UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
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KING OF PRUSSIA, PA 19406-1415

September 10, 2010

Mr. Michael J. Pacilio
Senior Vice President, Exelon Generation Company, LLC
President and Chief Nuclear Officer (CNO), Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: THREE MILE ISLAND STATION, UNIT 1 - NRC PROBLEM IDENTIFICATION AND RESOLUTION INSPECTION REPORT 05000289/2010009

Dear Mr. Pacilio:

On July 29, 2010, the U. S. Nuclear Regulatory Commission (NRC) completed an inspection at your Three Mile Island (TMI) Station, Unit 1. The enclosed report documents the inspection results, which were discussed on July 29, 2010, with Mr. William Noll and other members of your staff.

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.

The inspectors concluded that Exelon was generally effective in identifying, evaluating and resolving problems. TMI personnel identified problems and entered them into the corrective action program at a low threshold. Exelon prioritized and evaluated issues commensurate with the safety significance of the problems and corrective actions were generally implemented in a timely manner.

This report documents two NRC-identified findings and one self-revealing finding of very low safety significance (Green). The three findings were determined to involve violations of NRC requirements. However, because each violation was of very low safety significance and because they were entered into your corrective action program, the NRC is treating these findings as non-cited violations (NCVs), in accordance with Section VI.A of the NRC's Enforcement Policy. If you deny any of these NCVs, you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C., 20555-0001, with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C., 20555-0001; and the NRC Resident Inspector at the Three Mile Island Station. In addition, if you disagree with the cross-cutting aspect assigned to any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region I, and the NRC Resident Inspector at Three Mile Island Station Unit 1.

In accordance with Title 10 of the Code of Federal Regulations (CFR), Part 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of 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,

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

Docket No. 50-289
License No. DPR-50

Enclosures: Inspection Report 05000289/20100009
w/Attachment: Supplemental Information

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Sincerely,
/RA by Raymond J. Powell Acting For/
Ronald R. Bellamy, Ph.D., Chief
Projects Branch 6
Division of Reactor Projects

Docket No. 50-289
License No. DPR-50

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No.:	05000289
License No.:	DPR-50
Report No.:	05000289/2010009
Licensee:	Exelon Generation Company (Exelon)
Facility:	Three Mile Island Station, Unit 1
Location:	P. O. Box 480 Middletown, PA 17057
Dates:	July 12, 2010 through July 29, 2010
Team Leader:	Andrew A. Rosebrook, Senior Project Engineer, Division of Reactor Projects
Inspectors:	Dan Orr, Senior Reactor Inspector, Division of Reactor Safety Javier Brand, Resident Inspector, Division of Reactor Projects Ami Rao, Project Engineer, Division of Reactor Projects
Approved by:	R. Bellamy, Ph.D., Chief Projects Branch 6 Division of Reactor Projects

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SUMMARY OF FINDINGS

IR 05000289/20010-009; 07/12/2010 - 07/29/2010; Exelon Generation Company (Exelon); Three Mile Island, Unit 1 (TMI); IP 71152B, "Biennial Baseline Inspection of the Identification and Resolution of Problems (PI&R)." Three violations were identified with respect to the implementation of the corrective action program (CAP) and the use of operational experience.

This NRC team inspection was performed by three regional inspectors and a resident inspector. Three findings of very low safety significance (Green) were identified during this inspection. Each of the findings were classified as a non-cited violation (NCV). The significance of most findings is indicated by their color (Green, White, Yellow, Red) using NRC Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. Cross-cutting aspects associated with findings are determined using IMC 0310, "Components Within the Cross-Cutting Areas." The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

Identification and Resolution of Problems

Overall, Exelon's program for identification and resolution of problems was evaluated to be generally effective.

The team evaluated Exelon's performance in the area of identification of problems as adequate. Based on the samples selected, the team determined that Exelon personnel identified problems and entered them into the CAP at a low threshold. In most cases, problems were identified appropriately in issue reports (IRs). The team concluded that personnel were identifying trends at low levels, and the team did not identify trends or repetitive issues that Exelon had not self-identified. However, some deficiencies were noted in this area. Specifically, the team identified a finding in this area related to not identifying an inaccurate system design basis calculation for Main Steam Safety Valve (MSSV) capacity which had been present since 1988 and an unresolved item related to the monitoring of flood penetration seals.

The team evaluated Exelon's performance in the area of prioritization and evaluation of issues as adequate with weaknesses noted. The inspectors determined that, in general, Exelon appropriately prioritized and evaluated issues commensurate with the safety significance of the problem. IRs were screened for operability and reportability, categorized by significance, and assigned to a department for evaluation and resolution. The various IR screening and management review groups considered human performance issues, radiological safety concerns, repetitiveness, and adverse trends during the conduct of reviews. However, there was one finding regarding the failure of a scavenging air box gasket on the 'A' Emergency Diesel Generator (EDG) related to an inadequate extent of condition review for a similar failure on the 'B' EDG and there were other weaknesses noted in this area.

The team evaluated Exelon's performance in the area of timely and effective corrective actions (CAs) to be good and improvement was noted when comparing the results of this inspection area to the results of the 2008 PI&R inspection. The inspectors concluded that CAs for identified deficiencies were typically timely and adequately implemented. The inspectors also concluded that Exelon conducted in-depth effectiveness reviews for significant issues to determine if the CAs were effective in resolving the issue. For significant conditions adverse to quality, the inspectors noted that Exelon's actions were comprehensive and thorough, and generally successful at preventing recurrence.

The team determined that Exelon's performance regarding the use of operational experience (OE) was adequate. The inspectors determined that Exelon appropriately considered industry OE information for applicability and used the information for corrective and preventive actions to identify and prevent similar issues. The inspectors assessed that, in general, the use of OE was effective. However, one finding was identified in this area due to multiple MSSV test failures caused by an improper evaluation of Exelon fleet and industry OE.

The team evaluated Exelon's performance in the area of self-assessments to be good. The inspectors concluded that self-assessments, audits, and other internal Exelon assessments were generally critical, probing, thorough, and effective in identifying issues. The inspectors observed that these audits and self-assessments were completed in a methodical manner by personnel knowledgeable in the subject. The audits and self-assessments were completed to a sufficient depth to identify issues that were entered into the CAP for evaluation. In general, CAs associated with the identified issues were implemented commensurate with their safety significance.

Based on the interviews the inspectors conducted over the course of the inspection, observations of plant activities, and reviews of individual corrective action program and employee concerns program issues, the inspectors did not identify any indications that site personnel were unwilling to raise safety issues nor did they identify conditions that could have had a negative impact on the site's safety conscious work environment.

Cornerstone: Mitigating Systems

Green. The inspectors identified a finding of very low safety significance (Green) involving a NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for a deficient evaluation of a failed 'B' emergency diesel generator (EDG) scavenging air box gasket in April 2007. The deficient evaluation resulted in ineffective corrective actions to identify and correct an improper application of the same type of gasket material in the 'A' EDG (EG-Y-1A) scavenging air box gasket. As a result, on June 3, 2010, the 'A' EDG scavenging air box gasket failed during performance of a monthly surveillance test run. Corrective action included replacing the gasket with the original design, entering the issue into the CAP, and conducting a root cause analysis (RCA).

The inspectors determined the deficient extent of condition review of the April 2007, 'B' EDG scavenging air box gasket failure was a performance deficiency. This performance deficiency is more than minor because it affected the Equipment Performance Aspect of the Mitigating Systems Cornerstone Objective of ensuring the operability, availability, and reliability of systems designed to mitigate transients and prevent core damage. Specifically, this finding reduced the reliability of, and resulted in additional unplanned unavailability for, the 'A' EDG. The team assessed this finding in accordance with NRC IMC 0609, Attachment 4, Phase 1 – "Initial Screening and Characterization of Findings," and determined that it was of very low safety significance (Green) since it did not result in a loss of any system safety function.

