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

August 6, 2015

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 5000289/2015002

Dear Mr. Hanson:

On June 30, 2015, 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 July 17, 2015, with Mr. T. 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. The NRC is treating this violation as a non-cited violation, consistent with Section 2.3.2a of the NRC Enforcement Policy.

If you contest the non-cited violation 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 accordance Title 10 of the *Code of Federal Regulations* (CFR) 2.390 of the NRCs "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available

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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 05000289/2015002
w/Attachment: Supplementary Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No:	50-289
License No:	DPR-50
Report No:	05000289/2015002
Licensee:	Exelon Generation Company
Facility:	Three Mile Island Station, Unit 1
Location:	Middletown, PA 17057
Dates:	April 1 through June 30, 2015
Inspectors:	D. Werkheiser, Senior Resident Inspector J. Heinly, Resident Inspector J. Rady, Reactor Inspector R. Rolph, Reactor Inspector
Approved by:	S. Kennedy, Chief Projects Branch 6 Division of Reactor Projects

TABLE OF CONTENTS

SUMMARY

IR 05000289/2015002, 04/01/2015-06/30/2015; Three Mile Island, Unit 1, Refueling and Outage Activities.

This report covered a three-month period of inspection by resident inspectors and announced inspections performed by regional inspectors. The inspectors identified one non-cited violation (NCV) 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," 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: Initiating Events

- Green. A self-revealing NCV of 10 CFR Part 55.46(c), "Plant-Referenced Simulators," was identified for Exelon's failure to ensure that the plant-referenced simulator demonstrated expected plant response to normal, transient, and accident conditions to which the simulator has been designed to respond. Specifically, Exelon failed to ensure simulator modeling of once through steam generator (OTSG) turbine bypass valve (TBV) operation was consistent with the actual plant which introduced negative operator training and challenged orderly unit shutdown on May 7, 2015. The licensee documented their corrective actions for this issue in TMI issue reports (IR) 02496279 and 2497542, which included software changes to the simulator to reflect actual system design, crew remediation, and procedure changes.

  The performance deficiency is more than minor because it is associated with the human performance attribute of the Initiating Events cornerstone and 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. Specifically, the simulator difference introduced negative operator training and, as a result, challenged orderly shutdown of the unit on May 7, 2015. The inspectors evaluated the finding in accordance with NRC Manual Chapter 0609, "Significance Determination Process," and the corresponding Appendix I, "Licensed Operator Requalification Significance Determination Process." The finding was determined to have very low safety significance (Green) because the impact on operator performance was not during a reportable event. This finding has no cross-cutting aspect assigned because the cause was not representative of current licensee performance. Specifically, the difference in TBV modeling existed since initial simulator certification on June 28, 1990. (Section 1R20)

REPORT DETAILS

Summary of Plant Status

Unit 1 began the inspection period at 100 percent power. On May 2, 2015, an automatic runback occurred due to a dropped control rod and operators stabilized reactor power at approximately 57 percent. To facilitate troubleshooting and repairs, the unit was brought to a cold shutdown condition on May 6. It was determined that a control rod drive mechanism stator had failed. It was replaced and retested. Operators exited the forced-outage on May 9 and reached full power on May 11. On May 22 operators reduced reactor power to 89 percent for control rod and integrated control system (ICS) testing and returned the unit to full power the same day. 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 Seasonal Extreme Weather Conditions

a. Inspection Scope

The inspectors reviewed Exelon's readiness for the onset of seasonal high temperatures. The review focused on the nuclear river water pumps and the emergency diesel generators radiator cooling systems. The inspectors reviewed the Updated Final Safety Analysis Report (UFSAR), technical specifications (TS), control room logs, and the corrective action program to determine what temperatures or other seasonal weather could challenge these systems, and to ensure Exelon personnel had adequately prepared for these challenges. The inspectors reviewed station procedures, including Exelon's seasonal weather preparation procedure and applicable operating procedures. The inspectors performed walkdowns of the selected systems to ensure station personnel identified issues that could challenge the operability of the systems during hot weather conditions. Documents reviewed for each section of this inspection report are listed in the Attachment.

b. Findings

No findings were identified.

.2 Summer Readiness of Offsite and Alternate Alternating Current (AC) Power Systems

a. Inspection Scope

The inspectors performed a review of plant features and procedures for the operation and continued availability of the offsite and alternate AC power system to evaluate readiness of the systems prior to seasonal high grid loading. The inspectors reviewed Exelon's procedures affecting these areas and the communications protocols between the transmission system operator and Exelon. This review focused on changes to the established program and material condition of the offsite and alternate AC power

equipment. The inspectors assessed whether Exelon established and implemented appropriate procedures and protocols to monitor and maintain availability and reliability of both the offsite AC power system and the onsite alternate AC power system. The inspectors evaluated the material condition of the associated equipment by interviewing the responsible system manager, reviewing IRs and open work orders, and walking down portions of the offsite and AC power systems including the switchyard.

b. Findings

No findings were identified.

1R04 Equipment Alignment

.1 Partial System Walkdowns (71111.04Q – 3 samples)

a. Inspection Scope

The inspectors performed partial walkdowns of the following systems:

- Borated-water storage tank high pressure injection line-up during water transfer to the 'A' spent fuel pool on April 27, 2015
- Decay heat removal train alignment during cold shutdown operations on May 7, 2015
- Low pressure coolant injection system during code weld repairs to decay river system piping on June 18, 2015

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 UFSAR, TS, work orders, IRs, 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.

- Decay heat removal and nuclear services closed cycle cooling pump area, AB-FZ-7, on April 3, 2015
- Control building north heating and ventilation equipment room, CB-FZ-5B, on April 29, 2015
- Nuclear service pump 1A motor mecatiss fire wrap repairs on May 20, 2015
- Control building patio area elevation (380' elevation), FH-FZ-5, on June 1, 2015
- Control building rad con office and labs, CB-FA-1, on June 30, 2015

b. Findings

No findings were identified.

.2 Fire Protection – Drill Observation (71111.05A – 1 sample)

a. Inspection Scope

The inspectors observed a fire brigade drill scenario conducted on June 5, 2015, that involved a simulated fire in an electrical cabinet in the control building structure. The inspectors evaluated the readiness of the plant fire brigade to fight fires. The inspectors verified that Exelon personnel identified deficiencies, openly discussed them in a self-critical manner during the debrief, and took appropriate corrective actions as required. The inspectors evaluated the following specific attributes of the drill:

- Proper wearing of turnout gear and self-contained breathing apparatus
- Proper use and layout of fire hoses
- Employment of appropriate fire-fighting techniques
- Sufficient fire-fighting equipment brought to the scene
- Effectiveness of command and control
- Search for victims and propagation of the fire into other plant areas
- Smoke removal operations
- Utilization of pre-planned strategies
- Adherence to the pre-planned drill scenario
- Drill objectives met

The inspectors also evaluated the fire brigade's actions to determine whether these actions were in accordance with Exelon's fire-fighting strategies.

