



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BOULEVARD, SUITE 100
KING OF PRUSSIA, PA 19406-2713**

June 26, 2018

Mr. Bryan C. Hanson
Senior Vice President, Exelon Generation Company, LLC
President and Chief Nuclear Officer, Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

**SUBJECT: THREE MILE ISLAND STATION UNIT 1 – BIENNIAL PROBLEM IDENTIFICATION
AND RESOLUTION INSPECTION REPORT 05000289/2018012**

Dear Mr. Hanson:

On May 17, 2018, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Three Mile Island, Unit 1 (TMI). The team discussed the results of this inspection with Mr. Joseph Dullinger, Acting Plant Manager, and other members of the TMI staff. The results of this inspection are documented in the enclosed report.

The team reviewed the station's corrective action program and the station's implementation of the program to evaluate its effectiveness in identifying, prioritizing, evaluating, and correcting problems, and to confirm that the station was complying with NRC regulations and licensee standards for corrective action programs. Based on the samples reviewed, the team determined that your staff's performance in each of these areas supported nuclear safety.

The team also evaluated the station's processes for use of industry and NRC operating experience information and the effectiveness of the station's audits and self-assessments. Based on the samples reviewed, the team determined that your staff's performance in each of these areas supported nuclear safety.

Finally, the team reviewed the station's programs to establish and maintain a safety conscious work environment, and interviewed station personnel to evaluate the effectiveness of these programs. Based on the team's observations and the results of these interviews, the team found no evidence of challenges to your organization's safety conscious work environment. Your employees appeared willing to raise nuclear safety concerns through at least one of the several means available.

The team documented one finding of very low safety significance (Green) in this report. This finding did not involve a violation of NRC requirements.

B. Hanson

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If you disagree with the cross-cutting aspect assignment or the finding not associated with a regulatory requirement in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement; and the NRC Resident Inspector at TMI.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), Part 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Matthew R. Young, Chief
Reactor Projects Branch 6
Division of Reactor Projects

Docket Number: 50-289
License Number: DPR-50

Enclosure:
Inspection Report 05000289/2018012

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AND RESOLUTION INSPECTION REPORT 05000289/2018012
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**U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report**

Docket Number: 50-289

License Number: DPR-50

Report Number: 05000289/2018012

Enterprise Identifier: I-2018-012-0008

Licensee: Exelon Generation Company, LLC (Exelon)

Facility: Three Mile Island, Unit 1(TMI)

Location: Middletown, PA 17057

Dates: April 30 to May 17, 2018

Inspectors: T. Setzer, Senior Project Engineer, Team Leader
C. Hobbs, Reactor Inspector
B. Lin, Resident Inspector
R. Vadella, Project Engineer

Approved By: M. R. Young, Chief
Reactor Projects Branch 6
Division of Reactor Projects

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring Exelon's performance at TMI by conducting the biennial problem identification and resolution inspection in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information.

Based on the samples selected for review, the team concluded that Exelon was effective in identifying, evaluating, and resolving problems and that Exelon effectively used operating experience and self-assessments. The team found no evidence of significant challenges to Exelon's safety conscious work environment at TMI and concluded that the staff are willing to raise nuclear safety concerns through at least one of the several means available.

NRC identified and self-revealing findings are summarized in the table below.

List of Findings and Violations

Failure to Establish Appropriate Corrective Actions Associated with a Degraded Non-Safety Related Piping System.			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green FIN 05000289/2018012-01 Closed	P.2 Evaluation	71152B
The NRC identified a Green finding when Exelon failed to establish appropriate corrective actions for a non-safety related system in the vicinity of safety-related equipment from 2010 to 2018. Specifically, failure to fix non-safety related piping resulted in its failure and water intrusion into the ESAS cabinets. This resulted in an event that required extensive clean up and detailed inspection of several Emergency Safeguards Actuation System (ESAS) cabinets due to water intrusion from the non-safety related system.			

INSPECTION SCOPES

This inspection was conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at

<http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>.

Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The team reviewed selected procedures and records, observed activities, and interviewed personnel to assess Exelon's performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

OTHER ACTIVITIES – BASELINE

71152 - Problem Identification and Resolution

Biennial Team Inspection (1 Sample)

The team performed a biennial assessment of the licensee's corrective action program, use of operating experience, self-assessments and audits, and safety conscious work environment. The assessment is documented below.

- (1) Corrective Action Program Effectiveness – The team evaluated Exelon's effectiveness in identification, prioritization and evaluation, and correcting problems, and verified the station complied with NRC regulations and Exelon's standards for corrective action programs.
- (2) Operating Experience – The team evaluated Exelon's effectiveness in its use of industry and NRC operating experience information and verified the station complied with Exelon's standards for the use of operating experience.
- (3) Self-Assessments and Audits – The team evaluated the effectiveness of Exelon's audits and self-assessments and verified the station complied with Exelon's standards for the use of operating experience.
- (4) Safety Conscious Work Environment – The team reviewed Exelon's programs to establish and maintain a safety conscious work environment, and interviewed station personnel to evaluate the effectiveness of these programs.

INSPECTION RESULTS

Evaluation of the TMI PI&R Program	71152B
<p>The team reviewed the station's corrective action program and the station's implementation of the program to evaluate its effectiveness in identifying, prioritizing, evaluating, and correcting problems, and to confirm that the station was complying with NRC regulations and licensee standards for corrective action programs. Based on the samples reviewed, the team determined Exelon staff's performance in each of these areas supported nuclear safety. The team identified one finding in the area of Problem Identification and Resolution.</p>	
<p>The team also evaluated the station's processes for use of industry and NRC operating experience information and the effectiveness of the station's audits and self-assessments. Based on the samples reviewed, the team determined that the staff's performance in each of these areas supported nuclear safety.</p>	
<p>Finally, the team reviewed the station's programs to establish and maintain a safety conscious work environment, and interviewed station personnel to evaluate the effectiveness of these programs. Based on the team's observations and the results of these interviews the team found no evidence of challenges to the organization's safety conscious work environment. Employees appeared willing to raise nuclear safety concerns through at least one of the several means available.</p>	

Failure to Establish Appropriate Corrective Actions Associated with a Degraded Non-Safety Related Piping System.			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green FIN 05000289/2018012-01 Closed	P.2 Evaluation	71152B
<p>The NRC identified a Green finding when Exelon failed to establish appropriate corrective actions for a non-safety related system in the vicinity of safety-related equipment from 2010 to 2018. Specifically, failure to fix non-safety related piping resulted in its failure and water intrusion into the ESAS cabinets. This resulted in an event that required extensive clean up and detailed inspection of several Emergency Safeguards Actuation System (ESAS) cabinets due to water intrusion from the non-safety related system.</p>			
<p><u>Description:</u> Exelon's corrective action program (PI-AA-125) contains provisions to ensure that when multiple events or conditions occur due to similar causes, corrective actions will be taken in response to those previous events. From July 2010 to May 2018, Exelon documented 10 Issue reports where leakage due to degraded piping conditions in the control structure drain system propagated from the 355' level to the safety related rooms in the 338' level. In the 338' level, there are two drain pipes traversing above several trains of the ESAS system and the "D" train of the 4kV electrical distribution switchgear. In each issue report, the leakage condition was promptly identified and repaired.</p>			
<p>The inspectors noted that the leak path from the 355' level to the 338' level was never corrected to eliminate the potential impact to the safety-related equipment below. The inspectors also noted that there were several previous opportunities (issue reports 4057820 and 4124078) to evaluate the significance of this issue and complete timely repairs to the aging drain pipes in the control structure. One issue report recommending action to charter a multi-discipline team to evaluate the cumulative impact of non-safety related leakage in the control structure was closed with no action in 2017.</p>			

On February 19, 2018, operators discovered leakage from a breach in the overhead drainage pipe that propagated to the inside of the ESAS cabinets below. Operators were dispatched when the main control room received several ESAS alarms. No actuation of the ESAS system or plant trip occurred as a result of the water intrusion. Upon inspection of the inside of the ESAS cabinet, technicians discovered evidence of several components wetted from the event.

