May 15, 2006

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

SUBJECT: THREE MILE ISLAND STATION, UNIT 1 - PROBLEM IDENTIFICATION AND RESOLUTION INSPECTION REPORT NO. 05000289/2006007

Dear Mr. Crane:

On March 31, 2006, the US Nuclear Regulatory Commission (NRC) completed a team inspection at the Three Mile Island, Unit 1 (TMI) facility. The enclosed inspection report documents the inspection findings, which were discussed on March 31, 2006, with Mr. Glen Chick and members of your staff during an exit.

On May 11, 2006, the team leader conducted a supplemental exit to present the results of the review of open items and management's review of the preliminary findings. These results were presented to Mr. Rusty West, Site Vice President, Three Mile Island, Unit 1, and other members of the Three Mile Island staff who acknowledged the findings.

This inspection was an examination of activities conducted under your license as they relate to the identification and resolution of problems, and compliance with the Commission's rules and regulations and the conditions of your license. Within these areas, the inspection involved examination of selected procedures and representative records, observations of activities, and interviews with personnel.

On the basis of the sample selected for review, the team concluded that in general, problems were properly identified, evaluated, and corrected. There were five green findings identified during this inspection: two associated with problem identification and three associated with prioritization and evaluation of issues. The two findings associated with problem identification issues included inadequate abnormal operating procedures and the failure to establish appropriate inservice test reference values to monitor safety-related pump performance. The three findings associated with prioritization and evaluation included the failure to correctly apply the requirements of the ASME Code regarding a binding containment isolation valve, the failure to properly evaluate and correct indications of air in the 'A' decay heat removal system piping, and a deficient surveillance procedure.

The findings were determined to be violations of NRC requirements. However, because they have very low safety significance and because they were entered into your corrective action program, the NRC is treating these findings as Non-Cited Violations in accordance with Section VI.A.1 of the NRC's Enforcement Policy. If you deny these Non-Cited Violations, you should provide a response with the basis for your denial, within 30 days of the date of this inspection

report, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC, 20555-0001, with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC, 20555-0001; and the NRC Resident Inspector at the Three Mile Island, Unit 1 facility.

In addition, examples of minor problems were identified including a failure to comply with procedures to ensure that non-identical replacement items for a safety-related emergency diesel generator were evaluated for acceptability prior to use, and an alarm response procedure known to be deficient that was neither corrected nor entered into the corrective action process.

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

Sincerely,

/RA/

Ronald R. Bellamy, Ph.D., Chief
Projects Branch 7
Division of Reactor Projects

Docket Nos. 50-289
License Nos. DPR-50

Enclosure: Inspection Report Nos. 05000289/2006007
w/Attachment: Supplemental Information

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REGION I

Docket Nos:	05000289
License Nos:	DPR-50
Report Nos:	05000289/2006007
Licensee:	AmerGen Energy Company, LLC (AmerGen)
Facility:	Three Mile Island Station, Unit 1
Location:	PO Box 480 Middletown, PA 17057
Dates:	March 13 - March 31, 2006
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Trainee:	M. Brown, Operations Engineer, Division of Reactor Safety (DRS)
Approved by:	Ronald R. Bellamy, Ph.D., Chief Projects Branch 7 Division of Reactor Projects

Enclosure

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SUMMARY OF ISSUES

IR 05000289/2006007; 03/13/2006 - 03/31/2006; AmerGen Energy Company, LLC; Three Mile Island, Unit 1; biennial baseline inspection of the identification and resolution of problems. Violations were identified in the areas of problem identification and prioritization and evaluation of issues.

The inspection was conducted by three regional inspectors and one resident inspector. Five findings of very low safety significance (Green) were identified during this inspection and were classified as Non-Cited Violations (NCVs).

Identification and Resolution of Problems

The team concluded that overall, problems were properly identified, evaluated and corrected; however, during the middle of the two year inspection period, AmerGen identified some substantial challenges to their implementation of the corrective action program as a result of issues identified by external organizations. Later in the period, improvements were made in the corrective action program, particularly with the quality of the evaluation products. The team attributed the improvements to a station wide effort to improve the corrective action program standards which were driven by the station ownership and management review committees. Nonetheless, problem identification was inconsistent throughout the period and some of the AmerGen staff were not aligned with current expectations to identify problems and initiate Issue Reports (IRs), and in a few cases, did not initiate IRs for known deficiencies that resulted in these issues not being evaluated and corrected. Further, many of the more significant issues continue to be identified by external organizations, including the NRC. For example, NRC findings related to Abnormal Operating procedures, surveillance test acceptance criteria, and surveillance test results represented issues that Engineering and Operations had the opportunity to identify. The AmerGen staff also did not effectively use industry operating experience, resulting in additional NRC findings. A large number of NRC identified lower level issues were concentrated in some single owner engineering program areas such as in-service testing, that may be indicative of isolated issues with problem identification standards.

At the time of the inspection, the station ownership and management review committees were effective in the initial review and prioritization of IRs. Nonetheless, throughout the period there has been a station wide problem related to procedure usage and procedure adequacy that station management has been slow to recognize and address. AmerGen staff has not effectively used the corrective action program to address these procedure problem areas. While many IRs have been initiated related to procedure usage and adequacy, no root cause evaluations have been performed, and the evaluation tools such as common cause and apparent cause evaluations have not been effectively used to identify and resolve underlying issues. While Amergen is investing a significant effort to improve the problems with procedure use and adequacy, without a clear understanding of the underlying causes their efforts may not be efficient, or effective, or achieve the desired result. Further, while the corrective actions for identified deficiencies were typically effective, and completed in a timely manner, AmerGen continues to be challenged in the area of procedure adequacy and adherence, as evidenced by a recent audit which identified a number of maintenance program deficiencies that are related to processes not being followed. The continued problems related to procedure usage and

adequacy indicate corrective actions to date have not been fully effective for this station wide issue.

Some evaluation products were not thorough and as a result AmerGen did not identify problems or address the cause of some issues. NRC-identified issues and trends were not evaluated in aggregate to determine the cause of the cross-cutting aspects. Further, some of the individual IRs for NRC findings did not identify and correct the underlying causes of issues. Some of the lower level evaluation products, particularly early in the period, did not appropriately evaluate the cause of events and deficiencies, resulting in missed opportunities to identify broader issues.

A. NRC Identified and Self-Revealing Findings

Cornerstone: Initiating Events

- Green: The inspectors identified a non-cited violation (NCV) of Technical Specification (TS) 6.8.1, for failure to adequately establish and implement procedures required by Regulatory Guide 1.33, Section 6, "Procedures for Combating Emergencies and Other Significant Events." Specifically, no procedure existed to combat an emergency caused by a loss of electrical power to a vital bus. Additionally, the procedures to combat emergencies caused by a loss of 4160V AC and a loss of Nuclear Services Closed Cooling Water (NSCCW) were inadequate in that pump trip criteria and detailed guidance to the control room operators were not provided. Amergen has acknowledged that these problems exist and provided the team an abnormal operating procedure (AOP) implementation schedule showing that new AOPs will be generated to correct these deficiencies in 2006.

  This finding is more than minor because it is associated with the procedure quality attribute of the Initiating Events cornerstone and the associated cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. However, this finding was determined to have very low safety significance (Green) using Phase 1 of the NRC significance determination process described in NRC Inspection Manual Chapter (IMC) 0609, Appendix A, since the finding does not contribute to both the likelihood of a reactor trip and the likelihood that mitigation equipment or functions will not be available.

  The finding has a cross-cutting aspect related to the area of Problem Identification and Resolution in that AmerGen personnel did not identify that some AOPs were inadequate. (Section 4OA2.1.b.(1))

Cornerstone: Mitigating Systems

- Green. The team identified an NCV of 10 CFR 50.55a.(f)(4)(ii) "Codes and Standards," which requires, in part, that testing of safety-related pumps meet the requirements of the American Society of Mechanical Engineers (ASME) Operation and Maintenance (OM) Code requirements following maintenance on the "A" Decay Heat Removal (DH) pump. Specifically, AmerGen did not establish new vibration reference values or reconfirm the previous values following maintenance that can affect the reference values. This finding has been entered into the licensee's corrective action program as IRs 467551, 467056, 472106 and 471745. The planned corrective actions include an evaluation of the "A" DH pump reference values and a review of the methodology and process used to perform reference value evaluations.

  This finding is more than minor because it is similar to IMC 0612, Appendix E example 2C and the same issue affected a number of pumps tested that include 2B emergency feedwater pump and the1C NSCCW pump. This issue affected the Mitigating System cornerstone. The issue had very low safety significance (Green) because the "A" DH pump remained operable, there was no loss of safety function, and it was not related to a seismic, flooding, or fire initiating event. (Section 4OA2.1.b.(2))

- Green. The inspectors identified an NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for a deficient evaluation that resulted in ineffective corrective actions for indications of air in the DH system following maintenance. The ineffective corrective actions resulted in unknown quantities of air being forced through the 'A' DH pump casing and into the downstream piping, without an evaluation of the potential consequences to the DH and makeup systems. This finding has been entered into the licensee's corrective action program as IR 475218. Corrective actions include a comprehensive root cause evaluation, ultrasonic testing to verify no air remained in the piping, and actions to add new vent valves to enhance system fill and venting.

  This finding is more than minor because it is associated with the equipment performance attribute of the Mitigating System cornerstone and the objective to ensure availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The inspectors evaluated the risk significance of this finding using NRC IMC 0609, Appendix A, Phase 1. The finding screened to very low safety significance (Green) because the condition did not result in an actual failure of any safety-related system or component, or result in the system being declared inoperable for greater than its allowed technical specification outage time.