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06 – 1 sample)

Annual Review of Cables Located in Underground Manholes

a. Inspection Scope

The inspectors conducted an inspection of underground manholes subject to flooding that contain cables whose failure could affect risk-significant equipment. The inspectors performed walkdowns of risk-significant areas, including E-2 and E-3 vaults, to verify that the cables were not submerged in water, that cables and/or splices appeared intact, and to observe the condition of cable support structures. The inspectors also ensured that drainage was provided and functioning properly in areas where dewatering devices were not installed.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program (71111.11Q – 2 samples)

.1 Quarterly Review of Licensed Operator Performance in the Main Control Room

a. Inspection Scope

The inspectors observed control room operations during a forced-outage while in cold shutdown, with decay heat removal system operating on May 8, 2015. Repairs to control rod mechanism No. 61 were in progress and surveillances for unit restart were being conducted. 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.

.2 Quarterly Review of Licensed Operator Requalification Testing and Training

a. Inspection Scope

The inspectors observed licensed operator simulator training on June 16, 2015, which included a loss of main feedwater, loss of off-site power, station blackout, and the failure of select components to automatically start as required. 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.

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, and 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.

- 'B' emergency diesel generator coolant level switch failure on May 26, 2015
- Make-up flow transmitter repetitive calibration issues on June 26, 2015

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 5 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 TS 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 during the station blackout diesel generator outage on April 17, 2015
- Emergent corrective maintenance and unplanned Yellow station risk to replace failed engineered safeguards actuation system (ESAS) relay (63Z2A-RC3A) on April 22, 2015
- Planned yellow station risk and specified compensatory actions during 'B' decay heat river pump (DR-P-1B) during intake bay No. 5 desilting operations on May 1, 2015
- Shutdown safety plan for forced-outage 1FO9 on May 6, 2015
- Planned 'A' nuclear service water pump (NS-P-1A) system outage on May 20, 2015

b. Findings

No findings were identified.

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 based on the risk significance of the associated components and systems:

- Reactor coolant system (RCS) oxygen/hydrogen analyzer (CA-G-1B) high oxygen alarms after major maintenance as documented in IR 2482056 on April 21, 2015
- RCS makeup isolation valve (MU-V-18) not opening during testing as documented in IR 2490915 on April 25, 2015
- TMI review of Westinghouse Nuclear Safety Advisory Letter 15-2, as documented in IR 2472861, regarding breakage of reactor coolant pump seal cooling piping on May 1, 2015
- 'A' train main steam safety valve (MS-V-17A) opened before its design setpoint as documented in IR 2496660 on May 7, 2015
- 'A' train main turbine bypass valve (MS-V-3D,E,F) operation and unexpected closure during forced-outage T1FO9 shutdown as documented in IR 2496279 on May 7, 2015
- 'A' decay river pipe leak and temporary leak repair as documented in IR 2515562 and WO C2034682 on June 17, 2015

The inspectors evaluated the technical adequacy of the operability determinations to assess whether TS 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 TS and UFSAR to Exelon's evaluations to determine whether the components or systems were operable. The inspectors confirmed, where appropriate, compliance with bounding limitations associated with the evaluations. 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.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18 – 1 sample)

Permanent Modifications

a. Inspection Scope

The inspectors reviewed the permanent modification listed below to determine whether the modifications affected the safety functions of systems that are important to safety. The inspectors reviewed 10 CFR 50.59 documentation and post-modification testing results, and conducted field walkdowns of the modifications to verify that the permanent modifications did not degrade the design bases, licensing bases, and performance capability of the affected systems.

- Engineering Change Record 14-175 – TMI Unit 1 Flood Barrier Seal Remediation on June 10, 2015

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 7 samples)

a. Inspection Scope

The inspectors reviewed the post-maintenance tests for the maintenance activities listed below to verify that procedures and test activities adequately tested the safety functions that may have been affected by the maintenance activity, that the acceptance criteria in the procedure were consistent with the information in the applicable licensing basis and/or design basis documents, and that the test results were properly reviewed and accepted and problems were appropriately documented. The inspectors also walked down the affected job site, observed the pre-job brief and post-job critique where possible, confirmed work site cleanliness was maintained, and witnessed the test or reviewed test data to verify quality control hold point were performed and checked, and that results adequately demonstrated restoration of the affected safety functions.

- ESAS channel RB3 technical evaluation under action request A2350980-03 after ESAS relay (43Y-/RB3-B) replacement on April 17, 2015
- High/Low pressure injection system analog channel testing after ESAS relay replacements (63X-/RC5-B and 43/-RC5B) under R2252128 on April 21, 2015
- ‘A’ emergency loading sequence and high pressure injection group 2 component testing under 1303-5.2AY after emergent replacement of failed ESAS relay (63Z2A-RC3A) on April 22, 2015
- Main turbine bypass valve (MS-V-3A,B,C,D,E,F) troubleshooting and testing on May 7, 2015
- Reactor control rod drive mechanism No. 61 stator replacement during forced-outage T1FO9 on May 8, 2015
- ‘A’ nuclear service water pump test after motor replacement on May 21, 2015
- ‘A’ decay river piping repair under WO C2034682 on June 19, 2015

b. Findings

No findings were identified.

1R20 Refueling and Outage Activities (71111.20 – 1 sample)

Forced-outage to Replace Reactor Control Rod Drive Mechanism Stator (T1FO9)

a. Inspection Scope

The inspectors reviewed the station's work schedule and outage risk plan for the Unit 1 forced outage (T1FO9), which was conducted May 6 through May 9, 2015, to troubleshoot and repair dropped control rod 7-6. The inspectors reviewed Exelon's development and implementation of the forced outage plan and schedules to verify that risk, industry experience, previous site-specific problems, and defense-in-depth were considered. During the outage, the inspectors observed portions of the shutdown, cooldown, control rod mechanism stator replacement, heatup, and startup processes and monitored controls associated with the following outage activities:

- Unit shutdown and pre-startup verification
- Configuration management, including maintenance of defense-in-depth, commensurate with the outage plan for the key safety functions and compliance with the applicable TS when taking equipment out of service
- Implementation of clearance activities and confirmation that tags were properly hung and that equipment was appropriately configured to safely support the associated work or testing
- Configuration and control of reactor coolant pressure, level, and temperature instruments to provide accurate indication and instrument error accounting
- Status and configuration of electrical systems to ensure that TS were met
- Inspection of reactor vessel head areas
- Replacement of control rod mechanism stator (No. 61)
- Inspection of other control rod mechanism electrical connections
- Inspection of intermediate closed cooling water connections
- Monitoring of decay heat removal operations
- Activities that could affect reactivity and shutdown margin requirements
- Maintenance of containment as required by TS
- Fatigue management
- Identification and resolution of problems related to outage activities

b. Findings

Introduction. A Green self-revealing NCV of 10 CFR Part 55.46(c), "Plant-Referenced Simulators," was identified for Exelon's failure to ensure that the plant-referenced simulator demonstrated expected plant response to normal, transient, and accident conditions to which the simulator has been designed to respond. Specifically, Exelon failed to ensure simulator modeling of OTSG TBV operation was consistent with the actual plant which introduced negative operator training and challenged unit shutdown.

