



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION I
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November 5, 2008

Mr. Charles G. Pardee
President and Chief Nuclear Officer (CNO), Exelon Nuclear
Chief Nuclear Officer (CNO), AmerGen Energy Company, LLC
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: THREE MILE ISLAND STATION, UNIT 1 – NRC INTEGRATED
INSPECTION REPORT 5000289/2008004

Dear Mr. Pardee:

On September 30, 2008, the U.S. 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 October 7, 2008, with Mr. William Noll 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.

This report documents two NRC-identified findings of very low safety significance (Green). All of the findings were determined to involve violations of NRC requirements. Additionally, a licensee-identified violation which was determined to be of very low safety significance is listed in this report. However, because of the very low safety significance and because they were entered into your corrective action program, the NRC is treating these violations as non-cited violation (NCVs) consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest any NCV in this report, you should provide a response within 30 days of the date of this inspection report, with the basis of your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the Resident Inspector at Three Mile Island.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice", a copy of this letter, 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/

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

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

Enclosure: Inspection Report 05000289/2008004
w/Attachments: Supplemental Information
TI 2515/172 Documentation Questions for TMI Unit 1

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U.S. NUCLEAR REGULATORY COMMISSION
REGION 1

Docket No: 05000289

License No: DPR-50

Report No: 05000289/2008004

Licensee: AmerGen Energy Company, LLC (AmerGen)

Facility: Three Mile Island Station, Unit 1

Location: PO Box 480
Middletown, PA 17057

Dates: July 1 – September 30, 2008

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SUMMARY OF FINDINGS

IR 05000289/2008002, 7/1/2008 – 9/30/2008; AmerGen Energy Company, LLC; Three Mile Island, Unit 1; Operability Evaluations and Surveillance Testing.

The report covered a 13-week period of inspection by resident inspectors and announced inspections by regional inspectors. Two Green findings, each of which were non-cited violations (NCVs), were identified. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, Significance Determination Process (SDP). Findings for which the SDP does not apply may be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, Reactor Oversight Process, Rev. 3, dated July 2000.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. The inspectors identified an NCV of Technical Specification (TS) 6.8.1.e, which requires that written procedures covering the Fire Protection program be properly implemented. Specifically, fire seal inspections performed in August and October 2007 did not properly identify two degraded seismic floor penetration fire seals and initiate corrective measures including an expanded inspection scope as required by procedure 1303-12.9, Fire Barrier Seal Inspection. Consequently, numerous fire seals associated with plant areas containing safety related accident mitigation equipment remained degraded until independently identified by the NRC inspectors and licensee staff in June and July 2008. Upon discovery of the degraded fire seals, operators declared the fire seals inoperable, established appropriate compensatory measures, entered the issue into the corrective action program (Issue Reports 808410, 792382, 791987 and 793088), and implemented seal repairs.

This finding adversely affected the reliability of equipment required to achieve and maintain a safe shutdown condition following a severe fire, because the degraded fire seals adversely affected the confinement defense-in-depth element of fire protection. The finding is greater than minor because it is associated with the protection against external factors attribute of the Mitigating Systems cornerstone. Because the cracks, foam separation, and holes through the seals were small (1/8 to 3/8 inch width and up to full seal length), the finding was determined to have very low safety significance. The finding has a cross-cutting aspect in the area of human performance because AmerGen personnel did not properly implement the fire barrier seal inspection procedure during inspections completed in late 2007, such that degraded fire seals were promptly identified and corrected [H.4(b)]. (Section 1R15)

- Green. The inspectors identified an NCV of TS 4.2.2 for improper implementation of applicable American Society of Mechanical Engineers (ASME)

Operation and Maintenance (OM) Code requirements for quarterly in-service testing (IST) of the 'B' makeup pump (MU-P-1B). Specifically, the quarterly test procedure did not set pump differential pressure (d/p) or flow at a reference value which was readily duplicated when measuring required vibration data. Additionally, the test procedure allows adjustment of a 1 inch by-pass valve (MU-V-205) which could also influence pump d/p and the test reference value. The NRC inspectors determined that historically, the quarterly MU-P-1B pump test was not in accordance with the ASME Code and could have impacted proper vibration trending to adequately detect a degraded pump condition. Corrective actions included an extent-of-condition review of all IST test procedures, revision of the MU-P-1B test method to establish a fixed reference point for the duration of the test, and establishing a fixed position for the 1 inch bypass valve (IR 807157).

This finding is more than minor because it affected the equipment performance attribute of the Mitigating Systems cornerstone and the associated cornerstone objective of ensuring the reliability of systems that respond to initiating events to prevent undesirable consequences. This finding was of very low safety significance because it involved a qualification deficiency that was confirmed not to result in a loss of operability. This finding has a cross-cutting aspect in the area of problem identification and resolution (PI&R), corrective actions program component, because corrective actions to a prior similar NRC violation (NCV 05000289/2004004-02) regarding IST of the reactor river pumps, did not thoroughly evaluate the problem such that deficient IST testing of MU-P-1B was identified and corrected. As a result, deficient IST testing of MU-P-1B continued until identified by the NRC inspectors in 2008 [P.1(c)]. (Section 1R22)

B. Licensee Identified Violations

A violation of very low safety significance, which was identified by the licensee has been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. These violations and corrective actions are listed in Section 4OA7 of this report.

REPORT DETAILS

Summary of Plant Status

Three Mile Island, Unit 1 (TMI) operated at approximately 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 – 1 site sample)a. Inspection Scope

On September 5, 2008, the inspectors reviewed AmerGen's procedures for adverse weather relative to the protection of safety-related systems, structures, and components from the effect of external flooding. This review was performed during periods of expected heavy rains. The inspectors reviewed work order R2041888, Flood Preparedness, completed January 31, 2007, and emergency response procedure 1202-32, Flood, Revisions 62 and 65, and verified that flood emergency related equipment listed in Appendix 5 was properly stored and ready for use. The walkdown included the screen house, the auxiliary building, and the large inflatable seals for the fuel handling and auxiliary building roll-up doors.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment (71111.04)a. Inspection ScopePartial System Walkdowns (71111.04Q – 3 samples)

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

- On July 3, the inspectors walked down portions of the 'B' emergency diesel generator (EDG), its support systems, and its associated engineered safeguards electrical distribution system during a planned 'A' EDG unavailability due to scheduled surveillance testing;
- On July 16, the inspectors walked down portions of the 'A' EDG, its support systems, and its associated engineered safeguards electrical distribution system while the 'B' EDG was out of service for troubleshooting of increased turbocharger vibration readings (IRs 794609 and 776831);

- On September 4, the inspectors walked down portions of the 'C' make-up and purification train while the 'A' make-up and purification pumps were being tested per OP-TM-211-205, IST of MU-P-1A, Rev. 3.

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 are listed in the attachment.

Complete System Walkdown (71111.04S – 1 sample)

On September 24 through 30, the inspectors performed one complete system walkdown sample on the 'A' and 'C' nuclear river water system trains, while the 'B' system train was in a scheduled maintenance outage. The inspectors conducted a detailed review of the alignment and condition of the system using the applicable one-line diagrams 302-202, River Water System, Rev. 72 and 302-203, Screen Wash & Sluice System, Rev. 87. In addition, the inspectors reviewed and evaluated the corrective action program reports for impact on system operation, and interviewed the system engineer, maintenance technicians, and control room operators.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

a. Inspection Scope (71111.05Q – 4 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. 70. 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. 5. 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. 10. Fire zones and areas inspected included:

- Fire Zone AB-FZ-2B, Auxiliary Building Elevation 281', Makeup and Purification Pump B;
- Fire Zone AB-FZ-3, Auxiliary Building Elevation 281', Makeup Valve Alley;
- Fire Zone AB-FZ-4, Auxiliary Building Elevation 281', Reactor Building Pipe Penetration Area; and
- On July 18, 2008, the inspectors reviewed procedure 1420-FB-1, Fire Barrier Penetration Fire Seal Repairs, Rev. 29. In addition, the inspectors reviewed IR 798200 which evaluated the acceptability of ½ inch deep caulking application for seismic fire seal repairs.

b. Findings

No findings of significance were identified.

1R07 Heat Sink Performance**Error! Bookmark not defined.** (71111.07 – 2 samples)

a. Inspection Scope

Based on plant specific risk importance, the inspectors selected the 'B' EDG support system heat exchangers for inspection. These included the lube oil cooler (EG-C-1B), air cooler coolant radiators (EG-C-2B/A and EG-C-2B/B), and jacket water coolant radiators (EG-C-3B/A and EG-C-3B/B) heat exchangers. The inspectors evaluated the heat removal capability and verified that any potential heat exchanger deficiencies which could mask degraded performance were identified. The inspectors evaluated heat exchanger performance trends from data collected during EG-Y-1B operation during the last twelve months and verified heat removal performance met design basis values. The inspectors completed walk downs of the heat exchangers and associated instrumentation to assess general material condition of the selected heat exchangers and associated support components. The inspectors reviewed a sample of IRs related to the selected heat exchangers to ensure that problems related to these components were appropriately identified, characterized, and corrected.

