



UNITED STATES  
**NUCLEAR REGULATORY COMMISSION**  
REGION I  
475 ALLENDALE ROAD  
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

July 25, 2007

Mr. Christopher M. Crane  
President and CEO  
AmerGen Energy Company, LLC  
200 AmerGen Way, KSA 3-E  
Kennett Square, PA 19348

SUBJECT: THREE MILE ISLAND STATION, UNIT 1 - NRC INTEGRATED INSPECTION  
REPORT 05000289/2007003

Dear Mr. Crane:

On June 30, 2007, the United States Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Three Mile Island, Unit 1 (TMI) facility. The enclosed inspection report documents the inspection results, which were discussed July 12, 2007, with Mr. Rusty West and other members of your staff.

The 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.

On the basis of the results of this inspection, no findings of significance were identified.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice", a copy of this letter, and its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

We appreciate your cooperation. Please contact me at 610 337-5200 if you have any questions regarding this letter.

Sincerely,

**/RA/ A Rosebrook for**

Ronald R. Bellamy, Ph.D., Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

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

Enclosure: Inspection Report 05000289/2007003  
w/Attachment: Supplemental Information

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Site Vice President - TMI Unit 1, AmerGen  
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J. Johnsrud, National Energy Committee  
E. Epstein, TMI-Alert (TMIA)  
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U.S. NUCLEAR REGULATORY COMMISSION  
REGION 1

Docket No: 05000289

License No: DPR-50

Report No: 050000289/2007003

Licensee: AmerGen Energy Company, LLC (AmerGen)

Facility: Three Mile Island Station, Unit 1

Location: PO Box 480  
Middletown, PA 17057

Dates: April 1 - June 30, 2007

Inspectors: David M. Kern, Senior Resident Inspector  
Javier M. Brand, Resident Inspector  
Ronald M. Nimitz, Senior Health Physicist  
Andrew Rosebrook, Project Engineer  
Jeffrey Bream, Reactor Engineer  
Jennifer Bobiak, Reactor Inspector

Approved by: Ronald R. Bellamy, Ph.D., Chief  
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Division of Reactor Projects (DRP)

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## SUMMARY OF FINDINGS

IR 05000289/2007003; 4/1/2007 - 6/30/2007; AmerGen Energy Company, LLC; Three Mile Island, Unit 1; Routine integrated report.

The report covered a 13-week period of inspection by resident inspectors and announced inspections by regional inspectors. No findings of significance were identified. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

A. NRC-Identified and Self-Revealing Findings

No findings of significance were identified

B. Licensee Identified Violations

None.

## REPORT DETAILS

### Summary of Plant Status

Three Mile Island, Unit 1 (TMI) operated at or near 100 percent rated thermal power for the entire inspection period.

#### **1. REACTOR SAFETY**

##### **Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity**

#### 1R01 Adverse Weather Protection (71111.01)

##### a. Inspection Scope (1 Site Sample-Summer Readiness)

The inspectors reviewed the TMI design features and AmerGen's implementation of procedures to protect risk significant mitigating systems and components from adverse weather effects due to high temperatures. This review included measures to monitor and mitigate offsite power transmission grid stability issues. The inspectors verified that procedures addressed measures to monitor and maintain availability of both the offsite alternating current (AC) power system and the onsite alternate AC power system (station blackout diesel generator). This included verification that communication protocols between TMI operators and the transmission system operator were established to exchange appropriate information when issues arise that could impact the offsite power system.

The inspectors also reviewed AmerGen's summer readiness preparations performed in accordance with WC-AA-107, "Seasonal Readiness," Rev. 4. The inspectors reviewed active adverse contingency monitoring plans, performed plant walkdowns, discussed equipment performance issues with station personnel, and reviewed the corrective action data base to verify that AmerGen personnel were identifying and resolving weather-related equipment problems. Systems reviewed included 4160 VAC, Station Blackout Diesel Generators, and Main Condenser Vacuum System. Additional documents reviewed during this inspection are listed in the Attachment.

##### b. Findings

No findings of significance were identified.

#### 1R04 Equipment Alignment (71111.04)

##### a. Inspection Scope

##### Partial System Walkdowns (3 quarterly samples)

The inspectors performed three partial system walkdown samples on the following systems and components:

- On April 9 and 10, the inspectors reviewed the 'A' emergency diesel generator (EDG) and support systems while the 'B' EDG was unavailable due to planned inspection and maintenance.
- On April 18, 'A' train of the decay heat removal system while the 'B' train of the decay heat removal system was unavailable due to planned maintenance.
- On May 16, 'A' train of the control building ventilation and cooling system while the 'B' train was unavailable due to planned maintenance for compressor AH-P-9B replacement.

The partial system walkdowns were conducted on the redundant and standby equipment to ensure that trains and equipment relied on to remain operable for accident mitigation were properly aligned. Additional documents reviewed during the inspection are listed in the Attachment.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

a. Inspection Scope

Area Walkdowns (9 quarterly samples)

The inspectors conducted fire protection inspections for several plant fire zones, selected based on the presence of equipment important to safety within their boundaries. The inspectors conducted plant walkdowns and verified the areas were as described in the TMI Fire Hazard Analysis Report, and that fire protection features were being properly controlled per surveillance procedure 1038, "Administrative Controls-Fire Protection Program," Rev. 63. The plant walkdowns were conducted throughout the inspection period and included assessment of transient combustible material control, fire detection and suppression equipment operability, and compensatory measures established for degraded fire protection equipment in accordance with procedure OP-MA-201-007, "Fire Protection System Impairment Control," Rev. 2. In addition, the inspectors verified that applicable clearances between fire doors and floors met the criteria of Attachment 1 of Engineering Technical Evaluation CC-AA-309-101, "Engineering Technical Evaluations," Rev. 7. Fire zones and areas inspected included:

- Fire Zone IB-FZ-2, Intermediate Building Elev. 295', Turbine Driven EFW Pump Room;
- Fire Zone IB-FZ-3, Intermediate Building Elev. 295', Motor Driven EFW Pump Room;
- Fire Zone AB-FZ-2C, Auxiliary Building Elev. 281', Makeup and Purification Pump 'C';
- Fire Zone FH-FZ-6, Fuel Handling Building Elev. 285', Chiller Room;

- Fire Zone CB-FA-3D, Control Building Elev. 338', Relay Room;
- Fire Zone AB-FZ-6, Auxiliary Building Elev. 305', Demineralizers & A Motor Control Center Area;
- Fire Zone AB-FZ-6A, Auxiliary Building Elev. 305', Motor Control Center B;
- Fire Zone AB-FZ-7, Auxiliary Building Elev. 305', Decay Heat Removal & Nuclear Services Closed Cycle Cooling Pump Area;
- Fire Zone DG-FA-1, Diesel Generator Building Diesel Generator A.

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures (71111.06)

a. Inspection Scope (1 External Sample)

The inspectors reviewed Amergen's external flooding mitigation strategy including applicable sections of the Updated Final Safety Analysis Report (UFSAR Section 2.6.4, "Flood Studies,") and historic issue reports (IRs) (IR 596193, 584738, and 310344). The inspectors verified compensatory measures outlined in Emergency Procedure 1202-32, "Flood," Rev. 61, to ensure adequate protection against flood damage for risk significant equipment. The review included floor drains, flood gates, structures, and sumps in the 'A' and 'B' emergency diesel generator rooms (305' elev.), and the auxiliary building (281' and 305 elev.). In addition, the inspectors reviewed the most recent system health overview report for the "Dike/Flood Control System", and interviewed station personnel and the flood protection system engineer.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12)

a. Inspection Scope (4 quarterly samples)

The inspectors evaluated Maintenance Rule (MR) implementation for the following: MR scoping, characterization of failed structures, systems, and components (SSCs), MR risk categorization of SSCs, SSC performance criteria or goals, and appropriateness of corrective actions. Additionally, extent of condition follow-up, operability, and functional failure determinations were reviewed to verify they were appropriate. The inspectors verified that the issues were addressed as required by 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants;" Nuclear Management and Resources Council (NUMARC) 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Rev. 2, and AmerGen procedure ER-AA-310, "Implementation of the Maintenance Rule," Rev. 5. The inspectors verified that appropriate corrective actions were initiated and documented in IRs, and that engineers properly categorized failures

as maintenance rule functional failures and maintenance preventable functional failures when applicable.

- IR 628113 describes erratic 'A' emergency diesel generator control at initial loading during in service testing per procedure 1303-4.16, "Emergency Power System," Rev. 113.
- IR 620846 describes that nuclear river pump NR-P-1C failed to start from the control room after its breaker had been racked out to support divers de-silting clean-up of the screen house. The inspectors verified that the pump has been successfully stopped and re-started multiple times since this event.
- IRs 619545, 619896, 619532, and 619530 describe multiple issues with fire service pump FS-P-3 identified during a post maintenance test run. The issues included high fuel pressure, a sheared 1" brass fitting, and several other fitting leaks.
- IR 636857 documents a degraded 'A' 125 volt station battery ground resistance condition, reading 6 kilo-ohms. Following 10 days of investigation, technicians isolated the ground to station battery cells #72 and 73. Electrolyte weeping past the battery cell seal had saturated wooden spacer boards and created a ground path to the seismic battery support racks. Engineers concluded a manufacturing deficiency permitted the electrolyte leakage and affected numerous battery cells on each 125 volt station battery train. Immediate corrective actions were appropriate to eliminate the ground, and the battery remained operable. The inspectors identified that follow-up corrective actions were incomplete and untimely (IRs 638168 and 640137). Subsequent corrective actions included increased vendor oversight.

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13)

a. Inspection Scope (6 samples)

The inspectors reviewed scheduling, control, and restoration during the following maintenance activities to evaluate the effect on plant risk. This review was against criteria contained in AmerGen Administrative Procedure 1082.1, "TMI Risk Management Program," Rev. 5 and WC-AA-101, "On-Line Work Control Process," Rev. 12.

- In the entire Month of April, 2007, divers performed de-silting of the TMI pump bay area for multiple safety and non-safety related pumps. This condition elevated the on-line maintenance risk profile to yellow (Risk Document 663, Rev. 4).

- On April 8, the 'B' emergency diesel generator was removed from service for a scheduled two year inspection and maintenance activities. The condition elevated the online maintenance risk profile to yellow (Risk Document 814, Rev. 2).
- On April 18 and 19, the 'B' decay heat removal and building spray system trains were removed from service for scheduled maintenance activities. The condition elevated the online maintenance risk profile to orange (Risk Document 831, Rev. 17).
- On May 7, the 'A' decay heat removal and building spray system trains were removed from service for scheduled maintenance activities. The condition elevated the online maintenance risk profile to orange (Risk Document 1133, Rev. 6).
- On June 6-7, technicians removed a temporary repair from a through wall leak on the nuclear river water common supply header to support taking ultrasonic measurements of the piping flaw. Flaw measurements revealed that the micro biologic induced corrosion (MIC) rate was greater than previously analyzed. Contingencies were established to maintain the other river water cooling systems available while the operability evaluation was updated and the temporary repair was reinstalled.
- On June 20, the 'B' decay heat removal train was removed from service for scheduled corrective maintenance on flow transmitter (DH-FT-809). Station risk was assessed and downgraded from orange to green (Risk Document 711, Rev. 4).