Corrective Actions: Exelon inspected and repaired the affected components in the ESAS system, performed an extent of condition on other susceptible safety-related components that could be affected by non-safety related systems, and repaired the leak path and degraded pipe above the ESAS cabinets.

Corrective Action Reference: Issue Report 4105768

Performance Assessment:

Performance Deficiency: The team determined that the failure to establish appropriate corrective actions for degraded piping near safety-related equipment was a performance deficiency. This performance deficiency was reasonably within Exelon's ability to foresee and correct and should have been prevented.

Screening: The team determined the performance deficiency was more than minor because it is associated with the Equipment Performance attribute of the Initiating Events cornerstone and adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations.

Significance: The team assessed the significance of the finding using IMC 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings" worksheet, which directs the user to Exhibit 1 of IMC 0609, Appendix A, "The SDP for Findings at Power." The team determined that this finding is of very low safety significance (Green) because the performance deficiency did not cause both a reactor trip and a loss of mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition.

Cross-Cutting Aspect: This finding has a cross-cutting aspect in the area of Problem Identification and Resolution associated with Evaluation; in that, Exelon did not thoroughly evaluate issues to ensure that the resolution addressed the causes and extent of condition commensurate with their safety significance. Specifically, failing to establish appropriate corrective actions for the known degraded condition could cause a loss of safety related equipment or loss of a vital switchboard initiating event. [P.2].

Enforcement: The team did not identify a violation of regulatory requirements associated with this finding.

Observation	71152B
<p>Corrective Action Program: Based on the samples reviewed, the team determined that your staff's performance in this area adequately supported nuclear safety. However, the team identified an observation associated with the closure of corrective action items open for greater than two years, in which due dates for Action Tracking Items (ACITs) were extended multiple times. Specifically:</p> <ol style="list-style-type: none"> 1) Issue Report 1334581, initiated in February 2012, described a broken electrohydraulic control (EHC) tubing support that is located on the turbine building elevation 322' between the #2 and #3 main turbine control valves. Exelon performed a tubing stress analysis and concluded that an engineering change request (ECR) was needed to install additional tube supports due to the potential of a fatigue failure. The assignment (ACIT) to develop the ECR was extended eight times and was never completed. 2) Issue Report 2380995, initiated in September 2014, described a motor operated valve (MOV) that failed to stroke during a post maintenance test, which was caused by an error in the installation of a gasket during maintenance. Exelon created an assignment to develop and implement three procedures that would include guidance on how to install the gasket correctly. The due date for this ACIT was extended by more than three years due to other priority work preventing work on these new procedures. The procedures were never written. 3) Issue Report 1395413, initiated in July 2012, described a Reactor Building (RB) Spray piping analysis for hydraulic loading that was conducted as a response to Engineering Request (ER-AA-2009) for managing gas accumulation in sections of pipe that are voided by design. Exelon concluded in 2012 that the RB Spray system was operable and the piping and components in the system were adequate to support dynamic loads based on a worst case water hammer engineering evaluation. An ACIT was created to specify the dynamic loads at certain orifices and piping tees in the system using GOTHIC or RELAP computer models. This ACIT was extended 8 times since 2012 due to having a lower priority when compared to other outage related activities and that significant resources would be needed to complete this analysis. <p>ACITs are defined by Exelon's corrective action program as tracking items that correct minor problems that do not represent conditions adverse to quality. ACITs do not require a formal justification for extending their associated due dates. However, based on the three examples provided by the team, Exelon captured the observation as issue report 4138145, which will review due dates for other ACITs that have remained open for greater than two years.</p>	
Observation	71152B
<p>Operating Experience: Based on the samples reviewed, the team determined that your staff's performance in this area adequately supported nuclear safety.</p>	
Observation	71152B
<p>Self-Assessment and Audits: Based on the samples reviewed, the team determined that your staff's performance in this area adequately supported nuclear safety.</p>	
Observation	71152B
<p>Safety Conscious Work Environment: The team found no evidence of challenges to your organization's safety conscious work environment. Your employees appeared willing to raise nuclear safety concerns through at least one of the several means available.</p>	

EXIT MEETINGS AND DEBRIEFS

On May 17, 2018, the team presented the biennial problem identification and resolution inspection results to Mr. Joseph Dullinger, Acting Plant Manager, and other members of the TMI staff. The team verified no proprietary information was retained or documented in this report.