The issue has a cross-cutting aspect in the area of problem identification and resolution, because Exelon had identified in 2007 that a ½ inch Gore-Tex™ gasket had not been specifically authorized by an engineering change report (ECR) to be used in the EDGs scavenging air box application (IR 616514 and 6266457). However, Exelon did not evaluate the issue such that extent of condition was properly considered and the cause was properly resolved for the 'A' EDG [P.1(c)]. (Section 4OA2.a.3(a))

Green: A self-revealing Green NCV of TMI Technical Specification (TS) 3.4.1.2.3 was identified for having greater than three main steam safety valves (MSSVs) inoperable for greater than the allowed outage time with reactor power greater than 5%. MSSV testing prior to the 2009 refueling outage identified that six MSSVs failed the lift point test and were subsequently declared inoperable. All six valves failed by lifting above the ASME limit of +/- 3% of designed setpoint. Five of these six valves exhibited signs of oxide binding, a known failure mechanism for MSSVs and each of the valves had been refurbished during the 2007 refueling outage. Exelon had fleet and industry information about the oxide binding failure mechanism available in 2006 at the time the refurbishment method was selected for the 2007 TMI outage. This refurbishment method included a decision to machine hone the MSSV seat to a mirror finish. This decision created the conditions for oxide binding and resulted in each of the valves failing their lift tests and being declared inoperable when tested in 2009. Exelon has changed its refurbishment process to preclude this error in the future, refurbished all of the affected valves, submitted a required licensee event report (LER), and entered the issue into the CAP.

The decision in 2006 to machine hone the MSSV seat to a mirror finish, which established the conditions for oxide binding, was a performance deficiency that was within Exelon's ability to foresee and prevent due to available operational experience. This performance deficiency is more than minor because it affected the Equipment Performance Aspect of the Mitigating Systems Cornerstone Objective of ensuring the operability, availability, and reliability of systems designed to mitigate transients and prevent core damage. The team assessed this finding in accordance with IMC 0609, Attachment 4, Phase 1 – "Initial Screening and Characterization of Findings," and determined that it was of very low safety significance (Green) since it did not result in a loss of any system safety function.

This finding was determined to not have a cross-cutting aspect because the performance deficiency occurred in 2006 and was no longer indicative of current licensee performance. Specifically, Exelon made changes to their MSSV refurbishment program in 2008 which implemented the available OE, prior to discovery of the 2009 failures. (Section 4OA2.b.3)

Green. The inspectors identified a Green NCV of 10 CFR 50, Appendix B, Criterion III, "Design Control," associated with MSSV capacity calculations revised in 1988 to support a power uprate amendment. The MSSV capacity calculations erroneously referenced the as-purchased capacity instead of the as-built capacity when determining if there was sufficient blowdown capacity following the power uprate. When the correct value was used, the calculation showed that the MSSVs did not have sufficient capacity. This is the calculation of record for this system and is the basis for the TS requirements that all MSSVs are required to be operable or a power penalty must be assessed. During the inspection, Exelon was able to demonstrate that the MSSVs did have the required capacity and the American Society of Mechanical Engineers (ASME) code safety function to protect the Main Steam System piping and once through steam generator (OTSG) integrity had never actually been lost. The issue was placed in the CAP. A License Amendment Request (LAR) is also being developed which will replace the calculation of record.

Using an incorrect value for actual MSSVs relief capacity was a performance deficiency which was reasonably within the licensee's ability to foresee and prevent. This performance deficiency was more than minor because it affected the Design Control Aspect of the Mitigating Systems Cornerstone Objective of ensuring the operability, availability, and reliability of systems designed to mitigate transients and prevent core damage. The issue was also compared to the examples in NRC IMC 0612, Appendix E, "Examples of Minor Issues." The issue was similar to example 3j which states, "The violation of 10 CFR 50 Appendix B Criterion III is more than minor

if the engineering calculation error results in a condition where there is now a reasonable doubt on the operability of a system or component." The team assessed this finding in accordance with NRC IMC 0609, Attachment 4, Phase 1 – "Initial Screening and Characterization of Findings," and determined that it was of very low safety significance (Green) since it was determined that the error did not actually result in a loss of the system's safety function. The issue did not meet all the criteria to be considered as an old design issue because it was not a licensee-identified issue.

This finding was determined to not have a cross-cutting issue because the performance deficiency occurred in 1988 and was not indicative of current licensee performance. (Section 4OA2.a.3(b))

REPORT DETAILS

4. OTHER ACTIVITIES (OA)

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

a. Assessment of the Corrective Action Program (CAP)

1. Inspection Scope

The inspectors reviewed the procedures that describe Exelon's CAP at TMI. Exelon identified problems for evaluation and resolution by initiating issue reports (IRs) that were entered into the issue reporting (Passport) system. The IRs were subsequently screened for operability, categorized by significance (highest 1 to lowest 5), assigned a level of evaluation (highest A to lowest D), and routed for resolution and/or trending. Issues requiring work were entered into the work request (PIMS) system as action requests (ARs) where they could be developed into work orders (WOs).

The inspectors evaluated the process for assigning and tracking issues to ensure that issues were screened for operability and reportability, prioritized for evaluation and resolution in a timely manner commensurate with their safety significance, and tracked to identify adverse trends and repetitive issues. In addition, the inspectors interviewed plant staff and management to determine their understanding of and involvement with the CAP.

The inspectors reviewed IRs selected across the seven cornerstones of safety in the NRC's Reactor Oversight Process (ROP) to determine if site personnel properly identified, characterized, and entered problems into the CAP for evaluation and resolution. The inspectors selected items from functional areas that included emergency preparedness, engineering, maintenance, operations, physical security, radiation safety, and oversight programs to ensure that Exelon appropriately addressed problems identified in these functional areas. The inspectors selected a risk-informed sample of IRs that had been issued since the last NRC PI&R inspection conducted in April 2008. The inspectors considered risk insights from the station's risk analyses to focus the sample selection and plant tours on risk-significant systems and components. Inspectors' samples focused on these systems, but were not limited to them. The corrective action review was expanded to five years for evaluation of issues associated with the Main Steam Safety Valve Testing Program, the Internal & External Flood Protection Programs, and repetitive fuel pin failures over the last 3 operating cycles.

The inspectors selected items from other processes at TMI to verify that they were appropriately considered for entry into the CAP. Specifically, the inspectors reviewed a sample of ARs in the work management system, operator workaround conditions, operability determinations, and WOs.

The inspectors reviewed IRs to assess whether Exelon personnel adequately evaluated and prioritized identified problems. The inspectors observed daily IR screening meetings conducted by the Station Oversight Committee (SOC) in which Exelon personnel reviewed new IRs for prioritization and assignment. The issues and IRs reviewed encompassed the full range of evaluations, including root cause analyses

(RCAs), apparent cause evaluations (ACEs), and common cause analyses (CCAs). IRs that were assigned lower levels of significance which did not include formal cause evaluations were also reviewed by the inspectors to ensure they were appropriately classified. The inspectors' review included the appropriateness of the assigned significance, the scope and depth of the causal analysis, and the timeliness of resolution. The inspectors assessed whether the evaluations identified likely causes for the issues and developed appropriate CAs to address the identified causes. Further, the inspectors reviewed equipment operability determinations, reportability assessments, and extent-of-condition reviews for selected problems to verify these processes adequately addressed equipment operability, reporting of issues to the NRC, and the extent of problems. The inspectors observed a cross-disciplinary group of TMI personnel screen new issues at SOC meetings. The inspectors also observed Management Review Committee (MRC) meetings during which Exelon managers reviewed RCAs, as well as selected ACEs and CA assignments.

The inspectors reviewed IRs for adverse trends and repetitive problems to determine whether CAs were effective in addressing the broader issues. The selected sample of evaluation products reviewed also included trending reports and CCAs. The inspectors reviewed Exelon's timeliness in implementing CAs and effectiveness in precluding recurrence for significant conditions adverse to quality. The inspectors further reviewed IRs associated with selected NCVs and findings to determine whether Exelon personnel properly evaluated and resolved the issues. The IRs and other documents reviewed, as well as key personnel contacted, are listed in the attachment.

