate correspondence of the results. Since the NRC has not made a final determination in this matter, no Notice of Violation is being issued at this time. In addition, please be advised that the characterization of the apparent violation described in the enclosed report may change as a result of further review.

The inspectors also identified one issue of very low safety significance (Green). This issue was determined to involve a violation of NRC requirements. However, because of the very low safety significance and because the problem has been entered into your corrective action program, the NRC is treating this issue as a non-cited violation in accordance with Section VI.A.1 of the NRC's Enforcement Policy. If you deny this non-cited violation, you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-001; and the NRC Resident Inspector at the Three Mile Island Unit 1 facility.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/NRC/ADAMS/index.html> (the Public Electronic Reading Room).

We appreciate your cooperation. Please contact me at (610) 337-5080 if you have any questions regarding this letter.

Sincerely,

**/RA/**

Richard V. Crlenjak  
Deputy Director  
Division of Reactor Projects

Docket No: 50-289  
License No: DPR-50

Enclosure: NRC Inspection Report 05000289/2001-002  
Attachment: Supplementary Information

Mr. M. Warner

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cc w/encl:

AmerGen Energy Company - Correspondence Control Desk

E. Fuhrer, Regulatory Engineering

J. McElwain, Manager, Regulatory Assurance

G. Gellrich, Plant Manager

J. Hutton, Director-Licensing

J.A. Benjamin, Licensing - Vice President, Exelon Corporation

TMI-Alert (TMIA)

D. Allard, PADER

FEMA, Region III

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**U.S. NUCLEAR REGULATORY COMMISSION**

REGION 1

Docket No: 05000289  
License No: DPR-50

Report No: 2001-002

Licensee: AmerGen Energy Company, LLC (AmerGen)

Facility: Three Mile Island Station, Unit 1

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

Dates: February 11-March 31, 2001

Inspectors: J. Daniel Orr, Senior Resident Inspector  
Craig W. Smith, Resident Inspector  
Jason C. Jang, Senior Health Physicist, DRS  
Nancy T. McNamara, Emergency Preparedness Inspector, DRS  
Ronald L. Nimitz, Senior Health Physicist, DRS

Approved by: John F. Rogge, Chief  
Projects Branch 7  
Division of Reactor Projects

## SUMMARY OF FINDINGS

Three Mile Island, Unit 1  
NRC Inspection Report 05000289/2001-002

IR 05000289/2001-002, on 2/11/2001-3/31/2001, AmerGen Energy Company, LLC, Three Mile Island Unit 1, operability evaluations, post-maintenance testing.

The inspection was conducted by resident inspectors, an emergency preparedness inspector, an occupational radiation safety inspector and a radiological protection inspector. The inspection identified one preliminary White finding of low to moderate safety significance and one Green finding, which was a non-cited violation. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using IMC 0609 "Significance Determination Process" (SDP). Findings for which the SDP does not apply are indicated by "No Color" or by the severity level of the applicable violation. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described at its Reactor Oversight Process website at <http://www.nrc.gov/NRR/OVERSIGHT/index.html>.

### A. Inspector Identified Findings

#### **Cornerstone: Mitigating Systems**

- **Preliminary White.** AmerGen failed to promptly identify and correct a significant condition adverse to quality for an oil leak and vibrations on the 'A' emergency feedwater pump (EF-P-2A) of sufficient magnitude to cause the pump to be inoperable. An excessive oil leak was known by auxiliary operators to have existed for more than ten days before initiating corrective action to identify the cause. System engineers failed to investigate an unexplained step change in pump vibrations during the most recent pump inservice test. The increased vibrations were later determined to be directly related to the condition causing the oil loss. AmerGen's failure to promptly identify and correct this significant condition adverse to quality is an apparent violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action."

This finding was preliminarily evaluated as low to moderate safety significance (White). The oil loss and increased pump vibrations resulted from loose bolts on the pump bearing housing. The condition that resulted in the loosening of the bolts during pump operation existed for 39 days. The SDP Phase 2 analysis evaluated EF-P-2A being inoperable for greater than 30 days as low to moderate safety significance. An SDP Phase 3 analysis was performed to confirm this result. (Section 1R15.1)

- **Green.** AmerGen used an inadequate maintenance procedure to change the pump bearing oil on the "A" nuclear service closed cooling water system pump (NS-P-1A). The procedure used by the maintenance technicians did not ensure the bearing was refilled to the proper level following the oil change. Additionally, the functionality and alignment of the bearing automatic oiler were not verified following corrective maintenance. AmerGen's failure to have adequate procedures to ensure maintenance

activities conducted on NS-P-1A were satisfactorily accomplished, constituted a violation of 10 CFR Part 50, Appendix B, Criterion V, "Procedures."