Description. In order to maintain an NRC-approved simulation facility, Exelon is required to test, modify, and maintain the facility in accordance with an approved standard. Exelon committed to maintaining their simulator in accordance with Regulatory Guide 1.149, which endorses the use of American National Standards Institute/American Nuclear Society 3.5 2009, “Nuclear Power Plant Simulators for use in Operator Training and Examination.” As part of this, Exelon is required to simulate systems controlled or monitored from the control room to include systems of the reference unit to the extent necessary to allow the operator to perform the normal evolutions described in section 3.1.3.2, which includes “unit shutdown from rated power to cold shutdown conditions.”

A reactor shutdown following power operation requires removal of core decay heat. Normal decay heat is removed by the OTSGs via the TBVs (i.e. steam dump) to the condenser or to the atmosphere via the atmospheric dump valves when reactor coolant temperature is above 250 degrees F. Core decay heat can be continuously dissipated up to 15 percent of full power via the steam bypass systems as feedwater in the OTSG is converted to steam by heat absorption. The TBVs are important to safety, are normally controlled in automatic by the ICS, and can be manually controlled remotely or locally by operators.

On May 6, 2015, during TMI unit shutdown with a single dropped control rod (see report section 1R20), the main turbine was being unloaded per TMI procedure 1102-4, “Power Operation,” to commence a forced-outage (1FO9). The TBVs opened automatically as expected on both OTSGs. At time 00:43, May 7, the "A" OTSG TBVs, MS-V-3D, E, and F, unexpectedly closed when ICS demand changed from approximately 40 percent to 20 percent. Main control room operators determined that the closure of the valves was inappropriate. At 00:50 the TBV's were taken to remote manual control from the main control room and set to an approximate 20 percent demand signal to open the “A” OTSG TBVs. The TBV's showed demand on the ICS control station, however, there was no response from “A” OTSG TBV position lights or "A" OTSG steam pressure in the main control room. An operator was dispatched to verify position of the TBV's locally and confirmed that they were closed and were not responding to the demanded signal. “A” OTSG TBVs were declared inoperable and TS LCO 3.4.1.1.b was entered. "B" OTSG TBV's were verified to be controlling steam header pressure correctly per procedure 1102-4. Operators determined unit shutdown could continue because the steam header pressure was under control (via the “B” OTSG TBVs) per procedure, and that atmospheric dump valves were operable and available for use. The main turbine unloading continued and was shutdown at 00:58, May 7. This resulted in an “A” OTSG steam pressure transient sufficient to lift a single main steam safety valve (MS-V-17). After main turbine shutdown, the operators placed two “A” OTSG TBVs, MS-V-3D and MS-V-3E, in local manual control to assist in maintaining “A” OTSG pressure control.

The main control room operating crew determined that the “A” OTSG TBVs failed closed and issued IR 2496279. The crews were trained in the classroom and reinforced in the simulator that TBV response is linear from a demand starting at 0 percent. This was reflected in the ICS system training lesson plan, TQ-TM-104-621-C001, “Integrated Control System,” reinforced in various simulator training scenarios, and verified by interviewing a sample of licensed reactor operators.

Troubleshooting confirmed that the in-plant OTSG TBVs (MS-V-3A, B, C, D, E, and F) are non-linear stroke, based on a square root cam installed in the valve positioner, and designed to be 25 percent open at 50 percent demand signal. This design results in the

TBVs beginning to open at a demand signal of 25 percent. This lack of motion at lower signal demands is intentional and desirable to limit TBV leakage when closed. This is the original design configuration. Also, subsequent as-found testing of MS-V-17 on May 10, 2015 determined it lifted at the proper setpoint.

The main control room operating crew took action in response to two separate perceived equipment failures when in fact the equipment operated as designed. This challenged orderly shutdown of the unit and contributed to the resulting pressure transient during main turbine shutdown. The licensee documented their corrective actions for this issue in IRs 02496279, and 2497542 which involves software changes to the simulator to reflect actual system design, crew remediation, and procedure changes.

Analysis. The inspectors determined that Exelon's failure to ensure that the plant-referenced simulator demonstrated expected plant response to normal, transient, and accident conditions for which the simulator was designed as required by 10 CFR Part 55.46(c), "Plant-Referenced Simulators," is a performance deficiency that was within Exelon's ability to foresee and correct. The performance deficiency is more than minor because it is associated with the human performance attribute of the Initiating Events cornerstone and 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. Specifically, training on related transient scenarios had a negative impact on how licensed operators responded to the May 7, 2015 forced outage (1FO9) main turbine shutdown in the main control room. Licensed operators misdiagnosed the proper operation of the main turbine bypass valves, inappropriately deemed them inoperable and unavailable, and took unnecessary actions by removing automatic control functions.

The inspectors evaluated the finding in accordance with NRC Manual Chapter 0609, "Significance Determination Process," and the corresponding Appendix I, "Licensed Operator Requalification Significance Determination Process." The finding was determined to have very low safety significance (Green) because the impact on operator performance was not during a reportable event.

This finding has no cross-cutting aspect assigned because the cause was not representative of current licensee performance. Specifically, the difference in TBV modeling existed since initial simulator certification on June 28, 1990.

Enforcement. 10 CFR 55.46(c), "Plant-Referenced Simulators," requires, in part, that plant-referenced simulators demonstrate expected plant response to normal, transient and accident conditions to which the simulators have been designed to respond. Contrary to the above, from June 28, 1990, to May 7, 2015, the licensee failed to ensure that its plant-referenced simulator demonstrated expected plant response to normal, transient, and accident conditions to which it has been designed to respond. Specifically, Exelon failed to ensure simulator modeling of OTSG TBV operation was consistent with the actual plant design. This resulted in negative licensed operator training in the simulator. This negative operator training resulted in "A" OTSG TBVs being declared inoperable and unavailable on May 7, 2015, and challenged the orderly shutdown of the unit. The licensee documented their corrective actions for this issue in IRs 02496279, and 2497542 which involves software changes to the simulator to reflect actual system design, crew remediation, and procedure changes. Because this finding

is of very low safety significance and has been entered into the licensee's corrective action program, this violation is being treated as a NCV consistent with Section 2.3.2 of the NRC Enforcement Policy. (**NCV 05000289/2015002-01, Failure to Maintain Turbine Bypass Valve Simulator Modeling**)

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 TS, 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:

- Emergency plant radiation instruments functional test on April 7, 2015
- Incipient fire detector instrumentation functional test on April 9, 2015
- Fire service flow nozzle test on April 15, 2015
- OP-TM-220-251, Leak Rate Determination, on April 21, 2015 (RCS leak rate)
- OP-TM-211-242, MU-V-18 Stroke Test for IST, on April 27, 2015 (in-service test)

b. Findings

No findings were identified.

