



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

February 1, 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
5000289/2015004**

Dear Mr. Hanson:

On December 31, 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 January 29, 2016, with Mr. E. Callan, Site Vice President, 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 (NCV) consistent with Section 2.3.2a of the 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 addition, if you disagree with the cross-cutting aspect assigned to the finding 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 05000289/2015004
w/Attachment: Supplementary Information

cc w/encl: Distribution via ListServ

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No: 50-289

License No: DPR-50

Report No: 05000289/2015004

Licensee: Exelon Generation Company

Facility: Three Mile Island Station (TMI), Unit 1

Location: Middletown, PA 17057

Dates: October 01 through December 31, 2015

Inspectors: D. Werkheiser, Senior Resident Inspector
J. Heinly, Resident Inspector
L. Cruz, Project Engineer
H. Gray, Senior Reactor Inspector
J. Krafty, Senior Reactor Inspector
J. Kulp, Senior Reactor Inspector
K. Mangan, Senior Reactor Inspector
R. Rolph, Health Physicist

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

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SUMMARY

IR 05000289/2015004, 10/01/2015-12/31/2015; Three Mile Island, Unit 1, Maintenance Effectiveness.

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) 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 Nuclear Regulatory Commission (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. The inspectors identified a self-revealing finding of very low safety significance involving an NCV of 10 *Code of Federal Regulations* (CFR) 50, Appendix B Criterion XVI, "Corrective Action Program," because Exelon did not identify and correct a condition adverse to quality on the 'B' nuclear river water pump (NR-P-1B). Specifically, Exelon did not properly evaluate an adverse vibration trend on NR-P-1B, which resulted in exceeding its in-service test (IST) required action level and declared inoperable on October 10, 2015. Exelon entered the condition into their corrective action program (CAP) as issue report 2568763 and emergently replaced the pump, engaged the vendor for short and long term design and material changes to correct the vibration, and created process and peer check corrective actions to ensure all vibration data is reviewed timely and trends are addressed commensurate with their safety significance.

The performance deficiency is more than minor because it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the elevated vibrations reduced the reliability and capability of NR-P-1B to perform its safety function. The inspectors evaluated the finding using IMC 0609, Attachment 4, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process for Findings At-Power," Exhibit 2, and determined this finding to be of very low safety significance (Green) because the degraded condition was not a design deficiency that affected system operability; did not represent an actual loss of function of a system; did not represent an actual loss of function of a single train or two separate trains for greater than its technical specification (TS) allowed outage time and did not represent an actual loss of function of one or more non-technical specification trains of equipment designated as high safety significant.

The finding has a cross-cutting aspect in the area of Problem Identification and Resolution, Evaluation, because the station did not thoroughly evaluate the elevated vibration data such that the issue was addressed before NR-P-1B became inoperable [P.2]. (Section 1R12)

REPORT DETAILS

Summary of Plant Status

Unit 1 began the inspection period at 100 percent power. On October 23, 2015 operators began reducing power to support reactor coast down to a planned refueling outage. On October 30, operators shutdown the unit from 94 percent power for a planned refueling and maintenance outage. The unit achieved criticality on November 24 and synchronized to the electrical grid on November 25. Operators returned the unit to 100 percent reactor power on November 27. 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 – 1 sample)

.1 Readiness for Seasonal Extreme Weather Conditions

a. Inspection Scope

The inspectors performed a review of Exelon's readiness for the onset of seasonal low temperatures. The review focused on the borated water storage tank (BWST) and control tower heating and ventilation systems. The inspectors reviewed the Updated Final Safety Analysis Report (UFSAR), (TSs), control room logs, and the CAP 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 cold weather conditions. Documents reviewed for each section of this inspection report are listed in the Attachment.

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' train decay heat lineups following 'A' decay closed motor and breaker fire on October 6, 2015
- Nuclear river water system during refueling outage T1R21 on November 1, 2015

- Spent fuel pool cooling alignment during nuclear fuel core off-load on November 4, 2015
- 'B' train engineered safety feature ventilation system when 'A' train was out of service on November 10, 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, TSs, 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 CAP for resolution with the appropriate significance characterization.

b. Findings

No findings were identified.

.2 Full System Walkdown (71111.04S – 1 sample)

a. Inspection Scope

On December 2 and 3, 2015, the inspectors performed a complete system walkdown of accessible portions of the emergency feedwater system to verify the existing equipment lineup was correct and diverse and flexible coping strategy "FLEX" tie-ins were properly aligned. The inspectors reviewed operating procedures, surveillance tests, drawings, equipment line-up check-off lists, and the UFSAR to verify the system was aligned to perform its required safety functions. The inspectors also reviewed electrical power availability, component lubrication and equipment cooling, hangar and support functionality, and operability of support systems. The inspectors performed field walkdowns of accessible portions of the systems to verify system components and support equipment were aligned correctly and operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no deficiencies. Additionally, the inspectors reviewed a sample of related issue reports and work orders to ensure Exelon appropriately evaluated and resolved any deficiencies.

b. Findings

No findings were identified.

1R05 Fire Protection

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.

- Auxiliary building fire protection measures and response during an actual fire at decay-closed pump 1A (AB-FZ-7) on October 5 – 6, 2015
- Engineered safety feature ventilation building, (AB-FZ-11), on October 14, 2015
- Reactor building outside the D-rings (RB-FZ-1A, 1B, 1C) on November 6, 2015
- Reactor building inside 'A' and 'B' D-rings (RB-FZ-1D, 1E) on November 13, 2015
- Reactor building outside the D-rings elevations 308' and 346' (RB-FZ-2, 3) on November 20, 2015

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 cable vaults E-12, 15, 19, 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.

1R07 Heat Sink Performance (71111.07A – 1 sample)

a. Inspection Scope

The inspectors reviewed the 'A' decay closed cooling water heat exchanger (DC-C-2A) 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.

1R08 In-service Inspection (71111.08 - 1 sample)

a. Inspection Scope

From November 2 -12, 2015, the inspectors conducted an inspection and review of the Exelon staff's implementation of in-service inspection (ISI) program activities for monitoring degradation of the reactor coolant system (RCS) boundary, risk significant piping and components, and containment systems during refueling outage T1R21. The sample selection for this inspection was based on the inspection procedure objectives and risk priority of those pressure retaining components in systems where degradation would result in a significant increase in risk. The inspectors observed in-process non-destructive examinations (NDE), reviewed documentation, and interviewed Exelon personnel to verify that the NDE activities performed as part of the fourth interval, first period, of the Unit 1 ISI program were conducted in accordance with the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, 2004 Edition, with no Addenda.

Non-destructive Examination and Welding Activities (IMC Section 02.01)

The inspectors performed direct observation of NDE activities in process and reviewed documentation of non-destructive examinations listed below. Activities included review of liquid penetrant testing (PT), ultrasonic testing (UT), eddy current testing (ECT) and visual testing (VT).

The inspectors reviewed certifications of the NDE technicians performing the examinations and verified that the inspections were performed in accordance with approved NDE procedures and industry guidance. The inspectors verified that the test results were reviewed and evaluated by certified Level III NDE personnel and that the parameters used in the test were in accordance with the limitations, precautions and prerequisites specified in the test procedure.

ASME Code Required Examinations

- Observation of automated UT, utilizing the phased-array technique, volumetric examinations of a sample of reactor suction welds before and after Material Stress Improvement Process (MSIP) mitigation activities on the discharge lines and on the suction lines that were not MSIP mitigated during refueling outage T1R21
- Observation of equipment calibration and manual UT of pipe welds of the steam supply line to the auxiliary feedwater turbine driven pump

- Observation of data review and presentation of a sample of automated UT of the reactor pressure vessel welds including welds 9, 10, and 14 as part of the reactor vessel 10 year frequency examination
- For the “A” loop of the core flood alloy 82 dissimilar metal weld inner surface examination by ECT, per procedure 54-ISI-413-00, the inspectors discussed the procedure capabilities with the ECT technician and reviewed the data presentation including calibration results
- Review the PT procedure and work package with the PT examiner and review of PT data report for the containment penetration 339 weld
- Observation of ECT of the steam generator tubes
- Observation of the containment liner to concrete floor intersection including the leak inhibitor elastomer and confirmation that this area was VT inspected during the 1R21 outage
- Review of remote VT video documentation of the exterior surface of the upper reactor vessel head, control rod drive mechanism intersections and confirmation of the technique with the VT examiner

Other Augmented or Industry Initiative Examinations

The inspectors reviewed records documenting the results of manual UT, done per UT procedure 54-ISI-836 of the 3.6” diameter valve to safe end weld ID MU0952BMWeld per the requirements of MRP-146, “Managing Thermal Fatigue in Normally Stagnant Non-Isolable RCS Branch Lines,” and the risk informed requirements of the ASME Code Section IX.