2. Assessment

Identification of Issues

The team evaluated Exelon's performance in the area of identification of issues as adequate. Based on the samples selected, the team determined that Exelon personnel identified problems and entered them into the CAP at a low threshold. In most cases, problems were identified appropriately in IRs. The team concluded that personnel were identifying trends at low levels, and the team did not identify trends or repetitive issues that Exelon had not self-identified. However, some deficiencies were noted in this area. Specifically, the team identified a finding in this area related to not identifying an inaccurate system design basis calculation for MSSV capacity which had been present since 1988 and an unresolved item (URI) related to the monitoring of flood penetration seals. See Section 4OA2.a.3(b) for more details on the finding and section 4OA2.a.3(c) for additional information on the URI.

Prioritization and Evaluation of Issues

The team evaluated Exelon's performance in the area of prioritization and evaluation of issues as adequate with weaknesses noted. The inspectors determined that, in general, Exelon appropriately prioritized and evaluated issues commensurate with the safety significance of the problem. IRs were screened for operability and reportability, categorized by significance, and assigned to a department for evaluation and resolution. The various IR screening and management review groups considered human performance issues, radiological safety concerns, repetitiveness, and adverse trends during the conduct of reviews.

Items were generally categorized for evaluation and resolution commensurate with the significance of the issues. Guidance for categorization was sufficiently definitive for consistent implementation. In general, issues were appropriately screened and prioritized commensurate with their safety significance. Operability and reportability screenings were appropriately performed. Causal analyses appropriately considered extent-of-condition, generic issues, and previous occurrences. However, there was one finding related to the failure of a combustion air gasket on the 'A' EDG due to an inadequate extent-of-condition review for a similar failure on the 'B' EDG. See Section 4OA2.a.3(a) for additional details.

In addition, other weaknesses were identified which included:

- The inspectors identified that Exelon did not thoroughly document the operability basis for a spurious indication problem with the 'A' EDG output breaker (IR 01004133). On December 10, 2009, during maintenance activities, the 'A' EDG output breaker open indication at the switchgear cubicle was identified as going on and off when the cubicle door was opened or shut. The operable basis was documented based on a successful post-maintenance test of the 'A' EDG. Given the spurious nature of the indication problem and that a breaker auxiliary contact or switch could be involved that has the potential to impact breaker operation, the inspectors determined the documented operability basis was not thorough. Exelon resolved the spurious breaker indication on December 16, 2009 and determined the problem was only associated with the breaker auxiliary switch contact for position indication and 'A' EDG operability was not impacted. As a result, this issue was considered minor.

- LER 50-289 2009-001 related to the lift test failure of six MSSV identified at the start of Refueling Outage 1R18 stated that a calculation showing up to six MSSVs may be inoperable at one time was a bounding calculation. The inspectors reviewed the calculation and discovered the configuration of the actual condition was more severe than the referenced evaluation. Other configurations which more closely matched the actual configuration were modeled in the calculation and showed higher peak pressures. These configurations would have been a more appropriate bounding case. See Section 4OA3 for additional details. This issue was evaluated to be of minor risk significance because the error did not change the overall safety evaluation and the NRC had not relied upon the information to make any regulatory decisions.

- The inspectors identified several occasions where the resident inspectors engaged the licensee to perform a past operability review. For example, following the 'A' EDG scavenging air box gasket failure in April 2010, TMI staff did not perform a past operability review initially since the equipment had already been declared inoperable for the testing when the failure occurred. Considering the failure of the gasket limits air to the cylinders and thus limits EDG output, this could have resulted in the EDG not being able to achieve accident loading and therefore having been inoperable. When the condition was evaluated, operability was verified to be unaffected; therefore, the issue was considered to be of minor risk significance.

- There have been several IRs and three NCVs documented in 2008 and 2009 (NCV 0500289/2008006-03, NCV 05000289/2008004-02 and NCV 05000289/2009002-01) related to the use of inaccurate or calibrated test equipment and/or improper test conditions impacting the results of IST testing. Exelon had not performed a CCA for these events. Exelon initiated IR 1095591 to address this observation.

The inspectors independently evaluated each of the above issue for potential significance per the guidance in IMC 0612, Appendix B, "Issue Screening," and Appendix E, "Examples of Minor Issues." Minor violations of NRC requirements are not subject to enforcement action in accordance with the NRC Enforcement Policy. However, the NCV, these minor violations, trends, and observations support the inspectors' overall assessment in the area of prioritization and evaluation of issues that the area was adequate with weaknesses noted.

Timely and Effective Corrective Actions (CAs)

The team evaluated Exelon's performance in the area of timely and effective CAs to be good and improvement was noted when comparing the results of this inspection area to the results of the 2008 PI&R inspection. The inspectors concluded that CAs for identified deficiencies were typically timely and adequately implemented. The inspectors also concluded that Exelon conducted in-depth effectiveness reviews for significant issues to determine if the CAs were effective in resolving the issue. For significant conditions adverse to quality, the inspectors noted that Exelon's actions were comprehensive and thorough, and generally successful at preventing recurrence.

3. Findings

(a) Deficient Extent of Condition Evaluation for a 2007 'B' EDG Scavenging Air Box Gasket Leak Which Affected the Reliability and Availability of the 'A' EDG.

Introduction: The inspectors identified a finding of very low safety significance (Green) involving a NCV of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for a deficient evaluation of a failed 'B' EDG scavenging air box gasket in April 2007. The deficient evaluation resulted in ineffective corrective actions to identify and correct an improper application of the 'A' EDG (EG-Y-1A) scavenging air box gasket which had been replaced in 2004. As a result, on June 3, 2010, the 'A' EDG scavenging air box gasket failed during performance of a monthly surveillance test run (IR 1076387).

Description: The inspectors reviewed IR 1076387, which documented that on June 3, 2010, an air leak was discovered at the 'A' EDG scavenging air box gasket approximately one hour and fifteen minutes into the two hour loaded surveillance test run. Operators promptly evaluated the degraded condition and continued with the 'A' EDG surveillance test which was completed satisfactorily.

The inspectors performed field walkdowns; interviewed operators and engineers; and reviewed the prompt investigation, past operability evaluation, and equipment apparent cause evaluation (IR 1076387) performed to evaluate this degraded condition. Exelon identified that the air leak was due to a failed gasket at the scavenging air box. Approximately 4 inches of the ½ wide tape gasket had extruded from its seating surface and a total of 20 inches was discolored and stretched indicating a degraded condition.

The failure was determined to be related to improper application of the ½ inch tape gasket for this application. Specifically, in 2002, TMI undertook an initiative to replace the original equipment material (OEM) gaskets (a 2 ¼ inch organic sheet gasket) associated with the EDGs with Gore-Tex™ material to minimize fire hazards associated with leaks. Two separate technical evaluation documents T1-98-0058 (Nov. 1998) and ECR TM 02-00472 (March 2002) authorized the use of Gore-Tex™ material both strip/tape and sheet material types for specific locations of the EDGs. However, these documents did not specify the use of this gasket material at the scavenging air box gasket surfaces or for an oily mist environment.

In March 2004, TMI engineers improperly authorized replacement of the OEM sheet type 2-1/4 inch wide scavenging air box gasket with the ½ wide strip/tape Gore-Tex™ gasket. In April 2007, a similar gasket replacement was implemented on the 'B' EDG scavenging air box location. However, the gasket failed immediately during the subsequent post maintenance test (IR 616514 and 6266457). Investigation of this failure identified the ½ inch Gore-Tex™ gasket had been incorrectly affixed to the inner diameter of the bolt pattern thereby not sealing (by-passing) the three scavenging air passage vent holes. This gasket was then replaced with the original OEM gasket material and the 'B' EDG was tested satisfactorily. The investigation also determined the ½ inch Gore-Tex™ gasket had not been specifically authorized for this application and that the same gasket was installed in the 'A' EDG. However, no corrective actions were developed to evaluate, inspect, or replace the gaskets on the 'A' EDG despite the opportunity to do so during an upcoming EDG overhaul period.