The safety significance of the procedure inadequacies was very low because operability of NS-P-1A was not compromised. However, if left uncorrected, and similar maintenance practices are continued, improper bearing lubrication may result and pump operability could be affected. (Section 1R19.1)

B. Licensee Identified Violations

Violations of very low significance which were identified by the licensee have been reviewed by the inspector. Corrective actions taken or planned by the licensee appear reasonable. These violations are listed in Section 4OA7 of this report.

## Report Details

### Summary of Plant Status

AmerGen Energy Company, LLC (AmerGen) operated Three Mile Island, Unit 1 (TMI) at 100 percent power throughout the inspection period.

#### **1 REACTOR SAFETY Initiating Events/Mitigating Systems/Barrier Integrity [REACTOR - R]**

##### R04 Equipment Alignment

###### a. Inspection Scope

The inspectors walked down the nuclear service river water system and the secondary service river water system during an emergent repair on an underground nuclear service river water line. The systems were cross connected and permitted to be so by an exigent technical specification (TS) amendment. The inspectors verified that AmerGen implemented all compensatory measures required by the exigent TS amendment. The inspectors also verified that system pressures and temperatures were consistent with the normal split configuration.

###### b. Findings

No findings of significance were identified.

##### R05 Fire Protection

###### .1 Fire Protection Walkdowns

###### a. Inspection Scope

The inspectors conducted fire protection inspections for the following plant areas:

- Motor driven emergency feedwater pump rooms and surrounding areas
- Reactor building tendon galleries
- Decay heat closed cooling water and nuclear services closed cooling water pump areas
- Air intake tunnel

The inspectors verified that the area fire protection features were consistent with the fire hazard analysis report and that transient combustibles were controlled within TMI administrative requirements.



b. Findings

No findings of significance were identified.

.2 Announced Fire Drill and Fire Brigade Response

a. Inspection Scope

The inspectors observed the fire brigade response to an announced fire drill in the control building east battery charger area on February 22, 2001. The inspectors also observed the drill critique. The inspectors evaluated the response using guidance provided in NRC Inspection Procedure 71111.05, *Fire Protection*.

b. Findings

No findings of significance were identified.

R12 Maintenance Rule Implementation

a. Inspection Scope

The inspectors reviewed several aspects of maintenance rule implementation involving two recent equipment problems associated with core flood tank instrumentation and reactor building pressure transmitters. Those equipment problems were described in AmerGen corrective action program items T2000-1058 and T2000-1033. The aspects of maintenance rule implementation inspected included safety significance classification, a(2) performance criteria or a(1) goals and corrective actions, and maintenance preventable functional failure determinations. The inspectors referenced TMI procedure 1082, *NRC Maintenance Rule* and NUMARC 93-01, *Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Plants*.

b. Findings

No findings of significance were identified.

R13 Maintenance Risk Assessments and Emergent Work Evaluation

a. Inspection Scope

The inspectors reviewed AmerGen's risk management, observed that concurrent maintenance activities were adequate, and verified that contingency actions were appropriately established for the following maintenance activities or plant conditions:

- Nuclear service river water underground leak prior to repair
- Planned maintenance on the nuclear service closed cooling water pump 'A'
- Nuclear service river water underground line repair
- Makeup tank level sensing line drain-down evolution

The inspectors referenced TMI procedure 1082.1, *TMI Risk Management Program* and NUMARC 93-01, *Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Plants*.

b. Findings

No findings of significance were identified.

R14 Personnel Performance During Non-routine Plant Evolutions

a. Inspection Scope

The inspectors observed the main control room operators and auxiliary operators cross connect the nuclear service river water and secondary service river water systems. The cross connect configuration was permitted for one time use only by an exigent TS amendment to effect timely repairs on an underground nuclear service river water line. The inspectors verified that the cross connect evolution was performed using procedures; and in a controlled manner to minimize the likelihood of a plant transient while maintaining the cooling water to both nuclear as well as balance of plant components.

b. Findings

No findings of significance were identified.

R15 Operability Evaluations

.1 Inoperable Motor Driven Emergency Feedwater Pump

a. Inspection Scope

On February 12, 2001, the inspectors found the oiler on the 'A' motor driven emergency feedwater pump (EF-P-2A) outboard bearing empty. The inspectors reviewed operating logs and test records, and interviewed plant personnel to assess the operability of the pump as required by TSs.

b. Findings

INTRODUCTION:

The inspectors determined EF-P-2A was inoperable for 39 days and evaluated this finding to be of low to moderate risk significance (White). AmerGen's failure to identify a significant condition adverse to quality that resulted in EF-P-2A being inoperable for longer than the technical specification allowed outage time was an apparent violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action."