The inspectors reviewed the scope and methods for performing UT and VT examination techniques for the implementation of MRP-227-A, “Pressurized Water Reactor Internals Inspection and Evaluation Guidelines,” and performed using Exelon Procedure ER-TM-335-2002, “Inspection of TMI-1 Reactor Vessel Internals,” Revision 3.

Repair/Replacement Activities Including Welding Activities

There were no repair or replacement activities within the scope of the ASME Code Section XI during refueling outage T1R21.

Pressurized Water Reactor (PWR) Vessel Upper Head Penetration Inspection Activities (IMC Section 02.02)

The inspectors observed portions of the remote bare metal visual examination of the exterior surface of the reactor vessel upper head to verify that no boric acid leakage or wastage had been observed. The inspectors verified that the reactor vessel upper head penetration VT-2 visual examinations were performed in accordance with requirements of 10 CFR 50.55a and ASME Code Case N-729-1, “Alternative Examination Requirements for PWR Reactor Vessel Upper Heads,” to ensure the structural integrity of the reactor vessel head pressure boundary.

Boric Acid Corrosion Control (BACC) Inspection Activities

During the plant shutdown process, the NRC resident inspectors observed the boric acid leakage identification process. The ISI inspectors reviewed the BACC program, which is performed in accordance with Exelon procedures, and discussed the program requirements with the boric acid program owner. The inspectors reviewed photographic inspection records of each identified boric acid leakage location and discussed the mitigation and evaluation plans. The inspectors reviewed a sample of condition reports for evaluation and disposition within Exelon's CAP. Samples selected were based on component function, significance of leakage, and location where direct leakage or impingement on adjacent locations could cause degradation of safety system function.

Steam Generator Tube Inspection Activities (IMC Section 02.04)

The inspectors directly observed a sample of the once-through steam generator (OTSG) eddy current tube examinations, which consisted of full length bobbin inspection of 100 percent of all active tubes in each of the two OTSGs; array probe examination of the peripheral tubes, tubes with previous tube-to-tube wear (TTW), and tubes with greater than 10 percent tube-to-tube support sheet (TTS) wear; and array probe examination of special interest tubes. The inspectors compared the scope of the ECT activities with the potential degradation mechanisms documented in the T1R21 Steam Generator Degradation Assessment Report, Revision 0.

The inspectors directly observed the review of a sample of the OTSG eddy current tube examinations, which consisted of full length bobbin inspection of 100 percent of all active tubes in each of the two OTSGs; array probe examination of the peripheral tubes, tubes with previous TTW wear, and tubes with greater than 10 percent TTS wear.

The inspectors participated in the phone conference discussion on November 9, 2015, between Exelon personnel and NRC headquarters staff from the Steam Generator Branch to discuss the steam generator tube inspection results at TMI. These discussions were subsequently summarized in a memorandum available in the NRC's Agencywide Documents Access and Management System (ADAMS), Accession No. ML15327A079.

The inspectors verified that the OTSG eddy current tube examinations were performed in accordance with TMI TSs, ASME code requirements, and the TMI Steam Generator Program. The inspectors reviewed OTSG tube eddy current test results and verified that in-situ pressure testing of tubes was not required. The tube plugging list was reviewed to confirm that tubes at the 40 percent wear level or greater were to be plugged per the plant TS. The inspectors noted that a selection of tubes with wear below 40 percent were also conservatively selected for plugging. The tube plug procedure, tube plugs and tube stabilizers were examined. The inspectors verified that the OTSG tube examination screening criteria was in accordance with the Electric Power Research Institute (EPRI) Steam Generator Guidelines and flaw sizing was in accordance with an EPRI based examination technique specification sheet.

Identification and Resolution of Problems (IMC Section 02.05)

The inspectors reviewed a sample of TMI corrective action reports, which identified NDE indications, deficiencies, and other non-conforming conditions since the previous refueling outage and during the current refueling outage. The inspectors verified that non-conforming conditions were properly identified, characterized, evaluated, and that corrective actions were identified and entered into the CAP for resolution.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Regualification 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 unit shutdown and cooldown to support refueling outage T1R21 on October 30-31, 2015. 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 Regualification Testing and Training

a. Inspection Scope

The inspectors observed licensed operator simulator training on November 13, 2015, which focused on just-in-time training for crews scheduled to heat-up and restart of the unit from refueling outage T1R21. The inspectors evaluated operator performance during the simulated events 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 TS 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, or component (SSC) performance and reliability. The inspectors reviewed system health reports, CAP 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.

- Nuclear river water pump shaft wear and elevated vibrations on October 13, 2015
- Control rod drive failures on December 17, 2015

b. Findings

Introduction. The inspectors identified a self-revealing finding of very low safety significance (Green) involving an NCV of 10 CFR 50 Appendix B, Criterion XVI, “Corrective Action Program,” because Exelon did not identify and correct a condition adverse to quality on the ‘B’ nuclear river water pump (NR-P-1B). Specifically, Exelon did not properly evaluate an adverse vibration trend on NR-P-1B, which resulted in exceeding its IST required action level and declared inoperable on October 10, 2015.

Description. Exelon monitors the condition of TMI’s river water pumps, in part, through performance of IST surveillances. The IST surveillance is designed to measure pump performance and compare it to reference values such that trends in performance are identified and corrected. On June 26, 2015, Exelon performed the IST on NR-P-1B and identified elevated motor vibrations and documented the issue in the CAP as issue report 2520334. Exelon determined that the vibration increase was minimal and no repair or increased monitoring was warranted. During the subsequent NR-P-1B IST surveillance on October 10, 2015, it was identified that the pump motor vibrations had elevated into the required action level. The pump was declared inoperable and the station entered a 72 hour limiting condition of operation (LCO). Operations subsequently realigned NR-P-1C to the engineered safeguards standby position and exited the LCO.

The safety-related nuclear service river water system function is to provide a connection to the ultimate heat sink to support cooling safety-related SSCs used to respond to initiating events. The system contains three river water pumps (NR-P-1A/1B/1C) of which two independent pumps are required to be aligned to the ‘A’ and ‘B’ train to satisfy TS requirements.

Exelon entered the condition into the CAP as issue report 2568763 and performed an equipment apparent cause evaluation (EACE). The EACE identified that during normal power operations, operating equipment vibration data is collected on a monthly

frequency and the data collected for NR-P-1B revealed an adverse trend in vibration magnitudes. The EACE determined that station personnel had not reviewed the data therefore, missed identification of the trend prior to the vibrations escalating to the required action level and resulting in NR-P-1B inoperability.

Exelon performed an emergent replacement of NR-P-1B pump. Upon disassembly, the technicians identified excessive wear on the pump shaft and bearings. Exelon reviewed the as-found conditions in the EACE and identified that the wear worsened due to a natural frequency too close to running frequency. The EACE identified corrective actions to engage the vendor for short and long term design or material changes to correct the vibration issue. In addition, Exelon created process and peer check corrective actions to ensure all vibration data is reviewed timely and trends are addressed commensurate with their safety significance.

Analysis. The inspectors determined that Exelon's failure to identify and correct a condition adverse to quality on the NR-P-1B which resulted in the pump being inoperable was a performance deficiency that was reasonably within Exelon's ability to foresee and correct. Specifically, Exelon did not properly evaluate an adverse vibration trend on NR-P-1B, which resulted in exceeding its IST required action level and declared inoperable on October 10, 2015. This performance deficiency is more than minor because it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the elevated vibrations reduced the reliability and capability of NR-P-1B to perform its safety function. The inspectors evaluated the finding using Manual Chapter 0609, Attachment 4, "Initial Characterization of Findings," and Appendix A, "The Significance Determination Process for Findings At-Power," Exhibit 2, and determined this finding to be of very low safety significance (Green) because the degraded condition was not a design deficiency that affected system operability; did not represent an actual loss of function of a system; did not represent an actual loss of function of a single train or two separate trains for greater than its TS allowed outage time and did not represent an actual loss of function of one or more non-TS trains of equipment designated as high safety significant. The finding has a cross-cutting aspect in the area of Problem Identification and Resolution, Evaluation, because the station did not thoroughly evaluate the elevated vibration data such that the issue was addressed before NR-P-1B became inoperable. [P.2]

Enforcement. 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," requires that measures be established to assure that conditions adverse to quality are promptly identified and corrected. Contrary to the above, from June 2015 through October 2015, the measures established by Exelon's CAP did not assure that the condition adverse to quality that caused NR-P-1B to become inoperable was identified and corrected. Specifically, Exelon did not adequately trend vibration data on NR-P-1B and identify and correct the adverse trend prior to NR-P-1B becoming inoperable on October 10, 2015. Immediate corrective actions included performing an emergent replacement of NR-P-1B pump and creating a process and peer check to ensure vibration data is reviewed timely and trends are addressed commensurate with their safety significance. Since this deficiency was considered of very low safety significance (Green), and was entered into the CAP for resolution as issue report 2568763, this violation is being treated as an NCV, consistent with the NRC Enforcement Policy. **(NCV 05000289/2015004-01, Failure to Trend Vibration Data for Safety Related River Water Pump)**

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 TS requirements and inspected portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met.