  This finding is related to the cross-cutting area of Problem Identification and Resolution, because engineers and component maintenance optimization personnel missed several opportunities to properly evaluate and correct this degraded condition due to multiple reoccurrences of DH pump high vibrations and not appropriately applying prior industry operating experience. TMI also did

not implement a void monitoring/periodic venting program as recommended by industry operating experience.
(Section 4OA2.2.b.(2))

- Green. The inspectors identified an NCV of TS 6.8.1.a for deficient surveillance procedures that resulted in the introduction of air into the sodium hydroxide (NAOH) piping to several emergency core cooling systems (ECCS) during in-service testing (IST) activities. This finding has been entered into the licensee's corrective action program (IRs 475218 and 474439). The corrective actions included venting of the initial air void via a check valve vent port, initiation of a modification to install a high point vent valve to vent the large section of voided pipe, revision of applicable procedures to prevent draining of piping, and ultrasonic testing of multiple sections of pipe in the ECCS piping.

  This finding is more than minor because it is associated with the equipment performance attribute of the Mitigating System cornerstone and the associated cornerstone objective to ensure availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The inspectors evaluated the risk significance of this finding using NRC IMC 0609, Appendix A, Phase 1. The finding screened to very low safety significance (Green) because the condition did not result in an actual failure of any ECCS systems, and engineers concluded the 3.6 cubic feet of air void identified would not have prevented the ECCS systems from performing their design safety function.

  This finding is related to the cross-cutting area of Problem Identification and Resolution, because engineers and operators missed several opportunities to recognize that proper refilling of drained piping was not possible due to the inability to vent based on prior industry operating experience. AmergenI also did not implement a void monitoring/periodic venting program as recommended by industry operating experience.
  (Section 4OA2.2.b.(3))

Cornerstone: Barrier Integrity

- Green. The inspectors identified an NCV of 10 CFR 50.55a.(f)(4)(ii) "Codes and Standards" which requires, in part, that testing of safety-related check valves meet the requirements of the American Society of Mechanical Engineers (ASME) Operation and Maintenance (OM) Code. Specifically, AmerGen did not comply with IST requirements for a binding containment isolation check valve that was identified on November 6, 2005. IST program personnel did not declare the check valve inoperable, the cause of the failure was not analyzed, and other check valves in the sample group that may also be affected by this failure mechanism were not examined or tested during the same refueling outage to determine the condition of internal components and their ability to function, as required by the current TMI ASME IST Program. (ASME OM Code-2001, ISTC-5224, Corrective Action).

This issue is more than minor because it affected the Barrier Integrity containment barrier performance attribute and the associated cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. The inspectors evaluated the risk significance of this finding using NRC IMC 0609, Appendix A, Attachment 1. The finding screened to very low safety significance (Green).

The cause of the finding is related to the cross-cutting area of human performance, because engineering personnel did not evaluate the performance of a containment isolation check valve against IST program requirements properly and declare the observed condition as an IST/Code failure. (Section 4OA2.2.b.(1))

B. Licensee-Identified Violations

A violation of very low safety significance regarding technical TS requirements was identified by the licensee. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. The violation and corrective actions are listed in Section 4OA7 of this report.

REPORT DETAILS

4. OTHER ACTIVITIES (OA)

4OA2 Problem Identification and Resolution (PI&R) (Biennial - IP 71152B)

Background

In January 2005, a root cause investigation was conducted (IR 00283467) to determine why the TMI operations training programs had been placed on probation by the Institute of Nuclear Power Operations. Two root causes and one contributing cause were identified. The primary root cause involved the failure to ensure that investigations and assessments were performed to standards that resulted in identification of underlying causes with specific and measurable actions taken to address the cause(s). The root cause team has placed primary emphasis on this root cause, self-identification and resolution of known issues in training, due to multiple failed barriers over the past 3 years that if properly analyzed would have corrected Systematic Approach to Training (SAT) implementation and additional organizational and training weaknesses in operations and training. The team explored the "why" of the weak assessment and investigation products and found underlying cause and enablers that prevented the station from identifying their own weakness by not fostering a self-critical environment. The enablers involved minimization of the significance of issues and an underlying standard of regulatory compliance versus excellence. The extent-of-condition of self-identification and resolution weakness was explored by the team and found to be present in all site organizations. The review also concluded that TMI does not exhibit behaviors that demonstrate a high value for input from external sources. In response to this root cause, AmerGen has implemented aggressive action to improve station standards related to corrective action. The team found that the root cause was thorough.

.1 Effectiveness of Problem Identification

a. Inspection Scope

The inspection team reviewed the procedures describing the corrective action program (CAP) at AmerGen's Three Mile Island, Unit 1 facility (TMI). AmerGen identifies problems by initiating an Issue Report (IR) for a condition adverse to quality, plant equipment deficiency, industrial or radiological safety concern, or other significant issue. The IRs are subsequently screened for operability, categorized by priority (1 to 5) and significance (A through D), and assigned for evaluation and resolution.

The team reviewed IRs selected across the seven cornerstones of safety in the NRC's Reactor Oversight Program (ROP) to determine if problems were being properly identified, characterized, and entered into the CAP for evaluation and resolution. The team selected items from the maintenance, operations, engineering, emergency planning, security, radiological control, training, and oversight programs to ensure that the TMI staff was appropriately considering problems identified in each functional area.

The team used this information to select a risk-informed sample of IRs that had been issued since the last NRC PI&R inspection, which was conducted in March 2004.

The team also considered insights from risk analyses to focus the sample selection and system walkdowns on risk-significant components. The team reviewed the decay heat (DH), decay closed (DC), and the nuclear services closed cooling water (NSCCW) systems in detail. For the selected systems, the team reviewed the applicable system health reports, work requests, engineering documents, plant log entries, and results from surveillance tests and maintenance tasks. For these selected systems, the team also interviewed cognizant station personnel and completed system walkdowns to assess material condition and system performance.

In addition to IRs, the team selected items from other processes at TMI to verify that they appropriately considered problems identified in these areas for entry into the corrective action program. Specifically, the team reviewed a sample of work orders, engineering change requests, operator log entries, control room deficiencies and work-around lists, operability determinations, system health reports, completed surveillance tests, and temporary configuration modification packages. The documents were reviewed to ensure that underlying problems associated with each issue were appropriately considered for resolution via the corrective action process. In addition, the team interviewed plant staff and management to determine their understanding of and involvement with the CAP. The IRs and other documents reviewed, and a list of key personnel contacted, are listed in the Attachment to this report.

The team reviewed a sample of AmerGen's Nuclear Oversight (NOS) audits and quarterly reports, Nuclear Safety Review Board reports, departmental self-assessments, and the most recent NOS audit of the CAP. This review was performed to determine if problems identified through these evaluations were entered into the CAP, and whether the corrective actions were properly completed to resolve the deficiencies. The effectiveness of the audits and self-assessments was evaluated by comparing audit and self-assessment results against self-revealing and NRC-identified findings, and current observations during the inspection.

b. Assessment and Findings

The team found that performance related to problem identification was inconsistent. Although many problems were appropriately identified, as evidenced by the low threshold for what constitutes a problem and the correspondingly high number of IRs initiated, some TMI personnel were not consistently identifying problems and initiating IRs. In some cases, TMI personnel did not initiate IRs for known problems, resulting in the problems not being evaluated and corrected. For example:

- The team identified that an Operations Support Manager, in charge of the procedure upgrade program, was aware of a problem with a nuclear service system alarm response procedure that referred to a procedure for alternate makeup to the system that had not been approved and issued. Operators were not made aware of this deficiency that existed for more than a year which could have delayed actions to

mitigate some plant events. The known deficiency was not identified in an IR and was not corrected. This minor issue is discussed in section 4OA2.1.b.(3) below.

- AmerGen identified that the Maintenance staff did not initiate an IR for a main feed pump discharge check valve that appeared to have been stuck open, because it subsequently slammed shut during disassembly. The issue was noted in the work order remarks; however, it was not entered into the corrective action process until it was identified during a work package review a few weeks later. This is a licensee identified finding documented in section 4OA7 of this report.

AmerGen missed several opportunities to identify deficiencies as a result of not sufficiently questioning or evaluating some issues. For example, the team identified problems with Abnormal Operating Procedures (AOPs), surveillance test acceptance criteria, and surveillance test results that should have been identified by Engineering and Operations. For example:

- The Operations procedure upgrade staff did not identify that three AOPs were not consistent with Regulatory Guide 1.33, Appendix A requirements, despite the fact that a significant effort is underway to upgrade AOPs. This NRC-identified finding is discussed detail in section 4OA2.1.b.(1) below.

- During post-maintenance testing of a decay heat pump, IST reference values were not established or re-verified for work that was recognized to potentially affect these values. The pump was tested several times without establishing new reference values for vibration. This NRC-identified finding is discussed in detail in section 4OA2.1.b.(2) below.

- During a review of IR 00399937 (5D), test method for EF-V-12A/B, the team identified that during this surveillance that involved a back flow leak test of emergency feedwater check valves, multiple tests were performed prior to achieving acceptable results. The IST results were not properly evaluated as incomplete or failed tests in accordance with IST program requirements. This is a minor issue since the testing was ultimately acceptable and the valves were operable. AmerGen initiated IR 472053 and 472663 to address this issue. The team also identified a procedural compliance problem in that a high pressure and temperature drain hose was not used as specified by the procedure, "IST Close Test for EF-V-12A and EF-V-12B." AmerGen initiated IR 472039 to address this minor procedure compliance issue.

- During the decay heat pump testing on November 6, 2005, there were problems related to the operations review and approval of the test results that should have been identified by Engineering and Operations personnel. Specifically, Operations did not verify that no maintenance was performed for the data sheets used and they did not sign off the procedural step that declared the data acceptable. AmerGen initiated IR 467551 to address this minor issue.

Station staff promptly initiated CRs, as appropriate, in response to deficiencies or issues raised by the inspection team.

(1) Inadequate Abnormal Operating Procedures

Introduction: The team identified a Green Non-Cited Violation (NCV) of Technical Specification 6.8.1 which requires, in part, that written procedures shall be established, implemented and maintained covering the applicable procedures referenced in Appendix A of Regulatory Guide 1.33, Revision 2, "Typical Procedures for Pressurized Water Reactors and Boiling Water Reactors." The licensee did not recognize that they had no abnormal operating procedure (AOP) to address a loss of a vital bus and that their procedures for addressing a loss of 4160V AC and a loss of NSCCW were inadequate.