**SYSTEM DESCRIPTION:**

The TMI emergency feedwater system consists of three independent pumps (two motor driven and one turbine driven) and associated flowpaths to each of two steam generators. The emergency feedwater system is designed to automatically actuate to support the secondary heat removal function when the main feedwater system fails to function. Two of three pumps are required to meet the most limiting design basis flow requirement. The TS limiting condition for operation requires three pumps to be operable and permits an allowed outage time of 72 hours for one inoperable pump.

The oiler on EF-P-2A is an inverted glass bulb. As oil level in the pump bearing decreases below the mouth of the oiler, the liquid seal is broken permitting air to enter the glass bulb and oil to be discharged from the oiler into the pump bearing. The oiler maintains a constant oil level in the bearing housing provided oil is maintained in the inverted glass bulb.

**SUMMARY OF EVENTS:**

On February 12, 2001, the inspectors found the EF-P-2A outboard bearing oiler empty and notified the control room. Plant operators immediately refilled the oiler. A review of logs revealed auxiliary operators were making daily additions to the bearing oiler since the last pump surveillance on February 1, 2001. Prior to that date, the pump required oil additions every two weeks to makeup for identified minor oil leaks. The auxiliary operators failed to recognize the effect of increased oil losses on pump operability.

On February 5, 2001, an auxiliary operator found the outboard bearing oiler empty and informed the control room supervisor. The control room supervisor referenced the TMI maintenance procedure for component lubrication. The procedure provided actions to be taken if an oiler is found empty on an operating pump. Because EF-P-2A was not in operation at the time, the control room supervisor incorrectly determined pump operability was not affected. The deficient condition was not entered into the corrective action process for resolution and no actions were taken to identify the cause of the empty oiler.

On February 1, 2001, operators performed the EF-P-2A inservice surveillance test. The pump axial vibrations exhibited an unexplained step increase that was more than two and one-half times the previously recorded number and exceeded the inservice test alert range value. The condition received an inadequate operability evaluation by the shift manager. System engineers were aware of the increased vibrations, and planned to double the frequency of pump testing, but did not initiate an investigation to identify the cause. The deficient condition was not entered into the corrective action process for resolution. The pump remained in a stand-by condition from the time the surveillance test was run on February 1, 2001, until the inspectors found the oiler empty on February 12, 2001. The previous surveillance test of the pump, performed on November 1, 2000, showed a small increase in axial vibrations. When the pump was run on January 6, 2001, during testing of the emergency feedwater system automatic start circuit, no vibrations were recorded and no abnormal oil leaks were observed.

On February 14, 2001, AmerGen engineers identified loose bolts on the outboard bearing housing inner cover. The cover has four bolts holding it against the bearing housing. Two of the four bolts were tightened one full turn each, and the other two were

tightened one-half turn each. Tightening the bolts stopped the oil leak. However, AmerGen failed to perform a post-maintenance test on the pump after tightening the bolts. AmerGen performed a pump inservice test on March 3, 2001, after questioning by the inspectors. The pump axial vibrations returned to the previous reference value.

#### CROSS-CUTTING ISSUES:

The inspectors determined AmerGen failed to promptly identify the degraded condition of EF-P-2A that caused the pump to become inoperable. Several opportunities existed, starting on February 1, 2001, for both plant operators and system engineers to identify and correct the oil leak, before the inspectors found the pump bearing oiler empty on February 12, 2001. Auxiliary operators were making daily additions to the bearing oiler for more than ten days without recognizing the effect on pump operability or taking actions to have the adverse condition investigated. On one occasion, an auxiliary operator found the outboard bearing oiler empty and reported it to the control room supervisor. The control room supervisor incorrectly determined pump operability was not affected, because the pump was in a standby condition. The control room supervisor did not initiate any further investigation. Data recorded during the previous inservice surveillance run test showed an unexplained step increase in pump vibrations. System engineers were aware of the situation, but did not initiate actions to identify the cause of the increased vibrations. The increased vibrations were later determined to be directly related to the condition causing the oil loss. System engineers missed an opportunity to earlier identify the inoperable condition on EF-P-2A. This finding illustrated poor performance by AmerGen in problem identification and resolution.