Engineers determined that significant loss of boost pressure due to gross leakage would not prevent the EDG from running but would reduce available power output. If greater than 43 inches of the Gore-Tex™ gasket were extruded, the EDG would no longer be able to achieve its maximum accident rated loading and would therefore become inoperable. Since only 20 inches of the gasket was observed to be degraded, the EDG was capable of meeting it maximum accident loading in the "as-found" condition. The highest EDG loading requirements occur within the first 24 hours of the 7-day mission time. The inspectors performed detailed inspections of the failed Gore-Tex gasket and reviewed photographs taken prior to removal. It was reasonable to assume that during the course of a 7-day mission time run, that the entire bottom horizontal surface of the gasket (62 inches) would have been extruded. TMI engineering evaluated this concern and determined the 'A' EDG would have been able to complete its 7-day mission time as the degraded EDG capacity with the worse case gasket extrusion was still greater than the long term loading requirements. Therefore, the 'A' EDG would have remained operable based on the as-found condition of the gasket.

Corrective actions included replacement of the ½ inch Gore-Tex gasket with the original OEM gasket design, performing an extent-of-condition review to identify all the current installations of the ½ inch Gore-Tex™ gasket, briefing mechanical maintenance and planning personnel of the misapplication of this type gasket material, revising applicable procedures, and issuing a new ECR to clarify the use and acceptable applications for the Gore-Tex™ gasket material.

Analysis: The inspectors determined the deficient extent-of-condition review of the April 2007, 'B' EDG scavenging air box gasket failure was a performance deficiency. This deficient extent-of-condition review contributed to the 'A' EDG gasket failure of June 3, 2010, since the cause of this gasket failure was directly attributed to the

improper application of the ½ inch Gore-Tex™ gasket. This improper gasket application was recognized during the 2007 'B' EDG gasket failure evaluation but no corrective actions were implemented to address or correct the degraded condition on the 'A' EDG. In addition, the inspectors noted that TMI had missed two other opportunities to inspect and replace the 'A' EDG scavenging air box gasket during a full overhaul of the 'A' EDG performed during the October 2009 refueling outage (1R18) and an 'A' EDG system outage that was performed on April 25, 2010.

The inspectors determined this finding was more than minor because it is associated with the Equipment Performance Attribute of the Mitigating System Cornerstone and the associated cornerstone objective of ensuring the reliability of systems that respond to initiating events to prevent undesirable consequences. Specifically, this finding reduced the reliability of, and resulted in additional unplanned unavailability for, the 'A' EDG. The team assessed this finding in accordance with NRC IMC 0609, Attachment 4, Phase 1 – "Initial Screening and Characterization of Findings," and determined that it was of very low safety significance (Green) since it did not result in a loss of any system safety function.

The issue has a cross-cutting aspect in the area of Problem Identification and Resolution, because Exelon had identified in 2007 that a ½ inch Gore-Tex™ gasket had not been specifically authorized by the ECR to be used at the EDGs scavenging air box location (IR 616514 and 6266457). However, Exelon did not evaluate the issue such that extent of condition was properly considered and the cause was properly resolved [P.1(c)].

Enforcement: 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action" requires, in part, that conditions adverse to quality such as equipment deficiencies and malfunctions shall be promptly identified and corrected. Contrary to this requirement, Exelon identified an improper gasket application during an April 2007 'B' EDG gasket failure evaluation (IR 616514 and 6266457) but no corrective actions were implemented to address or correct the degraded condition on the 'A' EDG. As a result, on June 3, 2010, the 'A' EDG scavenging air box gasket failed during performance of a monthly surveillance test run. Because this violation was of very low safety significance and was entered into Exelon's corrective action program as IR 1095540, this violation is being treated as an NCV consistent with Section VI.A.1 of the NRC Enforcement Policy. **(NCV 05000289/2010009-01, Deficient Extent of Condition Evaluation for a 2007 'B' EDG Scavenging Air Box Gasket Leak Which Affected the Reliability and Availability of the 'A' EDG.)**

(b) MSSV Design Basis Calculations Inaccurate

Introduction: The inspectors identified a Green NCV of 10 CFR 50, Appendix B, Criterion III, "Design Control," associated with MSSV capacity calculations revised in 1988 to support a power uprate amendment, which erroneously referenced the as-purchased capacity instead of the as-built capacity when determining if there was sufficient blowdown capacity following the power uprate. When the correct value was used, the calculation showed that the MSSVs did not have sufficient capacity, thus MSSV operability was in question. This is the calculation of record for this system and is the basis for the TS requirements that all MSSVs are required to be operable or a power penalty must be assessed. During the inspection, Exelon was able to demonstrate that the MSSVs did have the required capacity and the American Society of Mechanical

Engineers (ASME) code safety function to protect the Main Steam System piping and once through steam generator (OTSG) integrity had never actually been lost.

Discussion: While reviewing the TMI LER 50-289 2009-001, related to the lift test failure of 6 MSSVs during 1R18 refueling outage, the inspectors questioned why the TS did not permit a single MSSV to be inoperable without assessing a power penalty, but the LER referenced a calculation which demonstrated all safety functions could be maintained with six MSSVs inoperable. Since the impact of a MSSV lifting late would be a reduction of relief capacity, the inspectors reviewed the system design basis documents.

Licensee document SDBD-TI-411 Revision 3, "System Design Basis Document for the Main Steam System (411)" (DBD) describes the safety function and design basis for the MSSVs. Section 3.2.3 of this document commits TMI to ASME Code Section III, Article 9, requirements for OTSG and Main Steam System integrity protection. Section 3.2.3.1 of the DBD refers to Ref 218, "Design Review Certification for MSSVs by J.E. Behen," dated April 18, 1970 for the calculations of required and actual MSSV blowdown capacities. Section 3.2.3.1 of the DBD states MSSV relief capacity margin was ~1% for the original plant licensed power level. Ref 218 originally calculated the relief capacity using the as-purchased specification which provided a 2.28% relief capacity margin. However in a separate section of Ref 218, the calculation was modified to account for the as-built configuration which reduced the excess capacity to 1%. This as-built capacity value (1%) is the referenced value used in the DBD.

In 1988, required MSSV capacity was recalculated to support a 1.3% power uprate. Section 3.2.3.2 of the DBD discusses this and lists the post power uprate required capacity. This number was erroneously compared to the as-purchased capacity (2.28%) vice the as-built value (1%) in Ref 218. Due to this error, the DBD stated there was an excess capacity of 0.2%. However, when the correct value is used, required capacity exceeds actual capacity by 0.8%. Therefore, the operability of the MSSVs was brought into question since the calculation of record indicated that the MSSVs did not have sufficient capacity to ensure maximum OTSG and Main Steam System pressure during all design basis casualties would remain below ASME limits.

Once Exelon became aware of the error, they were able to provide a reasonable assurance of operability by providing the inspector with a revised capacity calculation using the more accurate estimates of maximum OTSG outlet enthalpy, maximum feedwater inlet enthalpy, and actual relief capacities based upon empirical test data. This calculation showed an excess capacity of 0.07%. Exelon also is in the process of developing a LAR to ease restrictions of TS 3.4.1.2.3 and allow for up to 4 MSSV to be inoperable. Calculation 80-9052402-001, dated November 19, 2008, developed to support this licensee amendment used an integrated plant response methodology to calculate maximum Reactor Coolant System, OTSG, and Main Steam Line pressures. This calculation is referenced in the LER which stated that up to 6 MSSVs inoperable would not result in OTSG pressure exceeding its ASME maximum pressure limit. The inspectors reviewed these calculations, consulted with NRC regional technical experts and determined that the safety function of the MSSVs was never compromised.