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)

a. Inspection Scope (4 samples)

The inspectors reviewed operability evaluations for the following degraded equipment issues. The inspectors verified that degraded conditions in question were properly characterized, operability of the affected systems was properly evaluated in relation to Technical Specification (TS) requirements, that applicable extent of condition reviews were performed, and no unrecognized increase in plant risk resulted from the equipment issues. The inspectors referenced NRC Inspection Manual Chapter (IMC) Part 9900, "Operable/Operability-Ensuring the Functional Capability of a System Component" and AmerGen procedure OP-AA-108-115, "Operability Determinations," Rev. 1, to determine acceptability of the operability evaluations.

- On March 5, 2007, the inspectors identified that the auxiliary building sump level could exceed design basis assumptions because the level was being administratively controlled by operators at the limit established in design calculations. Specifically, the Auxiliary Building Sump Flooding Analysis (C-1101-573-E410-004, Rev. 1), assumes the initial auxiliary sump level is less than 3 feet when determining the time available for operators to respond to leakage into the safety related building spray (BS) and decay heat (DH) system vaults. Engineering determined that although at times the auxiliary sump level had slightly exceeded the <3 foot administrative limit stated in operating procedure 1104-40, "Plant Sump and Drainage System," Rev. 49, operability of the BS and DH system components was not affected (IR 599856).
- On April 3, operators observed increased through wall leakage on two previously identified MIC locations on a nuclear river water (NRW) system pipe. Engineering determined that the system was operable and that ASME Code Case 513-1 applied which supported this determination (IR 608589, 613770, 611631, 610963).
- On April 10, engineers documented that a cam roller bushing material deficiency identified by the EDGs manufacturer (Fairbanks Morse) under 10 CFR Part 21, may be applicable to TMI, Unit 1. Engineering determined that based on available procurement records and operational history of the TMI EDGs, this material deficiency did not apply to TMI and operability of the EDGs was not affected (IR 615417).
- On April 23, engineers identified fuel assembly guide tube growth due to irradiation in the core, was beyond the analyzed amount. This phenomenon pertained to model B-12 fuel assemblies and guide tubes made of B-5 zircaloy material (IR 620760). Operability evaluation OPE-07-003, "Mark B-12 Fuel Assemblies," Rev. 0 determined the fuel assemblies, control rods, reactor internals, and fuel cladding fission product barrier remained operable provided the reactor coolant system (RCS) was maintained > 525 degrees F. A revised engineering evaluation will be required if RCS temperature goes below 525 degrees F.

b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modifications (71111.17)

a. Inspection Scope (2 annual samples)

The inspectors reviewed the following modifications to determine whether they were designed and/or implemented as required by CC-AA-102, "Design Input and Configuration Change Impact Screening," Rev. 10 and CC-AA-103, "Configuration Change Control," Rev. 9. The inspectors verified the modifications supported plant

operation as described in the UFSAR and complied with associated TS requirements. The inspectors reviewed the function of changed components, the change description and scope, and the associated 10 CFR 50.59 screening evaluations.

- OP-TM-621-472, "Adjusting ULD Star Module Setpoint," Rev. 1, to reduce nuisance computer alarms (C3560) and maintain the average core thermal power at or below the limit.
- Engineering Change Request #TM 07-00407, "De-icing Line Replacement for CO-T-1A," Rev. 0 was installed to isolate and replace a leaking 4" underground line. This line had become corroded and leaked condensate containing tritium inside of the protected area. The inspectors evaluated installation of line stops with an access flange above ground on both ends of the line. The line stops were the first portion of the modification that isolated the leaking pipe from the source of the water. Installation of the replacement de-icing pipe was scheduled for July 2007.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope (5 samples)

The inspectors reviewed and/or observed the following post-maintenance test (PMT) activities to ensure: (1) the PMT was appropriate for the scope of the maintenance work completed; (2) the acceptance criteria were clear and demonstrated operability of the component; and (3) the PMT was performed in accordance with procedures. The following PMTs were observed and/or evaluated:

- On April 12, 2007, operators and maintenance technicians performed testing of the 'B' EDG (EG-Y-1B) in accordance with 1303-4.16, "Emergency Power System," Rev. 113, following a biennial inspection and a corrective maintenance outage.
- On April 19, operators performed testing in accordance with procedure OP-TM-212-202, "IST of DH-P-1B And Valves from ES Standby Mode," Rev. 5, following scheduled preventive maintenance.
- On April 20, operators performed testing in accordance with procedure 3303-M1, "Fire Pump Periodic Operation," Rev. 37, following scheduled corrective maintenance on fire service pump FS-P-3.
- On May 16, operators performed testing in accordance with procedure OP-TM-621-472, "Adjusting ULD Star Module Setpoint," Rev. 1, following implementation of a plant modification to reduce the core thermal power set point.

Enclosure

- On May 16 and 17, operators and maintenance technicians performed post maintenance testing in accordance with work order WO-C2015094, following replacement of control tower chiller compressor AH-P-9B.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope (2 In Service Test, 1 Isolation Valve, 1 Routine Surveillance samples)

The inspectors observed and/or reviewed the following operational surveillance tests, to verify adequacy of the test to demonstrate the operability of the required system or component safety function. Inspection activities included review of previous surveillance history to identify previous problems and trends, observation of pre-evolution briefings, and initiation/resolution of related IRs for selected surveillances.

- On May 15, 2007, procedure OP-TM-211-208, "IST OF MU-P-1C," Rev. 2.
- On May 15, procedure OP-TM-211-213, "IST OF MU-V-16C And MU-V-16D," Rev. 0.
- On May 24, procedure 1303-5.2A, "A Emergency Loading Sequence And HPI Logic Channel/Component Test," Rev. 3.
- On May 30, procedure OP-TM-541-208, "IST of NS-P-1A/B/C," Rev. 2.

b. Findings

No findings of significance were identified.