#### SIGNIFICANCE DETERMINATION:

This finding had a credible impact on safety because it resulted in a single train of emergency feedwater, a mitigating system, being inoperable for longer than the TS allowed outage time. The inspectors determined the condition that resulted in the loosening of the bearing housing cover bolts existed from the time the pump was last run on January 6, 2001, until the pump was tested on February 1, 2001. Any time EF-P-2A was called on to operate after January 6, 2001, would have resulted in the same conditions that existed on February 1, 2001. Specifically, the bearing housing cover bolts would have loosened sufficiently to cause increased pump vibrations and an oil leak of sufficient magnitude to render the pump inoperable. EF-P-2A was inoperable from the time the condition first existed on January 6, 2001, until the pump was repaired on February 14, 2001, a period of 39 days. Due to the magnitude of the oil leak and the increased pump vibrations observed during the February 1, 2001, pump run, operator action to identify and correct the degraded pump condition was not considered credible. Further, EF-P-2A is not equipped with temperature or vibration instruments to provide local indication or remote annunciation of impending pump failure. Based on this information, the inspectors determined EF-P-2A was inoperable for 39 days, while the reactor was operating at 100 percent power.

The inspectors and a Region I senior reactor analyst (SRA) evaluated this condition using the NRC Risk-Informed Inspection Notebook for Three Mile Island, Revision 0, dated January 24, 2001. The Phase 2 SDP evaluated EF-P-2A being inoperable for greater than 30 days as low to moderate safety significance. The sequence driving the risk of this finding was transients with a loss of the power conversion system + failure of the motor driven and turbine driven emergency feedwater pumps + failure to feed and

bleed (White). In addition, four other sequences were identified that each resulted in a sequence color of Green next to White.

The NRC's SDP Phase 2 evaluation result of White was consistent with results obtained from AmerGen's computer-based probabilistic risk assessment (PRA) model (about a  $2E-6$ /yr increase in core damage frequency). Neither of these analyses explicitly account for the risk contribution from externally initiated events. However, based on the submitted individual plant examination for external events (IPEEE), the SRA concluded that this risk contribution would not increase the significance result to more than White.

**APPARENT VIOLATION:**

The inspectors determined AmerGen failed to promptly identify and correct a significant condition adverse to quality for an oil leak on EF-P-2A of sufficient magnitude to cause the pump to be inoperable for longer than the TS allowed outage time. AmerGen has entered this issue into their corrective action process (T2001-0305 and T2001-0160). This apparent violation (AV) of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," is being treated as an open item pending NRC review of the risk significance. **(AV 50-289/01-02-01)**

.2 Additional Operability Evaluations

a. Inspection Scope

The inspectors reviewed the following degraded conditions for potential to affect the operability of safety-related systems:

- Nuclear service river water line underground leak
- 'A' makeup pump indicating light anomaly after a normal pump shutdown
- Reactor coolant hot leg temperature instrument variance
- 'B' reactor high pressure trip memory light unexpectedly lit
- 'A' and 'B' decay heat removal discharge cross connect leakage

b. Findings

No findings of significance were identified.

R19 Post-Maintenance Testing

.1 Inadequate Procedure for Nuclear Service Closed Cooling Water Pump Maintenance

a. Inspection Scope

The inspectors reviewed post-maintenance testing activities following a scheduled maintenance outage on the 'A' nuclear service closed cooling water system (NSCCWS) pump (NS-P-1A). Work performed during the outage included changing the oil in the pump bearing and repairing a minor oil leak on the bearing oiler.

b. Findings

The inspectors determined that AmerGen used an inadequate maintenance procedure to change the pump bearing oil on NS-P-1A. The safety significance of this finding was very low (Green) because operability of the pump was not compromised. AmerGen's failure to have adequate procedures to ensure maintenance activities were satisfactorily accomplished, constituted a violation of 10 CFR Part 50, Appendix B, Criterion V, "Procedures."

The work procedure used to change the oil on NS-P-1A during the March 12, 2001, system outage was inadequate in that it did not provide appropriate work instructions to ensure the bearing oil reservoir was properly refilled. The work procedure referenced the vendor manual for establishing the proper oil level when refilling the pump bearing. The vendor manual specifies filling the oil reservoir to the oil level mark located on the side of the bearing housing. However, NS-P-1A was not equipped with an oil sightglass to determine the oil level in the bearing housing. The maintenance technicians approximated the oil level by observing the oiler standpipe level. No instructions were provided in the maintenance work procedure or vendor technical manual regarding this method for refilling the bearing. The work procedure and the vendor manual also did not prescribe the correct amount of oil to be added. Additionally, during the outage a minor oil leak was repaired on the pump bearing oiler. The functionality and alignment of the oiler were not verified prior to returning the pump to service. The vendor manual provided no technical guidance on the proper adjustment of the oiler to ensure the oiler maintained the correct oil level in the pump bearing during operation. The inadequate work procedures, in this instance, did not render the pump inoperable. However, if left uncorrected, and similar maintenance practices are continued, improper bearing lubrication may result and pump operability could be affected.