Analysis: Using an incorrect value for MSSVs relief capacity was a performance deficiency which was reasonably within the licensee's ability to foresee and prevent. This performance deficiency was more than minor because it affected the Design Control Aspect of the Mitigating Systems Cornerstone Objective of ensuring the

operability, availability, and reliability of systems designed to mitigate transients and prevent core damage. The issue was also compared to the examples in NRC IMC 0612 Appendix E, "Examples of Minor Issues." The issue was similar to example 3j which states, "The violation of 10 CFR 50 Appendix B, Criterion III, is more than minor if the engineering calculation error results in a condition where there is now a reasonable doubt on the operability of a system or component." The team assessed this finding in accordance with NRC IMC 0609, Attachment 4, Phase 1 – "Initial Screening and Characterization of Findings," and determined that it was of very low safety significance (Green) since it was determined that the error did not actually result in a loss of the system's safety function.

This issue was evaluated under the NRC Enforcement Policy, Section B3, "Violations involving Old Design Issues," to determine if this violation could be treated as an old design issue. The issue did not meet all the criteria to qualify as an old design issue because it was not a licensee-identified issue. Rather, this issue was identified by the NRC team.

This finding was determined to not have a cross-cutting issue because the performance deficiency occurred in 1988 and was not indicative of current licensee performance.

Enforcement: 10 CFR 50 Appendix B Criterion III, "Design Control," states, in part, measures shall be established to assure that applicable regulatory requirements and the design basis as specified in the license application for those structures systems and components are correctly translated into specifications, drawings, procedures, and instructions. Contrary to the above, from 1988 to the present, the Main Steam System Design Basis document contained an error which when the correct values were used brought the operability of the MSSVs into question as it showed MSSV capacity was less than required after the 1988 power uprate. This specification was the design calculation of record for this SSC and the basis for Technical Specification action statements. Because this violation was evaluated to be of very low safety significance (Green), and was entered into Exelon's corrective action program as IR 1094566, this violation is being treated as an NCV consistent with Section VI.A.1 of the NRC Enforcement Policy. **(NCV 05000289/2010009-02, MSSV Design Basis Calculations Inaccurate)**

(c) URI- Potential Concern Regarding TMI's Internal and External Flood Protection Barriers and Mitigation Strategies.

Introduction: The team identified that Exelon was not meeting the requirements of USFSAR Section 2.6.5 and of 10 CFR 50.65 because TMI did not have an effective program to monitor the condition of flood seal penetrations into safety-related structures. This has been a long-standing issue for several years. However, a formal penetration seal inspection and evaluation program was only established in October 2009 and the initial round of seal inspections had not been completed. Considering the age of the flood seal components could be beyond the qualified lifetime, this program may not be adequately identifying degrading and non-conforming conditions which could impact the operability of safety-related equipment during a design basis flooding event. As a result, the NRC has opened an Unresolved Item (URI) related to this concern.

Description: The inspectors identified a potential concern regarding TMI's internal and external flood protection barriers and mitigation strategies. Specifically, TMI has not implemented an effective program for identifying, maintaining, inspecting, or repairing flood barriers to ensure that internal and external flooding risks are effectively managed and to verify that safe shutdown equipment is not subjected to damage from internal and external flood events. Monitoring of safety-related SSCs, as well as non-safety-related components whose failure could prevent a SSC from fulfilling their safety function, is required by 10 CFR 50.65.

The inspectors questioned Exelon about the controls in place to verify, inspect and maintain all openings below probable main flood elevation (309 foot level) that are potential leak paths (ducts, pipes, conduits, cable trays, seismic gaps, flood seals, non return flood protection check valves, watertight seismic gaps, etc.) in order to meet the commitments detailed in TMI UFASAR Section 2.6.5. However, Exelon was not able to demonstrate which barriers are credited as flood barriers, what the design and specified materials are, what the expected qualified life of the barriers is, nor the condition of all the credited barriers.

The team concluded that not having an effective program to monitor the condition of flood penetration seals for safety-related structures was a performance deficiency that was reasonably with in Exelon's ability to foresee and prevent. Since Exelon has not yet completed their initial evaluation of the flood seals at TMI, the team was unable to evaluate the potential impacts of this issue. Exelon intends to complete the initial inspections and report the results to the NRC by October 31, 2010. Subsequent to the completion of the PI&R inspection, Exelon issued Event Notification (EN) 46194 on August 23, 2010, describing that flood barriers needed to protect safety-related equipment in the TMI Auxiliary Building were identified to be missing or never installed.

The inspectors determined that issues concerning the internal and external flood programs at TMI, including flood barriers design, inspections, maintenance, and repairs, is an unresolved item pending further NRC review of Exelon's initial inspection and safety assessment. **(URI 05000289/2010009-04, Potential Concern Regarding TMI's Internal and External Flood Protection Barriers and Mitigation Strategies.)**

b. Assessment of the Use of Operating Experience (OE)

1. Inspection Scope

The inspectors selected a sample of industry OE issues to confirm that Exelon evaluated the OE information for applicability to TMI and took appropriate actions when warranted. The inspectors reviewed OE documents to verify that Exelon appropriately considered the underlying problems associated with the issues for resolution via their CAP. The inspectors also observed plant activities to determine if industry OE was considered during the performance of routine and infrequently performed activities. A list of the documents reviewed is included in the Attachment.

2. Assessment

The team determined that Exelon's performance in the area of use of OE was adequate. The inspectors determined that Exelon appropriately considered industry OE information for applicability and used the information for corrective and preventive actions to identify

and prevent similar issues. The inspectors assessed that, in general, the use of OE was effective. However, one finding was identified in this area due to multiple MSSVs test failures due to improper evaluation of Exelon fleet and general industry OE. See section 4OA2.b.3 for additional details

The inspectors observed Exelon demonstrating effective use of OE in pre-job briefs, and routine management meetings. The team also observed that Exelon effectively utilized OE during development of the Maintenance Rule a(1) action plans, RCAs, and ACEs. The inspectors independently verified that a sample of industry OE and NRC generic communications had been entered into their CAP, evaluated, and corrective actions developed as needed. OE was appropriately applied and lessons learned were communicated and incorporated into plant operations. The inspectors also observed plant activities and determined industry OE was being considered during the performance of routine and infrequently performed activities.

A list of the documents reviewed is included in the Attachment to this report.

3. Findings

Multiple MSSVs Test Failures Due to Improper Evaluation of Operating Experience

Introduction: A self-revealing Green NCV of TMI TS 3.4.1.2.3 was identified for TMI having greater than three MSSVs inoperable for greater than the allowed outage time with reactor power greater than 5%. MSSV testing prior to the 2009 refueling outage identified that six MSSVs failed the lift point test and were subsequently declared inoperable. All six valves failed by lifting above the ASME limit of +/- 3% of designed setpoint. Five of these six valves exhibited signs of oxide binding, a known failure mechanism for MSSVs and each of the valves had been refurbished during the 2007 refueling outage. Exelon had fleet and industry information about the oxide binding failure mechanism available in 2006 at the time the refurbishment method was selected for the 2007 TMI outage. This refurbishment method included a decision to machine hone the MSSV seat to a mirror finish. This decision created the conditions for oxide binding and resulted in each of the valves failing their lift tests and being declared inoperable when tested in 2009. It was later determined the valve would have been inoperable for the majority of the prior operating cycle.

Description: TMI has a total of 18 MSSVs, 16 - six inch valves (eight per OTSG) and 2-three inch valves (one per OTSG). The safety function of the MSSVs and RCS code safety valves is to ensure relief capacity is sufficient to ensure RCS pressure remains less than 110% of design (2750 psig) and OTSG pressure remains below the ASME code limit maximum pressure of 1169.7 psia to ensure system integrity.

The valves used at TMI are susceptible to a failure mechanism known as oxide binding. Oxide binding results from an oxide layer forming between the valve disc and the seat material. This results in the valve lifting at a higher than expected lift set point to overcome the disc to seat binding. The strength of the oxide layer is related to the rate of formation, so once an oxide layer is established the rate of formation drops and the binding is much weaker. Once this initial oxide layer is broken, the valve lift pressure will be significantly lower on the next lift more consistent with the establish lift set point. This is an indicator that oxide binding has occurred.