- Emergent Orange on-line risk for replacement of decay closed pump motor (DC-P-1A) on October 6, 2015
- Yellow shutdown risk condition during Plant Condition 4 (plant cooldown and depressurization) in on October 30, 2015
- Yellow shutdown risk condition during reduced RCS inventory at reactor vessel mid-loop level on November 2, 2015
- Yellow shutdown risk condition during a planned out-of-service window for one train of spent fuel pool cooling on November 10 – 12, 2015
- Yellow on-line risk during 'A' emergency diesel generator (EDG) surveillance testing on December 4, 2015
- Yellow emergent on-line risk and work-week revision to support 'A' EDG oil cooler replacement on December 30, 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:

- Low pressure injection flow element (DR-FE-1303B) piping wall thinning extent of condition discovery documented in issue report 2570405 on October 13 – 15, 2015
- High pressure injection flow performance issues identified and documented in issue report 2581774 on November 3 – 4, 2015
- Spent fuel pool cooling during issues with temporary power to the 'A' spent fuel pool cooling pump as documented in issue report 2584742 on November 10, 2015

- Decay closed valve 2B (DC-V-2B) degraded actuator performance as documented in issue report 2580068 on October 31, 2015
- 'C' make-up pump (MU-P-1C) degraded flow output performance documented in issue report 2581823, on November 19, 2015
- 'A' EDG high frequency documented in issue report 2591192, on November 23, 2015

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 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 TSs 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 – 2 samples)

Permanent Modifications

a. Inspection Scope

The inspectors evaluated two permanent modifications to TMI during refueling outage T1R21:

- RCS pressurizer insulation modification as implemented by engineering change package 2010-00363, "Partial Pressurizer Insulation Replacement."
- Main Steam Valve 3A – F replacements as implemented by engineering change package 2015-00295, "MS-V-3ABCDEF Replacement."

The inspectors verified that the design bases, licensing bases, and performance capability of the affected systems were not degraded by the modification. In addition, the inspectors reviewed modification documents associated with the upgrade and design changes. The inspectors interviewed engineering and maintenance personnel and performed detailed walkdowns of the modified systems.

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 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.

- Replacement of 'A' decayed closed cooling water pump (DC-P-1A) after damaged by fire on October 5 – 7, 2015
- Containment pressure transmitter (BS-PT-285) connector repairs under work order M2388748 on October 7, 2015
- Set point adjustment of main steam safety valve (MS-V-17A) under work order C2034479 on October 17, 2015
- Seal leak repairs on decay heat valve (DH-V-4B) on November 9, 2015
- 'A' EDG governor replacement under work order C2031759 on November 13 – 16, 2015
- Emergency feedwater Injection valve (EF-V-30A) FlowScan maintenance activity on December 3, 2015
- Reactor coolant high pressure injection valve (MU-V-16A) leak-by testing and issues documented in issue report 2584541 on November 09, 2015

b. Findings

No findings were identified.

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

a. Inspection Scope

The inspectors reviewed the station's work schedule and outage risk plan for the Unit 1 maintenance and refueling outage T1R21, which was conducted October 30 through November 25, 2015. The inspectors reviewed Exelon's development and implementation of outage plans 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 and cooldown processes and monitored controls associated with the following outage activities:

- Configuration management, including maintenance of defense-in-depth, commensurate with the outage plan for the key safety functions and compliance with the applicable TSs 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
- Installation and configuration of reactor coolant pressure, level, and temperature instruments to provide accurate indication and instrument error accounting
- Status and configuration of electrical systems and switchyard activities to ensure that TSs were met

- Monitoring of decay heat removal operations
- Impact of outage work on the ability of the operators to operate the spent fuel pool cooling system
- Reactor water inventory controls, including flow paths, configurations, alternative means for inventory additions, and controls to prevent inventory loss
- Activities that could affect reactivity
- Maintenance of reactor building/primary containment as required by TSs
- Refueling activities, including fuel handling and fuel receipt inspections
- Fatigue management
- Tracking of startup prerequisites, walkdown of the reactor building / primary containment to verify debris had not been left which would block the emergency core cooling system suction strainer, and startup and ascension to full power operation.
- Identification and resolution of problems related to refueling outage activities

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 TSs, 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:

- MA-TM-245-201, RB Personnel Hatch – Local Leak Rate Testing, on October 7, 2015
- R2228814, Main Steam Safety Valve Setpoint Checks, on October 13, 2015 (IST)
- MA-TM-244-217A, Penetration 346 LLRT of NS-V-11 and NS-V-15, on November 2, 2015 (containment isolation valve)
- 1301-10.1, Reactor Vessel Internal Vent Valve Inspection and Exercise, on November 6, 2015 (IST)
- C2035218, Circulating Water Master Trip Switch Test, on November 8, 2015

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

1EP6 Drill Evaluation (71114.06 – 1 sample)

.1 Training Observations

a. Inspection Scope

The inspectors observed a simulator training evolution for licensed operators on October 13, 2015, which required emergency plan implementation by an operations crew. Exelon planned for this evolution to be evaluated and included in performance indicator data regarding drill and exercise performance. The inspectors observed event classification and notification activities performed by the crew. The inspectors also attended the post-evolution critique for the scenario. The focus of the inspectors' activities was to note any weaknesses and deficiencies in the crew's performance and ensure that Exelon evaluators noted the same issues and entered them into the CAP.

b. Findings

No findings were identified.

2. RADIATION SAFETY

Cornerstone: Occupational and Public Radiation Safety

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01 - 1 sample)

a. Inspection Scope

The inspectors reviewed Exelon's performance in assessing and controlling radiological hazards in the workplace. The inspectors used the requirements contained in 10 CFR 20, TSs, applicable regulatory guides (RGs), and the procedures required by TSs as criteria for determining compliance.

Instructions to Workers

The inspectors observed several containers of radioactive materials and assessed whether the containers were labeled and controlled in accordance with requirements.

Contamination and Radioactive Material Control

The inspectors selected several sealed sources from inventory records and assessed whether the sources were accounted for and were tested for loose surface contamination. The inspectors evaluated whether any recent transactions involving nationally tracked sources were reported in accordance with requirements.

Radiological Hazards Control and Work Coverage

The inspectors evaluated in-plant radiological conditions and performed independent radiation measurements during facility walk-downs and observation of radiological work activities.

b. Findings

No findings were identified.

2RS2 Occupational ALARA Planning and Controls (71124.02 – 1 sample)

During November 4 – 10, 2015, the inspectors assessed performance with respect to maintaining occupational individual and collective radiation exposures as low as is reasonably achievable (ALARA). The inspector used the requirements in 10 CFR 20, RG 8.8, “Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Plants will be As Low As Is Reasonably Achievable;” RG 8.10, “Operating Philosophy for Maintaining Occupational Radiation Exposure As Low as Is Reasonably Achievable;” TSs; and Exelon procedures required by TSs as criteria for determining compliance.

a. Inspection Scope

Radiation Worker Performance

The inspector observed radiation worker and radiation protection technician performance during work activities being performed in radiation areas, airborne radioactivity areas, and high radiation areas. The inspectors evaluated whether workers demonstrated the ALARA philosophy in practice and whether there were any procedure or radiation work permit compliance issues.

b. Findings

No findings were identified.