1R23 Temporary Plant Modifications (71111.23)

a. Inspection Scope (1 sample)

The inspectors reviewed the following temporary modification (TM) and associated implementing documents, interviewed the respective system engineer, and walked down the in-plant system to verify the plant design basis and the system or component operability was maintained. Procedures CC-AA-112, "Temporary Configuration Changes," Rev. 12, and CC-TM-112-1001, "Temporary Configuration Change Implementation," Rev. 4, specify requirements for development and installation of TMs.

- Engineering change request 07-00132, "Change Smart Analog Signal Select System (SASS) Setpoint for 'B' Reactor Coolant Loop T-Cold Narrow Range," Rev. 0 was performed on May 31, 2007. The setpoint revision was performed to address the receipt of numerous invalid temperature mismatch alarms. The TM

was implemented using work order C2015217 and procedure 1430-SASS-1, "SASS Maintenance," Rev. 3.

b. Findings

No findings of significance were identified.

**Cornerstone: Emergency Preparedness [EP]**

1EP6 Drill Evaluation (71114.06)

a. Inspection Scope (1 sample)

On June 7, 2007, the inspectors observed an emergency event training evolution conducted at the Unit 1 control room simulator, the technical support center, and the operations support center to evaluate emergency procedure implementation, event classification, event notification, and protective action recommendation development. The event scenario involved multiple safety-related component failures and plant conditions warranting simulated Unusual Event, Alert, and Site Area Emergency event declarations. The licensee counted this training evolution toward the Emergency Preparedness Drill/Exercise Performance (DEP) Indicator. The inspectors attended a portion of the station critique to determine whether the licensee critically evaluated drill performance to identify deficiencies and weaknesses. Additionally, the inspectors verified the DEP performance indicators (PIs) were properly evaluated consistent with Nuclear Energy Institute (NEI) 99-02, "Regulatory Assessment Performance Indicator Guideline," Rev. 4. Additional documents used for this inspection activity included:

- TMI Emergency Preparedness Drill Scenario T05
- NRC Inspection Procedure 71114.06, "Drill Evaluation"
- EP-AA-1009, "Radiological Emergency Plan Annex for TMI Station," Rev. 8
- EP-AA-111, "Emergency Classification and Protective Action Recommendations," Rev. 11

b. Findings

No findings of significance were identified.

**2. RADIATION SAFETY**

**Cornerstone: Occupational Radiation Safety (OS)**

2OS1 Access Control To Radiologically Significant Areas (71121.01)

a. Inspection Scope (1 sample)

The inspectors selectively reviewed initial underwater diving activities occurring in the Unit 1 Spent Fuel Pool. The inspectors reviewed radiological survey data and application of dosimetry to effectively monitor exposure to dive personnel. The inspectors also reviewed radiation work permit and work procedure requirements, discussed work briefings, and reviewed access controls to the dive areas relative to Regulatory Guide 8.38, Rev. 1, Control of Access to High and Very High Radiation Areas in Nuclear Power Plants.

b. Findings

No findings of significance were identified.

**Cornerstone: Public Radiation Safety (PS)**

2PS1 Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems (71122.01)

a. Inspection Scope (11 samples)

Inspection Planning and In-office Inspection

The inspectors selectively reviewed the 2005 and 2006 Radiological Effluent Release Reports and Radiological Dose Assessment Reports to verify that the program was implemented as described in the station Radiological Effluents Technical Specifications (RETS) and the Offsite Dose Calculation Manual (ODCM). The inspectors reviewed the latest updated ODCM for significant changes to identify changes to radioactive waste system design and operation and to identify program changes. The inspectors determined whether changes to the ODCM were technically justified and documented, as appropriate. The technical justifications, as appropriate, were reviewed during the onsite inspection.

The inspectors evaluated AmerGen's analysis for any additional discharge pathways as a result of a spill, leak, routine, normal, abnormal, or unexpected liquid discharge or gaseous discharges, which may have developed since the previous inspection. The inspectors verified, as applicable, that AmerGen had records on sampling locations, type of monitoring, and frequency of sampling to meet 10 CFR 20.1501 requirements.

The inspectors determined whether modifications made to radioactive waste system design and operation, as applicable, changed the dose consequence to the public. The inspectors verified, as appropriate, that technical and/or 10 CFR 50.59 reviews were performed. The inspectors determined whether radioactive liquid and gaseous effluent radiation monitor setpoint calculation methodology changed since the previous inspection and that AmerGen had set and adjusted its radioactive effluent alarm setpoints in accordance with the methodology and parameters specified within the current ODCM.

The inspectors determined if anomalous results, reported in the current Radiological Effluent Release and Radiological Dose Assessment Reports, were adequately

resolved. The inspectors also reviewed AmerGen's actions to revolve any out-of-specification intra- and inter-laboratory cross-check analysis data for the effluent monitoring program and to determine if remedial action had been taken for the out-of-specification data.

The inspectors reviewed the RETS/ODCM to identify the effluent radiation monitoring systems and applicable flow measurement devices. The inspectors reviewed any effluent radiological occurrence performance indicator incidents for onsite follow-up and reviewed AmerGen self-assessments, audits, and event reports that involved unanticipated offsite releases of radioactive material, as appropriate. (See also Section 4OA2)

The inspectors reviewed the Updated Final Safety Analysis Report (UFSAR) description of radioactive effluent monitoring and radioactive gaseous and liquid processing systems, as appropriate.

The inspectors reviewed the RETS/ODCM to identify the programs for identifying potential contaminated spills and leakage and AmerGen's process for control and assessment. The inspectors determined if any AmerGen procedures and/or surveillance activities address the ability to identify onsite spills/leaks of contaminated fluids.

#### Onsite Inspection

The inspectors selectively walked down, where possible, major components of the gaseous and liquid release systems (e.g., radiation and flow monitors, filters, tanks, and vessels) to observe current system configuration with respect to the description in the UFSAR and equipment material condition. The inspectors verified that system components were as described in the ODCM and were used for reduction of activity levels in accordance with the RETS/ODCM. During facility tours, the inspectors were sensitive to potential unmonitored radioactive gaseous and/or radioactive liquid release pathways.

