



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

REGION I  
2100 RENAISSANCE BLVD., SUITE 100  
KING OF PRUSSIA, PA 19406-2713

April 28, 2016

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

**SUBJECT: THREE MILE ISLAND STATION, UNIT 1 – INTEGRATED INSPECTION REPORT  
5000289/2016001**

Dear Mr. Hanson:

On March 31, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Three Mile Island, Unit 1 (TMI) facility. The enclosed inspection report documents the inspection results, which were discussed on April 22, 2016, with Mr. Thomas Haaf, TMI Plant Manager, and other members of your staff.

NRC inspectors examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

The inspectors documented one finding of very low safety significance (Green) in this report. This finding involved a violation of NRC requirements. Additionally, a licensee-identified violation, which was determined to be of very low safety significance, is listed in this report. However, because of the very low safety significance, and because they are entered into your corrective action program, the NRC is treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest the non-cited violations 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 Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at Three Mile Island. In addition, if you disagree with the cross-cutting aspect assigned to any finding, or a 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 disagreement, to the Regional Administrator, Region I, and the NRC Resident Inspector at Three Mile Island.

In accordance with Title 10 of the *Code of Federal Regulations* (CFR) 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

*/RA/*

Silas R. Kennedy, Chief  
Reactor Projects Branch 6  
Division of Reactor Projects

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

Enclosure:  
Inspection Report 05000289/2016001  
w/Attachment: Supplementary Information

cc w/encl: Distribution via ListServ

In accordance with Title 10 of the *Code of Federal Regulations* (CFR) 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records component of the NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

*/RA/*

Silas R. Kennedy, Chief  
 Reactor Projects Branch 6  
 Division of Reactor Projects

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

Enclosure:  
 Inspection Report 05000289/2016001  
 w/Attachment: Supplementary Information

cc w/encl: Distribution via ListServ

Distribution w/encl:

DDorman, RA  
 DLew, DRA  
 MScott, DRP  
 DPelton, DRP  
 RLorson, DRS  
 BSmith, DRS

SKennedy, DRP  
 SShaffer, DRP  
 SEIkhiamy, DRP  
 MHenrion, DRP  
 DWerkheiser, DRP, SRI  
 LCruz, DRP, RI

LDumont, DRP, RI  
 ADiaz, DRP, OA  
 JBowen, RI OEDO  
 RidsNrrPMThreeMileIsland Res  
 RidsNrrDorLpl1-2 Res  
 ROPReportsRes

DOC Name: G:\DRP\BRANCH6\+++THREE MILE ISLAND\TMI INSPECTION REPORTS\  
 2016\TMI\_REPORT\_IR2016001 FINAL.DOCX  
 ADAMS ACCESSION No. ML16119A047

<input checked="" type="checkbox"/> SUNSI Review		<input checked="" type="checkbox"/> Non-Sensitive		<input checked="" type="checkbox"/> Publicly Available	
		<input type="checkbox"/> Sensitive		<input type="checkbox"/> Non-Publicly Available	
OFFICE	RI/DRP	RI/DRP	RI/DRP		
NAME	DWerkheiser/SWS via email	SShaffer/ SWS	SKennedy/ SRK		
DATE	04/22/16	04/ 27/16	04/27 /16		

OFFICIAL RECORD COPY

U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No: 50-289

License No: DPR-50

Report No: 05000289/2016001

Licensee: Exelon Generation Company

Facility: Three Mile Island Station, Unit 1

Location: Middletown, PA 17057

Dates: January 1 through March 31, 2016

Inspectors: D. Werkheiser, Senior Resident Inspector  
L. Cruz, Resident Inspector  
L. Dumont, Resident Inspector  
S. Barr, Senior Emergency Preparedness Inspector  
P. Ott, Reactor Inspector  
R. Rolph, Health Physicist

Approved by: S. Kennedy, Chief  
Projects Branch 6  
Division of Reactor Projects

## TABLE OF CONTENTS

SUMMARY .....	3
1. REACTOR SAFETY .....	5
1R01 Adverse Weather Protection.....	5
1R04 Equipment Alignment .....	8
1R05 Fire Protection .....	9
1R06 Flood Protection Measures.....	10
1R07 Heat Sink Performance .....	10
1R11 Licensed Operator Requalification Program .....	10
1R12 Maintenance Effectiveness.....	12
1R13 Maintenance Risk Assessments and Emergent Work Control .....	12
1R15 Operability Determinations and Functionality Assessments.....	13
1R18 Plant Modifications .....	14
1R19 Post-Maintenance Testing.....	14
1R22 Surveillance Testing .....	15
1EP2 Alert and Notification System Evaluation .....	16
1EP3 Emergency Response Organization Staffing and Augmentation System.....	16
1EP5 Maintenance of Emergency Preparedness .....	16
1EP6 Drill Evaluation .....	17
2. RADIATION SAFETY.....	17
2RS6 Radioactive Gaseous and Liquid Effluent Treatment .....	17
4. OTHER ACTIVITIES .....	19
4OA1 Performance Indicator Verification.....	19
4OA2 Problem Identification and Resolution .....	20
4OA3 Follow-Up of Events and Notices of Enforcement Discretion .....	20
4OA6 Meetings, Including Exit.....	21
4OA7 Licensee-Identified Violations .....	21
ATTACHMENT: SUPPLEMENTARY INFORMATION.....	22
SUPPLEMENTARY INFORMATION.....	A-1
KEY POINTS OF CONTACT .....	A-1
LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATED .....	A-2
LIST OF DOCUMENTS REVIEWED.....	A-2

## SUMMARY

IR 05000289/2016001, 01/01/2016-03/31/2016; Three Mile Island, Unit 1, Adverse Weather Protection.

This report covered a three-month period of inspection by resident inspectors and announced inspections performed by regional inspectors. Inspectors identified one non-cited violation (NCV) which was of very low safety significance (Green). The significance of most findings is indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP), dated April 29, 2015. Cross-cutting aspects are determined using IMC 0310, "Aspects Within Cross-Cutting Areas," dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated February 4, 2015. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 5.

### Cornerstone: Mitigating Systems

- Green. A self-revealing NCV of Title 10 of the *Code of Federal Regulations* (CFR), Part 50, Appendix B, Criterion III, "Design Control," was identified for failure to establish and implement adequate design control measures to assure that the borated water storage tank (BWST) was capable of performing its design function to mitigate a design basis loss of coolant accident (LOCA) event. Specifically, Exelon made a modification to the BWST level indicator safety grade heat trace circuit that placed the circuit in an unapproved electrical configuration, which failed to prevent instrument line freezing during cold weather periods, contrary to its safety-function to maintain BWST level indication operable in cold weather. This adversely impacted the availability of a BWST level indication necessary for operators to reliably perform a critical design basis manual action. Exelon documented these issues in issue reports 2609417 and 2611119. Immediate corrective actions included replacement of the affected heat trace and completion of a compatible modification to its electrical configuration.

This performance deficiency was more than minor because it was associated with the design control attributes of the Mitigating Systems cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Additionally, the finding was similar to example 2.f in Appendix E of IMC 0612, in that failure to properly maintain cold weather protection equipment for the BWST level transmitters resulted in DH-LT-809 becoming inoperable. The finding was of very low safety significance (Green) because it did not affect design or qualification, did not represent a loss of system function, did not cause at least one train of BWST level instrumentation to be inoperable for greater than its Technical Specification limiting condition of operation (LCO) allowed outage time, and did not involve external event mitigation systems.

The finding had a cross-cutting aspect in the area of Human Performance, Procedure Adherence, because station personnel did not follow the heat trace procedure, which did not allow the two types of heat trace to be spliced together. (IMC 0310, H.8). (Section 1R01)

**Other Findings**

A violation of very low safety significance that was identified by Exelon was reviewed by the inspectors. Corrective actions taken or planned by Exelon have been entered into Exelon's corrective action program. This violation and corrective action tracking number are listed in Section 4OA7 of this report.