During testing prior to refueling outage 1R18 in October 2009, six of the eighteen MSSVs failed the "as-found" setpoint testing, by lifting significantly above the ASME and TS limit of 3% of designed lift pressure (+9.2, +8.9%, + 7.0%, +6.4%, +4.4%, and +4.1%). As required by ASME code, the sample size was increased until all 18 MSSVs were tested. Five of the six MSSVs that exhibited signs of oxide binding had been refurbished during the 1R17 refueling outage in 2007. These five valves represented 100% of the valves refurbished in 2007.

The Exelon fleet had a significant amount of experience dealing with oxide binding related failures and had developed strategies for minimizing the impact of this failure mechanism. These strategies include replacing the stainless steel disc with an Inconel material disc, and pre-oxidizing both the disc and the seat material prior to placing the valve in service. Other Exelon plants experienced a number of oxide binding related failures in the late 1990s and early 2000s and corrective actions had implemented these strategies.

In 2006, Exelon held a meeting with TMI personnel and Exelon technical specialists to develop the refurbishment procedures and contracts for the 1R17 outage. Personnel at this meeting had operating experience available and had knowledge of the oxide binding failure mechanism. During this meeting a decision was made not to replace stainless steel disc material, but rather to pre-treat the existing disc. However, TMI also chose to machine hone the seat to a mirror finish. This removed the existing oxide layer and exposed bare metal. This strategy was also used in 2005; however, there were two plant scrams which resulted in the MSSVs lifting in 2006. This resulted in breaking the oxide layer and allowing the valve to test normally at the next opportunity. As a result, the group concluded, in error, that since they had not seen indications of oxide binding at TMI, the plant was not as susceptible to this failure mode. The mirror finish refurbishment method created the conditions for the formation of a fast growing and strong oxide layer and resulted in all five valves failing their lift tests.

Prior to discovery of the 2009 failures, another meeting was held in 2008 with similar personnel and a decision was reached to adopt a new refurbishment method to allow pre-treating both the seat and disc as well as changing the disc material from stainless steel to Inconel. Thus, the error made in 2007 could not be repeated and the 2006 decision was no longer indicative of current licensee performance. The failed valves have been refurbished and restored to operable status using the new refurbishment procedure.

Exelon's decision to machine hone the MSSVs to a mirror finish which created the conditions for oxide binding in 2006 was a performance deficiency that was within Exelon's ability to foresee and prevent due to the OE available to the responsible licensee staff at the time of the decision. This decision resulted in five MSSVs failing and being declared inoperable due to oxide binding. A past operability review concluded that the MSSVs were likely inoperable for a majority of the operating cycle. Licensee Event Report (LER) 50-289 2009-001 was submitted to the NRC for identification of a condition prohibited by TS on December 22, 2009. Exelon concluded that the overall safety function of the MSSVs to provide overpressure protection for Main Steam System piping and the OTSGs was never lost.

Analysis: The decision to machine hone the MSSVs to a mirror finish which created the conditions for oxide binding in 2006 was a performance deficiency that was within Exelon's ability to foresee and prevent due to the OE available to them at the time of the decision. This performance deficiency affected the Equipment Performance aspect of the Mitigating Systems Cornerstone objective of ensuring the operability, availability, and reliability of systems designed to mitigate transients and prevent core damage. Specifically, five MSSVs were determined to be inoperable for the majority of the operating cycle due to oxide binding. The team assessed the finding in accordance with IMC 0609, Attachment 4, Phase 1 – "Initial Screening and Characterization of Findings." and determined that it was of very low safety significance (Green) since it did not result in a loss of any system safety function.

This finding was determined to not have a cross-cutting aspect because the performance deficiency occurred in 2006 and was no longer indicative of current licensee performance. Specifically, Exelon made changes to their MSSV refurbishment program in 2008 which implemented the available OE, prior to discovery of the 2009 failures.

Enforcement: TS 3.4.1.2.3 requires that no more than three MSSVs are permitted to be inoperable with Reactor Power greater than 5%. Contrary to the above, from approximately January 2008 until October 2009, TMI had five MSSVs which were inoperable due to oxide binding. Because this violation was of very low safety significance and was entered into Exelon's corrective action program as IR 1095397, this violation is being treated as an NCV consistent with Section VI.A.1 of the NRC Enforcement Policy. **(NCV 05000289/2010009-03, Multiple MSSVs Test Failures due to Improper Evaluation of Operating Experience.)**

c. Assessment of Self-Assessments and Audits

1. Inspection Scope

The inspectors reviewed a sample of audits, including the most recent audit of the CAP, departmental self-assessments, Nuclear Oversight organization audits and assessments, and assessments performed by independent organizations. These reviews were performed to determine if problems identified through these assessments were entered into the CAP, when appropriate, and whether CAs were initiated to address identified deficiencies. The effectiveness of the audits and assessments was evaluated by comparing audit and assessment results against self-revealing and NRC-identified observations made during the inspection. A list of documents reviewed is included in the attachment to this report.

2. Assessment

The team evaluated Exelon's performance in the area of self-assessments to be good. The inspectors concluded that self-assessments, audits, and other internal Exelon assessments were generally critical, probing, thorough, and effective in identifying issues. The inspectors observed that these audits and self-assessments were completed in a methodical manner by personnel knowledgeable in the subject. The audits and self-assessments were completed to a sufficient depth to identify issues that were entered into the CAP for evaluation. In general, corrective actions associated with the identified issues were implemented commensurate with their safety significance.

3. Findings

No findings of significance were identified in the area of self-assessment.

d. Assessment of Safety Conscious Work Environment

1. Inspection Scope

During interviews with staff personnel, the inspectors assessed whether there were issues that may represent challenges to the free-flow of information or factors at the site that could produce a reluctance to raise safety concerns. In support of this, the inspectors assessed whether staff were willing to enter issues into the CAP or raise safety concerns to their management and/or the NRC. The inspectors also interviewed corporate and station Employee Concerns Program (ECP) personnel to determine the number and types of issues being raised and entered into the program. The inspectors reviewed a sample of the ECP files to assess the program's effectiveness in addressing potential safety issues. Additionally, the inspectors reviewed the results of nuclear safety culture surveys conducted in 2008.

2. Assessment

During interviews, TMI staff expressed a willingness to use the corrective action program to identify plant issues and deficiencies and stated that they were willing to raise safety issues. The inspectors noted that no one interviewed stated that they personally experienced or were aware of a situation in which an individual had been retaliated against for raising a safety issue. All persons interviewed demonstrated an adequate knowledge of the corrective action program and the Employee Concerns Program. Based on these limited interviews, the inspectors concluded that there was no evidence of an unacceptable safety conscious work environment and no significant challenges to the free flow of information.

3. Findings

No findings of significance were identified related to the SCWE at TMI.

4OA3 Event Followup (71153 – 1 Sample)

.1 (Closed) LER 50-289/2009-001-00,"Multiple Main Steam Safety Valve Failures"

During testing prior to refueling outage 1R18 (October 2009), six TMI -1 MSSVs failed "as found" setpoint testing. The valve's lift pressures were more than 3% above the setpoint, and the valves were declared inoperable and reactor power was reduced to comply with TS 3.4.1 until the valves were adjusted and operability was restored. Five of the six valves were determined to have failed as a result of oxide binding between the disc and seat of the valve. The condition would not have prevented the performance of MSSV safety functions credited in the safety analysis. The inspectors determined the failures were the result of a performance deficiency by the licensee due to improper evaluation of industry operating experience. This finding is Green NCV 05000289/2010009-03 and is documented in Section 4OA2.b.3 of this report.