2RS3 In-Plant Airborne Radioactivity Control and Mitigation (71124.03 – 1 sample)

During November 4 – 10, 2015, the inspectors verified in-plant airborne concentrations are being controlled consistent with ALARA principles and the use of respiratory protection devices on-site does not pose an undue risk to the wearer. The inspector used the requirements in 10 CFR 20, the guidance in RG 8.15, “Acceptable Programs for Respiratory Protection;” RG 8.25, “Air Sampling in the Workplace;” NUREG-0041, “Manual of Respiratory Protection Against Airborne Radioactive Material;” TSs; and Exelon’s procedures required by TSs as criteria for determining compliance.

a. Inspection Scope

Engineering Controls

The inspectors assessed whether the licensee had established threshold criteria for evaluating levels of airborne beta-emitting and alpha-emitting radionuclides.

Use of Respiratory Protection Devices

The inspector reviewed plant breathing air supply systems to determine whether they meet the minimum pressure and airflow requirements for the devices in use.

The inspectors chose four respiratory protection devices staged and ready for use in the plant. The inspector assessed the physical condition of the device components and reviewed records of equipment inspection for each type of equipment. The inspectors selected several of the devices and reviewed records of maintenance on the vital components.

b. Findings

No findings were identified.

2RS4 Occupational Dose Assessment (71124.04 – 1 sample)

During November 4 – 10, 2015, the inspector verified that occupational dose is appropriately monitored, assessed and reported by Exelon. The inspectors used the requirements in 10 CFR 20; the guidance in RG 8.13, "Instructions Concerning Prenatal Radiation Exposures;" RG 8.36, "Radiation Dose to Embryo Fetus;" RG 8.40, "Methods for Measuring Effective Dose Equivalent from External Exposure;" TSs; and the licensee's procedures required by TSs as criteria for determining compliance.

a. Inspection Scope

Internal Dosimetry

The inspectors evaluated whether Exelon had established procedural requirements for determining when external dosimetry and internal dose assessments are required.

Routine Bioassay (In Vivo)

The inspectors reviewed Exelon evaluation for use of its portal radiation monitors as a passive monitoring system. The inspector assessed if instrument minimum detectable activities were adequate to determine the potential for internally deposited radionuclides sufficient to prompt an investigation.

Special Bioassay (In Vitro)

There were no internal dose assessments obtained using whole body count results for the inspectors to review.

There were no internal dose assessments obtained using urinalysis or fecal sample results for the inspectors to review.

The inspectors reviewed the vendor laboratory quality assurance program and assessed whether the laboratory participated in an industry recognized cross-check program including whether out-of-tolerance results were reviewed, evaluated and resolved appropriately.

b. Findings

No findings were identified.

2RS5 Radiation Monitoring Instrumentation (71124.05 – 1 sample)

During November 4 – 10, 2015, the inspectors verified that Exelon is assuring the accuracy and operability of radiation monitoring instruments that are used to protect occupational workers and to protect the public from nuclear power plant operations. The inspectors used the requirements in 10 CFR 20; 10 CFR 50, Appendix A, Criterion 60, “Control of Release of Radioactivity to the Environment;” and Criterion 64, “Monitoring Radioactive Releases;” 10 CFR 50, Appendix I, “Numerical Guides for Design Objectives and Limiting Conditions for Operation to meet the Criterion ‘As Low as is Reasonably Achievable’ for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents;” 40 CFR 190. “Environmental Radiation Protection Standards for Nuclear Power Operations;” NUREG 0737, “Clarification of Three Mile Island Corrective Action Requirements;” TSS/Offsite Dose Calculation Manual;” applicable industry standards; and Exelon procedures required by TSS as criteria for determining compliance.

a. Inspection Scope

Portable Survey Instruments, Alarm Rate Meters, Electronic Dosimetry, and Air Samplers/Continuous Air Monitors

As available, the inspectors selected one portable survey instrument that did not meet acceptance criteria during calibration or source checks to assess whether the licensee had taken appropriate corrective action for instruments found significantly out of calibration (greater than 50 percent). The inspectors evaluated whether the licensee had evaluated the possible consequences associated with the use of an instrument that is “out-of-calibration” since the last successful calibration or source check.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151 – 1 sample)

Occupational Exposure Control Effectiveness (OR01)

a. Inspection Scope

During November 4 - 10, 2015, the inspectors sampled licensee submittals for the occupational exposure control effectiveness performance indicator (PI) for the period from the 1st quarter 2014 through 4th quarter 2014. The inspector used PI definitions and guidance contained in the Nuclear Energy Institute document 99-02, “Regulatory Assessment Performance Indicator Guideline,” Revision 7, dated August 31, 2013, to determine the accuracy of the PI data reported.

To assess the adequacy of the licensee's PI data collection and analyses, the inspectors discussed with radiation protection staff, the scope and breadth of its data review and the results of those reviews. The inspectors independently reviewed electronic personal dosimetry accumulated dose alarms, dose reports, and dose assignments for any intakes that occurred during the time period reviewed to determine if there were potentially unrecognized PI occurrences. The inspectors also conducted walk-downs of numerous locked high radiation area entrances to determine the adequacy of the controls in place for these areas.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152 – 4 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 CAP 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 CAP and periodically attended issue report screening and management review meetings.

b. Findings

No findings were identified.

.2 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 CAP backlogs. The inspectors also reviewed Exelon's CAP database for the third and fourth quarters of 2015 to assess issue reports written in various subject areas (equipment problems, human performance issues, etc.), as well as individual issues identified during the NRC's 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 prompt investigation timeliness (issue report 2569667), a decline in CAP investigative quality (issue report 2569489), and prevention of dropped objects during refueling outage T1R21 (issue reports 2587345 and 2590711). The inspectors reviewed the issue report trends and determined that the trends were substantiated and that the licensee implemented additional oversight and enforced accountability to arrest the trend, most particularly in regard to the number of dropped objects during refueling outage T1R21. Additionally, the inspectors noted Exelon has implemented a process to identify and document non-CAP issues into the CAP database (i.e. NCAP). These issues do not receive the same rigor of investigation as CAP items. Inspectors have reviewed NCAP items for possible errors in identification (CAP versus NCAP) and categorization and have noted minor issues during initial implementation that were subsequently and independently identified during Exelon supervisor or management review. No significant issues have since been identified by the inspectors. The inspectors conclude that adequate controls are in place for proper classification of issues and will continue to monitor the implementation of this process.

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

.3 Annual Sample: Inadequate Thermal Overload Protection Sizing Evaluation for Jogging/Throttling Valves (issue report 1347306)

a. Inspection Scope

The inspectors performed an in-depth review of Exelon's causal analysis, trend reviews, and corrective actions associated with a previously documented design control deficiency. In 2012, the NRC identified that Exelon had not verified thermal overload (TOL) protection relays for certain safety-related motor operated valves (MOVs) were properly sized to support the valves' design function of repetitive jogging and throttling of the MOV in response to a design basis accident (DBA). Exelon's preliminary operability reviews for low pressure injection valves (DH-V-4A/B), high pressure injection valves (MU-V-16A/B/C/D), and pressurizer power operated relief valve (RC-V-2) concluded there was reasonable assurance these valves were capable of performing their design function without tripping the TOL.

Exelon entered the issue into their CAP as issue report 1347306 to verify the scope of safety-related valves whose design function included repetitive jogging and throttling in response to a DBA, perform detailed evaluations and testing to verify adequacy of TOL protection relay sizing, and implement corrective actions as necessary to ensure the associated TOL protection was properly designed and maintained. Early in 2014, NRC inspectors identified that the TOL protection relay testing did not replicate the MOV operation sequence that formed the basis for the original operability determination. Exelon determined the test facility staff had misinterpreted the test plan. Issue report

1602025 was initiated and additional actions were added to issue report 1347306 to ensure appropriate testing was performed and evaluated to verify associated MOVs remained operable.

The inspectors independently reviewed issue reports 1347306 and 1602025, the TMI Unit 1 UFSAR, system design basis documents, industry standards and vendor documents regarding TOL protection, associated electrical design calculations, emergency and abnormal operating procedures, test plans and test results, periodic surveillance tests, and operator training documents. Additionally the inspectors interviewed station personnel to assess current practices and programs to ensure TOL protection relays for safety-related MOVs were properly sized to support the valves' design function of repetitive jogging and throttling. The inspectors assessed Exelon's problem identification threshold, documentation of the issues, causal analyses, extent-of-condition reviews, compensatory actions, and the prioritization and timeliness of corrective actions to evaluate whether Exelon was appropriately identifying, characterizing, and correcting problems associated with this issue. The inspectors also assessed whether Exelon had identified associated lessons-learned and communicated the results to appropriate staff. The inspectors compared the actions taken to the requirements of FENOC's CAP and 10 CFR 50, Appendix B.

b. Findings and Observations

No findings were identified.

