

# Three Mile Island 1

## 4Q/2010 Plant Inspection Findings

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### Initiating Events

**Significance:**  Dec 31, 2010

Identified By: NRC

Item Type: FIN Finding

#### **Inadequate Preventive Maintenance for Signal Converter Causes Turbine Trip and Plant Transient**

A self-revealing Green finding was identified, because station personnel did not establish a periodic task to calibrate and/or replace the integrated control system (ICS) to digital turbine control system (DTCS) signal converter, a critical component, in accordance with procedure MA-AA-716-210, Performance Centered Maintenance (PCM) Process, Rev. 10. Consequently, the signal converter remained in operation past the vendor recommended service life and failed due to age related degradation, causing a turbine trip and a plant power transient from 100 to 14 percent reactor power. Station personnel replaced the failed signal converter, entered the issue into the corrective action program (Issue Report 1115086), and performed extent-of-condition reviews regarding other critical station components.

The finding is more than minor because it adversely affected the equipment performance attribute of the initiating events cornerstone and the associated cornerstone objective to limit the likelihood of those events that upset plant stability. The inspectors evaluated the finding in accordance with IMC 0609.04, Phase I – Initial Screening and Characterization of findings. The finding was of very low safety significance because although it contributed to increased likelihood of a plant trip, it did not affect the likelihood that accident mitigation equipment or functions would be available. The finding had a cross-cutting aspect in the area of Problem Identification & Resolution, Operating Experience (OE) component because station personnel did not properly collect and evaluate industry OE, including vendor recommendations, to establish appropriate preventive maintenance (PM) tasks (e.g., calibration, replacement) for the ICS to DTCS signal converter to minimize consequential failures [P.2(a)].

Inspection Report# : [2010005](#) (*pdf*)

**Significance:**  Sep 30, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

#### **Deficient Control of Transient Material in Seismic Class I Buildings**

The inspectors identified a Green non-cited violation (NCV) of Technical Specification 6.8.1 for failure to properly control and store transient material within seismic Class I buildings such that the equipment did not pose a hazard to nuclear safety or safe plant operation. Specifically, an extension ladder and a maintenance tool cart were left unattended and unsecured in close proximity to the spent fuel pool cooling piping within the fuel handling building and near intermediate cooling pump IC-P-1A and intermediate cooling supply valve IC-V-4 in the auxiliary building, respectively. Operators promptly initiated actions to remove the subject material. During subsequent plant tours the inspectors identified numerous additional examples of improperly controlled transient material. The licensee promptly corrected the identified individual discrepancies and initiated issue reports (IRs) 1095403 and 1122633 to address this performance deficiency.

The transient material posed a potential hazard to safe shutdown and safety related equipment operation during a seismic event. Cooling water supplies to the spent fuel pool, the reactor coolant pump (RCP) thermal barriers, and control rod drive mechanisms (CRDM) were potentially affected. The dominant risk associated with this performance deficiency is the increased likelihood of a loss of coolant accident or forced plant shutdown. This finding is more than minor because it affected the equipment performance attribute of the Initiating Events cornerstone. The issue was also similar to IMC 0612, Appendix E, Examples of Minor Issues, example 4.k which stated the issue was more-than-minor because it involved a credible (seismic) scenario in which the transient materials could affect equipment important to safety. This finding was of very low safety significance because it did not involve loss or degradation of equipment specifically designed to mitigate a seismic event, and did not involve total loss of a safety function that

contributes to external event-initiated core damage accident sequences. The finding had a cross-cutting aspect in the area of Human Performance, Work Practices component because station personnel did not follow procedures for equipment storage and housekeeping within seismic Class I buildings [H.4(b)].

Inspection Report# : [2010004](#) (pdf)

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## Mitigating Systems

**Significance:**  Dec 31, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

### **Deficient Internal and External Flood Barrier Inspection Program**

The inspectors identified a Green non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion V, Instructions, Procedures and Drawings for deficient internal and external flood barrier inspection procedures. Specifically, no instructions, procedures, or drawings existed to periodically inspect all openings that are potential leak paths to prevent water intrusion into areas of the plant containing safety related equipment during a design basis internal or external flood event. Consequently, TMI failed to identify two external flood barriers in the air intake tunnel (AIT) structure that had been missing since original construction, which were needed to protect safety-related equipment in the auxiliary building.

This finding is more than minor because it was associated with the protection against external factors (floods) attribute and affected the mitigating systems cornerstone objective of ensuring the availability, reliability and capability of systems (including flood barriers) that respond to initiating events to prevent undesirable consequences. The inspectors evaluated the finding in accordance with IMC 0609.04, Phase I – Initial Screening and Characterization of findings. This finding was of very low safety significance 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, or screen as potentially risk-significant due to a seismic, flooding, or severe weather initiating event. This finding had a cross-cutting aspect in the area of Problem Identification and Resolution, Operating Experience (OE), because station personnel did not properly implement and institutionalize internal and external OE through changes to station procedures to address safety related flooding inspection and design vulnerabilities [P.2(b)].