During the review of the LER, the inspectors questioned the validity of statements made in Section C, "Analysis/Safety Significance." Specifically, Exelon stated that an analysis performed with six large (six inch valves) MSSVs unavailable bounded the TMI cycle 17 condition. The analysis showed peak OTSG pressure of 1169.1 psia which is below the ASME limit of 1169.7 psia. The inspectors reviewed the reference analysis (Calculation 80-9052402-001, dated November 19, 2008) and identified that the configuration selected as the "bounding case" from the referenced calculation did not match the configuration of the cycle 17 condition.

Specifically, each OTSG has two steam lines. Each steam line has 4-six inch MSSVs and one line per OTSG also has a three inch MSSV. In the "bounding case", the unavailable MSSVs were evenly distributed among the steam lines. For the cycle 17 condition, five of the six inoperable valves were on the 'B' OTSG and four of those five were on the same steam line (one of the inoperable valves was the three inch valve for the 'B' OTSG). In addition, the setpoints of the six inch valves are staggered such that all the valves do not lift at the same pressure. For the 'B' OTSG steam line with 4 inoperable MSSVs, the remaining valve was the valve with the highest lift point.

The inspector found two other cases in Calculation 80-9052402-001, which more closely matched the actual condition:

Case 1) 3 - six inch MSSVs on 1 OTSG, all on the same steam line failed evaluated from 100% reactor power; and

Case 2) 4 – six inch MSSVs on one steam line and 2 MSSVs on the other for one OTSG evaluated from 62% reactor power.

The peak OTSG and Main Steam Line pressures were 1175 psia for case 1 and 1188 psia for case 2. Both cases are greater than the ASME limit. Therefore, the case chosen did not accurately bound the cycle 17 condition. It was recognized that for the cycle 17 condition all of the inoperable valves did actually lift and other non-safety-related equipment such as the atmospheric dump valves and turbine bypass valves were functional throughout cycle 17. As a result, the Calculation 80-9052402-001 analysis is very conservative, and actual peak plant pressure would be much lower for the reasons stated above. The inspectors consulted regional technical experts and determined that Main Steam line or OTSG integrity would not be challenged by the worse case short term pressure spike. Based upon these facts, the inspectors determined the overall conclusion of the safety analysis was unchanged.

The inspectors interviewed several personnel responsible for writing the LER and determined that the intent of the bounding case statement was purely based on the capacity of the relief valves as stated in the LER itself. The cycle-specific configuration was not considered.

Since the LER was not relied upon to support any regulatory decisions, had not been reviewed previously by the NRC, and the overall safety assessment and conclusions were unaffected by the inaccurate statement, the violation was determined to be minor. Exelon has captured this issue in their CAP and has developed corrective actions to revise the LER. No addition findings were identified. This LER is closed. The NRC will review the revised LER under a separate sample when it is issued.

4OA6 Meetings, Including Exit

On July 29, 2010, the inspectors presented the inspection results to Mr. W. Noll, Site Vice President, and to other members of the TMI staff. The inspectors verified that no proprietary information is documented in the report.

ATTACHMENT: SUPPLEMENTAL INFORMATION

Enclosure

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee personnel

W. Noll, Site Vice President
T. Dougherty, Plant Manager
D. Atherholt, Manager, Regulatory Assurance
P. Bennett, Engineering
W. Bishop Work Management
S. Brantley, Operations Service Manager
H. Crawford, Reactor Engineering Manager
R. Ezzo, Manager Electrical I&C Design
T. Flemming, System Engineer-Emergency Diesels
A. Miller, Regulatory Assurance
D. Mohre, Manager, Security
D. Neff, Manager, Emergency Preparedness
S. Nowak, Supervisor, I&C Maintenance
T. Orth, Engineering ERT Manager
S. Queen, Director, Site Engineering
L. Weir, Manager, Nuclear Oversight Services
T. Wickel, Sr. Manager, Design Engineering
S. Wilkerson, Maintenance Manager
C. Armer, System Engineer
R. Hess, Corrective Action Program Coordinator
M. Reed, System Engineer
F. Reeser, System Engineer
K. Robles, System Engineer
P. Simmons, Security Shift Supervisor
R. Summers, Design Engineer-Emergency Diesels
T. Flemming, System Engineer-Emergency Diesels
W. Mc Sorley, Procedures and Flood Protection
M. Hardy, System Engineer-Flood Protection
R. Ezzo, Manager Electrical I&C Design
R. Masoero, Maintenance Rule

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000289/2010009-01	NCV	Deficient Extent Of Condition Evaluation for a 2007 'B' EDG Scavenging Air Box Gasket Leak Which Affected the Reliability and Availability of the 'A EDG (Section 4OA2.a.3(a)).
05000289/2010009-02	NCV	MSSV Design Basis Calculations Inaccurate (Section 4OA2.a.3(b))
05000289/2010009-03	NCV	Multiple MSSVs test failures due to improper evaluation of Operating Experience. (Section 4OA2.b.3)

Opened

05000289/2010009-04	URI	Potential Concern Regarding TMI's Internal and External Flood Protection Barriers and Mitigation Strategies (Section 4OA2.a.3(c))

LIST OF DOCUMENTS REVIEWED

Section 4OA2: Identification and Resolution of Problems

Non-Cited Violations
NCV 05000289/2008006-01, Failure to Stage Equiment Required by Abnormal Operating Procedures
NCV 05000289/2008006-02, Failure to Include Increased EDG Fuel Oil Consumption Into Design Basis Calculations.
NCV 05000289/2008006-03, Failure to Meet ASME OM Code Data Collection Requirement for Comprehensive IST
NCV 05000289/2008006-04, Failure to Require Emergency Light Units (ELUs),
NCV 05000289/2008009-01, Inappropriate Use of Elevators by Fire Brigade Members,
NCV 05000289/2008004-01, Deficient Implementation of Fire Barrier Seal Inspection Procedure,
NCV 05000289/2008004-02, Reference Test Conditions for MU-P-1B Not Established in Accordance with ASME OM Code.
NCV 05000289/2009002-01, Instrument Accuracy Not Verified Prior to Performing Containment Penetration Local Leak Rate Testing.
NCV 05000289/2009003-01, Deficient Coordination of Work Activities Resulted in NR-P-1C Becoming Inoperable.
NCV 05000289/2009003-02, Deficient Inspections, Evaluation, and Remediation of Submerged Underground Electrical Cables.
NCV 05000289/209005-01, Potential CO2 Migration Outside the Relay Room Fire Area,
NCV 05000289/2009006-01, Failure to Assess Seismic Qualifications of Stop Logs.
NCV 05000289/2009006-02, Unqualified Decay Heat River Water Strainer Due to Deficent Evaluation of A Plant Modification.
NCV 05000289/2009006-03, Failure to Install Amptector Bypass Jumper for Load Center Breaker,
NCV 05000289/2010007-01, Failure to Use Process or Engineering Controls Caused Airborne Radioacivity.
NCV 05000289/209002-02, Deficient Design Change Implementation and Controls Resulted in Unfiltered Radioactivity Release to the Environment.
NCV 05000289/209002-03, Untimely Corrective Action to Stop Unfiltered Radiological Release.