The inspectors also reviewed processes and programs used at TMI-Unit 1 to monitor and treat river water systems to minimize the effect of various bio-fouling mechanisms. Bio-fouling of heat exchangers due to induction and growth of marine life present in the Susquehanna River poses a potential challenge to various safety related systems cooled by river water. Plant life and Asiatic clams are the current bio-challenges to TMI-Unit 1 river water system heat exchangers. The inspectors performed walkdowns of the screen house, and reviewed operating procedure 1104-65, River and Circulating Water System Macrofouling Treatment, Interim Change IC-26002. In addition, the inspectors verified that AmerGen continues to track and trend zebra mussels which had been identified in the Susquehanna River several hundred miles north of TMI per IR 250470 and verified that zebra mussels do not currently represent a challenge to TMI-Unit 1.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification Program**Error! Bookmark not defined.** (71111.11Q – 1 sample)

a. Inspection Scope

On August 26, the inspectors observed licensed operator requalification training at the control room simulator for the 'D' operator crew. The inspectors observed the operators' simulator drill performance and compared it to the criteria listed in TMI Operational Simulator Scenario TQ-TM-106-LRU-S008, Rev. 0. The inspectors reviewed the operators' ability to correctly evaluate the simulator training scenario and implement the

emergency plan. The inspectors observed supervisory oversight, command and control, communication practices, and crew assignments to ensure they were consistent with normal control room activities. The inspectors observed operator response during the simulator drill transients. The inspectors evaluated training instructor effectiveness in recognizing and correcting individual and operating crew errors. The inspectors attended the post-drill critique in order to evaluate the effectiveness of problem identification. The inspectors verified that emergency plan classification and notification training opportunities were tracked and evaluated for success in accordance with criteria established in Nuclear Energy Institute (NEI) 99-02, Regulatory Assessment Performance Indicator Guideline, Rev. 5. Additional documents reviewed are listed in the attachment.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12Q – 2 samples)

a. Inspection Scope

The inspectors evaluated the listed samples for Maintenance Rule (MR) implementation by ensuring appropriate 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. 6. 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 816676 describes elevated vibrations on control building emergency ventilation supply fan AH-E-18B. During plant walkdowns the inspectors noted that several additional AH-E-18B fan and motor test points indicated elevated vibrations. The inspectors reviewed testing history, vendor specifications, and planned maintenance activities to determine whether the maintenance program activities properly monitored and maintained AH-E-18B performance and reliability.
- On April 23, 2008, relay 63Z-2D/RB-1B failed to actuate during a scheduled surveillance test due to severe binding (IR 766603). Gouges were noted on several white nylon relay contact arms that were caused by excessive vibration transmitted through the relay assembly. The vibration was due primarily to frictional forces caused by rust deposits on the surface of the rod and internal bore of the magnet. The failed relay is associated with several containment isolation valves and provides input to one of three separate engineered safeguards and actuation system (ESAS)

channels that are needed to satisfy a two out of three logic for component actuation. AmerGen identified this failure as a maintenance rule functional failure, but did not properly identify the failure as a maintenance preventable functional failure (MPFF). The inspectors determined this was a MPFF because procedures for the commercial dedication (WO-0030438), final quality receipt acceptance inspection (SM-AA-102, Rev. 9), and maintenance installation (1420-Y-11, Rev. 21) of magnet kits and coils for ESAS relays were not properly implemented to prevent installation of a degraded (corroded) magnet kit for ESAS relay 63Z-2D/RB-1B. The inspectors verified that this MPFF does not change the current 10 CFR 50.65 a(2) maintenance rule classification of ESAS relays and therefore the safety significance of this performance deficiency is minor. This issue was documented in IR 834728.

b. Findings

No findings of significance were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 5 samples)

a. Inspection Scope

The inspectors reviewed scheduling, control, and restoration during the following maintenance activities to evaluate their effect on plant risk. This review was against criteria contained in AmerGen Administrative Procedure 1082.1, TMI Risk Management Program, Rev. 7 and WC-AA-101, On-Line Work Control Process, Rev. 14.

- On July 3, the 'A' EDG [EG-Y-1A] was removed from service for scheduled surveillance testing. The condition elevated the online maintenance risk profile to Yellow;
- On July 16, the 'B' EDG [EG-Y-1B] was removed from service for troubleshooting of increased turbocharger vibration readings. The condition elevated the online maintenance risk profile to Yellow;
- On August 16, the 'C' nuclear river water cooling pump (NR-P-1C) tripped inadvertently (IR 807908). The condition elevated the online maintenance risk profile to Yellow. The inspectors performed system walkdowns, reviewed the protective equipment log, and interviewed the work control supervisor and the TMI risk analyst;
- On September 9-10, the #1091 230KV offsite power supply was unavailable due to an offsite electrical fault. Online maintenance risk remained Green. Onsite electrical power sources were protected until the #1091 line was restored; and
- On September 23, the 'B' nuclear river water cooling pump (NR-P-1B) was taken out of service for scheduled replacement of the strainer medium. The condition elevated the online maintenance risk profile to Yellow. The inspectors performed system walkdowns, reviewed the protective equipment log, and interviewed the work control supervisor and the TMI risk analyst.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15 – 7 samples)

a. Inspection Scope

The inspectors verified that degraded conditions were properly characterized, operability of the affected systems was properly evaluated in relation to TS requirements, applicable extent of condition reviews were performed, and no unrecognized increase in plant risk resulted from the equipment issues. The inspectors referenced NRC IMC Part 9900, Operability Determinations & Functionality Assessments for Resolutions of Degraded or Nonconforming Conditions Adverse to Quality or Safety and AmerGen procedure OP-AA-108-115, Operability Determinations, Rev. 6, to determine acceptability of the operability evaluations. The inspectors reviewed operability evaluations for the following degraded equipment issues:

- On October 23, 2007, operators observed an indicated failure of the safety-related 'A' nuclear service river water pump discharge check valve [NR-V-20A] during surveillance testing. This condition has the potential to degrade system performance by allowing reverse flow through an idle or failed pump. Operations and engineering personnel evaluated existing procedures, which direct closure of the associated discharge valve for a non-running pump, and determined system operability was maintained (IR 688477).
- On March 21, 2008, operators identified a failed surveillance test of the diesel driven fire service pump (FS-P-1) due to excessive packing leak. The pump could not be run for the required 30 minutes per procedure 3303-M1, Fire Pump Periodic Operation, Rev. 38, due to flooding of the pump outboard bearing seal leak-off basin. An engineering evaluation under IR 752921 determined operability of the pump was not impacted because the pump has greased bearings which are less susceptible to water damage.
- On April 23, operators identified ESAS relay 63Z-2D/RB-1B (reactor building, 4 pound pressure actuation relay) failed to actuate (drop-out) during surveillance testing per procedure 1303-4.13, RB Emergency Cooling and Isolation Analog Test, Rev. 41. Engineering evaluation and laboratory analysis (IR 766603) concluded the failure was due to severe binding. The binding was due to gouges on several white nylon relay contact arms, caused by excessive vibration transmitted through the relay assembly. The vibration was due primarily to frictional forces caused by rust deposits on the surface of the rod and internal bore of the magnet (Section 40A7).
- On April 28, operators identified a steam leak from the 'C' main steam line isolation valve (MS-V-1C) stem. Operators subsequently repositioned MS-V-1C to 90 percent open to seal (stop) the stem steam leak (IR 768804). The licensee plans to operate with MS-V-1C partially closed through the remainder of the operating cycle. The inspectors expressed concern that the valve's partially closed position could steam-

cut (erode) the valve seat or lead to an unplanned valve closure and transient. Based on valve design, engineers concluded the partially closed position did not increase the likelihood of valve closure or seat damage and the valve remained operable.

- On July 19, containment isolation valve CM-V-1 failed its closure stroke time during post-maintenance testing (PMT) and was declared inoperable. Following additional successful testing and assessment of the PMT configuration, engineers evaluated CM-V-1 performance as documented in Inservice Test Evaluation number 165, CM-V-1, Rev. 0. Based on this evaluation operators declared CM-V-1 operable and increased the associated test frequency.
- On July 24, the low sample flow alarm annunciated for the fuel building engineered safety feature ventilation system effluent radiation monitor. Technicians determined that sample flow was oscillating in and out of the required range of flow. Operators declared RM-A-14 inoperable and implemented appropriate TS sampling requirements and fuel handling restrictions. Troubleshooting and repair activities resolved some issues. However, RM-A-14 remained unreliable and therefore was inoperable at the close of the inspection period.
- The inspectors evaluated AmerGen's actions to address multiple degraded seismic floor penetration fire seals identified during extent-of-condition inspections performed in July 2008 (IR 791987 and 793088). The inspections were performed, in part, to address four degraded floor penetration fire seals identified by the inspectors on June 30, 2008 (IR 792382) affecting three separate safety related areas.

b. Findings

Deficient Implementation of Fire Barrier Penetration Seals Inspection Procedure

Introduction: The inspectors identified a Green NCV of TS 6.8.1.e, which requires that written procedures covering the Fire Protection Program be properly established and implemented. Specifically, fire seal inspections in August and October 2007 did not properly identify two degraded seismic floor penetration fire seals as required by procedure 1303-12.9, Fire Barrier Seal Inspection, Rev. 34. Consequently, identification, compensatory measures, and repair of multiple degraded fire seals were delayed until July 2008 (IR 792382).

Description: On June 23, 2008, TMI operations personnel identified floor penetration fire seal #68 was degraded (IR 789447). Penetration #68 is a foam fire seal in the seismic gap between the control building stairwell and the ESAS room. The procedure requires visual inspection of at least 10 percent of the silicone foam seals such that each penetration seal will be inspected at least once per 15 years. The procedure acceptance criteria for silicone foam seals states that each seal shall be free of any defects, including separation of layers of material, rupture or puncture of the seal, the tearing away of the seal from the sealing surface, or shrinkage of the foam away from the sides of the seal walls in excess of 3/16 inch wide and 1 inch deep. In addition, the procedure requires an additional 10 percent inspection of the seal population if apparent

changes in appearance or abnormal degradation are found. The seal was declared inoperable and was repaired on June 25, per work request AR-A2199622. During post repair inspection activities, operators identified multiple other locations in penetration #68 requiring further repairs (IR 791987). The inspectors determined this was an early indication that previous seismic gap fire penetration seal inspections were deficient.

On June 30, the inspectors identified four similarly degraded 3-hour fire rated penetration seals (#441, 442, 434, and 715) in the 'A' and 'B' battery rooms and the relay room (IR 792382). The seals had multiple areas of minor cracks, separation from the wall and/or floor, and small through-wall holes (<1/8 inch diameter) such that air was blowing through from the compartment below. The cracks were located in the foam itself and on both ends where the caulk had separated from the wall and the floor.

In response to the degraded floor penetration fire seals, the licensee expanded the inspection to include a 100 percent inspection of all seismic gap fire penetration seals in the plant (IR 793088). In addition, the inspection procedure acceptance criteria were revised to fail gaps which exceed 1/8 inch width and penetrate the entire seal depth, pass air through the seal, and areas where greater than 1 inch width of the foam material is missing. Multiple seals did not meet the acceptance criteria. Penetration seal #1230 (separating the relay room from the main control room), had a gap ¼ inch wide extending through the entire depth of the seal and running the entire seal length (approximately 65 feet). Penetration seal #1230 was last inspected in 1996. Seal #62 had shrinkage of >1/8 inch wide and 2 inches deep (IR 805238), while seal #63, had shrinkage > 1/8 inch wide and 2 inches deep. The inspectors identified that seals #62 and #63 had been previously inspected in August and October 2007. At that time, seal #62 was assessed as fully satisfactorily, while seal #63 was found to have two small gaps (<1/8 inch) which did not exceed the acceptance criteria (IR 657920).