2. RADIATION SAFETY

Cornerstone: Occupational and Public Radiation Safety

2RS2 Occupational ALARA Planning and Controls (71124.02)

a. Inspection Scope

The inspectors assessed Exelon's performance with respect to maintaining occupational individual and collective radiation exposures as low as is reasonably achievable (ALARA). The inspectors used the requirements contained in 10 CFR 20, applicable RGs, TS, and procedures required by TS as criteria for determining compliance.

Inspection Planning

The inspectors conducted a review of TMI collective dose history and trends, ongoing and planned radiological work activities, radiological source term history and trends, and ALARA dose estimating and tracking procedures.

Radiological Work Planning

The inspectors selected the following radiological work activities (radiation work permits) based on exposure significance for review:

- TM 1-15-00001, Top of Reactor Head Work
- TM 1-15-00002, Reactor Coolant Pump 1D Work
- TM 1-15-00003, Polar Crane Inspection & Service
- TM 1-15-00610, Shutdown/ Startup Mode 3 Walkdowns

For each of these activities, the inspectors reviewed: ALARA work activity evaluations, exposure estimates, exposure reduction requirements, exposure results achieved, and person-hour estimates and actual results.

Verification of Dose Estimates and Exposure Tracking Systems

The inspectors reviewed the current annual collective dose estimate; basis methodology; and measures to track, trend, and reduce occupational doses for ongoing work activities.

Source Term Reduction and Control

The inspectors reviewed the current plant radiological source term and historical trend, plans for plant source term reduction, and contingency plans for changes in the source term as the result of changes in plant fuel performance or changes in plant primary chemistry.

Problem Identification and Resolution

The inspectors evaluated whether problems associated with ALARA planning and controls were identified at an appropriate threshold and properly addressed in the corrective action program.

b. Findings

No findings were identified.

2RS3 In-Plant Airborne Radioactivity Control and Mitigation (71124.03)

a. Inspection Scope

The inspectors reviewed the control of in-plant airborne radioactivity and the use of respiratory protection devices in these areas. The inspectors used the requirements in 10 CFR 20, RG 8.15, RG 8.25, NUREG-0041, TS, and procedures required by TS as criteria for determining compliance.

Inspection Planning

The inspectors reviewed the UFSAR to identify ventilation and radiation monitoring systems associated with airborne radioactivity controls and respiratory protection equipment staged for emergency use. The inspectors also reviewed respiratory

protection program procedures and current performance indicators for unintended internal exposure incidents.

Engineering Controls

The inspectors reviewed operability and use of both permanent and temporary ventilation systems, and the adequacy of airborne radioactivity radiation monitoring in the plant based on location, sensitivity, and alarm set-points.

Use of Respiratory Protection Devices

The inspectors reviewed the adequacy of Exelon's use of respiratory protection devices in the plant to include applicable ALARA evaluations, respiratory protection device certification, respiratory equipment storage, air quality testing records, and individual qualification records.

Self-Contained Breathing Apparatus (SCBA) for Emergency Use

The inspectors reviewed: Exelon's SCBA procedures and maintenance and test records, the refilling and transporting of SCBA air bottles, SCBA mask size availability, and the qualifications of personnel performing service and repair of this equipment.

Problem Identification and Resolution

The inspectors evaluated whether problems associated with the control and mitigation of in-plant airborne radioactivity were identified at an appropriate threshold and addressed by Exelon's corrective action program.

b. Findings

No findings were identified.

2RS4 Occupational Dose Assessment (71124.04)

a. Inspection Scope

The inspectors reviewed the monitoring, assessment, and reporting of occupational dose. The inspectors used the requirements in 10 CFR 20, Regulatory Guides, TS, and procedures required by TS as criteria for determining compliance.

Inspection Planning

The inspectors reviewed: radiation protection program audits, National Voluntary Laboratory Accreditation Program (NVLAP) dosimetry testing reports, and procedures associated with dosimetry operations.

External Dosimetry

The inspectors reviewed: dosimetry NVLAP accreditation, onsite storage of dosimeters, the use of "correction factors" to align electronic personal dosimeter (EPD) results with

NVLAP dosimetry results dosimetry occurrence reports, and corrective action program documents for adverse trends related to external dosimetry.

Internal Dosimetry

The inspectors reviewed: internal dosimetry procedures, whole body counter measurement sensitivity and use, adequacy of the program for whole body count monitoring of plant radionuclides, adequacy of the program for dose assessments based on air sample monitoring and the use of respiratory protection, and internal dose assessments for any actual internal exposure.

Special Dosimetric Situations

The inspectors reviewed: Exelon's worker notification of the risks of radiation exposure to the embryo/fetus, the dosimetry monitoring program for declared pregnant workers, external dose monitoring of workers in large dose rate gradient environments, and dose assessments performed since the last inspection that used multi-badging, skin dose or neutron dose assessments.

Problem Identification and Resolution

The inspectors evaluated whether problems associated with occupational dose assessment were identified at an appropriate threshold and properly addressed in the corrective action program.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151 – 2 samples)

Reactor Coolant System (RCS) Specific Activity and RCS Leak Rate

a. Inspection Scope

The inspectors reviewed Exelon's submittal for the RCS specific activity and RCS leak rate performance indicators for the period of April 1, 2014, through April 1, 2015. To determine the accuracy of the performance indicator data reported during those periods, the inspectors used definitions and guidance contained in the Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7. The inspectors also reviewed RCS sample analysis and control room logs of daily measurements of RCS leakage, and compared that information to the data reported by the performance indicator. Additionally, the inspectors observed surveillance activities that determined the RCS identified leakage rate.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152 – 3 samples)

.1 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 IR screening meetings. The inspectors also confirmed, on a sampling basis, that, as applicable, for identified defects and non-conformances, Exelon performed an evaluation in accordance with 10 CFR Part 21.

b. Findings

No findings were identified.

.2 Annual Sample: Westinghouse 480V DB-25 Screen Wash Pump Breaker Failures

c. Inspection Scope

The inspectors performed an in-depth review of Exelon's equipment apparent cause evaluation and corrective actions associated with the condition reports IR 1672093, 2387410, and 2391023 regarding the failure of circuit breaker (SW-P-1A-BK) to trip on demand within the screen wash system (SWS). The SWS is designed to provide a flow of river water to the automatic bar rakes sluice canal, the travelling screens sluice canal, and three of the travelling screens. The flow ensures that the sluice canals and the travelling water screens are cleaned and any debris is deposited in the trash pit. The SWS is a non-safety related system, but the SWS breaker (SW-P-1A-BK) has a safety function to provide circuit isolation and protection for a non-safety related load fed from a safety related source.