Exelon concluded the existing TOL relay sizing was adequate to support operability of safety-related valves whose design function included repetitive jogging and throttling. Notwithstanding this outcome, engineers identified several longstanding errors in associate design calculations, resulting from lack of rigor by engineers. Examples included incomplete design calculation updates in response to NRC generic communications, not being aware of relevant vendor manual information and industry operating experience, and incorrectly translating design information from vendor motor performance curves. Corrective actions to verify and maintain appropriate safety-related MOV TOL protection included the following:

- Revised procedure ES-024T, Overload Heater Selection for Electrical Motors, Revision 4 to incorporate a more accurate TOL sizing methodology for jogging MOVs and characterization of thermal overload cooldown behavior.
- Revised calculation C-1101-730-5350-001, GL 89-10 MOV Heating Effects due to Jogging or Frequent Cycling, Revision 12 and fleet procedure OP-AA-103-105, Limitorque Motor-Operated and Chainwheel Operated Valve Operations, Revision 4, to incorporate vendor recommendations regarding consecutive motor starts and associated cooldown period.
- Completed TOL relay and heater testing and developed new calculation C-1101-730-E420-014, Thermal Overload Evaluation for Jogging GL 89-10 MOVs, Revision 0.
- Revised Topical Report 113, TMI GL 89-10 MOV Program Site Specific Information, Revision 0 to accurately document the design basis for MOVs which perform a jogging or throttling function.
- Trained operators regarding operational considerations and limitations when jogging and throttling MOVs, including revisions to OP-AA-103-105.
- Issued an industry operating experience report concerning this issue.

The inspectors determined that Exelon staff adequately evaluated the MOV TOL protection issues, identified reasonable primary and contributing causes, established and implemented adequate corrective actions, and effectively communicated the results to plant staff. Corrective actions were substantial and provided a more detailed basis for maintaining MOV operability.

Notwithstanding overall improvements to the program for verifying and maintaining MOV operability, the inspectors identified several observations. For example:

- The extent-of-condition review incorrectly excluded reactor building emergency cooling backpressure control bypass valve RR-V-5 from the evaluation. Procedure OP-TM-534-901, Reactor Building Emergency Cooling Operations, Revision 14, steps 4.2.13 – 4.2.14, direct operators to throttle RR-V-5 to maintain reactor building emergency cooler pressure (52-75 psig) during DBA response. Pressure must be maintained greater than containment pressure to prevent an unplanned radiological release. Pressure must be less than 75 psig to ensure pumps are not operated near their shutoff head.
- The operational guidance in OP-AA-103-105 for limiting the number of consecutive MOV jogs (from calculation C-1101-0730-E420-014) and applying the appropriate subsequent cooldown period is not clearly worded and could be misapplied.
- Corrective action 1347306-08, to link existing MOV TOL design calculations to provide a complete and accurate evaluation of TOL protection for these valves through their design jog/throttle function was closed without linking the calculations. This increases the likelihood of human error when referencing the individual procedures.
- Topical Report 113 includes description (Appendix B, Note 5) of RC-V-2 as a jog MOV. This is inaccurate, since the RC-V-2 (power operated relief valve block valve) design function is to fully open or fully closed. The valve is not used in a jogging or throttling manner.

The inspectors discussed each of these issues with engineers. Exelon performed a preliminary evaluation using the new ES-024T TOL sizing methodology for jogging MOVs and actual test data for similar MOVs and concluded RR-V-5 remained operable. The evaluation was simple and not complex due, in part, to availability of information already developed by the corrective actions to address the NCV. The inspectors determined these issues were minor because they did not create a reasonable doubt on component operability and the issues were not significant programmatic deficiencies. In accordance with IMC 0612, Power Reactor Inspection Reports, the above issues constituted violations of minor significance that are not subject to enforcement action in accordance with the Enforcement Policy. Exelon entered the inspectors' observations into their CAP (issue reports 2574453, 2574459, 2574469).

.4 Annual Sample: BWST Seismic Qualification (issue report 1631468)

a. Inspection Scope

The inspectors performed an in-depth review of Exelon's evaluation and corrective actions associated with failure to maintain the seismic integrity of the BWST when connected to non-seismic piping. Specifically, the inspectors reviewed condition reports,

the associated NRC Task Interface Agreement 2015-001, License Amendment No. 289, the UFSAR, and corrective actions associated with Exelon's use of non-seismic piping to perform recirculation, cleanup, and sampling activities on water contained in the BWST. Additionally, the inspectors evaluated the cause of Exelon's failure to determine that connecting non-seismic piping to the safety-related, seismically-qualified BWST would result in the BWST not meeting the licensing requirements to be seismically qualified resulting in the BWST not meeting TS Limiting Condition of Operation 3.3.1.1. Finally, the inspectors reviewed the implementation of corrective actions to address requirements described in licensee amendment approved by the NRC to allow limited use of this lineup during power operations.

The inspectors assessed Exelon's evaluation, extent-of-condition review, completed and proposed corrective actions, and the prioritization and timeliness of actions to evaluate whether the corrective actions were appropriate. Inspectors evaluated whether the revisions made to the TSs and operating procedures were in accordance with the License Amendment and that the revisions addressed the operability concerns associated with the issue. Additionally, the inspectors determined if Exelon adequately evaluated whether this deficiency could occur on other systems. The inspectors interviewed engineers and reviewed Exelon's evaluation of the issue and corrective actions taken to ensure that the scope of the review was adequate. Finally, the inspectors walked down the recirculation piping to determine if any material deficiencies existed and to verify that assumptions made in pipe stress calculations submitted by Exelon as part of the license amendment request were consistent with the installed configuration.

b. Findings and Observations

No findings were identified.

The inspectors determined that Exelon's evaluation and extent-of-condition review were thorough, and the causes were appropriately identified. The inspectors determined that all corrective actions were completed. The inspectors noted that Exelon suspended use of the non-seismic lineup after NRC inspectors identified the concern and did not use the lineup until allowed by TS License Amendment No. 289. Additionally, when inspectors identified minor configuration control concerns with the seismically qualified piping, Exelon quickly evaluated the concerns and entered deficiencies into the CAP. The inspectors concluded that Exelon's subsequent evaluation and completed actions were appropriate and thorough.

.5 Annual Sample: Normal Make-up to RCS Valve (MU-V-17) Long Term Corrective Actions (issue reports 984162, 1102070, 1292829, and 1584646)

a. Inspection Scope

The inspectors performed an in-depth review of Exelon's long-term corrective actions regarding degraded performance and controllability of MU-V-17, the normal make-up valve to the RCS. Specifically, the valve exhibited internal leak-by and the valve positioner did not accurately respond to demand signals, both of which contributed to operator challenges in maintaining RCS level parameters during power maneuvers and transients. These issues were documented in representative issue reports 984162, 1102070, 1292829, and 1584646.

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 these issues and whether the planned or completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of Exelon's CAP and 10 CFR 50, Appendix B. In addition, the inspectors performed field walkdowns and interviewed operations, maintenance, engineering personnel to assess the effectiveness of the implemented corrective actions.

b. Findings and Observations

No findings were identified.

Inspector review of UFSAR, TSs, and operating procedures determined that MU-V-17 is not a containment isolation valve nor is it credited for accident mitigation, but its satisfactory operation is integral to proper plant response during power maneuvers and transients. It can be controlled in automatic or in manual by the operators. In an early attempt to remedy degraded performance Exelon determined the valve controls needed retuning, which amounted to limited success. Troubleshooting determined the most probable causes were issues with the valve positioner or internal to the valve. Exelon replaced and satisfactorily tested the valve positioner in refueling outage T1R19. However, subsequent valve testing and control room operator observations determined the valve leaked by approximately 50 gallons per minute when the positioner indicated fully closed. Exelon performed additional actuator tuning and implemented operations department guidance to operate MU-V-17 until an internal valve inspection could be performed in refueling outage T1R20.

During refueling outage T1R20 the valve internals were inspected under work order C2027938 and concluded an internal repair was needed based on damage to the plug, cage, and seat. A small piece of plastic was identified wedged into the cage ports (issue report 1585060). However, the contingency valve repair kit was determined not to be compatible with the as-built TMI valve. An appropriate repair kit would not be available during the maintenance outage. The existing valve parts were refurbished to a minimally-acceptable standard for re-use. MU-V-17 was re-assembled, tested with indications of sticking and binding (issue reports 1586164 and 1586165), and returned to service until an acceptable kit was obtained. Exelon continued to operate MU-V-17 under administrative controls previously established and classified it as an operator challenge.