Age related shrinkage of the foam sealant material was a common characteristic of the degraded seals. Foam shrinkage is a slow process, which over time causes the foam seal to tear or separate from the floor or wall surface. The inspectors determined that fire seals #62 and #63 had been degraded sufficiently to fail surveillance test acceptance criteria in August and October 2007, but the inspection activity was deficient in that it didn't identify these degraded seals. The inspectors concluded this performance deficiency was programmatic because subsequent inspections performed in June and July 2008 identified multiple additional degraded fire seals which required repair. As a result, extent-of-condition inspections required by the fire seal inspection procedure were delayed and multiple degraded seals were not promptly identified and corrected in August and October 2007. Additionally, the degradation to seal #1230 indicated that the inspection frequency and/or acceptance criteria may not be sufficient to verify seals remained operable. Station engineers entered this concern into the corrective action program (IR 808410).

An engineering evaluation determined that with the exception of fire seal #1230, none of the degraded fire seals affected operability of safety equipment. The evaluation determined that fire seal #1230 would not meet the required 3 hour fire rating. However, engineers concluded that safe shutdown of the plant was not impacted due to available defense in depth fire protection features for the affected rooms such as ionization detectors, carbon dioxide, and the TMI fire brigade.

Analysis: The performance deficiency involved deficient implementation of seismic gap fire penetration seal inspection procedure 1303-12.9. The finding is greater than minor because it is associated with the protection against external factors attribute of the Mitigating Systems cornerstone in that it reduced the reliability of equipment in multiple safety related areas in the event of a fire.

Using IMC 0609, Appendix F, Fire Protection SDP, the inspectors assessed the defense-in-depth element of fire barrier degradation in the fire confinement category (Attachment 2, Tables A2.1 and A2.2). Degraded seals #62 and #63 screened to very low safety significance (Green) in Phase 1 of the SDP because it was assigned a low degradation rating. A low degradation rating was assigned based on degradation in an elastomeric low density silicone foam seal being cracks, foam separation, and small holes through the seals (1/8 to 3/8 inch width). These gaps, cracks, and holes were determined to be minor defects that will have no effect on fire endurance and no reduction on the overall fire barrier performance. Degraded seal #1230 screened to green because it retained >65% of the original fire endurance rating.

The finding has a cross-cutting aspect in the area of human performance because AmerGen personnel did not properly implement applicable fire inspection procedure (1303-12.9) during inspections completed in late 2007, such that degraded fire seals were promptly identified and corrected [H.4(b)].

Enforcement: TMI Unit 1, TS 6.8.1.e, requires that written procedures covering the Fire Protection Program shall be properly implemented. Procedure AP-1038, Fire Protection Program, establishes TMI Unit 1 Fire Protection Program functions. Procedure 1303-12.9, Fire Barrier Seal Inspection, requires that penetration seals shall be verified functional to ensure compliance with procedure 1038. Procedure 1303-12.9 requires an additional 10 percent inspection of the seals if an apparent change in appearance or abnormal degradation is found. For each seal that does not meet acceptance criteria, the shift manager is to establish appropriate compensatory measures and initiate corrective actions to restore the as-built fire seal configuration.

Contrary to these requirements, the inspectors identified that fire seal inspections performed by AmerGen in August and October 2007 did not properly identify two degraded seismic floor penetration fire seals as required by TMI-Unit 1 surveillance procedure 1303-12.9. As a result, extent-of-condition inspections required by the fire seal inspection procedure were delayed and multiple degraded seals were not promptly identified, compensated for, and corrected. In July 2008, fire seal inspections identified numerous degraded fire seals. Upon discovery, AmerGen declared the penetration seals inoperable, established a required hourly fire watch, and entered the seals into the licensee's corrective action program (IRs 808410, 789447, 791987, 792382, and 793088). Because this issue was of very low safety significance and has been entered into the corrective action program, this violation is being treated as an NCV, consistent with Section VI.A.1 of the NRC Enforcement Policy: **NCV 05000289/2008-004-01, Deficient Implementation of Fire Barrier Seal Inspection Procedure.**

1R18 Plant Modifications (71111.18 – 1 sample)a. Inspection Scope

The inspectors reviewed the following modification to determine whether it was designed and/or implemented as required by CC-AA-102, Design Input and Configuration Change Impact Screening, Rev. 16 and CC-AA-103, Configuration Change Control, Rev. 18. The inspectors verified the modification supported plant operation as described in the Updated Final Safety Analysis Report (UFSAR) and complied with associated TS requirements. The inspectors reviewed the function of the changed component, the change description and scope, and the associated 10 CFR 50.59 screening evaluation.

- On August 20, fire protection engineers identified a degraded floor penetration fire seal in the control room (Seal #1230, IR 809190). A temporary modification per procedure 1015, Equipment Storage Inside Class 1 Buildings, Rev. 3 and Equipment Storage Data Sheet (EDS #2008017) was implemented to facilitate required seal repair. The temporary modification relocated the existing equipment and implemented temporary seismic supports until the seal repair was completed.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing (71111.19 – 5 samples)a. Inspection Scope

The inspectors reviewed and/or observed the following post maintenance testing (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.

- On July 16, operators performed post maintenance testing of the 'B' EDG in accordance with 1107-3, Diesel Generator, Rev. 123, following troubleshooting of the turbocharger due to increased vibration readings.
- On July 19, operators performed post maintenance testing of the reactor building air sample isolation valve CM-V-1 in accordance with work order M2200870, following replacement of a degraded instrument air pressure regulator. Initial valve closure stroke time failed the PMT. Later the same day, CM-V-1 was retested successfully in accordance with work order A2201295.
- On August 19, operators performed post maintenance testing of the 'C' nuclear service river water cooling pump (NR-P-1C) in accordance with OP-TM-541-201, IST of NSRW Pumps and Valves, Interim Change # IC-25538, following motor replacement due to an inadvertent trip that occurred on August 16, 2008.

- On September 12, operators performed post maintenance testing of the diesel driven fire service pump FS-P-1 in accordance with 3303-M1, Fire Pump Periodic Operation, Rev. 38, following scheduled vendor assisted annual preventive maintenance activities.
- On September 27, operators performed post maintenance testing of the 'B' nuclear river water cooling pump (NR-P-1B) in accordance with OP-TM-541-201, IST of NSRW Pumps and Valves, Interim Change # IC-25538, following scheduled strainer media and breaker replacement activities.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22 – 10 samples)

a. Inspection Scope

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 July 3, procedure 1303-4.16, Emergency Power System-Train A, Rev. 119
- On August 13, OP-TM-211-213, IST of MU-V-16C and MU-V-16D, Rev. 0
- On August 13, OP-TM-211-206, IST of MU-P-1B, Rev. 2
- On August 15, 3303-M1, Fire Pump Periodic Operation, Rev. 38
- On August 16, the 'C' nuclear service river water cooling pump (NR-P-1C) tripped inadvertently (IR 807827). The inspectors reviewed the previous surveillance test completed on June 24, 2008, per OP-TM-541-201, IST of NSRW Pumps and Valves, Interim Change # IC-25538 to verify pump and motor operability
- On August 29, the inspectors walked down accessible portions of the inflatable seals in the auxiliary building (Door Seal A-116) and the fuel handling building (Door Seal FH-208). In addition, the inspectors reviewed the previous AmerGen inspection and pressure testing of these seals completed January 31, 2007, per operations surveillance procedure OPS-S62
- On September 4, OP-TM-211-212, IST of MU-V-16A and MU-V-16B, Rev. 1
- On September 4, OP-TM-211-205, IST of MU-P-1A, Rev. 3
- On September 9, OP-TM-220-251, RCS Leak Rate Determination, Rev. 8

- On September 9, OP-TM-211-215, Stroke Test of MU-V-10 and MU-V-51, Interim Change 25603

b. Findings

Introduction: The inspectors identified a Green NCV of TS 4.2.2 for improper implementation of applicable ASME OM Code requirements for quarterly IST of the 'B' makeup pump (MU-P-1B). Specifically, quarterly test procedure OP-TM-211-206, Rev. 2, did not set pump d/p or flow at a reference value which was readily duplicated when measuring required vibration data. Additionally, the test procedure allows adjustment of a 1 inch by-pass valve (MU-V-205) which could also influence pump d/p and the test reference value.

Description: On August 13, 2008, during surveillance testing of makeup pump MU-P-1B, the inspectors identified the system lineup was changed prior to taking the required vibration data. Specifically, makeup valve MU-V-17 was shut per procedure OP-TM-211-206, IST of MU-P1B, Rev. 2, to establish the ASME Code required reference value. After pump flow was verified stable, pump suction and discharge pressures were properly taken to calculate the pump d/p. However, per step 4.2.9 of the procedure, MU-V-17 was then placed back in automatic control prior to measuring and recording the required pump vibration data. With MU-V-17 in automatic, system flow changes and fluctuates up to 70 gallons per minute. In addition, the inspectors identified that the procedure allowed adjustment of a 1 inch bypass valve (MU-V-205) which could also change pump d/p and the test reference value.

The applicable Code for the current IST program interval is the ASME OM Code 1998 edition through 2000 addenda. Section ISTB-3000, General Testing Requirements for Pumps, states that the hydraulic and mechanical condition can be determined by attempting to duplicate by test a set of reference values. Deviations detected are symptoms of pump condition changes and may indicate need for corrective action. Section ISTB-3300, Reference Values, requires that reference values be established at point(s) of operation readily duplicated during subsequent tests and in region(s) of relatively stable pump flow. Section ISTB-5100, Centrifugal Pumps, requires the pump to be run at conditions as stable as the system permits for at least 2 minutes. At the end of this time, measurement of vibration shall be made and recorded.

The inspectors determined that the test conditions established in OP-TM-211-206 were not consistent with the ASME OM Code requirements, since the vibration data was taken at a different and non-repeatable reference value. As a result, reference values during quarterly tests were not reliably duplicated and therefore the test did not provide appropriate data to monitor for and identify changes in pump condition.

The inspectors verified that the hydraulic portion of the test (pump flow), was being performed properly since there was no evidence that adjustments of the 1 inch bypass valve (MU-V-205) actually occurred and the makeup system valve alignment procedure OP-TM-211-101 requires a specific setting for MU-V-205 (target 3.5 GPM). An engineering analysis (IR 807157) determined that quarterly IST vibration data which is performed with the pump at approximately 140 gallons per minute (GPM) did not change

drastically when compared with the full flow test performed at approximately 375 GPM during refueling outages. The inspectors reviewed historical pump and motor lubricating oil samples and pump and motor vibration data to verify proper pump operability. The inspectors also reviewed the past history of previous full flow tests and verified that pump vibration at higher flow rates was also within the acceptable range. In addition, the inspectors verified that IST testing of the two redundant makeup pumps (MU-P-1A and 1C) was being performed properly and consistent with the ASME code requirements.