Description: While reviewing TMI's AOPs to ensure all procedures required by Regulatory Guide 1.33 exist, the team noted several instances where it was not clear how TMI was complying with Regulatory Guide 1.33 requirements. The team had discussions with several licensed operators and operations management personnel that resolved most of the concerns. However, the team discovered that no AOP existed to combat a loss of safety-related Vital Buses A-D and that the procedures to combat a loss of NSCCW and a loss of 4160V AC buses were inadequate.

The team discussed the vital bus issue with operations and discovered that the "D" Inverter had failed twice in the past 12 months. Instead of having a single procedure to address this issue, the operators were forced to address 33 annunciators that were received, and used operating procedure 1107-2B "120 Volt Vital Electrical System" to address the problems caused by the inverter failure. This procedure is written to properly line up components prior to removing an inverter from service; not to address the emergency situation caused by a safety-related inverter failure. However, the operators indicated that this was the only procedure available to them that indicated all equipment affected by the inverter failure.

Procedure 1203-20, "Nuclear Services Closed Cooling System Failure," was determined to be inadequate because it does not provide the operator guidance on when to trip the NSCCW pumps on low surge tank level or when to trip the reactor coolant pumps (RCPs) on high temperature. The guidance on when to trip the reactor comes at the end of the procedure versus at the beginning of the procedure. It is conceivable that upon entering the procedure the operators would reach plant trip criteria prior to reaching a step which would provide them direction to trip the plant.

Procedure 1107-4A(B, C, D), "Loss of 1A(B, C, D) 4160V Bus" was determined to be inadequate because it did not provide the operator with detailed guidance on how to address this emergency and simply provides the operator with a list of reference information as to what equipment is affected by this loss of power.

Operations acknowledged problems with these AOP's and provided the team with an AOP Implementation Schedule indicating that all of these procedures will be revised by their AOP Upgrade project in 2006.

Analysis: The performance deficiency is the failure to establish, implement, and maintain adequate AOPs to address a loss of a vital bus; loss of 4160V AC; and a loss of NSCCW. The team determined that these procedure issues were more than minor because they are associated with the procedure quality attribute of the Initiating Events cornerstone and the associated cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. The absence of a single concise procedure or presence of inadequate procedures can reasonably result in necessary operator actions being untimely. However, this finding was determined to have very low safety significance (Green) using Phase 1 of the NRC significance determination process described in NRC Inspection Manual Chapter (IMC) 0609, Appendix A, since the finding does not contribute to both the likelihood of a reactor trip and the likelihood that mitigation equipment or functions will not be available.

The finding has a cross-cutting aspect related to the area of Problem Identification and Resolution: specifically, station personnel did not identify that these procedures either did not exist or were inadequate.

Enforcement: TS 6.8.1, states, in part, that written procedures shall be established, implemented and maintained as recommended in Appendix A of Regulatory Guide 1.33. Contrary to the above, as of March 23, 2006, the team determined that no procedure had been established to combat an emergency situation caused by a loss of a safety related vital bus. Additionally, the procedures to address a loss of NSCCW and a loss of a 4160V bus were inadequate in that pump trip criteria was not provided near the beginning of the procedure and detailed guidance to the control room operators was not provided. This violation is documented in AmerGen's corrective action program (IR 4731771) and therefore is being treated as a non-cited violation, consistent with Section VI.A.1 of the NRC Enforcement Policy. **NCV 05000289/2006007-01, Inadequate Abnormal Operating Procedures**

(2) Failure to Establish Appropriate Reference Values to Monitor the "A" Decay Heat Removal System Pump

(1) Introduction: The team identified a Green (NCV) of 10CFR50.55a for the failure to implement applicable ASME Operation and Maintenance (OM) Code requirements following maintenance on the "A" DH pump. Specifically, AmerGen did not establish new vibration reference values or reconfirm the previous values following maintenance that can affect the reference values.

Description: The applicable Code for the current TMI inservice test (IST) program interval requires that if reference values may be affected by pump maintenance, new reference values shall be determined or the previous values reconfirmed before declaring the pump operable. The team reviewed IR 394990 and the results of

surveillance procedure OP-TM-212-213, "DH-P-1A Refueling IST," performed on November 6, 2005, to determine whether the test met applicable code requirements. The test was performed to satisfy a refueling periodicity surveillance test requirement as well as to verify acceptable pump performance following maintenance. The pump maintenance involved replacement of a mechanical seal which was recognized as having the potential to affect vibration reference values. Through interviews, the team identified that the new vibration reference values were neither determined nor were the previous values reconfirmed. AmerGen initiated IR 467551 to address the issue. The investigation determined that a work package deficiency led to the use of the wrong data sheets and the failure to determine appropriate reference values.

The team also determined that the November 6, 2005, test was considered a comprehensive test but did not verify pump performance at low flow, which is the pump operating condition used for the quarterly testing, and thereby pump performance monitoring. The quarterly low flow test is performed per OP-TM-212-201 "IST of DH-P-1A and Valves from ES Standby Mode" and was performed twice since the pump maintenance without a reference value evaluation. A reference value evaluation of the quarterly test is also required since the vibration values may be affected by different system operating configurations, such as high flows versus low flows. AmerGen initiated IR 467056 to address this issue and reviewed pump reference value determinations to determine the extent-of-condition. The review identified two other instances in which quarterly test reference value evaluations were not performed as required following maintenance, as a result of using a refuel periodicity test to confirm acceptable pump performance associated with the 2B emergency feedwater (EF) pump and the 1C NSCCW pump. The refuel periodicity tests were performed under different system configurations and flow conditions which could affect pump flow, pressure and vibration values. AmerGen initiated IRs 472106 and 471745 to further evaluate the methodology and process used for performing reference value evaluations.

Analysis: The performance deficiency is the failure to establish new vibration reference values or reconfirm the previous values following maintenance on the "A" DH pump as required by the ASME Code for inservice testing. This issue is more than minor because it is similar to IMC 0612, Appendix E, example 2C and the same issue affected a number of pumps tested that include 2B EF pump and the 1C NSCCW pump. This issue affected the Mitigating System cornerstone. In accordance with the Reactor Safety SDP, a Phase 1 analysis of this condition was performed using NRC IMC 0609, Appendix A. The inspectors determined that the issue had very low safety significance (Green) because the "A" DH pump, 2B EF pump, and 1C NSCCW pump, remained operable, there was no loss of safety function, and was not related to a seismic, flooding, or fire initiating event. The planned corrective actions include an evaluation of reference values and a review of the methodology and process used to performing reference value evaluations to meet Code requirements.

Enforcement: 10CFR50.55a.(f)(4)(ii) - Codes and Standards - requires, in part, that testing of safety related pumps meet the requirement of the ASME OM Code. The applicable Code for the current TMI IST program interval is ASME OM Code - 2001. Section ISTB-3310, "Effect of Pump Replacement, Repair, and Maintenance on

Reference Values," requires, in part, that when a set of values may have been affected by repair, replacement, or routine servicing of a pump, a new set of reference values shall be determined or the previous value reconfirmed by a comprehensive or Group A test run before declaring the pump operable. Contrary to the above, during November 2005, following the replacement of the "A" DH pump mechanical seal, an activity that could affect the vibration reference values, the pump was returned to an operable status without establishing a new set of references values for vibration or reconfirming the previous values through comprehensive or Group A testing. This violation is documented in AmerGen's corrective action program (IR 467551, 467056, 472106 and 471745) and therefore is being treated as a non-cited violation, consistent with Section VI.A.1 of the NRC Enforcement Policy: **NCV 05000289/2006007-02**, **Failure to Establish Appropriate Reference Values to Monitor the "A" Decay Heat Removal System Pump.**

(3) Deficient Alarm Response Procedure

The corrective actions to IR 149885, which evaluated leakage from the nuclear service closed cooling water (NSCCW) system, called for development of a procedure for makeup to the NS surge tank. The team identified that alarm response procedure OP-TM-MAP-F0108, “NS Surge Tank Level HI/LO,” Rev. 0, had been incorrectly revised on December 9, 2004, and the error was not detected during the review. The procedure directed operators to use a non-existing procedure (OP-TM-541-921) for filling the NS surge tank after a loss of offsite power event. Further, the team identified that the operations procedure owner was aware that procedure OP-TM-541-921 had not been issued because engineering did not agree with the proposed makeup source, and did not take actions to correct the alarm response procedure. The team concluded that this performance deficiency was minor because it did not affect the mitigating system cornerstone objective of availability, reliability, or capability of the NS system since operators could have used available hoses to fill the NS surge tank using redundant diesel-driven fire system pumps. In addition, this finding has been entered into the AmerGen corrective action program as IR 466684, and the procedural error has been corrected.

.2 Prioritization and Evaluation of Issues

a. Inspection Scope

The inspection team reviewed the IRs listed in the Attachment to assess whether AmerGen adequately evaluated and prioritized identified problems. The team selected the IRs to cover the seven cornerstones of safety identified in the NRC’s Reactor Oversight Program. The team also considered risk insights from the TMI Probabilistic Risk Analysis to focus the IR sample. The review was expanded to five years for TMI’s evaluation of problems associated with their DH removal system and the NS system.

The IRs reviewed encompassed the full range of AmerGen evaluations, including root cause analyses, apparent cause evaluations, common cause evaluations and a work group evaluation. The review included the appropriateness of the assigned significance,

the scope and depth of the causal analysis, and the timeliness of the resolutions. For significant conditions adverse to quality, the team reviewed AmerGen's corrective actions to preclude recurrence. The team observed the Station Oversight Committee (SOC) and Management Review Committee (MRC) meetings, in which AmerGen managers reviewed incoming IRs to evaluate the prioritization, preliminary corrective action assignments, and analyses plans.