An acceptable valve rebuild kit was obtained and installed into MU-V-17 during refueling outage T1R21 under work order C2031230 and successfully tested without sticking or binding. Inspector observations and control operator interviews concluded the valve had been successfully repaired and was responding to demand signals as expected. Though the timeliness of Exelon corrective actions is marginally acceptable, the majority of the challenge is related to the unique design of the valve and the long-lead interval for a custom valve rebuild kit. In addition, the opportunity to inspect and implement repairs is limited to refueling and maintenance outages. Notwithstanding, Exelon conducted a thorough technical review of the valve issue, including a comprehensive probable failure analysis and placed administrative controls for safe operation until final valve repair and

return to service. This issue was determined to be a minor because it was related to equipment qualification and no equipment operability or functionality was significantly affected. In accordance with NRC IMC 0612, "Power Reactor Inspection Reports," the above issue constituted a violation of minor significance that is not subject to enforcement action in accordance with the Enforcement Policy.

4OA3 Follow-Up of Events and Notices of Enforcement Discretion (71153 - 2 samples)

.1 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 IMC 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.

- Declaration of Alert due to a fire in the auxiliary building at the 'A' decay closed pump (DC-P-1A) and control building at the motor control center breaker cubicle on October 5, 2015. (EN# 51455)

b. Findings

No findings were identified.

.2 (Closed) Licensee Event Report (LER) 2015-001-00, Seismically Qualified BWST Aligned To Non-Seismic Piping

On August 6, 2015, the NRC provided Exelon Task Interface Agreement (TIA) 2015-01, "Assessment of Three Mile Island Nuclear Station's Use of a Non-Seismic Qualified Cleanup Path for Borated Water Storage Tank." The NRC concluded, in the TIA, that when Exelon placed the BWST in the recirculation or cleanup lineup that connected the BWST to the non-seismically qualified system, the configuration resulted in the BWST losing its seismic qualification making the BWST inoperable per TS 3.3.1.1. Exelon subsequently reviewed operator logs and determined that the BWST was connected and recirculated via the non-seismic system while in the power operation mode within the past three years and for periods of time greater than TS 3.3.1.1 Limiting Condition of Operation allowed. Specifically, the cleanup lineup was used from June 1, 2013 to June 11, 2013, and TS Limiting Condition for Operation Action Statement 3.3.1.1, "Injection Systems," requires that the BWST shall contain a minimum of 350,000 gallons of water....If the BWST volume is not within limits, restore the BWST to OPERABLE within one hour otherwise within one hour action shall be initiated to place the unit HOT STANDBY within the next 6 hours, HOT SHUTDOWN within the following 6 hours, and COLD SHUTDOWN within the subsequent 24 hours. Additionally, Exelon used the recirculation lineup at various times for sampling the BWST until March 10, 2014, when

NRC inspectors communicated their concern with the lineup to Exelon. This communication occurred after inspectors reviewed Exelon's evaluation of NRC Information Notice 2012-01, "Seismic Considerations – Principally Involving Tanks," and concluded that Exelon's evaluation incorrectly concluded that the TMI licensing basis allowed this lineup and the Information Notice did not apply to TMI. This performance deficiency – incorrect evaluation of the BWST configuration to maintain the seismic licensing basis - was dispositioned in NRC Inspection Report 5000289/2014002 resulting in a 10 CFR 50.59, Severity Level IV, traditional enforcement violation.

The inspectors reviewed subsequent actions taken by Exelon to address the BWST alignment concerns. Inspectors found that Exelon submitted and received approval of a License Amendment No. 289 which allowed limited use of the recirculation and cleanup lineup. Inspectors reviewed the implementation of the license amendment and associated changes to operating procedures and verified that Exelon was meeting the revised licensing requirements. Finally, the inspectors identified that while a violation of TS 3.3.1.1 had occurred, the performance deficiency associated with this violation was the same as that previously discussed in the traditional enforcement violation in Inspection Report 5000289/2014002 (SLIV/NCV 05000289/2014002-01) and therefore the NRC has already dispositioned the issue. This LER is closed.

4OA5 Other Activities

Institute of Nuclear Power Operations Report Review

a. Inspection Scope

The inspectors reviewed the final report for the Institute of Nuclear Power Operations (INPO) assessment of TMI conducted in May 2015. The inspectors evaluated these reports to ensure that NRC perspectives of Exelon's performance were consistent with any issues identified during the assessments. The inspectors also reviewed these reports to determine whether INPO identified any significant safety issues that required further NRC follow-up.

b. Findings

No findings were identified.

4OA6 Meetings, Including Exit

Quarterly Inspection Report Exit

On January 29, 2016, the inspectors presented the inspection results to Mr. E. Callan, Site Vice President, 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

| | |
|--------------|---|
| E. Callan | Site Vice President |
| T. Haaf | Plant Manager |
| T. Alvey | Manager, Chemistry |
| T. Arnold | Regulatory Assurance, CAP Manager |
| D. Atherholt | Manager, Regulatory Assurance |
| M. Benson | Engineering/ Boric Acid Control |
| R. Campbell | Manager, Site Security |
| D. Divittore | Manager, Radiological Engineering |
| R. Ezzo | Senior Electrical Design Engineer |
| M. Fitzwater | Senior Regulatory Assurance Engineer |
| L. Friant | Materials Engineer, Corporate Steam Generator Program Mgr |
| M. Grimm | ISI coordinator |
| C Hawkins | ISI Tech and Oversight |
| T. Heindl | OTSG Coordinator |
| J. Hogan | Senior Radiation Protection Technician |
| G. McCarty | Radiological Engineering Manager |
| J. Piazza | Senior Manager, Design Engineering |
| T. Roberts | Radiation Protection Technical Support Manager |
| S. Sallade | Manager, Operations Instructor Lead |
| J. Smith | Senior Radiation Protection Technician |
| G. Smith | Director, Maintenance |
| B. Shumaker | Manager, Emergency Preparedness |
| M. Torborg | TMI Programs Engineering Manager |
| D. Yerkes | Design Engineer |

Other Personnel

| | |
|------------|--|
| D. Dyckman | Nuclear Safety Specialist Pennsylvania Department of Environmental Protection Bureau of Radiation Protection |
|------------|--|

LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATEDOpened/Closed

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|---------------------|-----|--|
| 05000289/2015004-01 | NCV | Failure to Trend Vibration Data for Safety Related River Water Pump (Section 1R12) |
|---------------------|-----|--|

Closed

| | | |
|----------------------|-----|---|
| 05000289/2015-001-00 | LER | Seismically Qualified BWST Aligned To Non-Seismic Piping (Section 4OA3.2) |
|----------------------|-----|---|

Discussed

05000289/2014002-01 SLIV/NCV Failure to Perform a 10 CFR 50.59 Evaluation for
the BWST Seismic Qualifications

LIST OF DOCUMENTS REVIEWED

* Indicated issue report was generated as a result of NRC inspection

Section 1R01: Adverse Weather ProtectionProcedures

1104-19, Control Building Ventilation Systems, Revision 84
E-70, Heat Trace Inspection, Revision 16
ER-AA-335-014-2004, VT-1 Visual Examination In Accordance with ASME 2004 Edition,
Revision 000
ER-AA-335-015-2004, VT-2 Visual Examination In Accordance with ASME 2004 Edition,
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WC-AA-107, Seasonal Readiness, Revision 16

Miscellaneous

| | | | | | | |
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| IRs: | 2572325 | 2570088 | 2457834 | 2471500 | 2574717 | 2585755 |
| | 2585029 | 2598648 | 2598029 | 2586912 | 2596013 | 2595956 |
| WOs: | R2227074 | R2228465 | R2250171 | | | |

Section 1R04: Equipment AlignmentProcedures

OP-TM-424-000, Emergency Feedwater System, Revision 13
OP-TM-424-271, Standby Lineup and Flow Path Verification Check of EFW System,
Revision 10
OP-TM-731-525, De-energizing 1S ES 480V Switchgear, Revision 011
OP-TM-732-504, De-energizing 1P Engineered Safeguard 480V Switchgear, Revision 8
OU-TM-103-1007, Safety Function Status of SFP Heat Removal, Revision 002

Drawings

302-082, Emergency Feedwater Flow Diagram, Revision 25
302-101, Condensate Flow Diagram, Revision 69
302-604, Decay Heat Removal, Revision 85
302-641, Decay Heat Removal Auxiliary Systems, Revision 6
302-645, Decay heat Removal Closed Cooling Water, Revision 39