Analysis: The performance deficiency associated with this issue is the incorrect application of ASME IST Code requirements to test makeup pump (MU-P-1B) performance during required quarterly testing. This finding is more than minor because it affected the equipment performance attribute of the Mitigating Systems cornerstone and the associated cornerstone objective of ensuring the reliability of systems that respond to initiating events to prevent undesirable consequences. Failure to perform quarterly IST for MU-P-1B in accordance with the code reduced the ability to identify degrading pump performance condition, and thereby reduced reliability of MU-P-1B to perform the high pressure injection function in the event of a design basis accident. The inspectors performed a Phase 1 analysis of this issue in accordance with NRC Manual Chapter 0609, Appendix A, Significance Determination of Reactor Inspection Findings for At-Power Situations. The inspectors concluded the finding was of very low safety significance because full flow testing was performed successfully in November 2007 and subsequent evaluation of the recent quarterly IST determined MU-P-1B remained operable. Corrective actions to address this finding included an extent-of-condition review of all IST test procedures, revision of the MU-P-1B test method to establish a fixed reference point for the duration of the test, and establishing a fixed position for the 1 inch bypass valve (IR 807157).

This finding has a cross-cutting aspect in the area of PI&R, corrective actions program component, because corrective actions to a prior similar NRC violation (NCV 05000289/2004004-02) regarding IST of the reactor river pumps, did not thoroughly evaluate the problem such that deficient IST testing of MU-P-1B was identified and corrected during the extent-of-condition reviews. As a result, deficient IST testing of MU-P-1B continued until identified by the inspectors in 2008 [P.1(c)].

Enforcement: TS Surveillance Section 4.2.2 requires, in part, that IST of ASME Code Class 1, Class 2, and Class 3 pumps shall be performed in accordance with the ASME Code for OM, 1998 Edition through the 2000 Addenda. Section ISTB-3000, General Testing Requirements for Pumps, states that the hydraulic and mechanical condition can be determined by attempting to duplicate by test a set of reference values. Deviations detected are symptoms of pump condition changes and may indicate need for corrective action. Section ISTB-3300, Reference Values, requires that reference values be established at point(s) of operation readily duplicated during subsequent tests and in region(s) of relatively stable pump flow. Section ISTB-5100, Centrifugal Pumps, requires the pump to be run at conditions as stable as the system permits for at least 2 minutes. At the end of this time measurement of vibration shall be made and recorded.

Contrary to these requirements, quarterly test procedure OP-TM-211-206 did not set pump d/p or flow at a reference value which was readily duplicated and stable when

measuring required vibration data. Additionally, the test procedure allowed adjustment of a 1 inch by-pass valve (MU-V-205) which could also influence pump d/p and the test reference value. As a result, reference values during quarterly tests were not reliably duplicated and therefore the test did not provide appropriate data to monitor for and identify changes in pump condition. This violation has been determined to have very low safety significance since there was not an actual loss of function of the makeup pump (MU-P-1B). This violation is documented in AmerGen's corrective action program (IR 807157) and, therefore, is being treated as a non-cited violation, consistent with Section VI.A.1 of the NRC Enforcement Policy: **NCV 05000289/2008004-02, Reference Test Conditions for MU-P-1B Not Established in Accordance with ASME OM Code.**

Cornerstone: Emergency Preparedness [EP]

1EP2 Alert and Notification System (ANS) Evaluation

a. Inspection Scope (71114.02 - 1 Sample)

An onsite review was conducted to assess the maintenance and testing of the ANS. During this inspection, the inspectors interviewed EP staff responsible for implementation of the ANS testing and maintenance, and reviewed IRs pertaining to the ANS for causes, trends, and AmerGen's corrective actions. The inspectors further discussed the ANS with the assigned technical specialist, reviewing system performance in 2007 and 2008. The inspectors reviewed the ANS procedures and the ANS design report to ensure AmerGen's compliance with those commitments for system maintenance and testing. Additionally, the inspectors reviewed changes to the design report and how these changes were captured. The inspection was conducted in accordance with NRC Inspection Procedure 71114, Attachment .02. Planning Standard 10 CFR 50.47(b)(5) and the related requirements of 10 CFR 50, Appendix E, were used as reference criteria.

b. Findings

No findings of significance were identified.

1EP3 Emergency Response Organization (ERO) Staffing and Augmentation System

a. Inspection Scope (71114.03 - 1 Sample)

The inspectors conducted a review of TMI's ERO augmentation staffing requirements and the process for notifying and augmenting the ERO. This was performed to ensure the readiness of key staff for responding to an event and to ensure timely facility activation. The inspectors reviewed procedures and IRs associated with the ERO notification system and drills, and reviewed records from call-in drills. The inspectors interviewed personnel responsible for testing the ERO augmentation process, and reviewed training records for the ERO to ensure training and qualifications were up to date. The inspectors further verified a sampling of ERO participation in exercises and

drills in 2007 and 2008. The inspection was conducted in accordance with NRC Inspection Procedure 71114, Attachment .03. Planning Standard 10 CFR 50.47(b)(2) and related requirements of 10 CFR 50, Appendix E, were used as reference criteria.

b. Findings

No findings of significance were identified.

1EP4 Emergency Action Level (EAL) and Emergency Plan Changes

a. Inspection Scope (71114.04 - 1 Sample)

Prior to this inspection, the NRC had received and acknowledged changes made to the TMI Station Emergency Plan and its implementing procedures. AmerGen developed these changes in accordance with 10 CFR 50.54(q), and determined that the changes did not result in a decrease in effectiveness of the Plan. The licensee also determined that the Plan continued to meet the requirements of 10 CFR 50.47(b) and Appendix E to 10 CFR 50. During this inspection, the inspectors conducted a review of AmerGen's 10 CFR 50.54(q) screenings for all the changes made to the EALs and all of the changes made to the Plan from April 2007 through August 2008 that could potentially have resulted in a decrease in effectiveness of the Plan. This review of the EAL and Plan changes did not constitute NRC approval of the changes and, as such, the changes remain subject to future NRC inspection. The inspection was conducted in accordance with NRC Inspection Procedure 71114, Attachment 04. The requirements in 10 CFR 50.54(q) were used as reference criteria.

b. Findings

No findings of significance were identified.

1EP5 Correction of Emergency Preparedness Weaknesses

a. Inspection Scope (71114.05 - 1 Sample)

The inspectors reviewed a sampling of self-assessment procedures and reports to assess AmerGen's ability to evaluate their EP performance and programs. The inspectors reviewed a sampling of IRs from January 2007 through August 2008 initiated from drills, self-assessments, and audits. Additionally, the inspectors reviewed Nuclear Oversight audits and reports, the event report for the November 2007 Unusual Event declaration at TMI; and the 2007 and 2008 50.54(t) audit reports. This inspection was conducted in accordance with NRC Inspection Procedure 71114, Attachment 05. Planning Standard 10 CFR 50.47(b)(14) and the related requirements of 10 CFR 50 Appendix E were used as reference criteria.

b. Findings

No findings of significance were identified.

1EP6 Drill Evaluation (71114.06 - 1 sample)

a. Inspection Scope

The inspectors observed an emergency event training evolution conducted on August 7, 2008, at the Unit 1 control room simulator and the technical support center to evaluate emergency procedure implementation, event classification, and event notification. The event scenario involved multiple safety-related component failures and plant conditions warranting simulated Site Area Emergency event declaration. The inspectors observed the drill critique to determine whether the licensee critically evaluated drill performance to identify deficiencies and weaknesses. Additionally, the inspectors verified the Drill/Exercise performance indicators were properly evaluated consistent with NEI 99-02, Regulatory Assessment Performance Indicator Guideline, Rev. 5. Additional documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstone: Occupational Radiation Safety (OS)

2OS1 Access Control to Radiologically Significant Areas (71121.01-1 Sample)

a. Inspection Scope

The inspectors reviewed selected activities and associated documentation in the below listed areas. The evaluation of AmerGen's performance was against criteria contained in 10 CFR 20, applicable TSs, and station procedures.

Plant Walkdowns, Radiation Work Permit Reviews, and Jobs in Progress Reviews

The inspectors toured the station radiological controlled areas and made selective independent radiation surveys during the tours and reviewed housekeeping, material conditions, posting, barricading, radioactive material controls, and access controls to determine if radiological controls were acceptable.

b. Findings

No findings of significance were identified.

Cornerstone: Public Radiation Safety (PS)**2PS1 Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems (71122.01-3 Samples)****a. Inspection Scope****Inspection Planning and In-office Inspection**

The inspectors selectively reviewed the 2006 and 2007 Radiological Effluent Release 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. During the onsite inspection, the inspectors verified that any changes made to the liquid or gaseous waste systems were effective and maintained effluent releases to as low as reasonably achievable (ALARA). The inspectors selectively reviewed the changes to the ODCM made by the licensee since the last inspection to ensure consistency is maintained with respect to guidance in NUREG-1301, and 0133, and Regulatory Guides 1.109, 1.21, 4.1, and 4.15.

For effluent monitoring instrumentation, the inspectors reviewed documentation to ensure adequate methods and monitoring of effluents. For changes to effluent radiation monitor set-point calculation methodology, the inspectors evaluated the basis for the changes to ensure an adequate justification.

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 whether AmerGen procedures and/or surveillance activities addressed the ability to identify onsite spills/leaks of contaminated fluids.

The inspectors reviewed effluent release reports since the last inspection to determine if anomalous or unexpected results were identified by the licensee, entered in the corrective action program, adequately resolved, and that any significant changes in reported dose values (compared to the previous report) were identified.

The inspectors reviewed the plant's correlation between effluent release reports and the environmental monitoring results. The inspectors reviewed the results from quality assurance audits to determine whether the licensee met the requirements of the RETS/ODCM. (See Section 4OA2)

Onsite Inspection

The inspectors selectively walked down 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 selectively walked-down and reviewed points of discharge effluent radiation monitoring systems and flow measurements devices. The inspectors reviewed effluent radiation monitor setpoint values for agreement with the RETS/ODCM.

The inspectors observed routine effluent sample collections from auxiliary building ventilation system, reactor building ventilation system, off-gas system, and composite sampling of the turbine building sump and selectively reviewed laboratory analysis of samples. The inspectors reviewed use of radioactive gaseous effluent treatment equipment in accordance with RETS/ODCM requirements, and reviewed use of systems per ODCM guidance. The inspectors selectively reviewed radioactive liquid waste release permits.