The inspectors observed routine effluent sample collections from station vent and selectively observed laboratory analysis of these effluent particulate filters, charcoal cartridges, tritium, and gas samples. The inspector reviewed use of radioactive gaseous effluent treatment equipment in accordance with RETS/ODCM requirements, as applicable, and reviewed use of systems per ODCM guidance. The inspectors selectively reviewed radioactive liquid waste release permits.

The inspectors reviewed, as appropriate, records of gaseous and/or liquid releases made with out-of-service effluent radiation monitors, and AmerGen's actions for these releases, to ensure an adequate defense-in-depth was maintained against an unmonitored, unanticipated release of radioactive material to the environment. The inspectors determined, where appropriate, compensatory sampling and radiological analyses was conducted, at the RETS/ODCM required frequency, when effluent monitors were declared out-of-service. For unmonitored releases, where applicable, the

inspectors determined if AmerGen had performed an evaluation of the type and amount of radioactive material that was released and the associated projected doses to members of the public. The inspectors also selectively determined if AmerGen had placed information on leaks or spills into its 10 CFR 50.75(g) decommissioning file, as appropriate.

The inspectors assessed AmerGen's understanding of the location and construction of underground pipes and tanks, and storage pools, that contain radioactive contaminated liquids. The inspectors evaluated if AmerGen may have potential unmonitored leakage of contaminated fluids to the groundwater as a result of degrading material conditions or aging of facilities. The inspectors evaluated AmerGen's capabilities (such as monitoring wells) of detecting spills or leaks and of identifying groundwater radiological contamination both on site and beyond the owner controlled area. The inspectors reviewed AmerGen's technical bases for onsite groundwater monitoring conducted and its long-term sample program. The inspectors reviewed ground and surface water sample results. The inspectors discussed with AmerGen, its understanding of groundwater flow patterns for the site, and in the event of a spill or leak of radioactive material, if AmerGen's staff can estimate the pathway of a plume of contaminated fluid both onsite and beyond the owner controlled area. The inspectors reviewed the TMI Station Hydro-geologic Investigation Report, dated September 1, 2006. The inspector also reviewed the Annual Radiological Groundwater Protection Program Report, dated April 2007.

The inspectors reviewed changes, as applicable, to the ODCM as well as to the liquid or gaseous radioactive waste system design, procedures, or operation since the last inspection. For each system modification, and each ODCM revision that impacted effluent monitoring or release controls, as applicable, the inspectors reviewed AmerGen's technical justification to determine whether the changes affected AmerGen's ability to maintain effluents as low as reasonably achievable and whether changes made to monitoring instrumentation resulted in a non-representative monitoring of effluents.

For significant changes to dose values reported in the Radiological Effluent Release Report from the previous report (2005 versus 2006), the inspectors evaluated, where applicable, the factors which may have resulted in the change. The inspectors also evaluated if the change was influenced by an operational issue (e.g., fuel integrity, extended outage, or major decontamination efforts).

The inspectors reviewed a selection of 2004, 2005, and 2006 monthly, quarterly, and annual dose calculations to ensure that AmerGen properly calculated the offsite dose (both cumulative and projected) from radiological effluent releases and direct radiation to determine if any annual TS/ODCM (i.e., Appendix I to 10 CFR Part 50) values were exceeded and, if appropriate, issued a PI report if any quarterly values were exceeded. The inspectors evaluated the source term used by AmerGen to ensure all applicable radionuclides discharged, within detectability standards, were included. The inspectors also selectively performed conservative calculations, based on ODCM methodology, to validate selective projected doses.

The inspectors reviewed air cleaning system surveillance test results (standby gas treatment system) to ensure that system operations were within applicable acceptance criteria specified in Technical Specifications. The inspectors selectively reviewed surveillance test results or methodology AmerGen used to determine ventilation exhaust flow rates.

The inspectors reviewed records of effluent monitor instrument calibrations, performed since the last inspection, for each point of discharge, effluent radiation monitor and flow measurement device; reviewed any completed system modifications; and selectively reviewed the current effluent radiation monitor alarm setpoint value for agreement with RETS/ODCM requirements.

The inspectors reviewed calibration records of radiation measurement (i.e., laboratory counting room) instrumentation associated with effluent monitoring and release activities. The inspectors reviewed quality control records for the radiation measurement instruments and looked for indications of degraded instrument performance and the corrective actions taken.

The inspectors reviewed the results of the intra- and inter-laboratory comparison program to verify the quality of radioactive effluent sample analyses performed by AmerGen. The inspector reviewed AmerGen's quality control evaluation of the inter-laboratory comparison test data and associated corrective actions for any deficiencies identified. The inspector also, as applicable, reviewed AmerGen's assessment of any identified bias in the sample analysis results and the overall effect on calculated projected doses to members of the public.

The inspectors reviewed the results from AmerGen's quality assurance audits to determine whether AmerGen met the requirements of the RETS/ODCM. (See also Section 4.05.)

b. Findings

No findings of significance were identified.

**4. OTHER ACTIVITIES**

4OA1 Performance Indicator Verification (71151)

a. Inspection Scope (2 samples)

The inspectors reviewed selected station records to verify NRC performance indicators (PIs) had been accurately reported to the NRC as required by NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Rev. 4. The two PI samples listed below were verified for the period April 2006 to March 2007. Documents reviewed during the inspection are listed in the attachment.

Barrier Integrity Cornerstone

- Reactor Coolant System Leakage
- Reactor Coolant System Activity

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems (71152)

.1 Review of Items Entered into the Corrective Action Program and Cross-References to Problem Identification And Resolution Issues Reviewed Elsewhere

As required by Inspection Procedure 71152, "Identification and Resolution of Problems," and in order to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the licensee's corrective action program. This review was accomplished by reviewing a list of daily issue reports, by performing detailed reviews of selected issue reports, attending daily screening meetings, and accessing the licensee's computerized database.