## REPORT DETAILS

### Summary of Plant Status

Unit 1 began the inspection period at 100 percent power. On February 27, 2016, operators reduced power to approximately 89 percent power to facilitate planned main turbine valve testing and reactor control rod testing. Operators returned the unit to 100 percent power on February 28. The unit remained at or near 100 percent power for the remainder of the inspection period.

### 1. REACTOR SAFETY

#### **Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity**

1R01 Adverse Weather Protection (71111.01 – 2 samples)

.1 Readiness for Impending Adverse Weather Conditions

a. Inspection Scope

The inspectors reviewed Exelon's preparations and response with the onset of extreme low temperatures during the period of January 3 – 6, 2016. The inspectors reviewed the implementation of cold weather preparation before the onset of and during this adverse weather condition. The inspectors walked down accessible portions of TMI systems exposed to air temperatures. The inspectors verified that operator actions defined in Exelon's adverse weather procedure for Three Mile Island (TMI) maintained the readiness of essential systems. The inspectors discussed readiness and staff availability for adverse weather response with operations and work control personnel. The inspectors reviewed Exelon's lessons learned from their implementation of severe weather procedures during previous low temperature conditions. Documents reviewed for each section of this inspection report are listed in the Attachment.

b. Findings

Introduction. A self-revealing Green NCV of Title 10 CFR 50, Appendix B, Criterion III, "Design Control," was identified for Exelon's failure to establish and implement adequate design control measures to assure that the borated water storage tank (BWST) was capable of performing its design function to mitigate a LOCA. Specifically, Exelon made a modification to the BWST level indicator safety grade heat trace circuit that placed the circuit in an unapproved electrical configuration, which failed to prevent instrument line freezing during cold weather periods, contrary to its safety-function to maintain BWST level indication operable in cold weather.

Description. Manual pump suction swapover from the BWST to the containment sump for the recirculation phase of a LOCA response is a time critical design basis manual operator action. Prior to swapping pump suction to the containment sump, operators must ensure enough BWST volume has been injected into the reactor vessel to support accident analysis assumptions (including sufficient containment sump level to meet ECCS pump net positive suction head (NPSH) requirements during recirculation mode). Operators must also ensure swapover is complete prior to BWST level lowering below the level needed to maintain ECCS pump NPSH requirements during the injection



phase. Operators rely on BWST level instruments DH-LT-808 and DH-LT-809 to provide accurate level indication to support performance of the ECCS swapover to the recirculation phase. Technical specifications require both level transmitter indications to be operable. Heat trace circuits and insulation are installed on the BWST level transmitter instrument lines to ensure the lines do not freeze and adversely affect BWST level indication during periods of cold weather.

At approximately 6:56 p.m., on January 4, 2016, during a cold weather period, the instrument line to BWST level transmitter DH-LT-809 froze, causing level indication to fail high and become unreliable. Operators promptly declared the level transmitter inoperable and applied the associated 72 hour plant shutdown LCO as required by Technical Specification 3.3.2. Station personnel initiated action to thaw the instrument sensing line and returned the transmitter to service. Technicians identified that instrument line insulation was properly in place for both transmitter instrument lines, but heat trace circuits for DH-LT-809 was not heating its respective line. Interim compensatory measures were implemented to maintain both BWST level transmitter (DH-LT-808 & 809) instrument lines from freezing until the issue was further investigated and repaired. At 1:26 a.m., on January 6, operators returned DH-LT-809 to service and exited the Technical Specification LCO.

After the DH-LT-809 failure, station personnel documented this issue and performed an equipment apparent cause evaluation (issue report 2607617) and determined the cause to be an unapproved heat trace configuration and insufficient heating of the DH-LT-809 instrument line from splicing the new Delta-Therm segment of heat trace in series with the existing Nelson heat trace under work order (WO) C2033726 in the fall of 2015. Two different design heat trace segments had been installed in series on the same heat trace power circuit. Based on different electrical design characteristics (Nelson: constant current, Delta-Therm: constant wattage), this configuration resulted in inadequate voltage to the downstream Nelson cable segment. The constant wattage segment dropped circuit voltage below the required value needed to operate the constant current segment of heat trace. Consequently circuit voltage to the Nelson segment heat trace was too low for the heat trace elements to function and this portion of the instrument line froze.

In 2001, procurement engineers performed item equivalency evaluation (IEE), IEE-T1-01-0005, which evaluated and authorized replacement of Chemlex or Nelson heat trace systems with Delta-Therm constant-wattage heat trace systems. Station procedures for heat trace repair and replacement were modified to direct replacement of Nelson heat trace with Delta-Therm heat trace, but did not allow the two designs to be spliced together in the same circuit. In the fall of 2015 during refueling outage 1R21, station personnel had identified and repaired degraded insulation and Nelson heat trace on the DH-LT-809 instrument line. The repair was planned in accordance with procedure 1420-HT-1.3, "Heat Trace Replacement," Revision 5, which specified that Delta-Therm constant-wattage type heat trace be used when replacing Nelson heat trace. Engineers did not sufficiently consider and evaluate the potential configurations in which the Delta-Therm heat trace may be installed in the plant. IEE-T1-01-0005 did not specifically address installation of segments of different types of heat trace in series (pre-modification TMI configuration). Therefore, engineers did not identify the different heat trace types were incompatible for certain installation configurations and that additional post-maintenance tests should be considered. Consequently, in the fall of 2015, repair of a damaged section of DH-LT-809 (Nelson) heat trace was replaced with a Delta-

Therm segment without adequate review and testing. Exelon documented these issues in issue reports 2609417 and 2611119. Immediate corrective actions included replacing the entire heat trace for DH-LT-809 with Delta-Therm heat trace with the proper electrical configuration under work order (WO) C2035545, verified the configuration to DH-LT-808 and other safety-related heat tracing worked during the previous outage, and modified the heat trace governing procedure, 1420-HT-1.3, to clarify acceptable configuration and compatibility. Final heat trace replacements, circuit repairs, and insulation repairs were completed on January 8.

Analysis. The inspectors determined that the failure to maintain the design function of the DH-LT-809 heat trace to prevent instrument line freezing during cold weather periods to assure that the BWST was capable of performing its safety function to mitigate a design basis LOCA as required by 10 CFR 50, Appendix B, "Criterion III," is a performance deficiency. This performance deficiency is more than minor because it was associated with the design control attributes of the Mitigating Systems cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Additionally, the finding is similar to example 2.f in Appendix E of IMC 0612, in that failure to properly maintain cold weather protection equipment for the BWST level transmitters resulted in DH-LT-809 becoming inoperable. This adversely impacted availability of a BWST level indication necessary for operators to reliably perform a critical design basis manual action.

The inspectors evaluated the finding in accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Initial Screening and Characterization of Findings," dated April 29, 2015, and IMC 0609, Appendix A, "The Significance Determination Process for Findings At-Power," Exhibit 2, "Mitigating Systems Screening Questions." The inspectors determined that the finding was of very low safety significance (Green) because it did not affect design or qualification, did not represent a loss of system, did not cause at least one train of BWST level instrumentation to be inoperable for greater than its Technical Specification LCO allowed outage time, and did not involve external event mitigation systems. The inspectors determined that the issue had a cross-cutting aspect in the area of Human Performance, Procedure Adherence, because station personnel did not follow the heat trace procedure, which did not allow the two types of heat trace to be spliced together. (IMC 0310, H.8).

Enforcement. Title 10 of the CFR 50, Appendix B, Criterion III, "Design Control," requires, in part, that measures be established to assure the suitability of materials, parts, equipment, and processes that are essential to the safety-related functions of the structures, systems, and components. Additionally, design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews, by the use of alternate or simplified calculational methods, or by the performance of a suitable testing program.