DOCUMENTS REVIEWED**71152B**Procedures

PI-AA-115, Operating Experience Program, Revision 3
 PI-AA-115-1002, Processing of Level 2 OPEX Evaluations, Revision 3
 PI-AA-115-1003, Processing of Level 3 OPEX Evaluations, Revision 4
 PI-AA-120, Issue Identification and Screening Process, Revision 8
 PI-AA-125, Corrective Action Program (CAP) Procedure, Revision 6
 PI-AA-125-1001, Root Cause Analysis Manual, Revision 3
 PI-AA-125-1003, Corrective Action Program Evaluation Manual, Revision 4
 PI-AA-125-1004, Effectiveness Review Manual, Revision 2
 PI-AA-125-1006, Investigation Techniques Manual, Revision 3
 PI-AA-126, Self-Assessment and Benchmark Program, Revision 2
 PI-AA-126-1001, Self-Assessments, Revision 2
 PI-AA-126-1005, Check-In Self-Assessments, Revision 1
 OP-AA-108-115, Operability Determinations, Revision 20

Condition Reports (*initiated in response to NRC inspection)

4133128*	4006988	2620076	4071175	4057820
4137944*	4006988	2678255	4071599	4020311
4138145*	4011082	2690849	4071647	2654014
4134400*	4012771	2695831	4072231	2491126
1395413	4014694	2697048	4082179	1442690
2380995	4016781	2715716	4101649	1442668
2494120	4022757	3948541	4101674	1360927
2520958	4022757	3949713	4119704	1360908
2566171	4041206	3950464	4120019	1096405
2644384	4041206	3950932	4120022	4070093
2650021	4041898	3958974	4120025	4070082
2651653	4041898	3954777	4124777	4029191
2651653	4047886	3958977	4126221	4021478
2652441	4049063	3965039	4127422	4025781
2657233	4049063	3967088	4129850	3997579
2666070	4049166	3969119	4130001	3997571
2673214	4053268	3976314	4130549	3997562
2686755	4057904	3979587	4132306	3993445
2686755	4061160	4007601	3977095	2670624
2694835	4063212	4008206	4014694	2670778
2695940	4063212	4015134	4016781	4071578
2705855	4072385	4015943	4076652	4071160
2708558	4072385	4046732	4090517	2658947
2730140	4072933	4050882	3949713	2673109
2736571	4076652	4051239	3950464	2698889
2736571	4081290	4051547	4049166	3993070
2742567	4085589	4051608	4081290	4013069
3949713	4085596	4052043	4085589	4130935
3950376	4085607	4060127	4085596	4131922
3950464	4090517	4060673	4085607	3987759
3977095	1334581	4060723	4136326	3987953
3989283	2578255	4061529	4124078	3985944
4006213	2608560	4061541	4105768	3670257
4006213	2611969	4067406	4089656	

Self-Assessment and Audits

Preparation for NRC Problem Identification and Resolution (PI&R) Inspection, dated 3/2/18
NOSA-TMI-18-01, Maintenance Functional Area Audit Report, dated 2/7/18
NOSA-TMI-17-04, Corrective Action Program Audit Report, dated 3/29/17
NOSA-TMI-17-05, Engineering Design Control Audit Report, dated 6/28/17
2017 Biennial Operating Experience Program Assessment, dated 6/15/17

Maintenance Orders/Work Orders

4742699
4574579
4640496
4656196
4656207

Non-Cited Violations (NCVs) and Findings (FIN):

05000286/2016003-01, Emergency Diesel Generator Internal Flooding Risk Not Evaluated
05000289/2017004-01, Failure to Correct Degraded Control Rod Connections
05000289/2018001-(EA-18-029), Multiple Examples of Nonconforming to Design for
Tornado Missile Protection
05000289/2018001-(EA-18-038), Primary Containment Declared Inoperable Due to Both
Airlock Doors Open Simultaneously