IR 01672093 documented the failure to trip of Screen Wash Pump 1A circuit breaker (SW-P-1A-BK, EE-BK-425) on June 15, 2014, during normal operation. IR's 02387410 and 02391023 documented the failure to trip of Screen Wash Pump 1A circuit breaker (SW-P-1A-BK, EE-BK-415) on September 28, 2014, and October 4, 2014, during normal operation. The failure to trip of circuit breaker (SW-P-1A-BK, EE-BK-415) on October 4, 2014, was part of a continuous monitoring and troubleshooting activity to identify the cause of the failure in normal operation.

The inspectors assessed Exelon's problem identification threshold, causal analyses, extent of condition reviews, and the prioritization and timeliness of corrective actions to determine whether Exelon was appropriately identifying, characterizing, and correcting problems associated with this issue and whether the planned or completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of Exelon's corrective action program and Title 10 of the Code of Federal Regulations (CFR) Part 50, Appendix B, Criterion XVI, "Corrective Action." In addition,

the inspectors reviewed documentation associated with this issue, including condition and failure analysis reports, and interviewed engineering personnel to assess the effectiveness of the implemented corrective actions.

d. Findings and Observations

No findings were identified.

The inspectors concluded that Exelon took appropriate actions to identify the cause of the June 15, 2014, September 28, 2014, and October 4, 2014, breaker failures. The inspectors concluded that each breaker failure was not a common issue.

For the June 15, 2014, breaker failure, Exelon determined the apparent cause to be trip mechanism binding due to the operating mechanism frame being bent. Exelon's determination was based on failure analysis of the screen wash pump circuit breaker (SW-P-1A-BK, EE-BK-425) performed by a third part vendor (Purchase order No. 80058362). The vendor was not successful at repeating the circuit breaker failure on the bench after repetitive cycling of the circuit breaker. However, visual inspection of the circuit breaker indicated that the bent operating mechanism frame was the most probable cause of the circuit breaker failure to trip.

Exelon promptly replaced the failed breaker with circuit breaker (SW-P-1A-BK, EE-BK-415) and incorporated the third party vendor recommendations into their breaker maintenance program. Specifically, Exelon revised the system performance monitoring plan to trend trip bar force over the next eight performances of the preventive maintenance procedure E-5.1, "Westinghouse 480V DB-25 Circuit Breaker Maintenance and Testing." Exelon performed a past operability review and determined that there was no impact on emergency diesel generator (EG-Y-1A) loading during failure of the circuit breaker to trip. Exelon also performed an extent of condition review and determined that there were no other breakers that were experiencing a similar issue.

For the September 28, 2014, breaker failure (SW-P-1A-BK, EE-BK-415), Exelon promptly cleaned the 62 (SW-P-1A/62) time delay relay because it had an intermittent high resistance contact. Exelon also replaced the shunt trip actuator coil because there were signs of overheating. Because Exelon could not replicate the failure in the cubicle or during bench testing, they instrumented the circuit breaker trip circuit and monitored multiple points for degraded voltage and returned it to service with monitoring and troubleshooting activities in progress. Exelon also procured the services of the vendor to provide further technical support.

With additional monitoring points instrumented, the circuit breaker failed again on October 4, 2014. The vendor's failure analysis report identified that there was corrosion and lubrication breakdown on the operating mechanism. Exelon's review of the vendor failure analysis concluded that the operating mechanism corrosion and lubrication breakdown was the most likely apparent cause of the September 28 and October 4, 2014, failures. Exelon took prompt corrective action to replace the failed breaker, and incorporated the vendor recommendations into their breaker maintenance program. Specifically, Exelon changed the frequency of PM E-5.1from 180 days to 90 days and validated that the lubrication requirements within Exelon's preventative maintenance procedure met the standards specified in Westinghouse DB Circuit Breaker Maintenance Manual. Exelon performed a review of previous events covering a 14 year period and

did not identify issues associated with 480V DB circuit breakers similar to the recent failures. Exelon also performed an extent of condition review and determined that there were no other breakers that were experiencing a similar issue. Exelon initiated a long term corrective action (IR 02392331-04) to determine a more suitable breaker or electrical switching device.

The inspectors determined Exelon's overall response to the issue was commensurate with the safety significance, was timely, and the actions taken and planned were reasonable to resolve the Westinghouse 480V DB-25 screen wash pump circuit breaker failures.

.3 Annual Sample: Air Intake Tunnel Fire Protection System Availability Management

a. Inspection Scope

The inspectors performed an in-depth review of Exelon's analysis and corrective actions associated with condition report IR 2397273, "NRC ID: Increased Sensitivity Required for Halon Out of Service Time." Specifically, Exelon accumulated elevated unavailability time for the air intake tunnel (AIT) fire protection (FP) systems. TMI contains an AIT which is a safety-grade design basis structure used to mitigate the effects of a design basis hypothetical aircraft impact. The AIT contains redundant and diverse fire detection and suppression systems designed to protect the air supply to the control building envelope. The inspectors identified that Exelon had not appropriately managed maintenance in the AIT such that AIT FP systems maintained a high level of availability to respond to a design basis event.

The inspectors assessed Exelon's problem identification threshold, cause analyses, extent of condition reviews, compensatory actions, and the prioritization and timeliness of Exelon's corrective actions to determine whether Exelon was appropriately identifying, characterizing, and correcting problems associated with this issue and whether the planned or completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of Exelon's corrective action program and 10 CFR 50, Appendix B. In addition, the inspectors performed field walkdowns and interviewed engineering, operations and work management personnel to assess the effectiveness of the implemented corrective actions.

b. Findings and Observations

No findings were identified.

In October of 2014, the inspectors identified that Exelon had not effectively managed the unavailability time associated with the removal of this design basis mitigating system. Exelon acknowledged the concern and documented the issue in IR 2397273 and determined that the cause was due to inadequate procedural controls, legacy routine surveillances, and a lack of a clear unavailability goal. Exelon implemented immediate corrective actions which included management approval prior to emergently removing the AIT FP systems from service for maintenance. Furthermore, Exelon work management staff was briefed on the need to bundle related AIT maintenance and increase system availability. Exelon created an availability goal of 90 percent to monitor the stations performance and improve overall system availability.

The inspectors reviewed the licensee's corrective actions and identified a noticeable improvement in the availability of the AIT FP systems. Specifically, the inspectors reviewed planned maintenance outage schedules to ensure appropriate bundling of work windows to maximize the system availability. The impacts of effective work bundling and management oversight is evident through Exelon exceeding the 90 percent availability goal for the first quarter of 2015.

In an effort to minimize the frequency of planned maintenance outages, Exelon justified the extension of monthly fire service system alignment checks to quarterly. The inspectors review identified no issues of concern with the extension of the fire service alignment checks. However, the inspectors identified that the justification was documented in the corrective action program under IR 1622415-02 on November 16, 2014, but the procedure has not yet been updated, which has therefore delayed implementation of quarterly testing and improved AIT system availability.

The inspectors reviewed the licensing basis for the AIT systems to determine whether a limiting condition of operation existed when the AIT systems were inoperable. The inspectors identified that the fire protection program historically contained a 48 hour time-clock which was applicable while the AIT fire protection equipment was inoperable. The inspectors identified that the time-clock was removed by Exelon without the appropriate justification. The inspectors evaluated this issue and determined that since the change to the fire protection program did not result in an adverse impact to a fire safe shutdown scenario, that the issue was considered to be minor. Exelon documented the issue under IR 2520040 and plans to document the appropriate justification.