The team reviewed AmerGen's evaluation of industry operating experience information for applicability to their facility. The team also reviewed equipment operability determinations, reportability assessments, and extent-of-condition reviews for selected problems. The team further reviewed equipment performance results and assessments documented in completed surveillance procedures, operator log entries, and trend data to determine whether the equipment performance evaluations were technically adequate to identify degrading or non-conforming equipment.

b. Assessment

The team concluded that, in general, AmerGen adequately prioritized and evaluated the issues entered into the corrective action program. The IRs were prioritized based on the safety significance; operability determinations and reportability assessments were made promptly when issues were entered into the system. AmerGen screened the IRs appropriately and properly classified them for significance. The team noted that significant conditions adverse to quality received a formal root cause analysis (RCA) and an extent-of-condition review. Less significant conditions typically received an apparent cause evaluation (ACE). A common cause analysis (CCA) was performed to identify common failure modes for selected issues. The majority of the IRs written were for less significant issues that were fixed and trended or in some cases received work group evaluations. Additionally, the team determined that the SOC and MRC were effective in the initial review and prioritization IRs.

Nonetheless, there has been a station wide problem related to procedure usage and procedure adequacy that station management has been slow to recognize and address. The team found that the TMI staff has not effectively used the corrective action program to address these procedure problem areas. While many IRs have been initiated related to procedure usage and adequacy, the evaluation tools such as common cause and apparent cause evaluations have not been effectively used to identify underlying issues. The team was concerned that while AmerGen is now investing a significant effort to improve the problems with procedure use and adequacy, without a clear understanding of the underlying causes their efforts may not be efficient, or effective, or achieve the desired result. In response to this concern, AmerGen initiated IR 469374 to consolidate actions to address the procedure problems and plan to consider whether any additional evaluations of procedure issues are necessary.

Examples of some of the opportunities to identify and address broader procedure problems included:

- January to March 2004, NOS identified IR 214133, declining trend in operations performance first quarter 2004, in part, as a result of procedure adherence issues and a high volume of procedure quality problems.

- March 2004, IR 199883, Rescheduling of preventative maintenance past their due date, the Common Cause Analysis (CCA) identified that Work Management and Engineering were not following MA-MA-716-009. Nonetheless, the evaluation did not address the underlying cause, the corrective action was to reinforce procedure usage.

- April 2004, IR 195652, High number of Maintenance Rule failures trend, the CCA documented some examples having a common theme of procedure adequacy and adherence; however, it was not felt that there was any commonality that would warrant expanding the extent-of-condition review.

- June to September 2004, NOS observed a declining trend in the procedure adherence fundamental (NOSPA-TM-04-3Q). The assessment noted problems with procedure adherence to Preventative Maintenance task deferrals, Condition Based Monitoring, Plant Seasonal Readiness, and Conduct of Engineering. The analysis noted that problems with Preventative Maintenance task deferrals was a repeat problem.

- February 2005, a CCA (IR 285099) was performed for externally identified issues (INPO, NRC, NOS, and NSRB) in 2004. The analysis identified that standards were not being enforced or used and procedures were not being followed which contributed to the external identification of issues.

- April 2005, an apparent cause evaluation (ACE) for Engineering Procedure Adherence Concerns (IR 306793) identified, in part, that individuals did not follow the applicable procedure because they were unaware that the procedure existed; personnel missed steps because they did not review Level 3 procedures; not all procedure steps were completed because personnel were unaware that additional steps were required; the wrong process path was chosen because of misinterpretation of ambiguous instructions.

- April 2005, an ACE was performed for an INPO identified area for improvement related to procedure quality and use (325952). The evaluation addressed a number of issues, including many maintenance and operating procedures not containing detail or relying on individual knowledge and skill. Management has tolerated procedure deficiencies, has not emphasized timely upgrading of procedures when deficiencies are identified, and has not established high standards for using procedures in the field.

- June 2005, a CCA (IR 319303) was performed for change management issues between March 2003 to March 2005. The analysis identified the common causes to be: 1) inadequate implementation of procedures/procedure revisions that fail to address change management issues of communication and training for affected personnel; 2) lack of management oversight and/or expectations for implementation of change management.

- June 2005, the NSRB identified that operating procedures continue to contain many "error traps" that could impact new, less experienced operators, and the Procedure Upgrade Program warrants management efforts to expedite the schedule.

- March 2006, a potential negative trend was identified by NOS in the area of configuration control (NOSPA-TM-05-4Q, IR 443277). A CCA was performed (IR 436402) and identified that procedure adherence and related human performance errors continue to challenge the site. Some procedure quality issues were also identified.

The quality of the causal analyses reviewed were generally adequate, although some evaluation products were not thorough and as a result AmerGen did not identify problems or address the cause of some issues. For example:

- AmerGen did not identify a potentially stuck open main feed containment isolation check valve as an IST test failure and consequently did not perform applicable evaluations and inspections. This NRC-identified finding of the IST program is discussed detail in section 4OA2.2.b.(1) below.

- Decay heat pump high vibrations indicative of air voids in the decay heat system were not evaluated and addressed. This NRC-identified finding for ineffective corrective action is discussed detail in section 4OA2.2.b.(2) below.

- AmerGen did not identify a deficient IST surveillance procedure as a result of not considering some internal and external operating experience. This NRC-identified finding of the IST program is discussed in detail in section 4OA2.2.b.(3) below.

- The root cause evaluation related to a reactor power excursion did not adequately address some procedure issues. Specifically, a corrective action to change a procedure was closed with no action, since the procedure was subsequently found to be adequate. However, procedure usage was not re-evaluated and the case study used to train the operators was not adjusted accordingly. AmerGen initiated IR 471201 to address the problems with the corrective actions.

NRC-identified issues and trends were not evaluated in aggregate to determine the cause of the cross-cutting aspects. Further, some of the individual IRs for NRC findings did not identify and correct the underlying causes of issues. For example:

- IR 301618 (3D), NRC Inspection 2004-05 contained seven findings; however, this IR did not evaluate common (cross-cutting) aspects. Instead, the IR reviewed individual IRs to ensure the issues were covered.

- IR 00355900 (4D), Procedure steps performed out of order (NRC-identified finding, 2005-004-03), did not evaluate why the procedure was not used by the technician and supervisor or why some steps were missed. Based on interviews, both individuals were aware of the procedure requirements.

- IR 00326794 (4D), Procedure 1420-DC-3 usage level 2 instead of M (NRC-identified finding, 2005-004-03), did not evaluate why the procedure was incorrect.

- IR 325106 (3D, NCV - Cross Cutting), NRC-identified potential radwaste classification issues, did not evaluate the procedure adequacy problems.

Some of the lower level evaluation products, particularly early in the period (typically 4D CRs), did not appropriately evaluate the cause of events and or deficiencies. For example:

- IR 00202535 (4D), Pre-conditioning concern raised regarding EF-P-IST 1300-3G, did not identify that the procedure was not clear on how to address a trap indicating a greater than normal band to ensure appropriate operability and pre-conditioning reviews were performed. The team determined that Amergen missed an opportunity to identify a procedure adequacy problem when addressing the pre-conditioning concern. IR 471828 was generated to improve the procedural guidance.

- IR 00208044 (3B - 4D), Surveillance test performed outside test conditions, did not evaluate the human performance aspects such as “schedule pressure prompted a desire to evaluate results instead of re-performing or rescheduling the test.”

- IR 00290864 (4D), TMI-1 inservice testing program health declined to yellow, did not evaluate why the program declined. The issue was closed out to 13 existing IRs which did not address the overall program decline.

- IR 00259011 (4D), IST program bases/plan document deficiencies and concerns (identified in NOSA-TMI-04-07, Surveillance and Test Program Audit), did not address the cause of the program discrepancies and the lack of documentation to address potentially missed tests. The team also reviewed IRs 256262 and 258908. Collectively, these IRs did not address the cause for the numerous problems identified by NOS with the IST program and why they were not identified by Amergen Engineering. An ACE was performed for IR 256262 but the evaluation was limited to addressing a potential missed test.

- IR 00435940, (4D) NOS Identified, LTA Corrective Action Closure (IR 379807) did not review open material non-conformance reports for operability; however, the Engineering investigation did not determine why the review wasn’t completed.

- IR 00215125 (4D), CR 196916 resolution too narrowly focused, did not identify and correct the cause for narrow corrective actions.

- IR 00242443 (4D), CR not initiated for MU-V-238 test failure in 1R15, did not identify, evaluate, and correct the cause for not initiating an IR.

- IR 00348405 (4D), Air Intake Tunnel Halon N2 over pressure margin decrease, did not address procedure adequacy.

- IR 00394990 (4D), Determination of DH-P-1A Operabilty following 1R16, did not resolve the procedure discrepancy related to the requirement to evaluate pump hydraulic performance by plotting five data points while the test only measures three points. AmerGen initiated IR 467056 to address this minor issue.

(1) Failure to Identify and Perform Evaluations and Inspections as a Result of the Anomalous Performance of a Main Feed Check Valve

Introduction: The inspectors identified a Green (NCV) of 10CFR50.55a for the failure to implement applicable ASME Operation and Maintenance (OM) Code requirements for a binding containment isolation valve. Specifically, IST program personnel did not declare the check valve inoperable, the cause of the failure was not analyzed, and other check valves in the sample group that may also be affected by this failure mechanism were not examined or tested during the same refueling outage to determine the condition of internal components and their ability to function, as required by the current TMI ASME IST Program (ASME OM Code-2001, ISTC-5224, Corrective Action).

Description: The team reviewed IR 428361, which evaluated a stuck open main feedwater (FW) system containment isolation valve (FW-V-12B), and IR 469960, which evaluated a missed opportunity to implement a design change to eliminate a known design deficiency regarding these feedwater and similar check valves.