Contrary to this requirement, during the fall of 2015, DH-LT-809 heat tracing was modified with incompatible heat trace and circuit configuration which rendered the heat trace incapable to perform its design function of preventing instrument line freezing during cold weather periods. Consequently, on January 4, 2016, during cold weather, the BWST level transmitter DH-LT-809 instrument line froze and became inoperable. The inoperable transmitter adversely impacted indication necessary for operators to perform a critical manual action credited to mitigate a design basis LOCA. Immediate corrective actions of replacing the heat with an acceptable electrical configuration restored the transmitter to operation on January 6, 2016. This violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. The violation was entered into the Exelon corrective action program as issue reports 2607617, 2609417, and 2611119. **(NCV 05000289/2016001-01, Deficient Design Control of ECCS Level Transmitter Instrument Line Heat Trace Causes Freezing and Inoperability)**

.2 Readiness for Impending Adverse Weather Condition

a. Inspection Scope

The inspectors reviewed Exelon's preparations for the prediction and onset of blizzard-conditions and extreme snowfall from winter storm "Jonas" during January 22 through January 25, 2016. Winter storm "Jonas" resulted in historic snowfall at the site, approximately 30 inches of snow. The inspectors reviewed the implementation of adverse weather preparation procedures, selection and staging of sequestered operating and support crews, and emergency preparedness contingencies before the onset of and during this adverse weather condition. The inspectors walked down the emergency diesel generators, intake structure, and snow removal equipment staging areas. The inspectors verified that operator actions defined in Exelon's adverse weather procedure for TMI maintained the readiness of essential systems. The inspectors discussed readiness and staff availability for adverse weather response with operations and work control personnel.

b. Findings

No findings were identified.

1R04 Equipment Alignment

.1 Partial System Walkdowns (71111.04Q – 4 samples)

a. Inspection Scope

The inspectors performed partial walkdowns of the following systems:

- 'B' reactor river water system during 'A' system outage, on March 1 and 2, 2016
- 'B' emergency feedwater system during 'A' steam-driven emergency feedwater pump supply valve (MS-V-13A) planned maintenance (WO R2112538), on March 21, 2016
- 'B' nuclear river water during 'A' nuclear river pump maintenance outage, on March 24, 2016

- 4160 volts alternating current emergency power during unplanned availability of the station blackout diesel generator, on March 28, 2016

The inspectors selected these systems based on their risk-significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors reviewed applicable operating procedures, system diagrams, the Updated Final Safety Analysis Report (UFSAR), technical specifications, work orders, issue reports, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have impacted system performance of their intended safety functions. The inspectors also performed field walkdowns of accessible portions of the systems to verify system components and support equipment were aligned correctly and were operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no deficiencies. The inspectors also reviewed whether Exelon staff had properly identified equipment issues and entered them into the corrective action program for resolution with the appropriate significance characterization.

b. Findings

No findings were identified.

1R05 Fire Protection

.1 Resident Inspector Quarterly Walkdowns (71111.05Q – 5 samples)

a. Inspection Scope

The inspectors conducted tours of the areas listed below to assess the material condition and operational status of fire protection features. The inspectors verified that Exelon controlled combustible materials and ignition sources in accordance with administrative procedures. The inspectors verified that fire protection and suppression equipment was available for use as specified in the area pre-fire plan, and passive fire barriers were maintained in good material condition. The inspectors also verified that station personnel implemented compensatory measures for out of service, degraded, or inoperable fire protection equipment, as applicable, in accordance with procedures.

- Yard general area (FA-Y-1), on January 5-8, 2016
- Control building 1S switchgear room, elevation 322' (CB-FA-2B), on March 17, 2016
- Station black out diesel fuel oil tank room, on March 24, 2016
- Auxiliary building elevation 281', makeup and purification pump C (AB-FZ-2C), on March 21, 2016
- Intermediate building level 295' general area (IB-FZ-4) on March 30, 2016

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06 – 1 sample)Internal Flooding Reviewa. Inspection Scope

The inspectors reviewed the UFSAR, the site flooding analysis, and plant procedures to assess susceptibilities involving internal flooding. The inspectors also reviewed the corrective action program to determine if Exelon identified and corrected flooding problems and whether operator actions for coping with flooding were adequate. The inspectors also focused on the reactor building tendon access gallery during the week of March 11, 2016, to verify the adequacy of equipment seals located below the flood line, floor and water penetration seals, watertight door seals, common drain lines and sumps, sump pumps, level alarms, control circuits, and temporary or removable flood barriers.

b. Findings

No findings were identified.

1R07 Heat Sink Performance (711111.07A – 1 sample)a. Inspection Scope

The inspectors reviewed the 'A' nuclear service closed cooling water heat exchanger (NS-C-1A) during inspection and cleaning activities on March 18, 2016, to determine its readiness and availability to perform its safety functions. The inspectors reviewed the design basis for the component and verified Exelon's commitments to NRC Generic Letter 89-13, "Service Water System Requirements Affecting Safety-Related Equipment," were being maintained. The inspectors observed actual performance tests for the heat exchangers and/or reviewed the results of previous inspections of the heat exchanger reviewed. The inspectors discussed the results of the most recent inspection with engineering staff and reviewed pictures of the as-found and as-left conditions. The inspectors verified that Exelon initiated appropriate corrective actions for identified deficiencies. The inspectors also verified that the number of tubes plugged within the heat exchanger did not exceed the maximum amount allowed.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program (71111.11 – 3 samples).1 Quarterly Review of Licensed Operator Requalification Testing and Training  
(71111.11Q – 1 sample)a. Inspection Scope

The inspectors observed crew 'A' licensed operator simulator training on March 15, 2016, which included a total loss of feedwater flow which required initiating high pressure cooling and the recognition and declaration of an emergency classification. The inspectors evaluated operator performance during the simulated

event and verified completion of risk significant operator actions, including the use of abnormal and emergency operating procedures. The inspectors assessed the clarity and effectiveness of communications, implementation of actions in response to alarms and degrading plant conditions, and the oversight and direction provided by the control room supervisor. The inspectors verified the accuracy and timeliness of the emergency classification made by the shift manager and the technical specification action statements entered by the shift technical advisor. Additionally, the inspectors assessed the ability of the crew and training staff to identify and document crew performance problems.

b. Findings

No findings were identified.

.2 Quarterly Review of Licensed Operator Performance in the Main Control Room (71111.11Q – 1 sample)

a. Inspection Scope

The inspectors observed control room operations in support of integrated control system troubleshooting, 'A' make-up pump (MU-P-1A) testing, and preparation and initiation of reactor building purge as well as routine plant operations conducted on February 24, 2016. The inspectors observed licensed operators performance to verify that procedure use, crew communications, and coordination of activities between work groups met the criteria specified in Exelon's OP-AA-1, "Conduct of Operations," Revision 000. In addition, the inspectors verified that licensee supervision and management were adequately engaged in plant operations oversight and appropriately assessed control room operator performance and similarly met established expectations and standards.

b. Findings

No findings were identified.

.3 Annual Review of Licensed Operator Regualification Exam Performance (71111.11A – 1 sample)

a. Inspection Scope

On March 31, 2016, one NRC region-based inspector conducted an in-office review of results of licensee-administered annual operating tests for 2016 for TMI Unit 1 operators. The inspection assessed whether Pass/Fail rates were consistent with the guidance of NRC Manual Chapter 0609, Appendix I, and "Operator Regualification Human Performance Significance Determination Process (SDP)." The review verified that the failure rate (individual or crew) did not exceed 20 percent.

- 3 out of 47 operators failed at least one section of the annual examination. The overall individual failure rate was 6.4 percent
- 1 out of 7 crews failed the simulator test. The crew failure rate was 14.3 percent

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12Q – 2 samples)

a. Inspection Scope

The inspectors reviewed the samples listed below to assess the effectiveness of maintenance activities on structure, system, or component (SSC) performance and reliability. The inspectors reviewed system health reports, corrective action program documents, maintenance work orders, and maintenance rule basis documents to ensure that Exelon was identifying and properly evaluating performance problems within the scope of the maintenance rule. For each sample selected, the inspectors verified that the SSC was properly scoped into the maintenance rule in accordance with 10 CFR 50.65 and verified that the (a)(2) performance criteria established by Exelon staff was reasonable. As applicable, for SSCs classified as (a)(1), the inspectors assessed the adequacy of goals and corrective actions to return these SSCs to (a)(2). Additionally, the inspectors ensured that Exelon staff was identifying and addressing common cause failures that occurred within and across maintenance rule system boundaries.