.4 Semi-Annual Trend Review

a. Inspection Scope

The inspectors performed a semi-annual review of site issues to identify trends that might indicate the existence of more significant safety issues. As part of this review, the inspectors included repetitive or closely-related issues that documented by Exelon in trend reports, performance indicators, major equipment problem lists, system health reports, maintenance rule assessments, and maintenance or corrective action program backlogs. The inspectors also reviewed Exelon's corrective action program database for the first and second quarters of 2015 to assess IRs written in various subject areas (equipment problems, human performance issues, etc.), as well as individual issues identified during the NRCs daily condition report review (Section 4OA2.1). The inspectors reviewed the Exelon quarterly trend reports for the past two quarters to verify that Exelon personnel were appropriately evaluating and trending adverse conditions in accordance with applicable procedures.

b. Findings and Observations

No findings were identified.

The station has identified adverse trends in corrective action program engagement, self-assessment quality, and configuration control. The inspectors reviewed the IR trends and determined that challenges regarding configuration control performance have demonstrated improvement in the fourth quarter of 2014, but has subsequently degraded in 2015. Additionally, Exelon identified and the inspectors confirmed a

negative trend in ESAS relay replacement errors, primarily during the engineering package development and pre-execution preparations. A review of these issues by the inspectors determined additional actions were taken to provide additional oversight and challenge reviews for future relay replacements. Also, the order of replacements were reprioritized based, in part, on these actions.

The inspectors discussed these issues with various station personnel, including station management. Station management acknowledged the issues, and verified they were captured in the corrective action program. The inspectors determined these corrective actions were appropriate.

4OA3 Follow-Up of Events and Notices of Enforcement Discretion (71153 - 1 sample)

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 Parts 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.

- Dropped control rod 7-6 due to a failed control rod drive mechanism stator and resulting main turbine runback on May 2, 2015

b. Findings

No findings were identified.

4OA6 Meetings, Including Exit

On July 17, 2015, the inspectors presented the inspection results to Mr. T. 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.

ATTACHMENT: SUPPLEMENTARY INFORMATION

SUPPLEMENTARY INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

R. Libra	Site Vice President
T. Haaf	Plant Manager
T. Alvey	Manager, Chemistry
D. Atherholt	Manager, Regulatory Assurance
J. Bell	Lead Maintenance Technician
K. Baldwin	Systems Engineer
R. Campbell	Manager, Site Security
D. Divittore	Manager, Radiological Engineering
M. Fitzwater	Senior Regulatory Assurance Engineer
K. Hummert	Radwaste Operator
J. Piazza	Senior Manager, Design Engineering
K. Robles	Component Engineer
C. Sinn	Technical Specialist
C. Six	Director Site Operations
G. Smith	Director, Maintenance
B. Shumaker	Manager, Emergency Preparedness
W. Vuxta	Radiological Engineering Manager

Other Personnel

D. Dyckman	Nuclear Safety Specialist Pennsylvania Department of Environmental Protection Bureau of Radiation Protection
A. Delamotte	ASN, France Regulatory Inspector

LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATED

Opened/Closed

05000289/2015002-01	NCV	Failure to Maintain Turbine Bypass Valve Simulator Modeling (Section 1R20)

LIST OF DOCUMENTS REVIEWED

* Indicated IR was generated as a result of NRC inspection

Section 1R01: Adverse Weather Protection

Procedures
OP-AA-108-107, Switchyard Control, Revision 4
OP-AA-108-107-1001, Station Response to Grid Capacity Conditions, Revision 6
OP-TM-108-107-1002, TMI Transmission Interactions That Impact Operations, Engineering, Work Management, and Maintenance That Includes First Energy Interface Agreement and NERC Standards, Revision 9
WC-AA-107, Seasonal Readiness, Revision 15

Miscellaneous
Certification of 2015 Three Mile Island Generating Station Summer Readiness Memorandum, May 15, 2015

ARs:	A2268794	A2300513	A2346714		
IRs:	2384589	2382351	2500100	2502664	2513488

Section 1R04: Equipment Alignment

Procedures
1104-6, Spent Fuel Cooling System, Revision 45A
OP-TM-212-000, Decay Heat Removal, Revision 19
OP-TM-212-151, Decay Heat Removal with 'B' in Standby, Revision 4
OP-TM-191-191, Decay Heat Removal with 'A' in Standby, Revision 11
OP-TM-191-451, Decay Heat Removal Operating and Temperature Limits, Revision 4

Drawings
302-630, Spent Fuel Cooling System – Flow Diagram, Revision 32
302-640, Decay Heat Removal – Flow Diagram, Revision 84
302-645, Decay Heat Closed Cycle Cooling Water – Flow Diagram, Revision 39

Miscellaneous
10 CFR 50.59 Screening TMI-15-5-0064, Revision 45A
TMI-1 Shift Operating Logs, dated April 26, May 7, and June 18, 2015

Section 1R05: Fire Protection

Procedures
1038, Administrative Controls-Fire Protection Program, Revision 76
1440-Y-14, Fire Barrier Envelopes and REHS Repair/Installation, Revision 17
OP-AA-201-003, Fire Drill Performance, Revision 14
OP-MA-201-007, Fire Protection System Impairment Control, Revision 6

Drawings
1-FHA-027, Fire Area Layout – Auxiliary & Fuel Handling Bldgs., Revision 8
302-842, Control Building and Machine Shop Ventilation, Revision 57
E-311-841, Control Building Ventilation, Revision 20
E-311-843, Control Building Ventilation, Revision 20

Miscellaneous
AR A2358347-03, Evaluation of Mecatiss Silco Wrap Quality
CC-AA-309-101, Engineering Technical Evaluations, Revision 11
Fire Hazard Analysis for AB-FZ-7, Revision 26
VM-TM-2753, TMI Vendor Manual – Mecatiss Firewrap Systems, Revision 2
WO C2032478, Remove and Install Mecatiss Fire Wrap, NS-P-1A, dated February 21, 2015
IRs: 2503735 2503870 2504160 2503812 2505802* 2505944

Section 1R06: Flood Protection Measures

Procedure
MA-TM-153-001, Inspection and Maintenance of TMI-1 Electrical and Telephone Manholes, Revision 5

Miscellaneous
IRs: 1493109 2483120 928120 1043638 1044859 1046016
1232725 1198974 1642613 1194775
WOs: R2238053 R2238054 R2225726

Section 1R11: Licensed Operator Requalification Program

Miscellaneous
TQ-TM-106-533-C001, Decay Heat Service Water, Revision 1
TQ-TM-LRU-106-S043, TMI Operational Simulator Training, Revision 0