The inspectors also identified weaknesses in the post-maintenance testing for this work. NS-P-1A was taken out of service on March 12, 2001, for a planned maintenance outage. The pump was returned to service on March 15, 2001, following post-maintenance testing. On March 21, 2001, the inspectors found the oiler on the pump bearing half-full after observing it to be completely full the previous day. Plant operators refilled the oiler two times before a stable oil level could be achieved. The pump was kept in service after the oil additions, with plant operators monitoring the oil level at an increased frequency. A review of logs revealed auxiliary operators had previously refilled the oiler on March 18, 2001, three days after the system outage. On March 27, 2001, the system engineer found the oiler empty with the pump still in

operation. At this time, the pump was declared inoperable and removed from service to make the required repairs. The source of the oil leak was determined to be the pump shaft seal. The system engineer's review of the circumstances surrounding the oil leak resulted in the identification of deficiencies with the method auxiliary operators were using to maintain level in the pump bearing automatic oiler.

The inspectors determined AmerGen used an inadequate maintenance procedure to change the pump bearing oil on NS-P-1A. This finding was more than minor because if left uncorrected operability of equipment in a mitigating system could be affected. The safety significance of the procedure inadequacies was very low (Green) because operability of NS-P-1A was not compromised. However, if left uncorrected, and similar maintenance practices are continued, improper bearing lubrication may result and pump operability could be affected. AmerGen's failure to have adequate procedures to ensure maintenance activities were satisfactorily accomplished, constituted a violation of 10 CFR Part 50, Appendix B, Criterion V, "Procedures." However, because of the very low safety significance and because AmerGen has entered this procedure problem into its corrective action process (T2001-0357), this violation is being treated as a Non-Cited Violation (**NCV 50-289/01-02-02**).

## .2 Additional Post-Maintenance Testing

### a. Inspection Scope

The inspectors reviewed post-maintenance tests and verified that the tests were adequate and consistent with the maintenance performed for the following activities:

- Fuel oil transfer to the emergency diesel generators fuel oil storage tank
- Inspection and alignment of the alternate infeed breaker to the '1E' safety-related 4160 volt bus
- 'A' emergency diesel generator bearing oil change at the generator end bearing

### b. Findings

No findings of significance were identified.

## R22 Surveillance Testing

### a. Inspection Scope

The inspectors reviewed the following surveillance tests:

- 'A' emergency diesel generator monthly loaded test with voltage and frequency response measurement
- Emergency diesel generators air start and diesel fuel oil transfer systems surveillance
- Intermediate closed cooling water and nuclear services closed cooling water surge tanks engineered safeguards isolation testing

- Once through steam generator level and pressure channel tests for the heat sink protection system

The inspectors observed portions of the surveillance tests and reviewed the test results to verify that the test performances met TS and procedure requirements.

b. Findings

No findings of significance were identified.

R23 Temporary Plant Modifications

a. Inspection Scope

The inspectors walked down the temporary modifications installed to support a pipe replacement on the nuclear service river water line. The inspectors verified that the temporary modifications were installed in accordance with plant instructions and that the installation did not interfere with system operability. The nuclear service river water system was cross connected with the secondary service river water system during the repair. The cross connect configuration was permitted for one-time use by a exigent TS amendment.

b. Findings

No findings of significance were identified.

**Emergency Preparedness [EP]**

EP4 Emergency Action Level and Emergency Plan Changes

a. Inspection Scope

A regional in-office review of revisions to the Three Mile Island Emergency Plan, Implementing Procedures and Emergency Action Level changes was performed to determine that the changes did not decrease the effectiveness of the Emergency Plan. The reviewed documents are listed below and covered the period from January 1, 2001, through March 31, 2001.

- *TMI Emergency Plan, Rev. 6*
- *TMI Emergency Plan, Rev. 7*
- *EPIP-TMI-.10, Onsite/Offsite Radiological/Environmental Monitoring, Revs. 13 and 14*
- *EPIP-TMI-.16, Contaminated Injuries, Rev. 9*
- *EPIP-TMI-.29, OSC Operations, Revs. 17 and 18*
- *EPIP-TMI-.44, Thyroid Blocking, Rev. 3*
- *TEP-ADM-1300.02, Emergency Preparedness Training, Rev. 9*
- *TEP-ADM-1300.02, Emergency Preparedness Training, Rev. 10*



- TEP-ADM-1300.04, *Admin. of TMI Initial Response and Emergency Support*, Rev. 6

b. Findings

No findings of significance were identified.