- Maintenance rule determination for the screen wash performance (system 535) based on exceeding unavailability hours criteria as documented in issue report 2600386, on January 11, 2016
- Maintenance rule screening and disposition of functional failures of decay heat functions (system 212) as documented in IRs 2615743 and 2471164 on January 25, 2016

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 6 samples)

a. Inspection Scope

The inspectors reviewed station evaluation and management of plant risk for the maintenance and emergent work activities listed below to verify that Exelon performed the appropriate risk assessments prior to removing equipment for work. The inspectors selected these activities based on potential risk significance relative to the reactor safety cornerstones. As applicable for each activity, the inspectors verified that Exelon personnel performed risk assessments as required by 10 CFR 50.65(a)(4) and that the assessments were accurate and complete. When Exelon performed emergent work, the inspectors verified that operations personnel promptly assessed and managed plant risk. The inspectors reviewed the scope of maintenance work and discussed the results of the assessment with the station's probabilistic risk analyst to verify plant conditions were consistent with the risk assessment. The inspectors also reviewed the technical specification requirements and inspected portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met.

- Planned 'Yellow' station risk in response to an emergent oil change and replacement of the 'A' emergency diesel generator cooling system fan gearbox cooler (EG-C-8A) due to a coolant leak documented in issue report 2605502, on January 4, 2016
- Planned station risk during nuclear river water pump (NR-P-1C) breaker inspection, on January 14, 2016
- Review of maintenance risk for nuclear service water (NS-V-16B) unavailability documented in issue report 2622217, on February 4, 2016
- Emergent 'Yellow' station risk for pressurizer power operated relief valve (RC-V-2) setpoint check, as documented in issue report 2622859, on February 7, 2016
- Work week 1608 station risk plan with multiple engineering safeguards actuation system relay replacements scheduled, on February 17, 2016
- Protected equipment for make-up pump (MU-P-1A) unavailability, as documented in issue report 2630107, February 22, 2016

b. Findings

During the conduct of these inspections Exelon identified a violation of regulatory requirements, which the inspectors reviewed and documented in section 4OA7 of this report.

1R15 Operability Determinations and Functionality Assessments (71111.15 – 6 samples)

a. Inspection Scope

The inspectors reviewed operability determinations for the following degraded or non-conforming conditions:

- Decay heat removal pump (DH-P-1A) seal leakage documented in issue report 2595583, on January 2, 2016
- Past operability review for the 'A' emergency diesel generator with a degraded fan drive cooler (EG-C-8A) and high water content in the gear oil as documented in issue report 2407156, on January 4, 2016
- 'B' battery cell No. 3 voltage as documented in issue report 2612387 on January 14, 2016
- Out of tolerance high-pressure make-up flow instrument (MU-FT-1127) to the 'B' train and evaluation as documented in issue reports 2615874 and 2615987, on January 23, 2016
- 'B' battery cell No. 3 degraded as documented in issue report 2612387 on January 26, 2016
- Report of possible defects TMI received regarding irradiation certification of vendor supplied circuit breakers as documented in issue report 2618830, on February 5, 2016

The inspectors selected these issues based on the risk significance of the associated components and systems. The inspectors evaluated the technical adequacy of the operability determinations to assess whether technical specification operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the technical specifications and UFSAR to



Exelon's evaluations to determine whether the components or systems were operable. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled by Exelon. The inspectors determined, where appropriate, compliance with bounding limitations associated with the evaluations.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18 – 1 sample)

Temporary Modifications

a. Inspection Scope

The inspectors reviewed the temporary modification listed below to determine whether the modification affected the safety functions of the supported systems requiring borated water from the borated-water storage tank, whose level indication was degraded based on a frozen sense-line on January 4 (see section 1R01). The inspectors reviewed the 10 CFR 50.59 documentation, monitored contingency actions while the temporary modification was active, and conducted field walkdowns of the modification to verify that the temporary modification did not degrade the design bases, licensing bases, and performance capability of the affected systems.

- Engineering Change Package 16-00006-000 – TCCP: Alternate heat to BWST Level Sensing Lines

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 6 samples)

a. Inspection Scope

The inspectors reviewed the post-maintenance tests for the maintenance activities listed below to verify that procedures and test activities ensured system operability and functional capability. The inspectors reviewed the test procedure to verify that the procedure adequately tested the safety functions that may have been affected by the maintenance activity, that the acceptance criteria in the procedure was consistent with the information in the applicable licensing basis and/or design basis documents, and that the procedure had been properly reviewed and approved. The inspectors also witnessed the test or reviewed test data to verify that the test results adequately demonstrated restoration of the affected safety functions.

- 1303-4.16, Emergency Power System, after emergent fan drive gearbox oil cooler (EG-C-8A) replacement and fan drive gearbox (EG-E-2A) oil change for the 'A' emergency diesel generator under WO C2035616, on January 2, 2016
- WO C2035545 testing after heat trace and insulation replacement for BWST level instrument BS-LT-809, on January 15, 2016

- 1303-4.16, Emergency Power System, after oil sump cleaning and oil change of 'A' emergency diesel generator cooling system fan gearbox (EG-E-2A) under WO C2035616, on February 2, 2016
- Testing per WO C2034612 after replacing the motor for the 'A' nuclear service water pump (NS-P-1A), on February 5, 2016
- WO C2033304 field checks and acceptance during RB2B engineering safeguards actuation relay replacement, on February 17, 2016
- Post-test conditions regarding intermediate closed-cooling water isolation valve to the reactor coolant pumps (IC-V-4) as documented in issue report 2627496, on February 18, 2016

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 5 samples)

a. Inspection Scope

The inspectors observed performance of surveillance tests and/or reviewed test data of selected risk-significant SSCs to assess whether test results satisfied the technical specifications, the UFSAR, and Exelon procedure requirements. The inspectors verified that test acceptance criteria were clear, tests demonstrated operational readiness and were consistent with design documentation, test instrumentation had current calibrations and the range and accuracy for the application, tests were performed as written, and applicable test prerequisites were satisfied. Upon test completion, the inspectors considered whether the test results supported that equipment was capable of performing the required safety functions. The inspectors reviewed the following surveillance tests:

- 1303-4.1D, reactor protection system channel 'D' test, on January 31, 2016
- OP-TM-541-214, in-service testing of spent fuel cooling pump 'B' room cooling isolation valve (NS-V-54B), on February 22, 2016, (in-service testing)
- OP-TM-211-205, in-service testing of make-up pump (MU-P-1A) on February 24, 2016
- OP-TM-220-251, reactor coolant system leak rate determination, on March 2, 2016, (leak rate determination)
- OP-TM-211-212, IST of high pressure coolant injection valves (MU-V-16A and MU-V-16B) after MU-V-16B breaker maintenance, on March 3, 2016

b. Findings

No findings were identified.

**Cornerstone: Emergency Preparedness**1EP2 Alert and Notification System Evaluation (71114.02 - 1 sample)a. Inspection Scope

An onsite review was conducted to assess the performance, maintenance, and testing of the TMI alert and notification system (ANS). During this inspection, the inspectors conducted a review of the ANS testing and maintenance programs. The inspectors reviewed the associated ANS procedures and the Federal Emergency Management Agency approved ANS Design Report to ensure compliance with design report commitments for system maintenance and testing. The inspection was conducted with 10 CFR 50.47(b)(5) and the related requirements of 10 CFR 50, Appendix E, as reference criteria.

b. Findings

No findings were identified.

1EP3 Emergency Response Organization Staffing and Augmentation System (71114.03 - 1 sample)a. Inspection Scope

The inspectors conducted a review of the TMI Emergency Response Organization (ERO) on-shift and augmentation staffing requirements and the process for notifying and augmenting the ERO. The review was performed to verify the readiness of key Exelon staff to respond to an emergency event and to verify Exelon's ability to activate their emergency response facilities (ERF) in a timely manner. The inspectors reviewed the TMI Emergency Plan for ERF activation and ERO staffing requirements, the ERO duty roster, applicable station procedures, augmentation test reports, the most recent drive-in drill reports, and corrective action reports related to this inspection area. The inspectors also reviewed a sample of ERO responder training records to verify training and qualifications were up to date. The inspection was conducted with 10 CFR 50.47(b) (2) and related requirements of 10 CFR 50, Appendix E, as reference criteria.

b. Findings

No findings were identified.