Audits and Self-Assessments
NOSA-TMI-09-07, Operations Functional Area Audit Report, 10/05/09 – 10/15/09
NOSA-TMI-09-05, Engineering Design Audit Report, 08/03/09 – 08/13/09

Issue Reports (IR)

1004133
1004133
1015513
1018893
1019023
1024978
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1043584
1045563
1052177
1055632
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994149
995153
995961
996007
996007
996823

*NRC Identified During Inspection

Attachment

Action Requests

A2102039	A2223458	A2247639
A2024524	A2239421	A2009544
A2230507	A2240194	A2230819
A2159228	A2245307	A2138016
A2223737	A2196987	
A2199665	A2138016	

Drawings

11865841, Sheet 1B of 3, Diesel Generator 1B Three Mile Island Nuclear Station Unit 1, Rev. 7

Miscellaneous

-OPE-10-002, Op Eval for EQ Life on MS-PT-1183, Rev 0
-OPE-09-001, Op Eval for Void Left in Piping to MU-V-16A & MU-V-16B, Rev. 0
-OPE-10-001, Op Eval for Relay 63ZB/RC1B Did Not Fully Drop Out During ES Testing, Rev. 0
-7kV/4kV Power System Health Reports for 3rd and 4th quarters 2009 and 1st quarter 2010
-Security Equipment System Health Reports for 4th quarter 2008, 2nd and 4th quarter 2009, and 2nd quarter 2010
-250/125 Volt DC System Health Reports for 2nd – 4th quarters 2009 and 1st quarter 2010
-TMI Station Ownership Committee Meeting Agenda, 07/26/10
-TMI Management Review Committee Meeting Agenda, 07/26/2010
-TMI Maintenance Rule Expert Panel Meeting Minutes for March 22, 2010, April 26, 2010, and May 17, 2010.
-Pictures of 1B Reactor Coolant Pump oil leak from May 2010
-Calculation 80-905240402-001 dated 11/19/2008
-Equipment Deficiency Tag 911567
-LER 50-289/2009-001-00 dated 12/22/2009
-Licensee Amendment Request package (Amendment Request, NRC Approval and NRCSafety Evaluation Review) for Amendment 142 dated 7/26/1988
-SDBD-TI-411 Rev3 ,"System Design Basis Document for Main Steam System (411)"
-Letter from Gilbert Associates Inc to Metropolitan Edison Company Subj: Main Steam Safety valve requirement Outiline RO 3984 dated April 23, 1968
-Design Review Certification for Main Steam Safety Valves by J. E. Behen date April 18, 1970
- Risk Informed Notebook Inspection Notebook for Three Mile Island Nuclear Generating Station Unit 1 Revision 2.1a, issued June 1, 2009
-Spreadsheet calculation of MSSV actual capacity and required capacity dated 7/28/2010.
-NRC Event Notification 46194 for August 23, 2010

Operating Experience

OE 28230
OE 24218
OE 28550

Procedures

CC-AA-112, Temporary Configuration Changes, Rev 16
CC-AA-309-101, Engineering Technical Evaluations, Rev 11
CY-AA-130-230, Control of Volume Devices, Rev 5

CY-AA-130-900, Operation of the Dionex Ion Chromatograph Utilizing Chromeleon, Rev 0
CY-AB-120-100, Reactor Water Chemistry, Rev 10
CY-OC-130-510, Radiochemical Instrumentation Genie 2K Gamma Spectroscopy, Rev 4
CY-OC-130-9080, Conductivity, Rev 5
EI-AA-1, Safety Conscious Work Environment, Rev 2
EI-AA-101, Employee Concerns Program, Rev 8
EI-AA-101-1001, Employee Concerns Program Process, Rev 9
EI-AA-101-1002, Employee Concerns Program Trending Tool, Rev 5
EP-AA-121, Emergency Response Facility and EP Readiness, Rev 9
ER-AA-321-1005, Condition Monitoring for Inservice Testing of Check Valves, Rev 4
ER-AA-302-1006, Generic Letter 96-05 Program MOV Maintenance and Testing Guidelines, Rev 8
HU-AA-1211, Briefings, Rev 4
LS-AA-1003, NRC Inspection Preparation and Response, Rev 10
LS-AA-1012, Safety Culture Monitoring, Rev 0
LS-AA-115, Operating Experience Program, Rev 15
LS-AA-115-1001, Processing of Significant Level 1 OPEX Evaluations, Rev 2
LS-AA-115-1002, Processing of Significant Level 2 OPEX Evaluations, Rev 1
LS-AA-115-1003, Processing of Significant Level 3 OPEX Evaluations, Rev 1
LS-AA-115-1004, Processing of NERs and NNOEs, Rev 1
LS-AA-119, Fatigue Management & Work Hour Limits, Rev. 8
LS-AA-120, Issue Identification and Screening Process, Rev 12
LS-AA-125, Corrective Action Program, Revision 14
LS-AA-125-1001, Root Cause Analysis Manual, Rev 7
LS-AA-125-1002, Common Cause Analysis Manual, Rev 6
LS-AA-125-1003, Apparent Cause Evaluation Manual, Rev 8
LS-AA-125-1004, Effectiveness Review Manual, Rev 4
LS-AA-125-1005, Coding and Analysis Manual, Rev 7
LS-AA-126, Self-Assessment Program, Rev 6
LS-AA-126-1001, Focused Area Self Assessments, Rev 5
LS-AA-126-1002, Management Observations of Activities, Rev 1
LS-AA-126-1005, Check-In Self Assessments, Rev 4
LS-AA-126-1006, Benchmarking Program, Rev 2
LS-AA-127, Passport Action Tracking Management Procedure, Rev 9
MA-MA-716-009, Preventive Maintenance (PM) Work Order Process, Rev 4
MA-MA-716-009, Preventive Maintenance (PM) Work Order Process, Rev 5
MA-MA-716-010-1000, PIMS Work Order Process Manual, Rev 4
NO-AA-101-1005, Qualification and Employee Concerns Personnel, Rev 4
NO-AA-21, Nuclear Oversight Audit Process Description, Rev 4
NO-AA-210, Nuclear Oversight Regulatory Audit Procedure, Rev 1
NO-AA-210-1001, Nuclear Oversight Audit Handbook, Rev 1
NO-AA-210-1002, Nuclear Oversight Audit Templates, Rev 1
OP-AA-102-104, Pertinent Information Program, Rev 1
OP-AA-108-115, Operability Determinations (CM-1), Rev 9
OP-TM-PPC-C4123, Station Battery 1A(B) Ground Resistance Low Alarm, Rev 0

Completed Surveillances
-1302-5031B, 4160V D and E Bus Loss of Voltage Relay System Calibration, completed 04/08/10
-OP-TM-424-203 Turbine Driven Emergency Feedwater Pump Flow Test, completed 6/24/10
-OP-TM-424-203 Turbine Driven Emergency Feedwater Pump Flow Test, completed 6/25/10

Work Orders (WO)
R2122303
C2022557
R2157066
R2160426
C2012410

LIST OF ACRONYMS

ACE	Apparent Cause Evaluation
ACITs	Action Items
ACM	Adverse Condition Monitoring
ADAMS	Agency-wide Documents Access and Management System
AOs	Auxiliary Operators
AOP	Abnormal Operating Procedure
AR	Action Request
ASME	American Society of Mechanical Engineers
CA	Corrective Action
CAP	Corrective Action Program
CAQ	Condition Adverse to Quality
CCAs	Common Cause Analyses
CFR	Code of Federal Regulations
DH	Decay Heat
DRP	Division of Reactor Projects
DRS	Division of Reactor Safety
ECP	Employee Concerns Program
ECR	Engineering Change Request
EDG	Emergency Diesel Generator
EFW	Emergency Feedwater
ELUs	Emergency Lighting Units
FHAR	Fire Hazards Analysis Report
Hz	Hertz
IMC	NRC Inspection Manual Chapter
IR	Issue Report
IST	In-service Testing
MRC	Management Review Committee
MU	Make Up
NCV	Non-Cited Violation
NDE	Nondestructive Examination
NRC	Nuclear Regulatory Commission
NSCCW	Nuclear Services Closed Cooling Water
OE	Operating Experience
OEM	Original Equipment Material
OM	Operation and Maintenance
PARS	Publicly Available Records System
PI&R	Problem Identification and Resolution
QA	Quality Assurance

QHPI	Quick Human Performance Investigation
RCA	Root Cause Analysis
RG	Regulatory Guide
RHR	Residual Heat Removal
ROP	Reactor Oversight Program
SCWE	Safety Conscious Work Environment
SDP	Significance Determination Process
SOC	Station Oversight Committee
SORC	Site Operations Review Committee
SSC	System, Structure, or Component
SSD	Safe Shutdown
TMI	Three Mile Island
TRM	Technical Requirements Manual
TS	Technical Specifications
UFSAR	Updated Final Safety Analysis Report
WO	Work Order