The inspectors reviewed records of gaseous and/or liquid releases made with out-of-service effluent radiation monitors, and AmerGen's actions for these releases, to ensure compensatory sampling and radiological analyses was conducted.

The inspectors reviewed air cleaning system surveillance test results (charcoal and high efficiency particulate air) to ensure that system operations were within applicable acceptance criteria specified in TSs, as applicable. The inspectors selectively reviewed surveillance test results or methodology AmerGen used to determine ventilation exhaust flow rates.

The inspectors determined if the licensee has identified any non-radioactive systems that have become contaminated to ensure that 10 CFR 50.59 evaluations have been performed per IE Bulletin 80-10, to determine if any of the newly contaminated systems have an unmonitored effluent discharge path to the environment, or whether required ODCM revisions were made to incorporate these new pathways, and whether the effluents were reported in accordance with the Regulatory Guide 1.21.

The inspectors reviewed instrument maintenance and calibration records (i.e. both installed and counting room equipment) associated with effluent monitoring equipment. The inspectors reviewed quality control records for the radiation measurement instruments to identify indications of degraded instrument performance and reviewed corrective actions taken, as applicable.

The inspectors evaluated the source term used to ensure all applicable radionuclides discharged, within applicable detectability standards, were included. The inspectors evaluated the methods used to determine the isotopes that are included in the source term to ensure all applicable radionuclides were included. The inspectors also selectively reviewed the Part 61 analyses to ensure hard-to-detect radionuclides were included in the source term.

The inspectors selectively reviewed the meteorological dispersion and deposition factors and hydro-geologic characteristics used in the ODCM and effluent dose calculations to ensure appropriate factors are being used for public dose calculations.

The inspectors reviewed the Land-use Census to verify that any new public dose receptors or pathways have been considered when performing member of the public dose assessments.

The inspectors reviewed a selection of 2007 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 relative to TS/ODCM (i.e., Appendix I to 10 CFR Part 50) requirements. The inspectors also selectively performed conservative calculations, based on ODCM methodology, to validate selective projected doses.

The inspectors selectively verified that the licensee was continuing to implement the voluntary NEI/Industry Ground Water Protection Initiative. The inspectors selectively reviewed changes, monitoring results, leakage or spill events and entries made into 10 CFR 50.75(g) records, remediation actions taken, and voluntary reporting of leaks and spills.

For abnormal discharges, the inspectors selectively reviewed aspects, such as identification and mitigation, dose evaluations, onsite contamination events, and reporting.

The inspectors reviewed the results from AmerGen's self-assessments and quality assurance audits to determine whether AmerGen met the requirements of the RETS/ODCM. (See also Section 4.02)

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 inspectors reviewed AmerGen's quality control evaluation of the inter-laboratory comparison test data and associated corrective actions for any deficiencies identified. The inspectors 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 selectively verified that AmerGen was maintaining adequate effluent sampling records needed to satisfy the requirements of 10 CFR 20.1501.

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151 – 5 samples)

a. Inspection Scope

Cornerstone: Mitigating Systems (1 sample)

The inspectors reviewed records to evaluate performance indicator (PI) assessment for safety system functional failures (SSFFs). The inspectors verified accuracy of the reported data through review of selected station operating logs, system health reports, SSFF databases, and Licensee Event Reports for the period October 2007 through August 2008. This review was performed to determine whether associated PI data had been accurately reported to the NRC in accordance with NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Rev. 5. Additional documents reviewed are listed in the Attachment.

Cornerstone: Barrier Integrity (1 sample)

The inspectors reviewed selected station records including operating logs, surveillance test reports, and IRs, observed associated surveillance tests, conducted interviews with operators and engineers, and performed equipment walkdowns to assess reactor coolant system identified leak rate for the period September 2007 through August 2008. This review was performed to determine whether associated PI data had been accurately reported to the NRC in accordance with NEI 99-02. Additional documents reviewed are listed in the Attachment.

Cornerstone: Emergency Preparedness (3 samples)

The inspectors reviewed data for the EP PIs; Drill and Exercise Performance; ERO Drill Participation; and ANS Reliability. The inspectors reviewed the PI data, its supporting documentation and the information AmerGen reported from the second quarter of 2007 through the second quarter of 2008, to verify the accuracy of the reported data. The review of these PIs was conducted in accordance with NRC Inspection Procedure 71151. The acceptance criteria used for the review were 10 CFR 50.9 and NEI 99-02.

Additionally, the inspectors performed NRC Temporary Instruction (TI) 2515/175, Emergency Response Organization Drill/Exercise Performance Indicator, Program Review, ensured the completeness of the licensee's completed Attachment 1 from the TI, and forwarded that data to NRC Headquarters.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems (71152 – 1 Sample).1 Review of Issue Reports and Cross-References to Problem Identification and Resolution Issues Reviewed Elsewhere

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 IRs, reviewing selected IRs, attending daily screening meetings, and accessing the licensee's computerized corrective action program database.

Section 1R15 documents an NCV for deficient implementation of penetration fire seal inspection procedure. Consequently, identification, compensatory measures, and repair of multiple degraded fire seals were delayed until July 2008.

Section 1R22 documents an NCV for deficient implementation of ASME OM Code requirements for IST of MU-P1B. The inspectors determined that corrective actions to a prior similar NRC violation (NCV 05000289/2004004-02) regarding IST of the reactor river pumps, did not thoroughly evaluate the problem such that deficient IST testing of MU-P-1B was identified and corrected.

.2 Problem Identification and Resolution for Radiological Protection Activitiesa. 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. The inspectors also reviewed selected corrective action documents written since the previous inspection. The following documents were reviewed:

- Check-in Self Assessment (LS-AA-126-1005), dated May 16, 2008;
- Chemistry, Radwaste, Effluent, Environmental Monitoring Program Audit Comparative Report- NOSA-Comp-08-04, dated June 16, 2008;
- ODCM, REMP, Effluent and Environmental Monitoring Audit Report, NOSA-TMI-08-04 (AR 745593), dated April 17, 2008; and Action Requests (794920, 746076, 735871, 794477, 646650, 649187, 649969, 653003, 653482, 655292, 656626, 656945, 662639, 669497, 670505, 676476, 701561, 708671, 751445, 764646, 768887, 794281, 794329, 794799, 794477, 794671, 795547, 795519, 795538, 795534).

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

b. Findings

No findings of significance were identified.

4OA3 Event Followup (71153 – 1 sample)Small Aircraft Near Three Mile Islanda. Inspection Scope

On September 18, Harrisburg International Airport (HIA) officials informed TMI personnel that a small aircraft had flown close to the power plant. HIA officials attempted to contact the aircraft via radio, but received no reply. Station personnel performed a potential threat assessment and notified the NRC, Federal Aviation Administration (FAA), Federal Bureau of Investigation (FBI), and appropriate Pennsylvania state agencies of the issue. The aircraft subsequently landed at another local airport and requested directions back to the pilot's home airport. Law enforcement and FAA personnel interviewed the pilot and searched the airplane upon its return to the home airport that afternoon. The student pilot stated he had become lost and had not intended to come near the TMI power plant. Law enforcement, FAA, and TMI personnel concluded the pilot's explanation was credible and that the small aircraft did not pose a hazard to TMI. The inspectors monitored licensee assessment of the issue throughout the day and verified the associated procedures OP-TM-AOP-008, Security Threat/Intrusion, Rev. 4 and SY-AA-101-132, Assessment and Response to Suspicious Activity and Security Threats, Rev. 11 were properly implemented. The occurrence was documented in IR 819594.

b. Findings

No findings of significance were identified.

4OA5 Other Activities.1 Security Force Safety Conscious Work Environment Surveya. Inspection Scope

The inspectors reviewed a report of the results of a survey of the site security organization relative to its safety conscious work environment. The inspectors considered whether the surveys were conducted in a manner that encouraged candid and honest feedback. The results were reviewed to determine whether adequate number of staff responded to the survey. The inspectors also reviewed AmerGen's self-assessment of the survey results and verified that any issues or areas for improvement were entered into the corrective action program for resolution.

b. Findings

No findings of significance were identified.

.2 Quarterly Resident Inspector Observations of Security Personnel Activities

a. Inspection Scope

During the inspection period, the inspectors conducted the following observations of security force personnel and activities to verify that the activities were consistent with Exelon security procedures and regulatory requirements relating to nuclear plant security. These observations took place during both normal and off-normal plant working hours.

- Multiple tours of operations within the Central and Secondary Security Alarm Stations;
- Owner Controlled Area and Protected Area access control posts; and
- Other security officer posts including the ready room and compensatory posts.

These quarterly resident inspector observations of security force personnel and activities did not constitute any additional inspection samples. These observations were considered an integral part of the inspectors' normal plant status review and inspection activities.

b. Findings

No findings of significance were identified.

.3 Inspection Results for TI 2515/172, Reactor Coolant System (RCS) Dissimilar Metal Butt Welds

a. Inspection Scope

Temporary Instruction TI 2515/172 provides for confirmation that owners of pressurized-water reactors (PWR) have implemented the industry guidelines of the Materials Reliability Program-139 (MRP) regarding nondestructive examination and evaluation of certain dissimilar metal welds in RCSs and components with welds containing Alloy 600/82/182. The TI requires documentation of specific questions in this inspection report. The questions and responses are included in Attachment B-1.

In summary, TMI Unit 1 has eighteen MRP-139 applicable Alloy 600/82/182 RCS welds. Those welds are:

- One 10" pressurizer surge line nozzle
- One 10" pressurizer hot leg surge nozzle weld
- One 4" pressurizer spray nozzle
- Four 28" RCS cold leg outlet nozzles (at the RC pump)

- Four 28" RCS cold leg inlet nozzles (at the RC pump)
- Two 14" core flood nozzles (at the reactor pressure vessel)
- One 12" hot leg decay heat drop line
- Four 2.5" high pressure injection nozzles (emergency core cooling system [ECCS])

AmerGen submitted relief request #5928-03-20218 dated November 3, 2003, providing a proposed alternative to the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components." This proposed alternative would permit the use of a full structural weld overlay repair for an indication identified in the steam generator "A" hot leg surge line nozzle to safe end weld. This request for relief was granted on November 14, 2003.

A second request (#5928-07-20102) for relief was submitted by AmerGen by letter dated May 1, 2007, providing a proposed alternative to the repair/replacement requirements of the ASME Code, Section XI for the application of structural weld overlays on the pressurizer surge, pressurizer spray, and hot leg decay heat drop line nozzle dissimilar metal welds. This request for relief (RR 2007-TMI-01) was granted on October 17, 2007.

b. Findings

No findings of significance were identified.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On October 7, 2008, the resident inspectors presented the inspection results to Mr. William Noll and other members of the TMI staff who acknowledged the findings. 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. No proprietary information was identified.