Miscellaneous

| | | | | | | |
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| AR: | A2318980 | | | | | |
| IRs: | 2577209 | 2571718 | 2584781 | 2566104 | 2566171 | 2566102 |
| WO: | R2212605 | | | | | |

Plant Condition 5 Contingency Plan T1R21-01, Actions to Respond to Rising SFP
Temperatures

Section 1R05: Fire ProtectionProcedures

1038, Administrative Controls-Fire Protection Program, Revision 76
 OP-AA-201-004, Fire Prevention for Hot Work, Revision 12
 OP-MA-201-007, Fire Protection System Impairment Control, Revision 6

Miscellaneous

CC-AA-309-101, Engineering Technical Evaluations, Revision 11
 IR: 2515258 2567245 2566102 2566104 2587137 2583341
 2591060
 WO: C2033620

Section 1R06: Flood Protection MeasuresProcedures

MA-TM-153-001, Inspection and Maintenance of TMI-1 Electrical and Telephone Manholes,
 Revision 6

Miscellaneous

WOs: R2256902 R2256898 R2257231

Section 1R07: Heat Sink PerformanceProcedures

ER-TM-340-1002, Guidance for Heat Exchanger Inspections and Cleaning at TMI, Revision 3

Miscellaneous

Eddy Current Exam Report, Decay Heat Closed Cooler, November 2015
 WO: R2195805

Section 1R08: In-Service InspectionProcedures

ER-TM-335-1005, Steam Generator Current Data Analysis Guidelines for Three Mile Island
 Unit 1, Revision 8
 ER-AP-420-300, TMI Unit 1: Steam Generator Eddy Current Activities, Revision 11
 ER-AP-331, Boric Acid Corrosion Control (BACC) Program, Revision 8
 ER-AP-331-1001, Boric Acid Corrosion Control (BACC) Inspection Locations, Implementation
 and Inspection Guidelines, Revision 8
 ER-AP-331-1002, Boric Acid Corrosion Control Program Identification, Screening and
 Evaluation, Revision 9
 ER-AP-331-1003, RCS Leakage Monitoring and Action Plan, Revision 8
 ER-AP-331-1004, Boric Acid Corrosion Control (BACC) Training and Qualification, Revision 6
 ER-AP-331-1005, Boric Acid Corrosion Control (BACC) Program Performance Indicators,
 Revision 5
 ER-TM-335-2002, Inspection of TMI-1 Reactor Vessel Internals, Revision 3
 MA-TM-133-226, Reactor Coolant Pump Flange Inspection, Revision 0
 ER-TM-335-2001, NDE Acceptance Criteria for Selected Components, Revision 2
 ER-AA-335-002, Liquid Penetrant (PT) Examination, Revision 9

ER-AA-335-1008, Code Acceptance & Recording Criteria for Non-Destructive Surface Examination (PT), Revision 3
 03-1275284, Field Procedure for Remote Rolled Plugging Utilizing the LAN SAP Box, Revision 20
 PDI-UT-2, PDI Generic Procedure for Ultrasonic Examination of Austenitic Pipe Welds, Revision F
 54-ISI-130, Ultrasonic Examination of Ferritic Vessel Welds Greater than 2.0 Inches Thickness, Revision 47
 54-ISI-132, Manual Ultrasonic Examination of Vessel Nozzle Inner Radius Regions, Revision 11
 54-ISI-413, Multi-Frequency Eddy Current Two-Row Pancake Coil Array Probe Examination of the Inside Diameter Surfaces of Nozzle Welds and Weld Regions, Revision 0
 54-ISI-801, Automated UT of PWR Vessel Shell Welds, Revision 3
 54-ISI-820, ID Automated Ultrasonic Examination of Ferritic Piping Welds, Revision 1
 54-ISI-823, ID Automated Ultrasonic Examination of Dissimilar Metal Core Flood Piping Welds, Revision 1
 54-ISI-829, Manual Ultrasonic Examination of Dissimilar Metal Piping Welds, Revision 11
 54-ISI-836, Ultrasonic Examination of Austenitic Piping Welds, Revision 14
 54-ISI-855, Automated Ultrasonic Examination of Reactor Vessel Nozzle to Shell Welds and Inner Radius Regions from the Nozzle Bore, Revision 5
 54-ISI-880, Procedure for Encoded Phased Array Ultrasonic Examination of Dissimilar Metal Piping Welds, Revision 1
 54-ISI-900, Ultrasonic Examination of B&W Upper and Lower Core Barrel Bolts, Upper and Lower Thermal Shield Bolts/Studs, Flow Distributor Bolts and Shock Pad Bolts, Revision 2
 PDI-UT-10, PDI Generic Procedure for the Ultrasonic Examination of Dissimilar Metal Welds Revision E

Drawings

02-8036827B, 36" Contour Circ. Ref. Block (S.S.), Revision 2
 02-8036825B, 36" Contour Axial Ref. Block (S.S.), Revision 2
 02-8036611B, 36" R Phased Array Cal Check Block, Revision 0
 RC0122BMWELD, A Reactor Coolant Pump Discharge Piping, Revision 0
 RC0043BMWELD, B Reactor Coolant Pump Suction Piping, Revision 0
 1D-ISI-BS-002, Reactor Building Spray System Spray Pump Discharge, Revision 0
 MA-TM-133-226, Reactor Coolant Pump Flange Inspection, Revision 0
 ER-TM-335-2001, NDE Acceptance Criteria for Selected Components, Revision 2
 1D-ISI-XX-002, Penetration Details, Revision 1
 129279E, Upper Head Assembly & Details, Revision 9
 1D-ISI-RC-012, Pressurizer RC-T2, Revision 4
 1D-ISI-RC-001, Reactor Coolant System OTSG "A" Loop (Area 174, 176), Revision 4
 1D-ISI-RC-002, Reactor Coolant System OTSG "A" Loop Details, Revision 4
 1D-ISI-RC-003, Reactor Coolant System OTSG "B" Loop (Area 174, 175), Revision 4
 1D-ISI-RC-004, Reactor Coolant System OTSG "B" Loop Details, Revision 4
 02-8085824D, Core Flood Nozzle NDE Scan Plan, Revision 1
 Core Flood Calibration Standard 8085842D
 5028132E, TMI-1 Service Structure Installation (Bolting), Revision 7
 5015610E, Specification Drawing for Replacement Reactor Vessel Closure Head TMI-1 Revision 8
 129279E, Upper Head Assembly & Details, Revision 9

Miscellaneous

Technical Evaluation 1650440-01, TMI Unit 1 Outage T1R21 Steam Generator Degradation Assessment, Revision: 0

TMI BACC Program Health Report, Second Triannual Report for 2015

PT-ISI-2015-002, Liquid Penetrant Test: Inspection Report for Penetration 339, dated November 3, 2015

Ultrasonic Testing, Formulas and Information, Simon Crothers, 2007 Edition PT-ISI-2015-002, Liquid Penetrant Examination, Attachment Weld at Penetration 339 (MU1383WAWELD), dated November 5, 2015

UT-ISI-2015-016, UT Examination: MU0953BMWELD Safe End to Nozzle Weld, dated November 11, 2015

UT-ISI-2015-015, UT Examination: MU0953BMWELD Valve to Safe End Weld, dated November 11, 2015

VE-ISI-2015-008, Automated Ultrasonic Phased Array Examination Summary Sheet, D Reactor Coolant Pump Suction RC0097BMWELD, Revision 0

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| 2579143 | 2579144 | 2579145 | 2579166 | 2579169 | 2579172 |
| 2579175 | 2579177 | 2579181 | 2579224 | 2579228 | 2579235 |
| 2579243 | 2579250 | 2579259 | 2579265 | 2579275 | 2579279 |
| 2579326 | 2579332 | 2579341 | 2579343 | 2579369 | 2579371 |
| 2579378 | 2579380 | 2579928 | 2579955 | 2579978 | 2579980 |
| 2579981 | 2579983 | 2579984 | 2579987 | 2579988 | 2579991 |
| 2579995 | 2579998 | 2580001 | 2580094 | 2580249 | 2580262 |
| 2580266 | 2580271 | 2580276 | 2580280 | 2580282 | 2580289 |
| 2580293 | 2580367 | 2580402 | 2580470 | 2580500 | 2580549 |
| 2581154 | 2581614 | 2581974 | 2582241 | 2582388 | 2582392 |
| 2582582 | 2583456 | 2583575 | 2583632 | 2583674 | 2583779 |
| 2583817 | 2583829 | 2584085 | 2584104 | 2584126 | 2584214 |
| 2584238 | 2584917 | 2585018 | 2585279 | 2585413 | 2585436 |
| 2585695 | | | | | |