EP6 Drill Evaluation

a. Inspection Scope

The inspectors observed an announced emergency preparedness drill on March 6, 2001. The inspectors evaluated the opportunities for classification and notification of the emergency action levels presented in the drill scenario. The inspectors observed the drill from the simulator main control room and emergency control center.

b. Findings

No findings of significance were identified.

## 2 RADIATION SAFETY

### Occupational Radiation Safety [OS]

OS1 Access Control to Radiologically Significant Areas

a. Inspection Scope

The inspector reviewed the following activities to determine the effectiveness of access controls to radiologically significant areas:

- The inspector toured accessible areas of the radiological controlled area and physically inspected and challenged four locked High Radiation Area access points to determine if access controls were sufficient to preclude unauthorized entry.
- The inspector reviewed access controls to licensee defined Very High Radiation Areas to verify that procedure described controls were implemented.
- The inspector made independent radiation level measurements within accessible radiologically controlled areas at the station to: 1) verify areas expected to exhibit radiation levels in excess of 100 mR/hr, were posted and controlled as High Radiation Areas or locked as appropriate; and, 2) confirm posted survey data. The inspector also reviewed and discussed licensee practices for control of non-fuel irradiated objects within the spent fuel pool, particularly those items that could be suspended by cables from the sides of the pools.

- The inspector reviewed the implementation and adequacy of radiological controls provided for a reactor building entry on February 9, 2001. The inspector verified conformance with applicable access controls including radiation work permit requirements. Work coordination activities, pre-entry approval completions, radiological survey data, and exposure results were reviewed to determine if adequate radiological controls were provided for the reactor building entry. The inspector also discussed entry requirements and expected radiological conditions with radiological controls technicians to ascertain general proficiency of the technicians.
- The inspector reviewed and discussed the types and magnitude of radiation exposures sustained by workers at the station in 2000 to identify anomalous exposure results. The inspector reviewed and discussed deep dose equivalent values, shallow dose equivalent values, lens dose equivalent values, committed effective dose equivalents, and committed dose equivalents.

b. Findings

No findings of significance were identified.

OS2 ALARA Planning and Controls

a. Inspection Scope

The inspector selectively reviewed the adequacy and effectiveness of the program to reduce occupational radiation exposure to as low as is reasonably achievable (ALARA). Specifically, the inspector reviewed the planning and preparation for the upcoming refueling outage (1R14). The inspector reviewed and discussed outage schedule development, major planned work activities including modifications, exposure estimates, incorporation of lessons learned, and source term control. The inspector also reviewed the current status of licensee planning, oversight, and implementation of cost-beneficial exposure reduction efforts for the outage. In addition, the inspector reviewed pre-outage milestones, action plans, and recent TMI Station ALARA Council minutes.

b. Findings

No findings of significance were identified.

OS3 Radiation Monitoring Instrumentation

a. Inspection Scope

The inspector selectively reviewed calibration and checking of fixed and portable radiological measurement instrumentation to determine if instruments were calibrated in accordance with applicable station procedures, if calibration records were up-to-date, and if applicable technical specification (TS) requirements were implemented. The following instrumentation was reviewed:

- Area radiation monitors

- G3, sampling room
- G5, personnel hatch
- G6,7, fuel bridge (TS 3.8)
- G-9, spent fuel bridge (TS 3.8)
- G18, reactor coolant sample line
- G 22,23, high range containment (TS 3.5.5)
- Atmosphere monitors
- A1, A13, spent fuel pool
- Liquid monitors
- L1, reactor letdown
- L4, service water
- Portable/Fixed
- RO-7 No. 500, (Probes 4000, 2900, 3966)
- E-530N No. 1040
- AMS-4 No. 452
- Portal Monitor PM-7 No. 445
- Ludlum 2000 No. 99198,102761
- SAC-4 No. 344, 655

The inspector verified that the following portable area radiation monitors were positioned as describe in the Updated Final Safety Evaluation Report and calibration was up to date.

- S-2, seal injection
- S-5, makeup
- S-6, waste evaporator

b. Findings

No findings of significance were identified.