The TMI IST program requirements are defined in administrative procedure 1041, " IST Program Requirements." Section 4.2.2 of this procedure states that for check valves, disassembly and inspection can be used as a positive means to ensure that a valve's disc will full stroke open and to verify closure capability. These IST requirements are implemented per surveillance procedure 1300-3L, "Disassembly / Inspection Of Valves For IST," and corrective maintenance procedure 1410-V-31, "Crane Tilting Disc Valve Inspection." The acceptance criteria provided in Section 9.0 of procedure 1300-3L, specifies that the valve disc has been manually exercised open and closed with no binding or interference as required by the Data Sheets of procedure MP-1410-V-31. Section 8.2.1 and Data Sheet 1 of this procedure requires inspection of the valve disc in an as found condition, and includes checking its tendency to hang open. IR 428361 documents that on November 5, 2005, during valve disassembly to perform a visual IST test on containment isolation check valve FW-V12B, a noise was heard which led the maintenance crew to suspect the disc may have been stuck open. Due to the design of this large check valve, disassembly required repeated strikes with large hammers to remove the threaded valve bonnet. The impacts may have caused the disc to become

free. This condition was properly documented in the work package, but the condition was not entered into the corrective action program (no IR initiated - discussed in Section 4OA7 of this report). Maintenance technicians identified a small hammered burr in the area of the disc stop contact with the seat ring area. This was the same area where a similar disc binding with this check valve had been previously identified (2003 Refueling Outage IR 15). The technicians were able to get the valve to stick open after several attempts and only after prying the valve disc to one side of the valve. Grinding repairs of the burr were performed and the technicians could not get the valve disc to stick open again.

The inspectors determined that there were sufficient indications of disc binding and the intent of the IST program was not properly implemented when the IST was signed off as fully satisfactory. The inspectors also noted that the FW-V12B containment isolation check valve has had previous problems, including severe hinge pin wear in 2001 and a stuck open disc in 2003. This valve is also similar in all respects (type, size, and manufacturer) with a check valve that failed open at the LaSalle Power Station (another AmerGen plant) in 2003, which resulted in a plant scram.

Analysis: The performance deficiency associated with this issue is the failure to apply the requirements of the ASME code that resulted in some of the required corrective actions not being implemented. Specifically, the cause of FW-V12B failure was not analyzed as required by the current TMI ASME IST Program (ASME OM Code-2001, ISTC-5224, Corrective Action), and other check valves in the sample group that may also be affected by this failure mechanism were not examined or tested during the same refueling outage to determine the condition of internal components and their ability to function.

The inspectors determined this issue is more than minor because it affected the Barrier Integrity containment barrier performance attribute and the associated cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. The inspectors evaluated the risk significance of this finding using NRC IMC 0609, Appendix A, Attachment 1. The finding screened to very low safety significance (Green) because the finding did not adversely inpact the barrier function of the control room, auxiliary building, or spent fuel pool, and did not represent an actual open pathway in the physical integrity of containment. Corrective actions included initiation of an inspection activity for the other check valve in the sample group (FW-V12A) and actions to replace both valves' internals per IRs 444055 and 444058 during the next refueling outage.

The cause of the finding is related to the cross-cutting area of human performance, because engineering personnel did not evaluate the performance of a containment isolation check valve against IST program requirements properly and declare the observed condition as an IST/Code failure.

Enforcement: 10 CFR 50.55a.(f)(4)(ii) "Codes and Standards" requires, in part, that testing of safety-related check valves meet the requirements of the ASME OM Code. ASME OM Code-2001, ISTC-5224, "Corrective Action" requires, in part, that for a failed

check valve, the valve shall be declared inoperable, the cause of the failure shall be analyzed, and the condition corrected. Other check valves in the sample group that may also be affected by this failure mechanism shall be examined or tested during the same refueling outage to determine the condition of internal components and their ability to function. Contrary to this requirement, AmerGen did not comply with IST requirements for a binding containment isolation check valve that occurred on November 6, 2005. Specifically, IST program personnel did not declare the check valve inoperable, the cause of the failure was not analyzed, and the other check valve in the sample group that may have been affected by this failure mechanism was not examined or tested during the same refueling outage to determine the condition of internal components and their ability to function. Because this violation was determined to be of very low safety significance and was entered into the TMI corrective action program (IR 481851), this violation is being treated as an NCV consistent with Section VI.A of the NRC Enforcement Policy. **NCV 05000289/2006007-03, Failure to Correctly Apply the Requirements of the ASME OM Code Regarding A Binding Containment Isolation Valve.**

(2) Failure to Evaluate and Correct Indications of Air in the 'A' Decay Heat Removal System Piping

Introduction: The inspectors identified a Green (NCV) of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for a deficient evaluation that resulted in ineffective corrective actions for air voids in the decay heat removal (DH) system following maintenance. The ineffective corrective actions resulted in unknown quantities of air being forced through the 'A' DH pump casing into the downstream piping without an evaluation of the potential consequences to the DH and High Pressure Makeup (MU) systems.

Description: The team reviewed IRs 395357 and 395567, which evaluated vibration readings and the inability to vent the 'A' DH pump on November 5, 2005. The inspectors also reviewed IR 217389, which documented a similar problem on April 4, 2004. These events occurred during post-maintenance surveillance testing performed after completion of scheduled system maintenance activities per procedure OP-TM-212-201, "IST Of DH-P-1A and Valves From ES Standby Mode." The team noted that increased vibrations in the 'A' DH pump had occurred six times in the last ten years (October 1997, May 1998, May 1999, October 2001, April 2004, and November 2005), due to ineffective venting, and that engineers did not correct the problem or analyze the impact on system operability prior to restoring the DH system to service. In all cases, the increased pump vibration occurred after portions of the DH system had been drained for maintenance activities. The inspectors identified that evaluations to these events had been narrowly focused and did not consider how much air remained in the DH system when it was returned to service and potential adverse impacts on system operability. In addition, the inspectors identified that the engineering evaluations had not considered the potential impact of the air void on the downstream high pressure MU system. The team determined that TMI was essentially performing dynamic venting (purging) of the air voids upon pump start for testing and in some cases, it took several pump runs for vibration to go down to normal levels. The team also noted that TMI does

not have a “gas void” monitoring program that would periodically confirm important safety systems are filled and vented.

In response to the team’s concerns, station management directed engineers to re-evaluate this issue. Engineers developed an inspection plan based on isometric drawings and system flow diagrams and selected a sample of high points to perform ultrasonic tests (UT) to detect the presence of air voids in the DH and MU system piping. No air voids were identified in any of these systems, indicating that all air had been completely vented. A root cause evaluation of this condition (IR 475218) determined that the estimated air void would not have affected operability of the DH or MU pumps. In addition, based on the DH pump design, vendor provided information, and industry events at the TMI, Harris, and Crystal River plants, engineers concluded that the DH pumps could clear larger volumes of air without damage. Engineers also determined that, with the exception of the May 1999 event when the elevated vibration levels took multiple pump runs and three months to clear, the vibration readings usually returned to normal levels by the time the next surveillance test was performed. The root cause identified that the increased DH pump vibration was due to insufficient high point vents to allow proper fill and venting of the DH pump casing and down stream piping. Corrective actions included actions to add new vent valves to enhance system fill and venting.

TMI has reviewed multiple industry operating experience gas void events which have indicated the importance of proper filling and venting piping systems after draining for maintenance and the importance of developing a gas void monitoring program. Industry operating experience events reviewed by TMI include Callaway, May 22, 2003, Air Binding Event, (SEN 243) caused by inadequate system venting after the suction header was drained for valve testing. TMI evaluation of this event concluded that no corrective actions were required, because the applicable procedure adequately vented the system. Other industry gas void operational experience reviewed by TMI include; NRC information notices IN 88-23 and 94-76, and INPO significant operating experience report SOER 97-0. The lessons learned from these operating experience events and applicable corrective actions implemented at TMI were not effective in preventing the introduction of air and proper venting of the DH pump casing and piping.

Analysis: The failure to properly evaluate and correct a long standing degraded condition related to air voids in the DH system following maintenance is a performance deficiency. This finding is more than minor because it is associated with the equipment performance attribute of the Mitigating System cornerstone and the objective to ensure availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding reduced the reliability of the DH and MU systems due to the repeated introduction of air into these systems. The inspectors evaluated the risk significance of this finding using NRC IMC 0609, Appendix A, Phase 1. The finding screened to very low safety significance (Green) because the condition did not result in an actual failure of any safety-related system or component, or result in the system being declared inoperable for greater than its allowed technical specification outage time.

This finding is related to the cross-cutting area of Problem Identification and Resolution, because engineers and component maintenance optimization personnel missed several opportunities to properly evaluate and correct this degraded condition due to multiple reoccurrences of the DH pump high vibrations and a result of not appropriately applying prior industry operating experience. TMI also did not implement a void monitoring/periodic venting program as recommended by industry operating experience.

Enforcement: 10 CFR 50, Appendix B, Criterion XVI "Corrective Action," requires in part that measures be established to assure conditions adverse to quality are promptly identified and corrected. Contrary to the above, from October 1997 to November 2005, engineers and component maintenance optimization personnel failed to properly evaluate and correct indications of air voids in the decay heat removal (DH) system following maintenance. The ineffective corrective actions resulted in unknown quantities of air being forced by the 'A' DH pump into the downstream piping without an evaluation of the potential consequences to the DH and high pressure MU systems. Because this issue was of very low safety significance and has been entered into the corrective action program (IR 475218), this violation is being treated as an NCV consistent with Section VI.A.1 of the NRC Enforcement Policy: **NCV 05000289/2006007-04, Failure To Properly Evaluate and Correct Indications of Air in the 'A' Decay Heat Removal System Piping.**

(3) Deficient Surveillance Procedures

Introduction: The inspectors identified a Green (NCV) of Technical Specification (TS) 6.8.1.a for deficient IST surveillance procedures that resulted in the introduction of air into the sodium hydroxide (NAOH) piping to several emergency core cooling (ECCS) systems during testing.

Description: In response to the teams' concerns related to the failure to evaluate and correct indications of air in the 'A' DH system piping (discussed in section 4OA2.2.b.(2) of this report), station management directed engineers to confirm important safety systems were filled and vented. Engineers developed an inspection plan based on isometric drawings and system flow diagrams and selected a sample of high points to perform ultrasonic tests (UT) to detect the presence of air voids.