1EP5 Maintenance of Emergency Preparedness (71114.05 - 1 sample)a. Inspection Scope

The inspectors reviewed a number of activities to evaluate the efficacy of Exelon's efforts to maintain the TMI emergency preparedness (EP) program. The inspectors reviewed: letters of agreement with offsite agencies; the 10 CFR 50.54(q) emergency plan change process and practice; TMI's maintenance of equipment important to EP; records of evacuation time estimate population evaluation; and provisions for, and implementation of, primary and backup ERF maintenance. The inspectors also verified

Exelon's compliance at TMI with NRC EP regulations regarding: emergency action levels for hostile action events, protective actions for on-site personnel during events, emergency declaration timeliness, ERO augmentation and alternate facility capability, evacuation time estimate updates, and on-shift ERO staffing analysis.

The inspectors further evaluated Exelon's ability to maintain their TMI EP program through their identification and correction of EP weaknesses, by reviewing a sample of drill reports, actual event reports, self-assessments, 10 CFR 50.54(t) reviews, and EP-related condition reports. The inspectors reviewed a sample of EP-related condition reports initiated at TMI from January 2015 through February 2016. The inspection was conducted with Title 10 CFR 50.47(b) and the related requirements of 10 CFR 50, Appendix E, as reference criteria.

b. Findings

No findings were identified.

1EP6 Drill Evaluation (71114.06 – 1 sample)

Licensed Operator Training Drill Exercise Performance Indicator Observation

a. Inspection Scope

The inspectors evaluated the conduct of Exelon emergency drills during licensed operator requalification training on March 15, 2016, to identify any weaknesses and deficiencies in the classification and notification activities. The inspectors observed emergency response operations in the simulator to determine whether the event classification and notifications were performed in accordance with procedures. The inspectors also attended the drill critique to compare inspector observations with those identified by Exelon staff in order to evaluate Exelon's critique and to verify whether the Exelon staff was properly identifying weaknesses and entering them into the corrective action program.

b. Findings

No findings were identified.

**2. RADIATION SAFETY**

**Cornerstone: Occupational and Public Radiation Safety**

2RS6 Radioactive Gaseous and Liquid Effluent Treatment (71124.06 – 6 samples)

a. Inspection Scope

The inspectors reviewed the treatment, monitoring, and control of radioactive gaseous and liquid effluents. The inspectors used the requirements in 10 CFR 20, 10 CFR 50, Appendix I, TSs, offsite dose calculation manual (ODCM), applicable industry standards, and procedures required by TSs as criteria for determining compliance.

### Inspection Planning

The inspectors conducted in-office review of the TMI 2013 and 2014 annual radioactive effluent and environmental reports, radioactive effluent program documents, UFSAR, ODCM, and applicable event reports.

### Walk-downs and Observations (1 sample)

The inspectors walked down the gaseous and liquid radioactive effluent monitoring systems to assess the material condition and verify proper alignment according to plant design. The inspectors also observed potential unmonitored release points and reviewed radiation monitoring system surveillance records and the routine processing and discharge of gaseous and liquid radioactive wastes.

### Calibration and Testing Program (1 sample)

The inspectors reviewed gaseous and liquid effluent monitor instrument calibration, functional test results, and alarm set-points based on National Institute of Standards and Technology calibration traceability and ODCM specifications.

### Sampling and Analyses (1 sample)

The inspectors reviewed: radioactive effluent sampling activities, representative sampling requirements; compensatory measures taken during effluent discharges with inoperable effluent radiation monitoring instrumentation; the use of compensatory radioactive effluent sampling; and the results of the inter-laboratory and intra-laboratory comparison program including scaling of hard-to-detect isotopes.

### Instrumentation and Equipment (1 sample)

The inspectors reviewed the methodology used to determine the radioactive effluent stack and vent flow rates to verify that the flow rates were consistent with technical specifications/ODCM and UFSAR values. The inspectors reviewed radioactive effluent discharge system surveillance test results based on technical specification acceptance criteria. The inspectors verified that high-range effluent monitors used in emergency operating procedures are calibrated and operable and has post-accident effluent sampling capability.

### Dose Calculations (1 sample)

The inspectors reviewed: changes in reported dose values from the previous annual radioactive effluent release reports, several liquid and gaseous radioactive waste discharge permits, the scaling method for hard-to-detect radionuclides, ODCM changes, land use census changes, public dose calculations (monthly, quarterly, annual), and records of abnormal gaseous or liquid radioactive releases.

Problem Identification and Resolution (1 sample)

The inspectors evaluated whether problems associated with the radioactive effluent monitoring and control program were identified at an appropriate threshold and properly addressed in Exelon's corrective action program.

b. Findings

No findings identified.

**4. OTHER ACTIVITIES**

4OA1 Performance Indicator Verification (71151 – 7 samples)

.1 Unplanned Scrams, Unplanned Power Changes, and Unplanned Scrams with Complications (3 samples)

a. Inspection Scope

The inspectors reviewed Exelon's submittals for the following initiating events cornerstone performance indicators (PI) for the period of January 1, 2015 through December 31, 2015.

- Unplanned Scrams (IE01)
- Unplanned Power Changes (IE03)
- Unplanned Scrams with Complications (IE04)

To determine the accuracy of the performance indicator data reported during those periods, inspectors used definitions and guidance contained in Nuclear Energy Institute (NEI) Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7. The inspectors reviewed Exelon's operator narrative logs, maintenance planning schedules, condition reports, event reports, and NRC integrated inspection reports to validate the accuracy of the submittals.

b. Findings

No findings were identified.

.2 Radiological Effluent Technical Specifications Offsite Dose Calculation Manual Radiological Effluent Occurrences (1 sample)

a. Inspection Scope

The inspectors reviewed licensee submittals for the radiological effluent technical specifications offsite dose calculation manual radiological effluent occurrences PI (PR01) for the period of January 1, 2015 through December 31, 2015. The inspectors used PI definitions and guidance contained in the NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine if the PI data was reported properly. The inspectors reviewed the public dose assessments for the PI for public radiation safety to determine if related data was accurately calculated and reported.

The inspectors reviewed the corrective action program database to identify any potential occurrences such as unmonitored, uncontrolled, or improperly calculated effluent releases that may have impacted offsite dose. The inspectors reviewed gaseous and liquid effluent summary data and the results of associated offsite dose calculations to determine if indicator results were accurately reported.

b. Findings

No findings were identified.

.3 Emergency Preparedness Performance Indicators (3 samples)

a. Inspection Scope

The inspectors reviewed data for the following three EP PIs: (1) drill and exercise performance (EP01); (2) ERO drill participation (EP02) and, (3) alert notification system (i.e. sirens) reliability (EP03). The last NRC EP inspection at TMI was conducted in the second calendar quarter of 2015. Therefore, the inspectors reviewed supporting documentation from EP drills and equipment tests from the second calendar quarter of 2015 through the fourth calendar quarter of 2015 to verify the accuracy of the reported PI data. The acceptance criteria documented in NEI 99-02, "Regulatory Assessment Performance Indicator Guidelines," Revision 7, was used as reference criteria.

b. Findings

No findings were identified.

40A2 Problem Identification and Resolution (71152)

Routine Review of Problem Identification and Resolution Activities

a. Inspection Scope

As required by Inspection Procedure 71152, "Problem Identification and Resolution," the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify that Exelon entered issues into the corrective action program at an appropriate threshold, gave adequate attention to timely corrective actions, and identified and addressed adverse trends. In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the corrective action program and periodically attended issue report screening and management meetings.

b. Findings

No findings were identified.