**Public Radiation Safety [PS]**

PS1 Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems

a. Inspection Scope

The inspector reviewed the following documents to evaluate the effectiveness of the licensee's radioactive gaseous and liquid effluent control programs. The requirements of the radioactive effluent controls are specified in the Technical Specifications/Offsite Dose Calculation Manual (TS/ODCM).

- *1999 Radiological Annual Effluent Release Report including Radiation Dose Assessment Reports*
- Current *ODCM* (Revision 21, January 3, 2001), and technical justifications for ODCM changes made
- Analytical results for charcoal cartridge, particulate filter, and noble gas samples

- Implementation of the compensatory sampling and analysis program when the effluent radiation monitoring system (RMS) is out of service (Procedure Number 6610-ADM-4250.10, *Radiological Controls/Chemistry Actions when RMS Malfunctions*)
- Selected 2000 and 2001 radioactive liquid and gaseous release permits
- Associated effluent control procedures, including analytical laboratory procedures
- Calibration records for laboratory measurements equipment (gamma and liquid scintillation counters)
- Implementation of measurement laboratory quality control program, including interlaboratory comparisons
- Self-assessment number 3213-OB-99-001
- The, (audit dates: 10/19/2000 - 1/9/2001; audit number and title: S-TMI-00-14, *ODCM and Environmental Controls*) for the radiological effluent control/ODCM implementations
- Most recent surveillance testing results (visual inspection, delta P, in-place testings for high-efficiency particulate air and charcoal filters, air capacity test, and laboratory test for iodine collection efficiency) for the following air treatment systems:
  - (1) TS Section 3.15.1: Emergency Control Room Air Treatment System (performed on June 8, 2000)
  - (2) TS Section 3.15.2: Reactor Building Purge Air Treatment System (performed on September 2, 2000)
  - (3) TS Section 3.15.3: Auxiliary and Fuel Handling Building Air Treatment System (performed on January 4, 2000)
  - (4) TS Section 3.15.4: Fuel Handling Building Engineered Safeguards Feature (ESF) Air Treatment System (performed on September 7, 2000)
- Most recent effluent RMS and flow measurement devices calibration results for the following monitors:
  - (1) Liquid Radwaste Effluent Line RMS (RM-L-6) calibrated on July 25, 2000
  - (2) Liquid Radwaste Effluent Line Flow Rate Measuring Device (FT-84) calibrated on September 11, 2000
  - (3) ISTS/IWFS Discharge Line RMS (RM-L-12) calibrated on August 4, 1999
  - (4) Station Effluent Discharge Flow Rate Measuring Device (FT-146) calibrated on June 30, 2000
  - (5) Waste Gas Holdup System: Noble Gas Activity Monitor (RM-A7) calibrated on June 21, 2000; Effluent System Flow Rate Measuring Device (FT-123) calibrated on July 24, 1999
  - (6) Containment Purge Vent System: Noble Gas Activity Monitor (RM-A9) calibrated on July 22, 2000; Effluent Flow Rate Measuring Device (FT-148) calibrated on February 7, 2001
  - (7) Condenser Vent System Noble Gas Activity Monitor (RM-A5) calibrated on January 9, 2001
  - (8) Auxiliary and Fuel Handling Building Ventilation System: Noble Gas Activity Monitor (RM-A4 on June 8, 2000 & RM-A6 on June 2, 2000);

- System Effluent Flow Rate Measuring Devices (FT-149 and FT-150) calibrated on February 7, 2001
- (9) Fuel Handling Building ESF Air Treatment System: Noble Gas Activity Monitor (RM-A14) calibrated on January 25, 2000; System Effluent Flow Rate (UR-1104 A/B) calibrated on October 20, 1999
  - (10) Chemical Cleaning Building Ventilation System Noble Gas Activity Monitor (ALC RM-1-18) calibrated on March 16, 2000
  - (11) Auxiliary and Fuel Handling Building High Range Noble Gas Monitor (RM-A-8GH) calibrated on March 16, 2000
  - (12) Channel test results for accident radiation monitors tested on February 19, 2001:
    - Condenser Vent System Noble Gas Monitor (RM-A5Hi)
    - Containment Purge Vent Noble Gas Activity Monitor (RM-A9Hi)

The inspector also toured and observed the following activities to evaluate the effectiveness of AmerGen's radioactive gaseous and liquid effluent control programs.

- Walkdown for determining the availability of radioactive liquid/gaseous effluent RMS and for determining the equipment material condition
- Walkdown for determining operability of air cleaning systems and for determining the equipment material condition
- Observed charcoal/particulate filter sampling technique
- Observed sample preparation for gamma spectrometry measurements

b. Findings

No findings of significance were identified.