Inspection Report# : [2010005](#) (pdf)

**Significance:**  Jul 29, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

### **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**

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 40A2.a.3(a))

Inspection Report# : [2010009](#) (pdf)

**Significance:**  Jul 29, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

#### **MSSV Design Basis Calculations Inaccurate**

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 40A2.a.3(b))

Inspection Report# : [2010009](#) (pdf)

**Significance:**  Jul 29, 2010

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

#### **Multiple MSSVs test failures due to improper evaluation of Operating Experience.**

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)

Inspection Report# : [2010009](#) (pdf)

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## Barrier Integrity

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## Emergency Preparedness

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## Occupational Radiation Safety

**Significance:**  Mar 12, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

### **Failure to Use Process or Engineering Controls Caused Airborne Radioactivity**

A self-revealing non-cited violation (NCV) of 10 CFR 20.1701 was identified because Exelon did not use process or other engineering controls, to the extent practicable, to control the concentration of radioactive materials in air. Specifically, process or engineering controls were not used to the extent practicable, during vacuuming of a Unit 1 reactor coolant system cold leg, of the "A" steam generator, on November 21, 2009. The vacuum was unfiltered and caused generation of airborne radioactivity, subsequent internal and/or external contamination of 145 personnel; dispersal of airborne radioactivity to the Containment work areas, and release of low-level contamination to the offsite environment. Workers were evacuated from Containment, the source of the radioactivity was stopped, and the issue was documented in the corrective action program (AR 996823).

This finding is more than minor because it adversely affected the Occupational Radiation Safety Cornerstone objective to ensure adequate protection of worker health and safety. Using the IMC 0609, Appendix C, Occupational Radiation Safety Significance Determination Process, the finding was determined to be of very low safety significance because it did not involve: (1) as low as is reasonably achievable collective exposure planning and controls, (2) an overexposure, (3) a substantial potential for overexposure, or (4) an impaired ability to assess dose. The cause of the finding is related to the cross-cutting area of Human Performance, Work Control aspect H.3(a), in that radiological controls requirements, developed for this task, were not adequately planned, coordinated, or incorporated to preclude its occurrence.

## Public Radiation Safety

**Significance:**  Mar 12, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

### **Deficient Design Change Implementation and Controls Resulted In Unfiltered Radioactivity Release to the Environment**

A self-revealing NCV of Technical Specification 6.8 was identified because Exelon did not properly establish and implement procedures for control of radioactivity to limit materials released to the environment and limit personnel exposure as specified in Appendix A of Regulatory Guide 1.33, 1978. Specifically, from November 12 to November 21, 2009, Exelon did not effectively manage Unit 1 Containment openings and ventilation system flows, following removal of a section of the Containment liner, to maintain inward airflow and promptly detect and minimize the release of radioactivity from the construction opening as required by Engineering Change Request TM-06-00816. As a result, an uncontrolled airborne radioactivity release occurred from the construction opening on November 21 at about 3:45 p.m. Further, airborne radioactivity was released from the opening during periods of outward airflow following the removal of a section of the Containment construction opening liner on November 12 through the time of the uncontrolled release, until midnight on November 21 when inward airflow was re-established. Exelon documented this issue in its corrective action program. (ARs 994989 and 1000819)

This finding is more than minor because, if left uncorrected the issue had the potential to lead to a more significant safety concern. Using the Public Radiation Safety Significance Determination Process (IMC 0609, Appendix D), the finding was of very low safety significance because the licensee was able to assess the dose impact to members of the public and the dose impact to a member of the public from the radiological release was less than the dose values specified in both Appendix I, to 10 CFR Part 50, and 10 CFR 20.1301(e). The cause of the finding is related to the cross-cutting area of Human Performance, Resources aspect H.2(c), because procedures developed for both control and timely detection of radioactive effluents from the Containment construction opening were inadequate.

Inspection Report# : [2010007](#) (pdf)

**Significance:**  Mar 12, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

### **Untimely Corrective Action to Stop Unfiltered Radiological Release**

The inspectors identified an NCV of Technical Specification 6.11 because from November 16 through November 21, 2009, Exelon did not implement timely follow-up and corrective action to minimize radioactivity released to the environment as required radiation protection procedures, RP-AA-1, RP-AA-10, and RP-AA-14. Specifically, upon discovery on November 16 of an unplanned, unfiltered radioactive release pathway from the Containment construction opening to the environment, station personnel did not promptly initiate a condition report or assign appropriate significance to the issue. Consequently, an unfiltered release pathway from the Containment existed until appropriate control of Containment openings and the ventilations system were re-established on November 21. Condition reports 1041529 and 1042874 were initiated to evaluate timeliness of actions to stop the unfiltered radioactive release to the environment.

This finding is more than minor because, if left uncorrected the issue had the potential to lead to a more significant safety concern. Using the Public Radiation Safety Significance Determination Process (IMC 0609, Appendix D), the Finding was of very low safety significance because the licensee was able to assess the dose impact to members of the public and the dose impact to a member of the public from the radiological release was less than the dose values specified in both Appendix I, to 10 CFR Part 50, and 10 CFR 20.1301(e). The cause of the finding is related to the cross-cutting area of Problem Identification and Resolution, Corrective Action Program aspect P.1(d), because appropriate corrective actions to assess and correct the cause of the outward air flow from the Containment construction opening were not properly prioritized and implemented in a timely manner commensurate with their

safety significance and complexity.

Inspection Report# : [2010007](#) (pdf)

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## Physical Protection

Although the NRC is actively overseeing the Security cornerstone, the Commission has decided that certain findings pertaining to security cornerstone will not be publicly available to ensure that potentially useful information is not provided to a possible adversary. Therefore, the [cover letters](#) to security inspection reports may be viewed.

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## Miscellaneous

**Significance:** N/A Jul 30, 2010

Identified By: NRC

Item Type: FIN Finding

**Biennial PI&R Corrective Action Program Effectiveness Assessment**

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.

Inspection Report# : [2010009](#) (*pdf*)

Last modified : March 03, 2011