40A3 Follow-Up of Events and Notices of Enforcement Discretion (71153 - 2 samples)

Plant Events

a. Inspection Scope

For the plant events listed below, the inspectors reviewed and/or observed plant parameters, reviewed personnel performance, and evaluated performance of mitigating systems. The inspectors communicated the plant events to appropriate regional personnel, and compared the event details with criteria contained in Inspection Manual Chapter 0309, "Reactive Inspection Decision Basis for Reactors," for consideration of potential reactive inspection activities. As applicable, the inspectors verified that Exelon made appropriate emergency classification assessments and properly reported the event in accordance with 10 CFR 50.72 and 50.73. The inspectors reviewed Exelon's follow-up actions related to the events to assure that Exelon implemented appropriate corrective actions commensurate with their safety significance.

- Inadvertent heat sink protection system actuation reported to the NRC under event notification 52695 on January 29, 2016
- Main feedwater transient due to integrated control system module malfunction on February 23, 2016

b. Findings

No findings were identified.

4OA6 Meetings, Including Exit

Quarterly Inspection Report Exit

On April 21, 2016, the inspectors presented the inspection results to Mr. Thomas Haaf, TMI Plant Manager, and other members of the TMI staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

4OA7 Licensee-Identified Violations

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

Inaccurate Risk Assessment during Pressurizer Power Operated Relief Valve Setpoint Check

On February 6, 2016, while making preparations to perform procedure 1303-11.45, "PORV Setpoint Check," a senior operator identified that the assigned risk for this planned maintenance activity was inaccurate. Specifically, the risk for the maintenance activity was Yellow, not Green, as originally determined. The reason for the inaccurate risk was due to not previously recognizing the pressurizer's block valve (RC-RV-2) would be rendered inoperable during the maintenance activity. This condition could result in failure to operate the pressurizer's power operated relief valve. The failure to accurately assess the risk of the power operated relief valve setpoint check was a performance deficiency that was within the licensee's ability to identify and correct. The inspectors noted that this maintenance activity had an inaccurate risk assessment for at least the past three years.



This performance deficiency was a violation 10 CFR Part 50.65(a)(4), which requires, in part, the licensee to assess and manage the increase in risk that may result from the proposed maintenance activity. Contrary to the above, Exelon failed to accurately assess the risk for the power operated relief valve setpoint check over the past three years. The issue was more than minor because it was associated with the configuration control attribute of the initiating systems cornerstone and it adversely affected the cornerstone objective of limiting the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations.

The inspectors determined that the finding was of very low safety significance (Green), based on IMC 0609, Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process," screening criteria. The finding screened to Green because the incremental core damage probability of failing to operate RC-RV-2 is less than  $1.00 \times 10^{-6}$  per year during the short period which the valve is rendered inoperable during each performance of this maintenance activity. Exelon has entered this issue into its corrective action program (issue report 2622859) and revised the risk assigned to this maintenance activity. Because this finding is of very low safety significance and had been entered into Exelon's corrective action program, this violation is being treated as a Green, licensee-identified NCV, consistent with section 2.3.2 of the NRC's Enforcement Policy.

**ATTACHMENT: SUPPLEMENTARY INFORMATION**

**SUPPLEMENTARY INFORMATION****KEY POINTS OF CONTACT**Licensee Personnel

E. Callan	Site Vice President
T. Haaf	Plant Manager
T. Alvey	Manager, Chemistry
D. Atherholt	Manager, Regulatory Assurance
J. Beaver	Electrical Training Instructor
J. Bingaman	Control Room Operator
J. Bomgardner	Chemistry Technician
J. Boudah	Supervisor, Maintenance I & C
R. Campbell	Manager, Site Security
J. Cavanaugh	Manager, Engineer
V. Cwietniewicz	Manager, Exelon Mid-Atlantic EP
N. Desantis	Shift Supervisor, Operations
D. Divittore	Manager, Radiological Engineering
N. Favorito	Shift Manager, Operations
T. Fitting	Chemistry Technician
M. Fitzwater	Senior Regulatory Assurance Engineer
T. Hanlon	Radio Chemist
M. Harty	Shift Supervisor, Operations
G. Herneisey	Operations Training Lead
D. Herr	Fire Protection System Engineer
S. Marbaise	Electrical Maintenance Manager
E. Miller	Auxiliary Operator
R. Miller	Regulatory Assurance Engineer
C. O'Hagan	TMI-Site Risk Management Engineer
J. Piazza	Senior Manager, Design Engineering
J. Picket	Manager, EP
B. Price	Shift Manager, Operations
D. Repice Jr.	Electrical Engineer
T. Roberts	Manager, Radiation Protection Technical Support
B. Smith	Operation Shift Supervisor
G. Smith	Director, Maintenance
B. Shumaker	Manager, Emergency Preparedness
M. Sweigart	Chemistry Laboratory Supervisor
L. Weber	Environmental Chemist
S. Wilkerson	Manager, Development
D. Williams	Shift Manager Unit 1
B. Wunderly	Director, Site Engineering

Other Personnel

S. Martin	Nuclear Safety Specialist Pennsylvania Department of Environmental Protection Bureau of Radiation Protection
-----------	--

**LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATED**Opened/Closed

05000289/2016001-01	NCV	Deficient Design Control of ECCS Level Transmitter Instrument Line Heat Trace Causes Freezing and Inoperability (Section 1R01)
---------------------	-----	--

**LIST OF DOCUMENTS REVIEWED**

\*IR generated due to NRC inspection

**Section 1R01: Adverse Weather Protection**Procedures

OP-AA-108-111-1001, "Severe Weather and Natural Disaster Guidelines"  
 OP-TM-108-111-1001, "TMI Severe Weather and Site Inaccessibility Guidelines"  
 MA-TM-1003, "Snow and Ice Removal Plan – TMI"  
 OP-AA-201-006, Control of Temporary Heat Generating Equipment, Revision 8

Miscellaneous

Prompt Investigation 2607617, BWST Level Indication DH-LT-809 Failed High, dated January 4, 2016  
 TMI-16-S-0004, Temp Config Change – BWST Level Instrument Freeze Protection (10CFR50.59 Screen), Revision 0, dated January 6, 2016  
 TMI Operations and Outage Control Central shift narrative logs, dated January 4 – 25, 2016  
 TMI Primary Plant Computer trace for DH-LT-809, dated January 4 - 5, 2016  
 TMI TS 3.3.2

IRs:	2612495	2612413	2612667	2610837	2608465	2608297
	2607775	2607918	2607676	2067678	2598648	2598029
	2586912	2596013	2595956	2457834	2620704	

**Section 1R04: Equipment Alignment**Procedures

OP-TM-535-000, River Water Support System, Revision 007

Drawings

302-082, Emergency Feedwater – Flow Diagram, Revision 25  
 302-202, Nuclear Service River Water System, Revision 81  
 302-611 Reactor Building Normal and Emergency Cooling Water System, Revision 14

Miscellaneous

WOs: R2112538    C2035397

### **Section 1R05: Fire Protection**

#### Procedures

1038, Administrative Controls-Fire Protection Program, Revision 76  
1038, Administrative Controls- Fire Protection Program, Revision 82  
1303-12.23, Fire Damper Functional Test, dated 07/10/2015  
1303-12.25, Fire Door Inspection and Maintenance, dated 03/02/2016  
1303-12.3, Fire Hose Reel Inspection (outside RB), dated 3/25/2015  
1303-12.8C, Fire Protection Instrumentation Functional Test (control building elevation 322'),  
dated 04/08/2015  
1303-12.8F, Functional Test AB/FHB FS Instrumentation, dated 06/06/2015  
CC-AA-309-101, Engineering Technical Evaluations, Revision 11  
OP-MA-201-007, Fire Protection System Impairment Control, Revision 6

#### Miscellaneous

990-1745, Three Mile Island Unit no. 1 Fire Hazards Analysis Reports, Revision 26  
Fire Hazard Analysis Report, Revision 25  
Safe Shutdown Equipment List, Revision 25  
Three Mile Island Nuclear Station Pre-Fire Plan Index, dated 9/25/2013  
IRs: 1295171 2645116