4OA7 Licensee Identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as an NCV.

- Technical specification 6.8.1.a requires procedures be properly established, implemented, and maintained covering activities recommended in Appendix 'A' of Regulatory Guide 1.33, Rev. 2, February 1978. Regulatory Guide 1.33 requires

procedures for performing maintenance of safety related equipment. Contrary to this requirement, procedures for the commercial dedication (WO-0030438), final quality receipt acceptance inspection (SM-AA-102, Rev. 9), and maintenance (1420-Y-11, Rev. 21) of magnet kits and coils for ESAS relays were not properly implemented to prevent installation of a degraded (corroded) magnet kit for ESAS relay 63Z-2D/RB-1B (reactor building, 4 pound pressure actuation). Specifically, on April 23, 2008, relay 63Z-2D/RB-1B failed to actuate during a scheduled surveillance test due to severe binding. Gouges were noted on several white nylon relay contact arms that were caused by excessive vibration transmitted through the relay assembly. The vibration was due primarily to frictional forces caused by rust deposits on the surface of the rod and internal bore of the magnet. The failed relay is associated with several containment isolation valves and provides input to one of three separate ESAS channels that are needed to satisfy a two out of three logic for component actuation. This finding is more than minor because it affected the equipment performance attribute of the Mitigating System cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding is of very low safety significance because it impacted only one of three redundant channels and it did not involve an actual loss of safety function. This issue was placed in AmerGen's corrective action program as IR 766603.

ATTACHMENTS: SUPPLEMENTAL INFORMATION
TI 2515/172 DOCUMENTATION QUESTIONS FOR TMI UNIT 1

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

D. Atherholt	Manager, Regulatory Assurance
C. Baker	Manager, Chemistry
B. Carsky	Director, Operations
G. Chevalier	Chemist
T. Dougherty	Plant Manager
D. Etheridge	Acting Radiation Protection Manager
R. Godwin	Training
J. Heischman	Director, Maintenance
J. Karkoska	AmerGen Mid-Atlantic Emergency Preparedness Manager
W. Laudenbach	System Engineer
A. Miller	Regulatory Assurance
D. Mohre	Manager, Security
P. Mussleman	Security Supervisor
D. Neff	Manager, Emergency Preparedness
W. Noll	Site Vice President
T. Roberts	Radiation Protection
K. Robles	System Engineer
D. Trostle	Operations Security Analyst
L. Weber	Chemist
L. Weir	Manager, Nuclear Oversight Services
C. Wend	Manager, Radiation Protection
H. Yeldell	Work Management

Others

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

Opened & Closed

05000289/2008004-01	NCV	Deficient Implementation of Fire Barrier Seal Inspection Procedure (Section 1R15)
05000289/2008004-02	NCV	Reference Test Conditions for MU-P-1B Not Established in Accordance with ASME OM Code (Section 1R22).

LIST OF DOCUMENTS REVIEWED

Section 1R04: Equipment Alignment

Procedures

1301-1, Shift and Daily Checks, Rev. 160

OP-TM-541-201, IST of NSRW Pumps and Valves, Interim Change 25538

Drawings

302-660, Make-up and purification system Flow Diagram, Rev. 44

302-661, Make-up and purification system Flow Diagram, Rev. 59

Other Documents

TMI On-Line Station Risk Evaluation Document #522, Tag# 103-4.16A EG-Y-1A, Rev. 10

TMI-1, TS Section 3.3.1.4, Cooling Water Systems

TMI-PRA-029.01, Loss of Nuclear River Water Plant Transient Assessment Tree Basis, Rev. 0

Section 1R011: Licensed Operator Requalification Program

Procedures

OP-TM-211-950, Restoration of Letdown Flow, Rev. 3

OP-TM-AOP-014, Loss of 1E 4160V Bus, Rev. 4

OP-TM-AOP-020, Loss of Station Power, Rev. 12

OP-TM-AOP-041, Loss of Seal Injection, Rev. 3

OP-TM-EOP-001, Reactor Trip, Rev. 10

OP-TM-EOP-004, Lack of Primary to Secondary Heat Transfer, Rev. 6

OP-TM-EOP-010, Abnormal Transients Rules, Guides, and Graphs, Rev. 10

EP-AA-1009, Radiological Emergency Plan Annex for TMI Station, Rev. 12

Section 1R013: Maintenance Risk

Procedures

1303-4.16, Emergency Power System, Rev. 119

Other Documents

Station Risk Report for Work Week 0827, Rev.0

TMI On-Line Station Risk Evaluation Document #522, Tag# 103-4.16A EG-Y-1A, Rev. 10

Section 1R015: Operability Determinations

Procedures

OP-TM-411-202, NS-V-1A/B/C/D Partial Stroke Test, Interim Change 25757

OP-TM-541-000, Primary Component Cooling, Rev. 9

OP-TM-541-201, IST for NR-P-1A, Interim change 22545

Drawings

P-446447, Rockwell – Edward Stop-Check Valve, Main Steam Isolation Valve, Rev. 9

Other Documents

Technical Specification 3.3.1.4, Amendment 263, Cooling Water Systems
 Work order R2115474
 IRs 688477 768804

Other Documents

OP-TM-541-201, IST Data Eval #63 for NR-P-1A Nuclear Service Water Pump
 OP-TM-541-201, IST Data Eval #157 for NR-P-1A Nuclear Service Water Pump
 OP-TM-541-201, IST Data Eval #158 for NR-P-1A Nuclear Service Water Pump
 OP-TM-541-201, IST Data Eval #159 for NR-P-1A Nuclear Service Water Pump
 Bowl Assembly Performance Curves for NR-P-1A/1B/1C, dated September 25, 2001, Rev. 16

Section 1R022: Surveillance Tests

Other Documents

Adverse Condition Monitoring Plan for Monitoring of EG-Y-1A Exhaust muffler Degradation,
 dated April 4, 2008; OPE 08-006
 Adverse Condition Monitoring Plan for Monitoring of DF-T-1 (30K tank) due to Non-
 Conservative Calculation, dated April 19, 2008; OPE Tech Eval 764180-02
 Adverse Condition Monitoring Plan for Monitoring of EG-Y-1A Generator End Bearing Condition,
 dated May 9, 2008
 IRs 793168 793165 776843 793187
 Technical Specification 4.6.1, Emergency Power System Periodic Tests – Diesel Generators
 Work Orders R2122198 R2125228

Section 1EP2: Alert and Notification System (ANS) Evaluation

Procedures

EP-MA-121-1002, Exelon East ANS Program, Rev. 5
 EP-MA-121-1004, Exelon East ANS Corrective Maintenance, Rev. 4
 EP-MA-121-1005, Exelon East ANS Preventive Maintenance Program, Rev. 3
 EP-MA-121-1006, Exelon East ANS Siren Monitoring, Troubleshooting and Testing, Rev. 5

Other Documents

All siren and tone alert radio Incident Reports dated between January 2007 and August 2008
 FEMA Technical Review of ANS Update, dated December 20, 2005
 TMI Upgraded Public ANS Report, dated March 2005

Section 1EP3: Emergency Response Organization (ERO) Staffing and Augmentation System

Procedures

EP-AA-1009, Exelon Nuclear Radiological Emergency Plan Annex for Three Mile Island Station,
 Rev. 12
 EP-AA-112-100-F-07, Mid-Atlantic ERO Notification or Augmentation, Rev. E
 EP-AA-121-1001, Automated Call-out System Maintenance, Rev. 5
 EP-AA-122, Drills and Exercises, Rev. 7
 EP-AA-122-1001, Drill and Exercise Scheduling, Development and Conduct, Rev. 10
 EP-AA-1102, ERO Fundamentals, Rev. 5
 OP-TM-112-101-1002, On-Shift Staffing Requirements, Rev. 3
 TQ-AA-113, ERO Training and Qualification, Rev. 11

Other Documents

TMI ERO Qualification Component Listing, dated September 8, 2008
 TMI Five-Part ERO Duty Roster, dated September 2, 2008
 Call-In Augmentation Drill Report, dated January 23, 2008
 Call-In Augmentation Drill Report, dated June 24, 2008
 Call-In Augmentation Drill Report, dated September 3, 2008

Section 1EP4: Emergency Action Level (EAL) and Emergency Plan ChangesProcedures

EP-AA-120, Emergency Plan Administration, Rev. 9
 EP-AA-120-1001, 10CFR50.54(q) Change Evaluation, Rev. 5
 EP-AA-1000, Exelon Nuclear Standard Radiological Emergency Plan, Rev. 19
 EP-AA-1009, Exelon Nuclear Radiological Emergency Plan Annex for Three Mile Island Station,
 Rev. 9, 10, 11 and 12
 LS-AA-104, Exelon 50.59 Review Process, Rev. 5
 LS-AA-104-1000, Exelon 10CFR50.59 Resource Manual, Rev. 4

Other Documents

10 CFR 50.54(q) screenings and reviews, dated between April 2007 and August 2008

Section 1EP5: Correction of Emergency Preparedness WeaknessesProcedures

EP-AA-125, Emergency Preparedness Self Evaluation Process, Rev. 4
 LS-AA-120, Issue Identification and Screening Process, Rev. 8
 LS-AA-125, Corrective Action Program (CAP) Procedure, Rev. 11

Other Documents

Three Mile Island Emergency Preparedness Excellence Plan, dated May 30, 2008
 Three Mile Island Excellence Plan, dated August 19, 2008
 Emergency Preparedness Audit NOSA-TMI-07-04, dated May 9, 2007
 Emergency Preparedness Audit NOSA-TMI-08-03, dated April 23, 2008
 Nuclear Oversight Quarterly Reports, Three Mile Island:
 NOSPA-TM-07 1Q
 NOSPA-TM-07 2Q
 NOSPA-TM-07 3Q
 NOSPA-TM-07 4Q
 NOSPA-TM-08 1Q
 FASA - TMI EP 50.54(t) Audit Readiness Assessment (AR 704553-02)
 FASA – TMI Station 2008 NRC Baseline Program Inspection (AR 704564-03)
 Check-In Self-Assessment – EAL Implementation (AR 704548-02)
 Check-In Self-Assessment – Five Team ERO Readiness (AR 807156)
 Three Mile Island Station 11/13/2007 Unusual Event Report
 TMI April 17, 2007 Graded Exercise Evaluation Report
 TMI June 7, 2007 Drill Evaluation Report
 TMI July 19, 2007 Drill Evaluation Report
 TMI September 13, 2007 Drill, Evaluation Report
 TMI January 31, 2008 Drill Evaluation Report
 TMI August 7, 2008 Drill Evaluation Report