#### 4 OTHER ACTIVITIES

OA1 Performance Indicator Verification

.1 Occupational Exposure Control Effectiveness

a. Inspection Scope

The inspector examined the adequacy and effectiveness of the licensee's implementation of the Occupational Exposure Control Effectiveness performance indicator. The inspector reviewed the following matters:

- The inspector reviewed corrective action program records for occurrences involving high radiation areas, very high radiation areas, and unplanned personnel exposures for the past quarter against the applicable criteria specified in NEI 99-02, *Regulatory Assessment Performance Indicator Guideline*, to verify that all conditions that met the Nuclear Energy Institute criteria were recognized and identified as performance indicators.

b. Findings

No findings of significance were identified.

.2 Radiological Effluent Technical Specification/ODCM Radiological Effluent Occurrences

a. Inspection Scope

The inspector reviewed the following documents to ensure that AmerGen met all requirements of the performance indicator from the first quarter 1999 through the fourth quarter 2000 (eight quarters):

- Monthly projected dose assessment results due to radioactive liquid and gaseous effluent releases
- Quarterly projected dose assessment results due to radioactive liquid and gaseous effluent releases
- Associated procedures, including projected dose calculation methodology

b. Findings

No findings of significance were identified.

OA2 Identification and Resolution of Problems

Problem identification and resolution weaknesses led to an extended period of inoperability for the 'A' motor driven emergency feedwater pump. Those weaknesses are described in 1R15.1 of this inspection report.

OA3 Event Follow-up

(Closed) Licensee Event Report 50-289/2000-004-00: Discovery of a Condition Outside the Plant Design Basis for the Small Break Loss of Coolant Accident Analysis of Record for the Core Flood Tank Line Break Case. This licensee event report (LER) reported a condition identified as potentially outside the design basis of the plant related to a core flood tank line break with offsite power available. Preliminary analyses indicated that for this accident the reactor coolant pumps needed to be tripped within one minute of loss of sub-cooling margin, to maintain an acceptable peak clad temperature. Immediate actions of tripping the reactor coolant pumps upon a loss of sub-cooling margin were reinforced to control room operators; this action was already an existing abnormal transient procedural requirement. The inspectors verified that control room operators were familiar with this requirement. Additional analyses were being performed to verify the preliminary results indicated above, and the licensee will provide more updated information in a supplement to this LER. This LER was closed during onsite review. The inspectors will review the LER supplement when available.

OA6 Management Meetings

Exit Meeting Summary

On April 11, 2001, the resident inspectors presented the inspection results to members of AmerGen management led by Mr. George Gellrich. The occupational radiation safety inspection and radiological protection inspection results were presented

to AmerGen management on February 14, 2001, and March 9, 2001, respectively. AmerGen acknowledged the findings presented. The licensee did not indicate that any of the information presented at the exit meeting was proprietary.

**ATTACHMENT 1****SUPPLEMENTARY INFORMATION**a. Key Points of Contact

D. Atherholt, Director - Operations  
G. Gellrich, Plant Manager  
O. Limpas, Director - Site Engineering  
J. McElwain, Regulatory Assurance  
B. Merryman, Director - Maintenance  
J. Telfer, Director - Radiation Health & Safety  
M. Warner, Vice President, TMI Unit 1

b. List of Items Opened, Closed, and DiscussedOpened

01-02-01 AV Emergency Feedwater Pump Found Inoperable

Opened and Closed

01-02-02 NCV Inadequate Procedure for Nuclear Service Closed Cooling Water Pump Maintenance

Closed

2000-004-00 LER Discovery of a Condition Outside the Plant Design Basis for the Small Break Loss of Coolant Accident Analysis of Record for the Core Flood Tank Line Break Case



c. List of Acronyms Used

ADAMS	Agencywide Documents and Management System
ALARA	As Low As is Reasonably Achievable
AmerGen	AmerGen Energy Company, LLC
AV	Apparent Violation
CDF	Core Damage Frequency
CFR	Code of Federal Regulations
DRS	Division of Reactor Safety
ESF	Engineered Safeguards Feature
IR	Inspection Report
IPEEE	Individual Plant Examination for External Events
LER	Licensee Event Report
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
NCV	Non-cited Violation
NSCCWS	Nuclear Service Closed Cooling Water System
ODCM	Offsite Dose Calculation Manual
PRA	Probabilistic Risk Assessment
RMS	Radiation Monitoring System
SDP	Significance Determination Process
SRA	Senior Reactor Analyst
TMI	Three Mile Island, Unit 1
TS	Technical Specification