### **Section 1R06: Flood Protection Measures**

#### Miscellaneous

TMI Operations Priority Worklist, dated March 21, 2016  
IRs: 2629435 2640064

### **Section 1R07: Heat Sink Performance**

#### Drawings

1D-541-29-001, HX NS-C1A Nuclear Service Closed Cooling Water Tube plug Map, Revision 4

#### Miscellaneous

Clearance 16500179  
Work Order R2234972

### **Section 1R11: Licensed Operator Requalification Program**

#### Procedures

1102-4, Power Operations – Enclosure 6: Maintaining Core Thermal Power Within Licensed  
Limits, Revision 130  
OP-TM-621-000, Integrated Control System, Revision 6  
OP-TM-PPC-C1708, Reactor High Power, Revision 1

#### Miscellaneous

11.7.10.004, Operator Simulator #4 – Total Loss of FW Requiring HP Cooling, Revision 15  
Gas Release Permit G-20160224-018B, dated February 24, 2016  
WC-AA-104, Risk Screening for M2398825, SP8AFT1A: Investigate and Repair ICS Module,  
dated February 24, 2016

**Section 1R12: Maintenance Effectiveness**

Procedures

ER-AA-310, Implementation of the Maintenance Rule, Revision 9  
ER-AA-310-1004, Maintenance Rule Performance Monitoring, Revision 013  
ER-AA-310-1005, Maintenance Rule – Dispositioning between (a)(1) and (a)(2), Revision 7  
ER-TM-310-1001, TMI Guidance for Maintenance Rule Unavailability Monitoring, Revision 5  
PI-AA-120, Issue Identification and Screening Process, Revision 5

Miscellaneous

IRs 2452858 2615743 2471164 2600386

**Section 1R13: Maintenance Risk Assessments and Emergent Work Control**

Procedures

1303-11.45, PORV Setpoint Check, Revision 41  
1082.1, TMI Risk Management Program, Revision 8  
ER-AA-600-1016, Configuration Risk Model Update, Revision 010  
OP-TM-108-117, Protected Equipment Worksheets, Attachment 7-2, Revision 0A,  
February 24, 2016  
WC-AA-101, On-Line Work Control Process, Revision 18

Miscellaneous

TMI Plan of the Day, February 23, 2016  
IRs: 2606178 2605502 2608660 2607115 2606712 2605678  
2605804 2612204\*\* 2617232 2622217 2621925 2621889  
2622558 2630107 2622859

Clearance: 15501410

WOs: C2035530

\*\*Immediate investigation, "Question on Station Risk from Breaker Inspections," dated January 15, 2016

**Section 1R15: Operability Evaluations**

Procedures

1301-4.6.2, Station Battery 1B Weekly  
1420-DC-3.1, Online Replacement of a Station Battery Cell  
OP-AA-102-103, Operator Work Around Program, Revision 004  
OP-AA-108-115, Operability Determinations, Revision 10  
OP-AA-108-115-1002, Supplemental Consideration for On-Shift Immediate Operability  
Determinations, Revision 2  
OP-TM-212-000, Decay Heat Removal System, Revision 021  
MA-AA-716-230-1001, Oil Analysis Interpretation Guideline, Revision 019

Miscellaneous

IN 2015-12, "Unaccounted for error Terms Associated with the Irradiation Testing and  
Environmental Qualification of Important-to-Safety Components"  
MRC Package 01-20-2016  
TMI Part 21 Review; P21A: 02618830-02

IRs:	2595583	2606178	2605502	2608660	2607115	2606712
	2605678	2605804	02612387	2618830	2612376	
WOs:	A2393641	C2035530	R2267222			

**Section 1R18: Plant Modifications**

Procedures

CC-AA-102, Design Input and Configuration Change Impact Screening, Revision 20  
 CC-AA-103, Configuration Change Control, Revision 21  
 CC-AA-112, Temporary Configuration Change, Revision 23  
 OP-AA-201-006, Control of Temporary Heat Generating Equipment, Revision 8

Drawings

5130-813059, BWST Isometric DH Line, Revision 6  
 5130-213097, RCM Technology Heat Trace Wiring per ECR 15-00085, Revision 3  
 ET-30250A, Electric Pipe Temperature Control Schedule, Revision 1

Miscellaneous

ECR TM 16-00006-000, TCCP: Alternate Heat to BWST Level Sensing Lines, dated  
 January 5, 2016  
 IRs: 2607617 2612000\*

**Section 1R19: Post-Maintenance Testing**

Procedures

1303-4.16, Emergency Power System, Revision 136A  
 1420-HT-1.1, Heat Trace and Alarm Circuit Troubleshooting, Revision 003  
 1420-HT-1.2, Nelson Electric Heat Trace Replacement and Splicing, Revision 001  
 1420-HT-1.3, Heat Trace Replacement, Revision 005  
 OP-TM-541-208, IST of NS-P-1A/B/C, Revision 011

Vendor Manual

VM-TM-2874, Heat Trace Vendor Technical Manual

Miscellaneous

A2395462 (CM ECR), Authorize Wiring Parallel vs. Series for Heat Trace 30250A 1 & 2, dated  
 January 8, 2016  
 C2035545, Resolve for Proper Level Indication (DH-LT-809), dated January 8, 2016  
 ECR TM 16-00006-000, Alternate Heat to BWST Level Sensing Lines, dated January 5, 2016  
 FRAGNET WW1606 for NS-P-1A Motor Replacement, dated January 29, 2016  
 IST Evaluation #271, IC-V-4, dated February 17, 2016

IRs:	2620135	2607617	2609417	2608866	2608865	2608864
	2608784	2608327	2622194	2621529	2621511	2621041
	2623209	2606178	2605502	2608660	2607115	2606712
	2605678	2605804				
WOs:	C2035530	C2035545	R2252355	C2033478		

**Section 1R22: Surveillance Testing**Procedures

1303-4.1D, Rev.23, RPS Channel D Test  
 ER-AP-331-1003, RCS Leakage Monitoring and Action Plan, Revision 8  
 OP-TM-211-205, In-service Testing of Make-Up Pump 1A, Revision 9  
 OP-TM-211-212, IST of MU-V-16A and MU-V-16B, Revision 004A  
 OP-TM-220-251, RCS Leak Rate Determination, Revision 3  
 OP-TM-541-214, IST of NS-V-54B, Revision 000  
 WC-TM-430, Surveillance Testing Program, Revision 0  
 WC-TM-430-1001, Surveillance Testing Program Database Interface and Maintenance,  
 Revision 1

Miscellaneous

IRs: 2619936      2620101      2630999      2631103      2631020      0262316  
       2624061  
 WOs: R2267225      R2159303

**Section 1EP2: Alert and Notification System Evaluation**Procedures

EP-AA-1009, Exelon Nuclear Radiological Emergency Plan Annex for Three Mile Island Station  
 Revision 24  
 EP-MA-121-1002, Alert Notification System (ANS) Program, Revision 11  
 EP-MA-121-1003, Alert and Notification System (ANS) Monitoring, Troubleshooting, and  
 Testing Program, Revision 5  
 EP-MA-121-1003, Alert and Notification System (ANS) Monitoring, Troubleshooting, and  
 Testing Program, Revision 6  
 EP-MA-121-1004, Alert and Notification System (ANS) Program, Revision 8

Miscellaneous

ANS Maintenance Records, 2015  
 ANS Testing Records, January 2014 – January 2016 Design Report, Three Mile Island  
 Generating Station, Public Alert and Notification System, Revision 0 – April 2013  
 IRs: IR 2630725

**Section 1EP3: Emergency Response Organization Staffing and Augmentation System**Procedures

EP-AA-1000, Standardized Radiological Emergency Plan, Revision 28 EP-AA-1009,  
 Exelon Nuclear Radiological Emergency Plan Annex for Three Mile Island Station,  
 Revision 24  
 EP-AA-1009 Addendum 1, Three Mile Island Station On-Shift Staffing Technical Basis  
 Revision 1  
 EP-AA-112-100-F-06, ERO Notification or Augmentation, Revision R  
 EP-AA-120-F-03, MA/MW Station EP Recurring Tasks, Revision 0  
 TQ-AA-113, ERO Training and Qualification, Revision 028