Section 1R12: Maintenance Effectiveness

Procedures
1301-8.2, Diesel Generator Major Inspection, Revision 95
1302-5.18D, Calibration of 'B' Loop HPI Flow Transmitter MU-FT-1129, Revision 2
DGA/B, Diesel Generator Annunciator Panels 'A' and 'B,' Revision 9
ER-AA-310, Implementation of the Maintenance Rule, Revision 9
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
OP-TM-861-902, Diesel Generator 'B' Emergency Operations, Revision 16

Miscellaneous
ARs: A2366650 A2334390 A2348569 A2306235 A2349424 A2380549
IRs: 1673246 2510258 2505345 2509662 1504941 990807
1227820 2517315 2506867 2517329 2516905
WOs: R2224567 R2258884

Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Procedures
1082.1, TMI Risk Management Program, Revision 8
OP-AA-108-117, Protected Equipment Program, Revision 4
OP-AA-201-012-1001, Operations On-Line Fire Risk Management, Revision 1
OP-TM-999-097, Manual Actuation of 'A' ES Components During Relay Replacement, Revision 0

OU-AA-103, Shutdown Safety Management Program, Revision 15
TM-MISC-024, Risk Management Document, Revision 0
WC-AA-101, On-Line Work Control Process, Revision 18

Drawings
1E-168-02-001, General Arrangement Intake Screen and Pumphouse Plan Floor Elevation 262-6 and 265-0, Revision 4
302-357, Station Blackout Diesel Generator Cooling Water, Revision 5

Miscellaneous
Clearance 15500532, Replace Relay 63Z-2A/R-C3A, dated April 22, 2015
Clearance 15500359
Prompt Investigation, IR 2488936 – Failure of ES relay 63Z-2A/R-C3A
Protected Equipment List for 63Z-2A/RC3A, dated April 22, 2015
Protected Equipment List for T1FO9, dated May 6, 2015
Risk Technical Evaluation TMI-15-S-0054
T1FO9 Outage Fuel Protection Criteria Brief Sheet 2015-1, Revision May 7, 2015
T1FO9 Shutdown Safety Approval, dated May 6, 2015
TMI-1 OCC Update Logs, dated April 22 – 23, 2015
TMI-1 Shift Operations Logs, dated April 22 – 23, 2015, May 1, 2015
IRs: 2488936 2489014 2489567 2489574 2489586 2496886
WO: C2032708

Section 1R15: Operability Evaluations

Procedures
1303-4.22B, Beckman O2/H2 Analyzer Channel Functional Test and Calibration, Revision 39
1303-11.3, Surveillance Test and Set Main Steam Safety Valves, Revision 38
IC-57.1, MS-V-3A – 'F' Actuator Testing, Revision 0
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-211-000, Makeup and Purification System, Revision 29
OP-TM-211-242, MU-V-18 Stroke Test for IST, Revision 7

Drawings
302-011, Flow Diagram – Main Steam, Revision 75

Surveillances
ST200960, (1303-11.3) – Setpoint Calibration of MS-V-21A, dated October 23, 2013
C2034479, (1303-11.3) – Setpoint Calibration of MS-V-17A, dated May 10, 2015

Miscellaneous
C2034682, Temporary Leak Repair to 'A' Decay River piping – Southside of connection for DR-FE-1303A, dated June 18, 2015
Non-destructive Evaluation Report BOP-MT-2015-024, Base Metal Plate for DR Pipe Repair, dated June 19, 2015
NRC SER to allow Exelon to utilize ASME Code Case N-789, dated May 10, 2012
NWS Technology Inc. Refurbishment / Repair Report (PO 80-040852 / 80-048841) of MS-V-17A, SN BS05102, dated September 13, 2013
Prompt Investigation 2496279, 'A' OTSG TBVs Failed Closed

Primary Plant Computer Plot of T1FO9 Shutdown Response, dated May 7, 2015
Troubleshooting Data, MS-V-3 I&C test data, dated May 7, 2015
Westinghouse Nuclear Safety Advisory Letter 15-2, dated March 23, 2015
IRs: 1575798 2482056 2490915 2498526* 2496348 2496660
2518534 2497542 2499410 2515562
WOs: R2251747 R2213174

Section 1R18: Plant Modifications

Procedures
SP-9000-23-002, Placement of Concrete, Revision 0
1101-33-017, Production and Delivery of Concrete, Revision 0

Miscellaneous
CC-AA-102, Design Input and Configuration Change Impact Screening, Revision 20
CC-AA-103, Configuration Change Control, Revision 21
ECR 14-00175, TMI Unit 1 Flood Barrier Seal Remediation, Revision 0
IR: 2515382

Section 1R19: Post-Maintenance Testing

Procedures
1303-4.11, HPI/LPI Logic and Analog Channel Test, Revision 31
1303-4.13, RB Emergency Cooling and Isolation System Analog Test, Revision 047B
1303-4.19, HPI/LPI Analog Channel Test, Revision 35
1303-5.1BX, 'B' RB Emergency Cooling and Isolation System Logic Channel/Component Test – Group 1 Components
1303-5.2AY, 'A' Emergency Loading Sequence and HPI Logic Channel Component Test – Group 2 Components, Revision 0
OP-TM-541-208, IST of NS-P-1A/B/C, Revision 11
OP-TM-622-221, Control Rod Program Special Check, Revision 2
OP-TM-999-097, Manual Actuation of 'A' ES Components During Relay Replacement, Revision 0

Miscellaneous
Apparent Cause Evaluation 2496808, CRDM Quick Disconnect Fittings Disengaged Causing Leaks, dated June 30, 2015
Engineering Change Request 13-00060
Prompt Investigation, IR 2488936 – Failure of ES relay 63Z-2A/R-C3A
Protected Equipment List for 63Z-2A/RC3A, dated April 22, 2015
Risk Technical Evaluation TMI-15-S-0054
TMI-1 OCC Update Logs, dated April 22 – 23, 2015
TMI-1 Shift Operations Logs, dated April 22 – 23, 2015
Clearances: 14501339 15500532
IRs: 2486524 2488936 2489014 2489567 2489574 2489586
2499371 2504719 2513805 2496808 2523037 2488936
WOs: C2032708 R2252128 A2350980 C0151517 R2253706 C2032478
C2034460 R2009870

Section 1R20: Refueling and Other Outage Activities

Procedures
1101-3, Containment Integrity and Access Limits, Revision 91
1102-2, Plant Startup, Revision 153
1102-4, Power Operation, Revision 128A
1102-10, Plant Shutdown, Revision 97A
1102-11, Plant Cooldown, Revision 142B
1103-8, Approach to Criticality, Revision 53
OP-AA-108-108, Unit Restart Review, Rev. 12
OP-AA-108-108-1001, Drywell/Containment Closeout, Revision 1
OP-AA-108-108-1008, TMI-1 Supplement to OP-AA-108-108, Revision 11
OP-TM-220-251, RCS Leak Rate Determination, Revision 10
OP-TM-300-205, Shutdown Margin for Hot Shutdown Conditions, Revision 2
OP-TM-300-206, Shutdown Margin for Low Temperature Conditions, Revision 1
OP-TM-311-102, Standby Mode to Operating Mode, Revision 2