On April 3, 2006, an air void was identified in a 7.5 foot section of four-inch NAOH pipe leading to the 'A' DH pump suction (IR 474439). This system supplies NAOH to the suction of TMI's "A" train ECCS and containment building spray (CBS) systems. To address the extent of condition, additional samples were selected for UT testing. On April 5, 2006, an air void was identified in 48 feet of 4 inch pipe of the common NAOH header. Engineers determined that the total amount of air in the NAOH piping was 3.6 cubic feet, which could adversely impact the operability of the both trains of ECCS system, and in particular the MU pumps. Operators entered a one hour plant shutdown limiting condition for operation statement per TS 3.0.1 due to declaring both trains of High Pressure Recirculation Inoperable until the air void in the NAOH piping was isolated from the ECCS systems. The CBS system was also declared inoperable for approximately 48 hours, until actions to vent the air voids were completed.

Engineers determined that this air void was inadvertently introduced into the NAOH piping during performance of system quarterly IST surveillance tests. Procedures used for these tests include; OP-TM-214-201 and 202, "IST Of BS-P1A and 1B and Valves." These procedures require operators to isolate sections of the pipe from the NAOH tank and drain the water in the pipe to prevent trace amounts of NAOH from getting into the reactor coolant system through the DH system, since sodium is detrimental to the steam generator tubes. Although the procedures require re-filling the drained piping, proper filling was not possible due to the lack of high point vents. The inability to properly fill the drained section of piping was not recognized by operators and engineers.

The licensee assembled an investigation team to perform a root cause evaluation and initiated extensive reviews to address the air voids. A comprehensive extent-of-condition review was also implemented, which included industry operational experience, system walkdowns, and UT testing for multiple ECCS piping system high points. In addition, the licensee installed a high point vent valve to vent the air void from the common NAOH pipe header, and was able to vent other air voids via a check valve bonnet plug.

The operability evaluations performed were comprehensive and considered all postulated accidents that could have been impacted by the air void, such as small and large break loss-of-coolant accidents (SBLOCA, LBLOCA), and a complete loss of feedwater accident scenario. In addition, TMI contracted an engineering firm to perform a detailed analysis to determine the effects of the air void on the ECCS and CBS systems during a worst case accident condition. These evaluations determined that the most susceptible components were the high pressure injection (HPI) pumps. However, the analysis showed the void fraction at these pumps would be below 0.1% which was less than the 2% void fraction specified in NRC Regulatory Guide 1.82. Therefore, the HPI pumps would not have been impacted by the 3.6 cubic feet of air void in the NAOH piping. For the low pressure DH pumps, the analysis determined that the maximum air void was just below 2% and that almost all of the air would have passed through the pumps within 40 seconds. Based on pump design, vendor provided information, and known industry events at TMI, Harris, and Crystal River plants, engineers concluded that these pumps could clear larger volumes of air without damage and without loss of pump ability.

NRC specialists performed an independent review of the potential effects of the air void and agreed with the licensee conclusion that the 3.6 cubic feet of air would not have significantly affected the DH, CBS or HPI pumps, and did not constitute a loss of safety function for any of these systems. The inspectors verified that adequate immediate corrective actions were implemented which included prompt venting of the initial air void via a check valve vent port, initiation of a modification to install a high point vent valve to vent the large section of voided pipe, revision of applicable procedures to prevent draining of piping, and UT testing of multiple sections of pipe in the ECCS piping. In addition, the inspectors verified that an adequate extent-of-condition review was performed. The inspectors also verified that the long term actions to install 18 new high

point vents and to establish a gas monitoring program for selected locations were reasonable and were entered into the corrective action program.

TMI has reviewed multiple industry operating experience gas void events, which have indicated the importance of proper filling and venting piping systems after draining for maintenance, and the importance of developing a gas void monitoring program. Industry operating experience events reviewed by TMI include Callaway, May 22, 2003, Air Binding Event, (SEN 243) caused by inadequate system venting after the suction header was drained for valve testing, NRC information notices IN 88-23 and 94-76, and INPO significant operating experience report SOER 97-0. The lessons learned from these operating experience events and applicable corrective actions implemented at TMI were not effective in preventing the introduction of air and proper venting of the TMI NAOH piping.

Analysis: The team determined that the licensee did not maintain adequate IST surveillance procedures and this is a performance deficiency since use of these procedures resulted in the introduction of air into the NAOH piping to several ECCS systems during testing. This finding is more than minor because it is associated with the equipment performance attribute of the Mitigating System cornerstone and the associated cornerstone objective to ensure availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. As a result of this air void, both trains of the High Pressure Recirculation function were declared inoperable and the CBS system was rendered inoperable for approximately 48 hours. The inspectors evaluated the risk significance of this finding using NRC IMC 0609, Appendix A, Phase 1. The finding screened to very low safety significance (Green) because the condition did not result in an actual failure of any ECCS systems, and Amergen's evaluation, as required by NRC, concluded that the size of the air void would not have compromised the ECCS pumps from performing their design safety function.

This finding is related to the cross-cutting area of Problem Identification and Resolution, because engineers and operators missed several opportunities to recognize that proper refilling of drained piping was not possible due to inability to vent based on prior industry operating experience. TMI also did not implement a void monitoring/periodic venting program as recommended by industry operating experience.

Enforcement: TS Section 6.8.1.a requires that written procedures shall be established, implemented, and maintained covering applicable procedures recommended in Appendix A of Regulatory Guide 1.33, Rev. 2, February 1978. Regulatory Guide 1.33, Appendix A, recommends procedures for safe operation and shutdown of safety-related systems, including surveillance testing, and instructions for filling, venting, and draining the ECCS system. Contrary to these requirements, operators and engineers failed to properly develop surveillance procedures to ensure proper venting and refilling portions of the NAOH system piping after it was drained for IST testing. Because this issue was of very low safety significance and has been entered into the corrective action program (IR 475218 and 474439), this violation is being treated as an NCV consistent with

Section VI.A.1 of the NRC Enforcement Policy: **NCV 05000289/2006007-05, Deficient IST Surveillance Procedures.**

.3 Effectiveness of Corrective Actions

a. Inspection Scope

The team reviewed the corrective actions associated with selected IRs to determine whether the actions addressed the identified causes of the problems. The team reviewed CRs for repetitive problems to determine whether previous corrective actions were effective. The team also reviewed TMI's timeliness in implementing corrective actions and their effectiveness in precluding recurrence for significant conditions adverse to quality. The team reviewed the IRs associated with selected non-cited violations and findings to determine whether TMI properly evaluated and resolved these issues.

b. Assessment and Findings

No findings of significance were identified.

The team concluded that corrective actions for identified deficiencies were typically appropriate, effective, and completed in a timely manner. For significant conditions adverse to quality, corrective actions were identified to prevent recurrence. In some cases, TMI staff appropriately self-identified ineffective or improper closeout of corrective actions and reentered the issue into the CAP for further action.

The TMI staff continues to be challenged in the area of procedure adequacy and adherence. For example, a recent NOS Audit identified a number of maintenance program deficiencies that are related to processes not being followed, such as tracking of measurement and test equipment (including out of tolerance issues), material storage, preventive maintenance deferrals, contractor oversight and equipment deficiency tagging. Additionally, the team identified some potential challenges to AmerGen's plans to upgrade some operating procedures, including:

- Operating crews are responsible for revising system operating procedures as a collateral duty while onshift. This could be a distraction from monitoring plant operation and if operators are not familiar with the procedure writer's guide or have an understanding of what a good procedure looks like the procedure quality could be adversely impacted.

- According to the manager of the operations procedure upgrade project, not all changes are being driven through the IR process. Forty to fifty percent of procedure work load are non-IR or modification-related changes. This could cause inappropriate assessments of the progress and may inhibit the understanding of the number and significance of procedure problems at the station.

- There does not appear to be a process to ensure procedure changes do not adversely impact other processes such as operator rounds.

The team identified one minor example of a failure to comply with TS 6.8.1.a. when procedures to ensure that non-identical replacement items be evaluated for acceptable use were not implemented. The inspectors audited the corrective actions taken as a result of a previous green NCV written in NRC Inspection Report 2004004. This finding was issued as a result of AmerGen's failure to assess a degraded fuel line on the 'A' Emergency Diesel Generator (EDG). The fuel line was forty percent degraded due to rubbing between the tubing and the fuel oil duplex filter metal cover plate (shroud). The corrective actions taken by AmerGen included enlarging the penetration, adding mounting screws and performing an extent-of-condition on the other diesel, 'B' EDG.

The inspectors found that on both the 'A' and 'B' EDG, the shroud mounting screws added were too long and were rubbing on the fuel line resulting in only minor cosmetic damage. AmerGen engineering performed an operability evaluation and concluded that both diesels were operable and could perform their intended safety function for the 7-day mission time. The control of modification work by way of item equivalency is covered in AmerGen procedure SM-AA-300 revision 1 "Procurement Engineering Support Activities." Section 4.4.1.3 "Item Equivalency Evaluation" of SM-AA-300 requires that Item Equivalency Evaluations (IEEs) shall be performed to determine and document that changes to an item do not negatively impact design criteria in the areas of physical characteristics (e.g. dimensions, weight). SM-AA-300 defines IEEs as a document which determines the acceptability of non-identical replacement items by evaluating form, fit, and function. The inspectors determined that the failure to perform an IEE and Equivalency Evaluation Screening to approve the use of the mounting screws before installation was a performance deficiency, however, it did not rise to the level of greater than minor.

.4 Assessment of Safety Conscious Work Environment

a. Inspection Scope

The team members interviewed station personnel, observed activities throughout the plant, and attended a cross section of meetings to assess the safety conscious work environment (SCWE) at TMI. Specifically, the team interviewed station personnel to assess whether they were hesitant to raise safety concerns to their management and/or the NRC due to a fear of retaliation. The team also reviewed TMI's Employee Concerns Program (ECP) to determine if employees were aware of the program and had used it to raise concerns. The team reviewed a sample of the ECP files to ensure that issues were entered into the corrective action program.

b. Assessment and Findings

No findings of significance were identified.