Miscellaneous

TMI Call-In Augmentation Drill Report 12-10-15 - Team D  
 TMI Call-out Drill Reports: June 2015, August 2015, December 2015  
 TMI Five-Part Duty Roster, dated January 1, 2016

**Section 1EP5: Maintenance of Emergency Preparedness**

Procedures

EP-AA-120, Emergency Plan Administration, Revision 17  
 EP-AA-120-1001, 10 CFR 50.54(q) Change Evaluation, Revision 7  
 EP-AA-120-F-06, Evacuation Time Estimate Review Checklist, Revision A  
 EP-AA-1009 Addendum 2, Evacuation Time Estimates for Three Mile Island Plume Exposure Pathway Emergency Planning Zone, Revision 01  
 EP-AA-121, Emergency Response Facilities and Equipment Readiness, Revision 14  
 EP-AA-121-F-09, TMI EP Equipment Matrix, Revision 2  
 LS-AA-104, Exelon 50.59 Review Process, Revision 10  
 LS-AA-104-1000, 50.59 Resource Manual, Revision 9  
 LS-AA-104-1002, 50.59 Applicability Review Form, Revision 5  
 LS-AA-104-1003, 50.59 Screening Form, Revision 4  
 LS-AA-104-1004, 50.59 Evaluation Form, Revision 6  
 WC-AA-106, Work Screening and Processing, Revision 15

Miscellaneous

Check In Self-Assessment Report, Assignment 2568465, 2016 NRC EP Baseline Inspection Readiness  
 ERO Augmentation Drill (Everbridge Test) Memo, 12/10/15 Drive-In Augmentation Drill Results  
 KLD TR-623, Three Mile Island Generating Station, Development of Evacuation Time Estimates (March 24, 2014) KLD TR-732, Three Mile Island 2014 Population Update Analysis (December 11, 2014) KLD TR-792, Three Mile Island 2015 Population Update Analysis (November 10, 2015) NOSA-TMI-14-03 Emergency Preparedness Audit Report NOSA-TMI-15-03 Emergency Preparedness Audit Report Safety Evaluation for Three Mile Island, Unit 1 (TMI-1), Relocation of the Technical Support Center (TSC) (TAC No. M35210)  
 Three Mile Island 2015 Graded Exercise Evaluation Report  
 Three Mile Island June 9, 2015, Drill Evaluation Report  
 Three Mile Island July 28, 2015, Drill Evaluation Report  
 Three Mile Island August 25, 2015, Drill Evaluation Report  
 Three Mile Island October 5, 2015, Fire Event Evaluation Report, Revision 1  
 Three Mile Island October 13, 2015, Drill Evaluation Report  
 TMI 2016 Emergency Plan Letters of Agreement/Memoranda of Understanding with: AREVA; Bainbridge Fire Department; Elizabethtown/Friendship Fire Company; Harrisburg Area Community College; Hershey Medical Center; Lancaster Airport; Londonderry Volunteer Fire Company; Lower Swatara Volunteer Fire Company; Middletown Volunteer Fire Company; Norfolk Southern Railway Company; Northwest EMS; Pennsylvania Emergency Management Agency; Petroleum Products Corporation; Pinnacle Health Hospital; Susquehanna Area Regional Airport Authority; and, South Central EMS, Inc.

IRs:	1639140	2486081	2485559	1696897	2534522
	2551653	2560112	2568240	2568422	2570252
	2582086	2598722	2603824	2628670	



**Section 1EP6: Drill Evaluation**Procedures

EP-AA-1009 Addendum 3 (Hot Matrix) – FA1 Fission Product Barrier Matrix, Revision 0  
 EAL Technical Basis Document – FA1, Revision 0

Miscellaneous

11.7.10.004, Operator Simulator #4 – Total Loss of FW Requiring HP Cooling, Revision 15

**Section 2RS6: Radiological Gaseous and Liquid Treatment System**Procedures

CY-AA-130-3200, "Tritium, Gross Alpha, and Gross Beta Sample Preparation for Scintillation Counting," Revision 2  
 CY-TM-130-9780, "Determination of Tritium Activity," Revision 0  
 CY-TM-170-201, "Condenser Vacuum Pump Release Sampling, Normal Configuration," Revision 4  
 CY-TM-170-2001, "Releasing Radioactive Liquid Waste", Revision 0  
 CY-TM-170-2007, "Non-Routine Effluent Releases," Revision 2  
 CY-TM-170-2020, "Radiological Abnormal Release or Discharge," Revision 3  
 N-TM-408-4160, "RGPP Reference Material for TMI," Revision 3  
 EN-AA-408, "Radiological Groundwater Protection Program," Revision 0  
 EN-AA-408-4000, "Radiological Groundwater Protection Program Implementation," Revision 6  
 N1828, "Quality Assurance Program for Radiological Effluent Monitoring," Revision 12  
 RW-AA-100, "Process Control Program for Radioactive Wastes," Revision 11

Miscellaneous

Discharge Release Packages

Gaseous

G-2015-1123-223B, G-2015-1201-225B, G-2015-1209-229B, G-2015-1222-233B,  
 G-2016-0108-001B, G-2016-0123-006B

Liquids

L-2016-0205-018B, L-2016-0206-019B, L-2016-0207-020B, L-2016-0208-022B

Ventilation Surveillance Records

WOs	R2236319	R2245619	R2235413	R2233757
ARs/IRs:	02531179	02588315	02619999	02624960

**Section 4OA1: Performance Indicator Verification**Procedures

LS-AA-2001, Collecting and Reporting of NRC Performance Indicator Data, Rev. 014  
 LS-AA-2110, Monthly Data Elements for NRC Emergency Response Organization (ERO)  
 Drill Participation, Revision 006  
 LS-AA-2120, Monthly Data Elements for NRC Drill and Exercise Performance, Revision 004  
 LS-AA-2130, Monthly Data Elements for NRC Alert and Notification System (ANS) Revision 005  
 ANS Reliability PI data, April 2015 – December 2015

Miscellaneous

Consolidated Data Entry (TMI), dated February 2, 2016  
DEP PI data, April 2015 – December 2015  
ERO Drill Participation PI data, April 2015 – December 2015

**Section 40A3: Followup of Events and Notices of Enforcement Discretion**

Procedures

1102-4, Power Operation, Revision 130  
MA-AA-716-004, Conduct of Troubleshooting, Revision 013  
OP-TM-621-471, ICS Manual Control, Revision 009

Drawings

D8032731, Integrated Control System – Detailed Schematic Part 4: Feedwater Control,  
Revision S

Miscellaneous

ACE 2594514, Invalid HSPS Train 'A' Actuation During CLR Application, dated  
January 14, 2016  
NRC Event Notification No. 51695, dated January 29, 2016  
M2398825, Troubleshooting for SP8A-DPT-1 Erratic, dated February 24, 2016  
TMI-1 Core Power Plots, dated February 23 – 25, 2016  
TMI-1 Shift Operations Logs, dated February 23 – 25, 2016  
Clearance 11500335

IRs	2594514	2630734	2631312	2630831	2630799	2630734
WO	C2022584	M2398825	A2398825			

**LIST OF ACRONYMS**

ADAMS	Agencywide Documents Access and Management System
ANS	alert and notification system
BWST	borated water storage tank
CFR	Code of Federal Regulations
ECCS	emergency core cooling system
EP	emergency preparedness
ERF	emergency response facilities
ERO	emergency response organization
GPI	groundwater protection initiative
IEE	item equivalency evaluation
IMC	Inspection Manual Chapter
LER	licensee event report
LCO	limiting condition of operation
LOCA	loss of coolant accident
NCV	non-cited violation
NEI	Nuclear Energy Institute
NPSH	net positive suction head
NRC	Nuclear Regulatory Commission
ODCM	offsite dose calculation manual
PARS	publicly available records
PI	performance indicator
SDP	significance determination process
SSC	structure, system, and component
TMI	Three Mile Island Unit 1
UFSAR	Updated Final Safety Analysis Report
WO	work order