The inspectors also reviewed a sample of IRs associated with 10 CFR 50.59 issues and plant modification issues to ensure that AmerGen was appropriately identifying, characterizing, and correcting problems associated with these areas and that the planned or completed corrective actions were appropriate. Additional documents reviewed during this inspection are listed in the attachment.

.2 Semi-Annual Review to Identify Trends (1 sample)

a. Inspection Scope

The inspectors performed a semi-annual review of common cause issues in order to identify any unusual trends that might indicate the existence of a more significant safety issue. This review included an evaluation of repetitive issues identified via the corrective action program, self revealing issues, and issues evaluated using programs supplemental to the formal corrective action program such as the maintenance rule program and corrective maintenance program. The results of the trending review were compared with the results of normal baseline inspections.

b. Assessment and Observations

Station-wide corrective actions to improve procedure quality and adherence have been effective; steady improvement noted since March 2006. Senior reactor operator (SRO) staffing levels were challenged due to retirements, exam failures, and several fitness for duty (FFD) issues over the past 18 months. The most recent was when the Shift manager (SM) passed out while giving a blood sample for his period physical while assigned duty as SM and emergency response organization emergency director (see

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Section 4OA3.2). The station actions to address these staffing challenges have been effective. Eleven applicants (3 reactor operators and 8 SROs) successfully passed their examination and received licenses in June 2007. The next initial license class begins in January 2008.

Problem identification has improved. However, problem resolution (rigor and timeliness) remains inconsistent. Recent examples included deficient assessment and mitigation of electrolyte leakage from 125 volt station battery cells which caused an electrical ground (IRs 636468, 636857, 638168, 640137), on-shift SM unfit for duty due to passing out while giving a blood sample (IR 621713, 636536), degraded reactor building coatings (IR 575064), and deficient protected area access controls (IR 565138).

During the past 6 months the station has had an elevated number of degraded equipment or material issues. Station personnel have used the corrective action program to reasonably assess individual issues and when appropriate developed adverse condition monitoring plans in accordance with OP-AA-108-111. At the close of the inspection period nine adverse condition monitoring plans were in effect. Examples included nuclear riverwater leaks due to corrosion, fuel assembly guide tube growth, one failed fuel pin, 'B' channel of the reactor protection system in "bypass" due to a reactor coolant loop T-hot instrument failure, a condensate storage tank deicing line tritium leak, 'B' decay heat system flow indication degraded, 125 volt station battery electrolyte leakage causing grounds, main condenser vacuum pump high discharge temp, one feedwater heater level in manual control, and various hot weather challenge issues. The inspectors noted that although individual issues were reasonably addressed, the cumulative impact may adversely affect plant or operator response to initiating events. The inspectors discussed this concern with station management. Station management held daily meetings to focus attention on managing and correcting the degraded equipment conditions. The inspectors observed good interdepartmental communications and progress on correcting several of degraded material conditions toward the end of the inspection period.

.3 Annual Sample Review (1 sample)

a. Inspection Scope

The inspectors reviewed AmerGen's evaluation and corrective actions associated with the First Energy 2006 Grid Voltage Calculation Review. The inspectors reviewed IR-577700 and the associated actions against the requirements of AmerGen's corrective action program to ensure that the full extent of the issues were identified, appropriate evaluations were performed, and appropriate corrective actions were specified and prioritized. The inspectors interviewed relevant station personnel and reviewed the grid calculation update. The inspectors reviewed applicable station procedures to ensure the extent of the grid information was incorporated as appropriate.

b. Findings

No findings of significance were identified. AmerGen adequately incorporated the First Energy data into the voltage calculations. Changes in margin were correctly identified and tracked. The inspectors noted that while this information was adequately integrated into the grid voltage calculation, there was a delay in discussing the changes in margin with First Energy. The data is pertinent to a specific time period, the summer of 2007, and this should have been reflected in the prioritization of the corrective actions. The inspectors also noted that, although a requirement exists in procedure ES-037T to annually verify the transmission operator has adequate guidance to respond to voltage limit issues for Three Mile Island, this was not being done consistently and no method exists to ensure this procedure step is performed. AmerGen has entered this issue into their corrective action program as IR 00640019.

.4 Radiation Safety

a. Inspection Scope (71122.01, 7112203) (1 Sample)

The inspectors reviewed audits and assessments of the radioactive waste handling, processing, storage, and shipping programs including the Process Control Program (PCP). The inspectors also reviewed selected corrective action documents written since the previous inspection. Documents reviewed are listed in the attachment.

The review was against criteria contained in 10 CFR 20, Technical Specifications, and applicable station audit and surveillance procedures.

b. Findings

No findings of significance were identified.

4OA3 Event Followup (71153 - 3 samples)

.1 Condensate Storage Tank (CST) Deicing Line Water Line Leak

a. Inspection Scope

On April 17, 2007, station personnel discovered water containing tritium (45,200 picocuries/liter) within a cable trench in the telecommunications room inside the protected area (IRs 618443 and 618929). Station personnel determined the water came from a leak in an underground CST deicing line, close to where the line had leaked in May 2006 (documented in NRC Integrated Inspection Report 050002892006-04, Dated July 26, 2006). The inspectors reviewed station drawings, conducted field walkdowns, and interviewed station personnel to verify appropriate actions were implemented to stop the leak and prevent migration of the tritium water offsite.

Chemistry samples confirmed small amounts of the tritium water had reached underground cable conduit runs (IR 618944). The cable conduit manways were

pumped out, the leak was stopped, and the affected section of piping was isolated. The Exelon Groundwater Tritium study, completed in September 2006, confirmed that almost all groundwater tritium at TMI remains at TMI due to the associated island hydrology characteristics and industrial wells which draw an aquifer to their point of suction. Groundwater flux migration studies concluded that only a very small amount of tritium water, well below the lower limit of detection, reaches the Susquehanna river. This data is included in the annual report of plant effluents.