The team determined that the plant staff were aware of the importance of having a strong SCWE and expressed a willingness to raise safety issues. No one interviewed had experienced retaliation for safety issues raised or knew of anyone who had failed to raise issues. All persons interviewed had an adequate knowledge of the CAP and ECP. The team determined that the investigations performed for employee concerns appeared prompt and thorough. The threshold for entering concerns in the program appeared appropriately low and the program administrator willingly accepted not only safety concerns but also other work place concerns. Based on these limited reviews and interviews, the team concluded that there was no evidence of an unacceptable SCWE.

4OA6 Meetings, including Exit

On March 31, 2006, the team presented the inspection results to Mr. Glen Chick, Three Mile Island, Unit 1 Plant Manager, and other members of the Three Mile Island staff who acknowledged the findings. The inspectors confirmed that no proprietary information reviewed during the inspection was retained.

On May 11, 2006, the team leader conducted a supplemental exit to present the results of the review of open items and management's review of the preliminary findings. These results were presented to Mr. Rusty West, Site Vice President, Three Mile Island, Unit 1, and other members of the Three Mile Island staff who acknowledged the findings.

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 meet the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as an NCV.

10 CFR 50, Appendix B, Criterion XVI "Corrective Action," requires, in part, that measures be established to assure conditions adverse to quality are promptly identified and corrected. Contrary to this requirement, the licensee identified that on November 11, 2005, while the plant was shutdown for a scheduled refueling outage (1R16), a degraded condition regarding a potentially stuck open containment isolation check valve (FW-V-12B) was not entered into the TMI corrective action process for proper evaluation and review. Specifically, during valve disassembly to perform an inspection to satisfy ASME Code inservice testing (IST), a maintenance technician and the IST engineer assigned to the job became aware of a potential stuck open check valve disc and did not issue a required IR. The issue was identified during a system engineering review of the completed work order. However, this issue was not recognized until November 28, after the system was returned to service and the plant was back to full power operation. This issue is more than minor because the degraded condition affected the reliability of a safety-related containment isolation valve, and since the issue was not properly evaluated the degraded condition could have impacted safety. The licensee performed a subsequent operability evaluation and determined

that corrective actions had been implemented during the outage to remove a burr (that may have contributed to the potential disc binding) and that future operability of the check valve was not affected. This event was placed in AmerGen's corrective action program (IRs 428361 and 469960).

ATTACHMENT: Supplemental Information

In addition to the documentation that the inspectors reviewed (listed in the attachment), copies of information requests given to the licensee are in ADAMS, under accession number ML061320409.

ATTACHMENT - SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel:

G. Bryant, Security
T. Knisely, Security
P. Bennett, Engineering
J. Valent, Engineering
V. Zeppos, Design Engineering
M. Reed, System Engineer
R. Troutman, Equipment Reliability Engineer
G. Smith – Electrical System Engineering Manager
S. Wilkerson – Engineering Response Team Manager
R. Masoero – Decay Heat System Engineer
T. Flemming – Diesel Generator System Engineer
J. Bashista – System Engineer
J. Valent – System Engineering Manager
W. McSorely – Operations Procedure Writer
D. Neff – Emergency Preparedness Manager
T. Lighty – OpEval Coordinator
J. Barrett – Mechanical Maintenance Manager
S. Baker – Procurement Engineer
J. Portz – Procurement Engineer
C. Demars - Corrective Action Program Manager
D. Hockley - Regulatory assurance
R. Stark -NOS, Maintenance Assessor and ECP
J. Dullinger - I&C
W. Bishop - Electrical Maintenance
P. Bennett - Engineering
L. Rajkowski - Engineering Programs Supervisor
M. Fauber - IST Engineer
S. Wilkenson - ERT Manager
R. Campbell, Operations Support
G. Ciranla, NOS Operations Assessor
J. Murray, Operations Training Supervisor

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed:

05000289/2006007-01	NCV	Inadequate Abnormal Operating Procedures (Section 4OA2.1.b.(1))
05000289/2006007-02	NCV	Failure to Establish Appropriate Reference Values to Monitor the "A" Decay Heat Removal System Pump. (Section 4OA2.1.b.(2))
05000289/2006007-03,	NCV	Failure to Correctly Apply the Requirements of the ASME OM Code Regarding A Binding Containment Isolation Valve. (Section 4OA2.2b.(1))
05000289/20076007-04	NCV	Failure To Properly Evaluate and Correct Indications of Air in the 'A' Decay Heat Removal System Piping. (Section 4OA2.2b.(2))
05000289/20076007-05	NCV	Deficient IST Surveillance Procedures. (Section 4OA2.2b.(3))

LIST OF DOCUMENTS REVIEWED

Procedures:

Maintenance of Makeup/Purification Pumps (MU-P-1A-C), MA-TM-134-102, Rev 0
Maintenance of Decay Heat Closed Cooling Water Pumps, MA-TM-134-112, Rev 0
Design Input and Configuration Change Impact Screening, CC-AA-102, Rev 10
Configuration Change Control, CC-AA-103, Rev 9
Equipment Reliability Process Description, ER-AA-10
Proactive Maintenance Program, MA-AA-716-232
Equipment Reliability Process Description, ER-AA-10, Rev 15
Performance Centered Maintenance Process, MA-AA-716-210, Rev 4
System Performance Monitoring and Analysis, ER-AA-2003
Monitoring Performance of Maintenance Activities, MA-MA-716-010-1009, Rev 2
Conduct of Troubleshooting, MA-AA-716-004, Rev 4
General Station Piping Analysis, CC-AA-309-1011, Rev 1
OP-TM-EOP-010, Guide 16, EFW Failure - Rev 5
OP-TM-EOP-010, Rule 2, HPI/LPI Throttling - Rev 5
OP-TM-AOP-005, River Water System Failures - Rev 4
OP-TM-212-101, Shifting DHR Trains A and B from ES Standby to DHR Standby - Rev 2
1203-20, Nuclear Services Closed Cooling System Failure - Rev 23
1107-2B, 120 Volt Vital Electrical System - Rev 14
OP-TM-MAP-H0101, ICS Runback - Rev 1
OP-TM-MAP-G0308, RC Press Narrow RNG HI/LO - Rev 1
OP-TM-MAP-N0106, MN COND VACUUM LO - Rev 2

OP-TM-MAP-M0101, FWP 1A TRIP - Rev 0
OP-TM-MAP-L0102, GEN MAIN XFMR TRIP, Rev 1
OP-TM-MAP-K0101, Turbine Trip - Rev 1
OP-TM-MAP-F0101, RCP Motor Trip - Rev 0
OP-TM-MAP-G0308, RC PRESS NARROW RNG HI/LO - Rev 1
OP-TM-AOP-010, Loss of 1A 4160V Bus - Rev 0 (Procedure not issued yet)
OP-TM-AOP-0101, Loss of 1A 4160V Bus Basis Document - Rev 0 (Procedure not issued yet)
1107-4A, Loss of 1A 4160V Bus - Rev 0
TQ-AA-1016 - Training Long Range Self-Assessment Schedule - Rev 1
TQ-AA-1002, Training Committees - Rev 5
1302-17.6, RM-A-5/15 Calibration - Rev 20
1302-3.4D, Flow and Vacuum Calibrations for TMI Atmospheric Effluent Radiation Monitors, Rev 1
1105-8, Radiation Monitoring System, Rev 77
OP-TM-AOP-022, Load Rejection, Rev 2
OP-TM-AOP-020, Loss of Station Power, Rev 9
OP-TM-431-000, 431 System Modes Lineups, Rev 6
1203-43, Transfer Canal Level Loss, Rev 10
1101-3, Containment Integrity and Access Limits, Rev 83
1202-41, Total or Partial Loss of ICS/NNI Hand Power, Rev 35
1202-42, Total or Partial Loss of ICS/NNI Auto Power, Rev 43
1202-40, Loss of ICS Hand and Auto Power, Rev 42
OP-TM-533-474, Alternate (A) Decay River Water Supply from Nuclear Service River Water System, Rev 1
1103-11, RCS Water level Control, Rev 63
OP-TM-AOP-043, Loss of Pressurizer (Solid OPS Cooldown), Rev 0
OP-TM-AOP-070, Primary to Secondary Heat Transfer Upset, Rev 0
1505-1, Fuel and Control Component Shuffles, Rev 44
1503-1, Receipt of New Fuel and Control Components, Rev 29
1503-2, Damaged Fuel and Control Components, Rev 10
1505-3, Fuel Handling Problems, Rev 17
1505-1, Fuel and Control Components shuffles, Rev 44
MA-MA-796-024-1001 “Scaffold Criteria for Mid-Atlantic Stations,” Rev 4
OP-TM-102-102-1004 “Valve Related Guidelines,” Rev 1
OP-TM-541-000 “Primary Component Cooling,” Rev 2
OP-TM-541-461 “Intermediate Cooling and Nuclear Service Temperature Control,” Rev 2
OP-AA-106-101-1004 “Station Duty Teams, OCC Activation, Management Observations,” Rev 1
LS-AA-105 “Operability Determinations,” Rev 1
ER-AA-310-1001 “Maintenance Rule Scoping,” Rev 2
LS-AA-125 “Corrective Action Program (CAP) Procedure,” Rev 8
ER-AA-1100 “Program Health Reports att. 7,” Rev 4
SM-AA-300 “Procurement Engineering Support Activities,” Rev 1
SM-AA-102 “Warehouse Operations,” Rev 7
OP-TM-212-555, “Fill & Vent Of DHR Train A/BS Train A Using SFP,” Rev 2
1410-V-31, “Crane Tilting Check Valve Inspection,” Rev 25, Completed October 28, 2003
1410-V-31, “Crane Tilting Check Valve Inspection,” Rev 28
1015, “Equipment Storage Inside Class I Buildings,” Rev 2
1300-4A, “IST Close Test For FW-V12A/B and EFW-V12A/B,” Completed September 1999

Operability Evaluations:

467273, 395567, 217389, 469960, 428361, 461841, 469095, 431906, 356528, 316448, 310670
319449, 293582, 286790

Temporary Modifications:

05-00737 - FH-EP-1A Upframe Down Limit Switch (2127141)
04-00845 - NR-V-4A/B Inflatable Plug (2098312)
06-00154 - DTCS Control Room Monitor Not Working (2135824)
LL-99 - Remove AH-C-184A from service (heater for AH-E-29A-Diesel generator room)

Operator Challenges:

2025300 - EHC System Fluid Tank
2083733 - Amertap Recirc Pump A Motor
2045366 - Must add oil to AH-C-4B prior to starting
363336 CA10 - ULD runs up sometimes when SG/Rx demand is placed in auto
2087712 - Aux Boiler controls replacement

Nuclear Oversight Assessments and Audits:

NOSA-TM-05-4Q, Nuclear Oversight Quarterly Report For October - December 2005
NOSA-TMI-04-07, Surveillance and Test Program Audit
NOSA-TMI-06-01, Nuclear Oversight Maintenance Functional Audit Report, dated 2/28/2006
TMI 2005 Security Audit Report

Self Assessments:

Check-in Self-Assessment Report - 5/9 - 5/13/05 (296445)
Check-in Self-Assessment Plan - SAT Process - CRC/TAC Effectiveness and Training Warning Flags - 5/3/05
Focused Area Self Assessment, PI&R (AR-294292)
Check-In Self Assessment Report , Alignment of SHIP Long Term Plans, MCIP And LTAM's
Focused Area Self Assessment, Operational Decision Making (292225)
Check-In Self Assessment Report , Change Management Effectiveness

Issue Reports:

080345	141241	173187	193289	193973	197045	202535
081244	141986	176758	193480	194444	197110	202892
081907	142886	179644	193506	194787	197544	203254
093531	142914	181939	193519	194844	197679	2045366
098147	143977	183739	193807	195029	198701	205445
114718	145562	184283	193834	195151	199346	205445
116729	147624	184313	193913	195652	199883	207894
117172	149885	185785	193931	195772	200150	208044
138553	168822	188345	193944	195986	200195	209412
140429	171108	188527	193949	196916	2025300	210282

210880	255332	290864	306432	340362	367076	395315
210880	255767	291437	306793	340871	367114	395398
210880	256262	291445	306793	342126	367480	398012
211355	258108	291448	307483	346929	368640	398079
211607	258908	291800	308057	347324	369196	398470
212684	259011	291825	308450	347539	369389	399937
2127141	259299	292253	309331	347960	371029	426656
213465	259435	294556	310679	348086	371211	426656
213541	259435	294845	311243	348086	371356	427472
213832	260551	294865	312122	348405	371495	428361
215125	260580	295541	314122	349025	374467	429610
217125	262458	296034	314704	349025	376610	430830
217576	263231	296555	314704	349030	379807	431906
222266	263404	296700	315002	350412	381102	435940
227545	264456	297543	319303	350919	382674	436255
227545	264456	297619	319449	351113	383506	436402
227574	265386	297630	319499	351343	384561	437075
228891	265507	298626	320086	351853	385281	440404
228973	267353	299206	320094	352246	385339	442511
230392	267630	300196	320328	352707	387484	443225
233969	267839	300201	322819	352825	388066	443277
235347	271397	300924	325106	352825	390155	443560
235894	271452	301431	325952	353304	390163	457191
236039	272362	301618	326794	353687	390796	458743
237506	273568	301705	326794	354218	391104	464899
237638	275004	302322	327361	354384	391220	464988
238918	275122	303005	329110	355900	391412	467153
239021	275193	303038	329148	355900	391707	467273
239634	276214	303042	329394	357412	392073	467273
241215	277571	303042	329438	357412	392757	467275
242443	277590	303042	329440	357413	393461	467329
242869	277594	303049	330778	357423	394384	467551
244066	279397	303423	332109	359906	394398	469095
244399	281003	305700	332109	359906	394942	472131
244803	281370	305734	333138	361977	394990	472131
248051	283467	305744	334775	363336	394990	472576
250295	285099	305848	340268	364982	395072	472663
255153	290744					

Maintenance Work Orders:

R2031917 FW-V-12B Open and Inspect (November 2005)
R2001685 ISI Close Test For FW-V-12A/B
R1835762 Inspect Valve Internals By Use Of Non-Intrusive Test (March 2003)
R2028533 FW-V-12A, Inspect Tilting Disc Check Valve (October 2003)
C1086232 FW-V-12B Internal rework Check Valve (October 2001)
R2064824, NS-C-1C Clean and Inspect (Eddy Current Test)
R1830852 RR-V-4B Breaker and Overload Testing
R2041656 NS-P-1B Perform Dielectric Check of Motor and Cable Insulation

R2041644 PM Sample and Change Oil NS-P-1B
C2008820, C2010413, C2003720

Action Requests:

A1733491 Disassemble, Clan & Reassemble Cyclone Separator
A1800668 Valve Works Very Hard, When You Think It's Closed, It Isn't
A1802516 Replace Relief Valve with a Crosby Model
A2004922 DH-P-1A Automatic Casing Vent Valve
A2012255 Remove Broken Bolts to Electrical Cover on DH-T1-H2
A2018648 FW-V-12A Inspection For IST Requirements (November 2001)
A2028147 Verify Proper Torque Switch Arm Thickness
A2033509 DH-P-1A Motor Axial Vibes Decreased < 50%
A2033986 DH-P-1A Pump and Motor Remote Oiler
A2046568 SDR#1 for 1302-5.19 (BWST Level Indicator)
A2054501 DH Piping Between DH-V-38A and DH-C-1A
A2064801 BWST Temperature Trending Higher Than Expected
A2073228 Monitor DH-C-1B Vibration
A2076984 Vibration Alarm Received on DH-P-1A
A2087978 Dual Indication for DH-V-76A
A2088545 DH-P-1A Leaks at the Pump Seal and the Pump Casing (BACC)
A2107839 DH-P-1A: Improper Thread Engagement on the Seal Grind
A2109158 DH-DPI-1493A/B Do Not Meet ASME Testing Requirement
A2109161 Oil in DH-P-1B Requires Changing
A2109560 Oil Sample Points for DH-P-1A/B May Not be Adequate
A2123719 Remove Insulation & Heat Trace IAW ECR 05-00521
A2127131 DH-V-2 Hot Short Concern
A2128004 Unable to Vent DH-P-1A through DH-V-77A/78A
A2129528 DH-V-37 Test or Replace Relief Valve per ST 1300-4H
A2133018 DH-P-1A/1B Cable Protection
A2133483 'B' DH Vault Housekeeping/Ventilation/Coating Issues
A2098312, M2120749, A2110420, A2079823, A2091386, A2038865, A2138063, A2093685

System Health Indicator Program (SHIP) Reports:

System Health Report, For LPI/Decay Heat Removal System, December 2005
Decay Heat Closed Cooling Water 4Q2005 SHIP Report
HPI/Makeup and Purification System 4Q2005 SHIP Report
LPI/Decay Heat Removal System 4Q2005 SHIP Report
4Th Quarter 2005 SHIP Summary for TMI-1
3rd Quarter 2005 SHIP Summary for TMI-1
2nd Quarter 2005 SHIP Summary for TMI-1
1st Quarter 2005 SHIP Summary for TMI-1
4Th Quarter 2004 SHIP Summary for TMI-1
3rd Quarter 2004 SHIP Summary for TMI-1
2nd Quarter 2004 SHIP Summary for TMI-1
1st Quarter 2004 SHIP Summary for TMI-1

Technical Data Reports:

TDR 1183 Single Failure Analysisy Of Nuclear service Closed Cooling Water And Nuclear Service River Water (NR) Systems, Rev. 0

Miscellaneous Documents:

Nuclear Safety Review Board Report 1-05 dated 3/14/2005
Nuclear Safety Review Board Report 5-05 dated 7/28/2005
Nuclear Safety Review Board Report 9-05 dated 11/1/2005
HEP's in Top 50 Cutsets -3/27/06
Human Reliability Analysis Calculator - HEF1
Human Reliability Analysis Calculator - HINJ4
AOP Implementation Schedule
Commitment 1983T0145, IEN 80-44, Actuation of ECCS in Recir Mode While in Hot Shutdown
Unsolved mystery list
ASME OM Code -1998, Code for Operation and Maintenance of Nuclear Power Plants

LIST OF ACRONYMS

ACE	Apparent Cause Evaluation
AR	Action Request
ASME	American Society of Mechanical Engineers
CAP	Corrective Action Program
CCA	Common Cause Analysis
CR	Condition Report
DC	Direct Current
DH	Decay Heat
ECCS	Emergency Core Cooling System(s)
ECP	Employee Concerns Program
FIN	Finding
FSAR	Final Safety Analysis Report
FW	Feedwater
GL	NRC Generic Letter
HPI	High Pressure Injection
I&C	Instrumentation and Controls
I&E	Inspection and Enforcement
IMC	NRC Inspection Manual Chapter
IN	NRC Information Notice
IR	Inspection Report
IST	Inservice Test
LCO	Limiting Condition for Operation
LLRT	Local Leak Rate Test
MOV	Motor-Operated Valve
MRC	Management Review Committee
NCV	Non-Cited Violation
NDE	Non-Destructive Examination
NOS	Nuclear Oversight
NRC	Nuclear Regulatory Commission
NSCCW	Nuclear Services Closed Cooling Water
OE	Operating Experience
OM	Operation & Maintenance
PI&R	Problem Identification & Resolution
QA	Quality Assurance
RCA	Root Cause Analysis
ROP	Reactor Oversight Process
RWP	Radiation Work Permit
SCWE	Safety Conscious Work Environment
SDP	Significance Determination Process
SOC	Station Oversight Committee
TMI	Three Mile Island
TRM	Technical Requirements Manual
TS	Technical Specifications
UT	Ultrasonic Tests
VOTES	Valve Operator Testing Evaluation System