IR 638229, Findings From DEP Failure
 IR 772773, Possible NRC Finding from the Peach Bottom Biennial Exercise
 TMI EP-Related Incident Reports, dated between January 2007 and August 2008

Section 1EP6: Drill Evaluation

Procedures

AOP-050, Reactor Coolant Leakage, Rev. 0

Section 2OS1 and 2PS1

Procedures

CY-AA-170-210, Potentially Contaminated System Control Program, Rev. 0

CY-AA-170-400, Radiological Groundwater Protection Program, Rev. 2

CY-AA-170-4000, Radiological Groundwater Protection Program, Rev. 3
 Implementation,

CY-TM-170-1002, Rev. 0, Radiological Environmental Monitoring Program TLD
 Program Data Review, Rev. 0

CY-TM-170-4160, TMI Radiological Groundwater Protection Program (RGPP) Sample Point
 Data and Standard Control Limits, Rev. 3

EN-AA-407, Response to Unplanned Discharges, Spills and venting of
 Licensed Radionuclides to Groundwater, Surface Water or Soil, Rev. 0

N1828, Quality Assurance Program for Radiological Effluent Monitoring, Rev. 10

Other Documents

2006 Radiological Environmental Monitoring Report, dated April 30, 2007

2007 Radiological Environmental Monitoring Report, dated April 28, 2008

2006 Radioactive Effluent Release Report, dated April 30, 2007

2007 Annual Radioactive Effluent Release Report, dated April 28, 2008

Intra and Inter Laboratory Cross-check Analysis Results

Offsite Dose Calculation Manual

10 CFR 50.75(g)- History file record summary/additions

Laboratory Counting Systems Calibration/Quality Assurance Records

Effluent Radiation Monitor Calibration Records

Effluent Exhaust System Ventilation System Surveillance testing data

System Health Report – Radiation Monitors (March 2008)

Section 4OA1: Performance Indicator (PI) Verification

Procedures

LS-AA-2001, Collecting and Reporting of NRC Performance Indicator Data, Rev. 11

LS-AA-2110, Monthly Data Elements for NRC Emergency Response Organization (ERO) Drill
 Participation, Rev. 6

LS-AA-2120, Monthly Data Elements for NRC Drill/Exercise Performance, Rev. 4

LS-AA-2130, Monthly Data Elements for NRC Alert and Notification System (ANS) Reliability,
 Rev. 5

Other Documents

DEP PI data, April 2007 - June 2008

ERO Drill Participation PI data, April 2007 - June 2008

ANS Reliability PI data, April 2007 - June 2008

Section 40A5: Other**Procedures**

PDI-UT-8RF, PDI Generic Procedure for the Ultrasonic Examination of Weld Overlaid Similar and Dissimilar Metal Welds, Manual Scan, Includes Procedure Qualification In Accordance With PDI Implementation of Section XI, Appendix VIII, Addendum 0
 54-ISI-838-09R9 Manual Ultrasonic Examination of Weld Overlaid Similar and Dissimilar Metal Welds (Incorporates Generic PDI-UT-8RF)
 GE-UT-232V4 Procedure for Automated Ultrasonic Examination and TOMOVIEW Analysis of Weld Overlaid Austenitic Piping Welds in Accordance With PDI

Examination Reports

ID-ISI-RC-002R3 Liquid Penetrant Examination Data Sheet, SR 0010 BM Surge Line
 GE-T1R15-001 Ultrasonic Examination Summary Sheet, Nozzle to Safe End, SR 0010 BM Surge Line
 GE-T1R15-01 Ultrasonic Data/Scan Parameter Sheet, Nozzle to Safe End SR 0010BM, Surge Line
 GE-T1R15-001 Ultrasonic Calibration Data Sheet, Weld SR 0010 BM
 TTP10096110 Ultrasonic Instrument Qualification (TOMOSCAN)
 DH-001BM/Dh498 NDE Report, Weld Overlay of the Decay Heat Nozzle to Safe End
 PR-021BM Weld Overlay of the Pressurizer Surge Nozzle to Safe End Weld, (PT and UT)
 DH-001-NDE-160-00 Ultrasonic Report Pressurizer Decay Heat Weld Overlay
 DH-001-NDE-130-00 Liquid Penetrant Report Decay Heat Weld Overlay

Welding Procedure Specifications (WPS) and Procedure Qualification Records (PQR)

WPS 01-08-T-801R0 Gas Tungsten Arc Welding (GTAW), Machine P1 Group 2 to P8
 WPS WP1/8/43 Machine GTAW, P1 Group 2 to P8
 WPS WP 8/8/F6AW1, P8 to P8
 WPS WP 43/43/F43 AW1, P43 to P43
 2(SPP-2) General Procedure for Arc Welding
 PQR A08202.3-3R1 GTAW Automatic Machine P8 to P8
 PQR 01-01-T-801R0 GTAW Machine, P1 Group 2 to P1 Group 2
 PQR PQ7214-001 P1 Group 2 Machine GTAW Temper Bead
 PQR PQ7213-00 P8 to P43 Manual GTAW and Shielded Metal Arc Welding

Other Documents

Non-destructive test personnel qualifications, PDI-UT, reviewed eight Level II and III
 Welder Test Qualifications review of tests for six welders
 ER-AP-330-1001 Exelon Alloy 600 Management Plan
 Alloy 600 Management Plan Site Notebook
 ISI Program Plan – Third Ten-Year Inspection Interval
 ISI Selection Document – Third Ten-Year Inspection Interval
 MRP-139 Interim Guidance on <4" Volumetric Exam Requirements (Mandatory)
 High Pressure Injection Nozzle Shop Fabrication (<4")
 Approval Letter from NRC for Relief Request 2007-TMI-01
 IR 508626-02 Core Flood Nozzle to Safe End Weld MRP Bare Metal Visual Examination Deviation
 EIR 51-9064387 TMI Unit 1 Pressurizer Weld Overlay NDE Final Report

DH-001BM/Dh498 Weld Overlay of Decay Heat Nozzle to Safe End (PT and UT)

Section 4OA7: Licensee Identified Violations

Procedures

1420-Y-11, ESAS Channel Relay Maintenance, Interim Change 23433

Other Documents

ANSI/ASME N45.2.2-1978, Packaging, Shipping, Receiving, Storage, and Handling of Items for Nuclear Power Plants.

Exelon Power Labs report # TMI-96648, Failure Analysis of Joslyn Clark Relay Assembly

TMI Technical Specification Table 3.5-1, Instruments Operating Conditions

TMI Inspection Report # 0028184, Kit Magnet and Rod Assembly, December 7, 2006

TMI Inspection Report # 0029953, Kit Magnet and Rod Assembly, May 7, 2007

TMI Inspection Report # 0030438, Kit Magnet and Rod Assembly, October 22, 2007

Exelon Powerlabs Report # TMI-56393, Commercial grade Dedication Of Joslyn Clark Relays Magnet Assemblies, August 15, 2007

Royalton Tool & Die Inc. Request # 00421093, Honing Magnet Tips from Joslyn Clark For TMI-1

IR 697493, ESAS Relay 63Z-2B/RC3A Buzzing, November 10, 2007

IR 701123, ESAS Relay 63Z-2D/RB1B Magnet Kit is Noisy, November 18, 2007

IR 766603, SDR for procedure 1303-4.13 RB Cooling & Isolation System, April 23, 2008

IR 768252, EQR ESAS Relay 62X-2A/RC3A Buzzing Louder than other Relays, April 27, 2008

IR 780746, ESAS Relay 62X-1/RC2B Buzzing Excessively, June 29, 2008

LIST OF ACRONYMS

ADAMS	Agencywide Documents and Management System
ALARA	As Low As is Reasonably Achievable
AmerGen	AmerGen Energy Company, LLC
ANS	Alert and Notification System
ASME	American Society of Mechanical Engineers
BMV	Bare Metal Visual
CFR	Code of Federal Regulations
CL	Cold Leg
d/p	Differential Pressure
DRP	Division of Reactor Projects
EAL	Emergency Action Level
ECCS	Emergency Core Cooling System
EDG	Emergency Diesel Generator
EP	Emergency Preparedness
ERO	Emergency Response Organization
ESAS	Engineered Safeguards and Actuation System
FAA	Federal Aviation Administration
FBI	Federal Bureau of Investigation
GPM	Gallons Per Minute
GTAW	Gas Tungsten Arc Welding
HIA	Harrisburg International Airport
HL	Hot Leg
HPI	High Pressure Injection
IMC	Inspection Manual Chapter
IR	Issue Report
ISI	Inservice Inspection
IST	Inservice Testing
MPFF	Maintenance Preventable Functional Failure
MR	Maintenance Rule
MRP	Materials Reliability Program
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
NUMARC	Nuclear Management and Resources Council
ODCM	Offsite Dose Calculation Manual
OM	Operation and Maintenance
OS	Occupational Radiation Safety
PADEP	Pennsylvania Department of Environmental Protection
PARS	Publicly Available Records
PDI	Performance Demonstration Initiative
PI	Performance Indicator
PI&R	Problem Identification & Resolution
PMT	Post-Maintenance Test
PQR	Procedure Qualification Record

PS	Public Radiation Safety
PWR	Pressurized Water Reactor
RCS	Reactor Coolant System
RETS	Radiological Effluents Technical Specifications
RFO	Refuel Outage
SDP	Significance Determination Process
SI	Stress Improvement
SMAW	Shielded Metal Arc Welding
SSC	Structures, Systems, and Components
SSFF	Safety System Functional Failures
TI	Temporary Instruction
TMI	Three Mile Island, Unit 1
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
UT	Ultrasonic Test
WPS	Welding Procedure Specification

ATTACHMENT B-1

TI 2515/172 Documentation Questions for TMI Unit 1

Introduction:

Temporary Instruction 2515/172 provides for confirmation that owners of pressurized-water reactors (PWR) have implemented the industry guidelines of the Materials Reliability Program (MRP)-139 regarding nondestructive examination and evaluation of certain dissimilar metal welds in reactor coolant systems (RCS) containing Alloy 600/82/182. The TI requires documentation of specific questions in an inspection report. The questions and responses are included in this Attachment.