A project team was formed to develop a permanent repair for this repetitive leak. An adverse condition monitoring plan was developed and an enhanced groundwater well monitoring plan was implemented to verify the leak was stopped. Repair plans were developed in accordance with engineering change request (ECR) TM -7-00401, "Deicing Line Replacement for CO-T-1A," Rev. 0. The inspectors reviewed the ECR, discussed repair and monitoring activities with station personnel, and monitored installation of temporary line stops on the deicing line to isolate the leak. Completion of the plant modification to replace the existing CST deicing line is scheduled for July 2007.

b. Findings

No findings of significance were identified.

.2 Shift Manager and Emergency Director Position Not Staffed For Brief Period

a. Inspection Scope

On April 25, the shift manager (SM) briefly fainted while he was at the south office building providing a blood sample for a medical exam (IR 621713). Although the SM revived within one minute, as a precaution, another qualified SM operator was located, briefed on plant conditions, and assigned SM watch standing duties. Correspondingly the SM and station emergency director position was not staffed for 30 minutes. The inspectors reviewed logs, interviewed station personnel, and reviewed regulatory staffing requirements. The inspectors determined the SM was not fit for duty while passed out and during subsequent recovery (a total period of less than 10 minutes). Two senior reactor operators remained on watch at the control room, fully capable of overseeing safe plant operation and making emergency plan classifications if the need arose. Deficiencies which permitted this event to occur, and deficiencies in AmerGen's follow-up to this issue were documented in IR 636536.

B. Findings

No findings of significance were identified.

.3 (Closed) Licensee Event Report (LER) 05000289/2006-002-00, Automatic Reactor Trip Due to an Invalid Turbine Protective System Actuation

On November 2, 2006, the reactor automatically shut down due to an invalid trip actuation signal during calibration of the main condenser pressure transmitters. Station

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personnel determined the cause was a latent design deficiency in the digital turbine control system. The event was previously documented in NRC Inspection Report 05000289/2006006. The inspectors determined the LER accurately described the event and no findings of significance were identified. This LER is closed.

#### 40A5 Other

##### Additional NRC Assessment of NRC Finding 05000289/2007502-01, Failure to Adequately Critique and Identify a Performance Problem Associated with the Process of Event Classification

NRC Inspection Report 05000289/2007502 dated May 15, 2007, documented a Green findings associated with an EP drill critique deficiency. The shift manager made an Unusual Event classification based on an incorrect classification criteria and the critique did not identify this performance error. During this inspection period the inspectors discussed the cause of the deficient EP drill critique with both licensee staff and the NRC Team who identified the finding. The inspectors determined that the finding had a cross-cutting aspect in the area of problem identification and resolution, because the licensee did not ensure this issue which potentially impacted nuclear safety was promptly identified [P.1(a)]. The licensee did not implement a corrective action program with a low threshold for identifying issues. Specifically, station personnel did not recognize that the shift manager made the Unusual Event classification based on an incorrect classification criteria. Therefore, the EP drill critique did not identify and correct the event classification deficiency as required by 10 CFR 50, Appendix E, Section IV.F.2.g.

#### 40A6 Meetings, Including Exit

##### Exit Meeting Summary

On July 12, 2007, the resident inspectors presented the inspection results to Mr. Rusty West and other members of the TMI staff. The regional specialist inspection results were previously presented to members of AmerGen management. The inspectors asked the licensee whether any of the material examined during the inspection should be considered proprietary and none was identified.

ATTACHMENT: SUPPLEMENTAL INFORMATION

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**SUPPLEMENTAL INFORMATION****KEY POINTS OF CONTACT**Licensee Personnel

C. Baker	Manager, Chemistry
R. Barley	Maintenance Rule Coordinator
J. Bashista	System Engineer
P. Bennett	Manager, Design Engineering
R. Bensel	System Engineer
M. Benson	Program Engineer
J. Carney	Licensed Operator Requalification Program Supervisor
B. Carsky	Director, Operations
G. Chevalier	Chemist
T. Dougherty	Plant Manager
E. Eilola	Director, Site Engineering
E. Eisen	System Engineer
R. Ezzo	Manager, Electrical I&C Design
M. Fitzwater	System Engineer
R. Godwin	Training Director
R. Green	Engineer
J. Hayes	System Engineer
J. Heischman	Director, Maintenance
R. Masoero	Program Engineer
A. Miller	Regulatory Assurance
J. Murray	Operations Training Manager
T. Nahay	Director, Work Management
D. Neff	Manager, Emergency Preparedness
L. Porter	System Engineer
S. Queen	Sr. Manager Plant Engineering
L. Rajkowski	Manager Engineering Programs
K. Robles	System Engineer
R. Sieglitz	Fire Protection System Engineer
C. Shorts	Engineer
C. Smith	Manager, Regulatory Assurance
J. Valent	Manager Mechanical Maintenance
L. Weir	Manager, Nuclear Oversight Services
C. Wend	Manager, Radiation Protection
R. West	Vice President, TMI Unit 1
T. Wickel	Senior Manager, Design Engineering

Others:

M. Murphy	Pennsylvania Department of Environmental Protection, Bureau of Radiation Protection
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**LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

Closed

05000289/2006002-00	LER	Automatic Reactor Trip Due to an Invalid Turbine Protective System Actuation
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## LIST OF DOCUMENTS REVIEWED