Drawings
SS-209-093, Turbine Bypass Valve Electrical Elementary Diagram, Revision 9
SS-209-774, Control Power Monitoring – ICS NNI System, Revision 7

Miscellaneous
1102-11, Cooldown Data Sheets, dated May 7, 2015
MS-V-3 Diagnostic Trend Data, dated May 7, 2015
MS-V-17A / 'A' OTSG Pressure (PT1181) plant computer trend, dated May 7, 2015
Prompt Investigation 2496279, 'A' OTSG TBVs Failed Closed
Primary Plant Computer Plot of T1FO9 Shutdown Response, dated May 7, 2015
PORC 2015-07 Meeting Minutes, dated May 8, 2015
Post-Transient Review, dated May 2, 2015 & May 7, 2015
SWR 16132, Simulator software work request regarding MS-V-3 model corrective action
T1FO9 ALARA Plan, RP-AA-401, dated May 6, 2015
T1FO9 Forced Outage Plan, dated May 6, 2015
TMI-1 Shift Operations Logs, dated May 6 – 11, 2015
TMI-1 Updated Final Safety Analysis Report, Section 10.3.2.1 – Design Basis, Turbine Bypass System, Revision 22
TQ-TM-104-411, TMI Training Lesson Plan – Main Steam, dated March 10, 2008
TQ-TM-104-621, TMI Training Lesson Plan - Integrated Control System, dated October 28, 2008
TQ-TM-104-GOP-S007, ILT Simulator – Plant Shutdown, dated May 4, 2015
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Section 1R22: Surveillance Testing

Procedures
1301-13.1, Emergency Plant Radiation Instruments, Revision 10
1303-12.18.3, Fire System Nozzle Flow Test – AH-F-3A/B Control Building Charcoal Filters Deluge, Revision 0
1303-12.8J, Incipient Fire Detector (IFD) Instrumentation Functional Test, Revision 5

1104-45S, Incipient Fire Detectors, Revision 1
OP-TM-211-000, Makeup and Purification System, Revision 29
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OP-TM-220-251, Leak Rate Determination, Revision 12
RP-TM-850, Radiation Protection Emergency Equipment Readiness, Revision 5
WC-AA-111, Surveillance Program Requirements, Revision 4

Drawings
302-231, Fire Service Water In-Plant Header and End Users, Sheet 2, Revision 2
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Section 2RS2: Occupational ALARA Planning and Controls

Procedures
RP-AA-400, ALARA Program, Revision 11
RP-AA-400-1002, Radiological Risk Management, Revision 6
RP-AA-400-1003, Work Group Radiological Excellence Plans, Revision 1
RP-AA-400-1004, Emergent Dose Control and Authorization, Revision 7
RP-AA-401, Operational ALARA Planning and Controls, Revision 18

Documents
ALARA Plans
AP 15-006, Top of Reactor Head Work, RWP TM 1-15-00001
AP 15-007, Forced Outage (1F09) Functional Maintenance, RWPs TM 1-15-00002, TM 1-15-00003, TM 1-15-00610
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Surveys
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Section 2RS3: In-plant Airborne Radioactivity Control and Mitigation

Procedures
RP-AA-301, Radiological Air Sampling Program, Revision 8
RP-AA-440, Respiratory Protection Program, Revision 10
RP-TM-440-004, Recharge of Breathing Air Cylinders Using Ingersoll-Rand Recharging System, Revision1
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RP-AA-870-1001, Set-Up and Operation of Portable Air Filtration Equipment, Revision 3
RP-AA-870-1003, Treating Portable HEPA Filter Units, Revision 3
RP-AA-870-1004, Use of Air Movers/Portable Fans in Radiologically Controlled Areas, Revision 0

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Section 2RS4: Occupational Dose Assessment

Procedures
RP-AA-203-1001, Personnel Exposure Investigations, Revision 8
RP-AA-210, Dosimetry Issue, Usage, and Control, Revision 25
RP-AA-210-1001, Dosimetry Logs and Forms, Revision 9
RP-AA-220, Bioassay Program, Revision 10
RP-AA-222, Methods for Estimating Internal Exposure from In-VIVO and In-VITRO Bioassay Data, Revision 5
RP-AA-250, External Dose Assessments from Contamination, Revision 6
RP-AA-270, Prenatal Radiation Exposure, Revision 7
RP-AA-302, Determination of Alpha Levels and Monitoring, Revision 7

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Section 4OA1: Performance Indicator Verification

Procedures
OP-TM-220-251, Leak Rate Determination, Revision 12

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Section 4OA2: Problem Identification and Resolution

Procedures
1038 Administrative Controls Fire Protection Program Revision 15
1038 Administrative Controls Fire Protection Program Revision 16
1104-451 Air Intake Tunnel Halon System, Revision 20
E-5.1, Westinghouse 480V DB-25 Circuit Breaker Maintenance and Testing, Revision 7
LS-AA-128 Fire Protection Change Regulator
MA-AA-716-004, Complex Troubleshooting, Revision 12
PI-AA-125, Corrective Action Program Procedure, Revision 2

Drawings
8-6489-E1, Electrical Plant Fire Protection, Revision 17
209-116, Air Intake Structure Protective Relays, Revision 7
E-206-022, One Line and Relay Diagram 4160V Switchgear, Revision 21
E-206-032, One Line and Relay Diagram Screen House Reactor Building 480V Switchgear, Revision 18
SS-208-259, Elementary Diagram 480V Switchgear, Revision 2
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Section 4OA3: Followup of Events and Notices of Enforcement Discretion

Procedures

Abnormal Operating Procedure 62, Inoperable Rod, Revision 5
OP-TM-AOP-0621, Inoperable Rod Basis Document, Revision 5
OP-TM-621-471, ICS Manual Control, Revision 25
OP-TM-622-000, Control Rod Drive System (CRD), Revision 6
OP-TM-622-411, De-Energizing a Mechanism, Revision 5
OP-TM-641-000, Reactor Protection System, Revision 6

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TS 4.7.1, Amendment 274
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LIST OF ACRONYMS

AC	alternating current
ADAMS	Agencywide Documents Access and Management System
AIT	air intake tunnel
ALARA	as low as is reasonably achievable
CFR	Code of Federal Regulations
ESAS	engineered safeguards actuation system
FP	fire protection
ICS	integrated control system
IMC	Inspection Manual chapter
IR	issue report
NCV	non-cited violation
NRC	Nuclear Regulatory Commission
NVLAP	National Voluntary Laboratory Accreditation Program
OTSG	once through steam generator
RCS	reactor coolant system
SCBA	self-contained breathing apparatus
SSC	structure, system, and component
SWS	screen wash system
TBV	turbine bypass valve
TMI	Three Mile Island Unit 1
TS	technical specifications
UFSAR	Updated Final Safety Analysis Report