In summary, TMI Unit 1 has three (3) 2.5 inch pressurizer safety/relief nozzles which were previously maintained within the MRP-139 program. These three welds were replaced during the Fall 2007 outage (1R17) and are now categorized as "A", "resistant materials" and future examinations will be in accordance with the existing ASME section XI Inservice Inspection (ISI) program.

Also, TMI has one (1) four (4) inch spray nozzle which is currently placed in categories "D" and "J" and is planned for inspection or mitigation by application of a structural weld overlay in 2011. TMI also has two (2) fourteen (14) inch core flood nozzles which are scheduled to be ultrasonically examined (Performance Demonstration Initiative [PDI] Qualified) in the Fall 2009 outage. These two dissimilar welds are planned for mitigation in 2009 with the application of a protective barrier to the inside diameter of the nozzle (weld inlay or onlay, depending on final engineering evaluation of the nozzle inside surfaces).

TMI has four (4) twenty eight (28) inch cold leg (CL) RC Pump Suction and four (4) twenty eight (28) inch CL RC Pump Discharge Welds. There are no plans (or commitments) to perform mitigation activities on these welds. They are scheduled to be subjected to a bare metal visual (BMV) examination and ultrasonic examination (using PDI Qualified technique) during the Fall 2009 outage (1R18).

TMI has two (2) ten (10) inch surge line nozzles (one directly attached to the pressurizer and the second attached to the thirty six (36) inch carbon steel hot leg). Both of these dissimilar metal welds were mitigated with the application of a structural weld overlay in the Fall of 2007 (1R17) and the Fall of 2003 (1R15), respectively. Also, TMI has one (1) twelve (12) inch hot leg Decay Heat Nozzle which was mitigated during the Fall 2007 outage (1R17) with the application of a structural weld overlay.

The EPRI Materials Reliability Program issued Interim Guidance on November 1, 2007 regarding dissimilar metal butt welds of <4" (but > 1"), Volumetric Exam Requirements (Mandatory Element). The MRP guidance provided that dissimilar metal butt welds greater than or equal to 2" nominal pipe size in the following service conditions and not already included within the volumetric examination requirements of MRP-139 should be added:

- Those at pressurizer temperatures
- Those at hot leg temperatures
- Those that serve an ECCS function

TMI has identified four (4) nozzles in this classification that are two and one-half (2.5) inches in diameter and, perform an ECCS function. One of the welds in one nozzle had been previously mitigated in 2005 due to a replacement of an internal thermal sleeve (unrelated to dissimilar metal weld). The remaining welds in all four nozzles are currently scheduled for replacement in the Fall 2009 (1R18) outage and will then be incorporated into the ASME Section XI ISI program.

AmerGen provided relief request #5928-03-20218 dated November 3, 2003, submitting a proposed alternative to the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components." This proposed alternative would permit the use of a full structural weld overlay repair for an indication identified in the 'A' steam generator hot leg surge line nozzle to safe end weld. This request for relief was granted on November 14, 2003.

AmerGen submitted an additional proposed alternative to the ASME Code to allow the application of a preemptive full structural weld overlay on the pressurizer surge, spray, safety/relief, and hot leg decay heat drop line nozzle dissimilar metal welds. The proposed alternative, Relief Request No. 2007-TMI-01 was authorized by the NRC staff on October 17, 2007.

a. For MRP-139 baseline inspections:

Qa1. Have the baseline inspections been performed or are they scheduled to be performed in accordance with MRP-139 guidance?

- A. Yes. Baseline manual ultrasonic test (UT-PDI qualified) inspections have been performed on the pressurizer surge nozzle, pressurizer hot leg surge nozzle, hot leg decay heat drop line weld and one (1) high pressure injection (HPI) nozzle. The three (3) remaining HPI nozzles will be replaced in the Fall 2009 outage and their "category" will be changed to "A" concluding the replacement. The pressurizer spray nozzle has been UT examined (PDI qualified) this outage (Fall 2007) but has not yet been mitigated. The spray nozzle weld will be mitigated (weld overlay) in the Fall of 2011 and will be MRP-139 UT (PDI qualified) examined at that time. The two (2) core flood nozzles will be mitigated (weld inlay/overlay) in the Fall outage of 2009 and the MRP-139 baseline examination (UT-PDI qualified) will be performed at that time. The eight cold legs (four inlets and four outlets) RCS suction and discharge nozzle welds will be UT examined (PDI qualified) in the Fall 2009 outage. The three (3) pressurizer safety/relief nozzle welds were replaced in the Fall 2007 outage and are now category "A".

Qa2. Is the licensee planning to take deviations from the MRP-139 baseline inspection requirements of MRP-139? If so, what deviations are planned and what is the general basis for the deviation? If inspectors determine that a licensee is planning to deviate from any MRP-139 baseline inspection requirements, NRR should be informed by e-mail as soon as possible.

- A. No deviations have been taken at TMI and none are planned.
- b. For each examination inspected, was the activity:
 - Qb1. Performed in accordance with the examination guidelines in MRP-139, Section 5.1 for unmitigated welds or mechanical stress improved welds and consistent with NRC staff relief request authorization for weld overlaid welds?
 - A. Yes. The weld overlays of the three (3) previously identified welds were examined in accordance with the examination guidelines of MRP-139 and the relief request authorizations. The relief request authorizations permitted the application of a full structural weld overlay with subsequent volumetric PDI qualified ultrasonic examination of the weld overlay. Mechanical stress improvement was not used on any dissimilar weld.
 - Qb2. Performed by qualified personnel? Briefly describe the personnel training/qualification process used by the licensee for this activity.
 - A. Yes. The examinations were performed by personnel qualified to the requirements of ASME Section XI, Appendix VIII. Procedures and personnel were qualified in the PDI program for the manual ultrasonic examination of weld overlays on similar and dissimilar metal welds. The ultrasonic technique using “phased array” was not used at TMI to date.
 - Qb3. Performed such that deficiencies were identified, dispositioned, and resolved.
 - A. Yes. Indications identified in the ultrasonic examination were evaluated for relevance, characterized and entered into the licensee’s corrective action process for disposition and resolution.
- c. For each weld overlay inspected, was the activity:
 - Qc1. Performed in accordance with ASME Code welding requirements and consistent with NRC staff relief request authorizations? Has the licensee submitted a relief request and obtained NRR staff authorization to install the weld overlays?
 - A. Yes. The application of the weld overlays was performed in accordance with the ASME Code requirements (Section IX and XI) using qualified welding procedures and qualified welders. Weld overlay of the three (3) dissimilar metal welds was authorized by NRR in their approval dated November 14, 2003 and October 17, 2007 for TMI to apply full structural weld overlays on the surge nozzle, hot leg surge nozzle and the hot leg decay heat drop line welds.
 - Qc2. Performed by qualified personnel? (Briefly describe the personnel training/qualification process used by the licensee for this activity).
 - A. Welders applying the structural weld overlay were qualified in accordance with the requirements of ASME Section IX and personnel performing examination of the completed weld overlays were qualified in accordance with ASME Section XI, Appendix VIII and PDI qualified for manual ultrasonic examination.

- Qc3. Performed such that deficiencies were identified, dispositioned, and resolved?
A. Yes. Indications identified as a result of the ultrasonic PDI-qualified UT examination were evaluated for relevance, characterized and entered into the licensee's corrective action process for disposition and resolution.

d. For each mechanical stress improvement (SI) used by the licensee during the outage, was the activity performed in accordance with a documented qualification report for SI processes and in accordance with demonstrated procedures? Specifically:

- Qd1. Are the nozzle, weld, safe end, and pipe configurations, as applicable, consistent with the configuration addressed in the SI qualification report?

A. N/A, the mechanical stress improvement process was not used.

- Qd2. Does the SI qualification report address the location radial loading is applied, the applied load, and the effect that plastic deformation of the pipe configuration may have on the ability to conduct volumetric examinations?

A. N/A

- Qd3. Do the licensee's inspection procedure records document that a volumetric examination per the ASME Code, Section XI, Appendix VIII was performed prior to and after the application of the SI?

A. N/A

- Qd4. Does the SI qualification report address limiting flaw sizes that may be found during pre-SI and post-SI inspections and that any flaws identified during the volumetric examination are to be within the limiting flaw sizes established by the SI qualification report?

A. N/A

- Qd5. Performed such that deficiencies were identified, dispositioned, and resolved?

A. N/A

e. For the inservice inspection program:

- Qe1. Has the licensee prepared an MRP-139 ISI program? If not, briefly summarize the licensee's basis for not having a documented program and when the licensee plans to complete preparation of the program.

A. Yes. The licensee has an MRP-139 inservice inspection program which is implemented through ER-AP-330-1001, Alloy 600 Management Plan, Rev. 9. The Alloy 600 Management Plan program defines the processes, objectives and key elements for maintaining the integrity and operability of each alloy 600/82/182 component for the remaining life of the plant. This program makes provision for the incorporation of MRP-139 designated welds into the existing ASME Section XI ISI program upon completion of the specified MRP-139 mitigation activities. This program provides the basis to support management

strategies needed to address technical operating experience with all Alloy 600/82/182 pressure boundary butt welds including materials, commitments, remediation, inspection, and regulatory requirements. The subject welds will be included in the Risk-Informed ISI program upon completion of the remediation plan for TMI Unit 1 Alloy 600.

- Qe2. In the MRP-139 Inservice Inspection Program, are the welds appropriately categorized in accordance with MRP-139? If any welds are not appropriately categorized, briefly explain the discrepancies.
- A. Yes. All eighteen (18) welds identified during this inspection are appropriately categorized in accordance with MRP-139.
- Qe3. In the MRP-139 Inservice Inspection Program, are there inservice inspection frequencies, which may differ between the first and second 10-year intervals after the MRP-139 baseline inspection, consistent with the inservice inspection frequencies called for by MRP-139?
- A. All MRP-139 applicable welds are scheduled either for mitigation and/or inspection prior to the end of the current 10-year inspection interval which ends April 19, 2011.
- Qe4. If any welds are categorized as H or I, briefly explain the licensee's basis for the categorization and the licensee's plans for addressing potential primary water stress-corrosion cracking.
- A. There are three safety injection welds at TMI that are categorized as "I" and "K". Due to restrictive access and unacceptable surface profile, ultrasonic test cannot be performed such that the required examination volume will be achieved. These three welds are scheduled for replacement in the Fall 2009 outage.
- Qe5. If the licensee is planning to take deviations from the inservice inspection requirements of MRP-139, what are the deviations and what are the general bases for the deviations? Was the NEI 03-08 process for filing deviations followed?
- A. No deviations are currently planned from the inservice inspection requirements of MRP-139 at TMI.