### **Section 1R01: Adverse Weather Protection**

#### Procedures:

1082.1, "TMI Risk Management Program," Rev. 5  
1107-8, "Substation Emergency Power," Rev. 20  
1107-11, "TMI Grid Operations," Rev. 19  
ES-037T, "TMI-1 Voltage Criteria," Rev. 1  
OP-AA-108-107-1001, "Station Response to Grid Capacity Conditions," Rev. 2  
OP-AA-108-111, "Adverse Condition Monitoring and Contingency Planning," Rev. 3  
OP-TM-864-901, "SBO Diesel Generator (EG-Y-4) Operations," Rev. 4  
OP-TM-AOP-020, "Loss of Station Power," Rev. 9

#### Issue Reports:

474924, 606634, 634796, 635808, 640010

#### Other Documents:

Pennsylvania, Jersey, Maryland Manual 03, "Transmission Operations," Rev. 26

### **Section 1R04: Equipment Alignment**

#### Drawings:

302-351, "Emergency Diesel Generator Services," Rev. 18  
302-640, "Decay Heat Removal," Rev. 80  
302-847, "Control Building Chilled Water," Rev. 21

### **Section 1R15: Operability Evaluations**

#### Other Documents:

Areva CR # 2007-1878, Defect Determination, "Fuel Assembly Growth," Dated 6/14/07

### **Sections 2OS1 and 2PS1: Radiation Safety**

Annual Effluent Release Reports - 2005, 2006  
Annual Radiological Environmental Monitoring Report - 2005, 2006  
Annual Radiological Groundwater Protection Program Report- 2006  
Intra and Inter Laboratory Cross-check Analysis Results - 2006  
Offsite Dose Calculation Manual  
10 CFR 50.75(g) history file record summary  
Laboratory Counting Systems Calibration Records  
Effluent Radiation Monitor Calibration Records  
Effluent Exhaust System Ventilation System Surveillance testing data  
Radiological Controls Documentation for Diving Activities

### **Section 4OA1: Performance Indicator Verification**

#### Procedures:

ER-AP-331-1003, "RCS Leakage Monitoring and Action Plan," Rev. 1  
LS-AA-2001, "Collecting and Reporting of NRC Performance Indicator Data," Rev. 4

LS-AA-2090, "Monthly PI Data Elements for Reactor Coolant System (RCS) Specific Activity," Rev. 4

LS-AA-2100, "Monthly PI Data Elements for RCS Leakage," Rev. 5

OP-TM-220-251, "Reactor Coolant System Leak Rate," Rev. 7

**Section 40A2: Identification and Resolution of Problems**

Drawings:

229-001, "Electrical Substation One Line Diagram", Rev 27

E-206-011, "Electrical Main One Line and Relay Diagram", Rev 50

Procedures:

1107-11, "TMI Grid Operations", Rev 19

ES-037T, "TMI-1 Voltage Criteria", Rev 1

OP-AA-108-107-1001, "Station Response to Grid Capacity Conditions", Rev 2

OP-TM-AOP-020, "Loss of Station Power", Rev 11

Calculations and Engineering Analyses:

C-1101-700-E510-010, "TMI-1 AC Voltage Regulation Study", Rev 6F

Other Documents:

AR 00305418

AR 00577700

ECR 07-00238

Email from John Gyrath to Randy Ezzo, "FW: Voltage Control Documents for TMI and Oyster Creek", 6/13/07

Email from Nandishwara Dantuluri to John Gyrath, "FW: TMI 2007 Degraded Grid Analysis", 01/02/07

Letter from Jason Smalley, First Energy, to John Gyrath, "TMI Offsite Voltage Analysis for Conditions Expected for Summer 2007", 12/1/06

Self Assessment 558899-04, dated April 4, 2007,

NOS Quarterly Report - NOSA-TM-07-1Q, dated April 25, 2007

Chemistry, Radwaste, Effluent, Environmental Monitoring Program Audit Report - NOSA-TMI-06-04(AR 4652991), dated April 19, 2006

ODCM, REMP, Effluent and Environmental Monitoring Audit Report, NOSA-TMI-05-08 (AR 386079), dated December 7, 2007

Issue Reports

640019, 573812, 618944, 630556, 609783, 616995, 491601, 4955884, 353049, 480878, 632494, 629098, 633755, 637682, 637698, 637709, 639600, 639617, 639618, 618944 ).

**LIST OF ACRONYMS**

AC	Alternating Current
ADAMS	Agencywide Documents and Management System
AmerGen	AmerGen Energy Company, LLC
BS	Building Spray
CFR	Code of Federal Regulations
CST	Condensate Storage Tank
DEP	Drill/Exercise Performance
DH	Decay Heat
DRP	Division of Reactor Projects
ECR	Engineering Change Request
EDG	Emergency Diesel Generator
EFW	Emergency Feed Water
EP	Emergency Preparedness
FFD	Fitness for Duty
IMC	Inspection Manual Chapter
IR	Issue Report
IST	Inservice Testing
LER	Licensee Event Report
MIC	Microbiologic Induced Corrosion
MR	Maintenance Rule
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulations
NRW	Nuclear River Water
NUMARC	Nuclear Management and Resources Council
NOS	Nuclear Oversight
OCDM	Offsite Dose Calculation Manual
OEDO	Office of Executive Director of Operations
PARS	Publicly Available Records
PADEP	Pennsylvania Department of Environmental Protection
PCP	Process Control Program
PI	Performance Indicator
PMT	Post-Maintenance Test
PS	Public Radiation Safety
RCA	Radiological Controlled Area
RCS	Reactor Coolant System
RETS	Radiological Effluents Technical Specifications
RI	NRC Region I
RP&C	Radiological Protection and Chemistry
SASS	Smart Analog Signal Select System
SM	Shift Manager
SRO	Senior Reactor Operator
SSC	Structures, Systems, and Components
SUNSI	Sensitive Unclassified Non-Safeguards Information
TM	Temporary Modification

TMI	Three Mile Island, Unit 1
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
ULD	Unit Load Demand
WO	Work Order