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| C2033973 | R2231650 | C2034124 | C2034182 | C2034833 | C2034224 |
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Section 1R11: Licensed Operator Regualification ProgramProcedures

1102-2, Plant Startup, Revision 161

1102-10, Plant Shutdown, Revision 99

1102-11, Plant Cooldown, Revision 151

1103-8, Approach to Criticality, Revision 55

OP-TM-212-101, Transfer DH System from ES Standby to DHR Standby Mode, Revision 9B

OP-TM-300-403, Estimated Critical Position Calculation, Revision 5

OP-TM-310-202, Approach to Criticality for Zero Power Physics Testing, Revision 5

TQ-TM-106-GOP-S014, Reactor Startup to 5% Power, Revision 0

TQ-TM-106-GOP-S015, Plant Startup 5% to 25% Power, Revision 0

TQ-TM-106-GOP-S016, Plant Startup 25% to 100% Power, Revision 0

Section 1R12: Maintenance Effectiveness

Procedures

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-541-232, IST of NR-P-1B and Valves – Multiple Pump Operations, Revision 9

Miscellaneous

2500646-04, Control Rod Drive a(1) Action Plan, Revision 0
 Control Rod Drive System FMCT, December 18, 2015

AR: A2389244
 IRs: 2527738 2591838 2494727 1542811 2506484
 2568763 2520334
 WOs: C2035142 R2247340

Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Procedures

1082.1, TMI Risk Management Program, Revision 8
 1101-3, Containment Integrity and Access Limits, Revision 93
 OP-AA-201-012-1001, Operations On-Line Fire Risk Management, Revision 1
 OP-AA-108-117, Protected Equipment Program, Revision 4
 OP-TM-108-117-1001, Three Mile Island Protected Equipment Program, Revision 0
 OP-TM-731-525, De-energizing 1S ES 480V Switchgear, Revision 011
 OP-TM-732-504, De-energizing 1P Engineered Safeguard 480V Switchgear, Revision 8
 OU-TM-103-1007, Safety Function Status of SFP Heat Removal, Revision 002
 WC-AA-101, On-Line Work Control Process, Revision 18
 WC-AA-101-1006, On-Line Risk Management and Assessment, Revision 1

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TM-CRM-043, Development of risk Management Actions for the Inclusion of Fire Insights into
 Three Mile Island Nuclear Generating Station Configuration Risk Management Program,
 Revision 2
 TMI Shift Operating Logs, dated November 10, 2015
 IR: 2581645* 2566698 2582909* 2583048

Section 1R15: Operability Evaluations

Procedures

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-211-211, HPI Test, Revision 12 and 12B

Miscellaneous

OPE-15-001, DR-FE-1303B, Decay River Water System Flow Orifice, Revision 0
 OPE-15-002, MU-P-1C Operability Determination, Revision 0
 TMI Shift Operations Logs, dated November 3 – 4, 2015

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| | 2581823 | 2581774 | 2581823 | 2553008 | 2555539 | 2571795 |
| WOs: | R2229331 | C2034744 | | | | |

Section 1R18: Plant Modifications

Procedures

FTP 412.01, MS-V-3ABCDEF Replacement, Revision 1
 IC-57.1, MS-V-3A-F Actuator Testing, Revision 0
 MA-TM-153-301, Inspection and Maintenance of Transco Products Mirror Insulation, Revision 1

Drawings

RM-50980-GA, Pressurizer Key Layout Elevation, Revision 1

Miscellaneous

CC-AA-102, Design Input and Configuration Change Impact Screening, Revision 20
 CC-AA-103, Configuration Change Control, Revision 21
 Letter from Exelon Generation – Clarification of Commitment Regarding Resolution of Generic Letter 2004-02, September 10, 2015
 RN-51121-IMM_PZR, Installation & Maintenance Instructions for Replacement Thermal Insulation System for the Pressurizer for Three Mile Island Unit 1, Revision 1
 IRs: 2589470 2587547 2586636 2584144 2590951 2591633
 2591567 2595754 2588571 2588637 2588746

Section 1R19: Post-Maintenance Testing

Procedures

1303-4.13, RB Emergency Cooling and Isolation System Analog Test, Revision 048
 1303-11.3, Surveillance Test and Set Main Steam Safety Valves, Revision 040
 MA-AA-736-610, Application of Freeze Seal to all Piping, Revision 9
 MA-AA-743-310, Diagnostic Testing and Evaluation of Air Operated Valves, Revision 6
 MA-TM-134-705, Furmanite Trevitest Preparation for Safety Valve Testing, Revision 000
 OP-TM-212-242, Shutdown IST of DH-V-4A and DH-V-4B, Revision 6
 OP-TM-424-212, IST of EF-V-30s and EF-V-52s, Revision 7
 OP-TM-543-201, IST of DC-P-1A, Revision 3
 OP-TM-642-231, ES Train A Emergency Sequence and Power Transfer Test, Revision 6

Drawing

11865841

Miscellaneous

14-00442, Technical Evaluation – DH-V-4B Freeze Seal, Revision 0
 Instrument Calibration Sheet, BS-PT-285, Revision 00
 ARs: A2342840 A2388095 A2363846
 IRs: 2584211 2585958 2586588 2595178 2557670 2571726
 2595478 2587236 2584541 2565761 2565844 2566068
 WO: C2031344 C2035065 C2031759 C2033234 R2230052 R2219417
 R2212629 M2388748

Section 1R20: Refueling and Other Outage Activities

Procedures

- 1015, Equipment Storage Inside Class 1 Building—RB Sump Clogging Post-LOCA, Rev. 7
- 1101-3, Containment Integrity and Access Limits, Rev. 93A
- 1102-2 Plant Startup, Rev. 162A
- 1102-10, Plant Shutdown, Rev. 099
- 1102-11, Plant Cooldown, Rev. 151
- 1103-8, Approach to Criticality, Rev. 055
- 1103-11, RCS Water Level Control, Rev. 072
- 1104-6, Spent Fuel Cooling System, Rev. 046
- 1104-15D, Fuel Handling ESF Ventilation System, Rev. 025
- 1404-4.4A, Remove – Install EOTSG Primary Upper Manway, Revision 7
- 1505-1, Fuel and Control Component Shuffles, Rev. 059
- 1505-3, Fuel Handling Problems, Rev. 023
- 1507-1, Polar Crane Operations, Rev. 027
- 1507-1, Attachment 7.3, Catwalk/ Miscellaneous Loads Safe Load Path and Handling Restrictions, Rev. 027
- 1507-3, Main Fuel Handling Bridge Operating Instructions, Rev. 033
- 1507-5, Spent Fuel Handling Bridge Operating Instructions, Rev. 046
- MA-AA-716-008, FME Program, Rev. 011
- MA-TM-134-903, Reactor Vessel Disassembly, Rev. 013
- MA-TM-460-001, Planned Containment Entry-TMI 1, Rev. 2
- OP-TM-220-261, Reactor Coolant System VT-2 Exam, Rev. 010
- OP-TM-220-567, Drain Cold Leg(s) to RCBT via RC Drain Pump, Rev. 004A
- OP-TM-300-205, Shutdown Margin for Hot Shutdown Conditions, Rev.004
- OP-TM-300-206, Shutdown Margin for Low Temperature Conditions, Rev. 003
- OP-TM-310-401, Controlling Procedure for Physics Testing, Rev. 005

Miscellaneous

Apparent Cause Report 2571509, Temporary Loss of PPC Heat Balance due to Unplanned NetArray Loop 2 Reset

R2230377, BWST Internal Surface Inspection on November 9, 2015

| | | | | | | |
|------|----------|----------|----------|----------|----------|----------|
| IRs: | 2582909* | 2583048 | 2583372* | 2581030 | 2584645 | 2601214 |
| | 2601327 | 2601086 | 2601031 | 2601026 | 2601022 | 2601016 |
| | 2600103 | 2600026 | 2599896 | 2598950 | 2592809 | 2592706 |
| | 2592776 | 2592711 | 2592311 | 2592250 | 2592649 | 2592586 |
| | 2592628 | 2592661 | 2595746 | 2593902 | 2599173 | 2605522 |
| | 2582373* | 2582414* | 2592131* | 2592129* | 2592128* | 2591670* |

Section 1R22: Surveillance Testing

Procedures

- 1301-10.1, Reactor Vessel Internal Vent Valve Inspection and Exercise, Revision 20
- MA-TM-244-217A, Penetration 346 LLRT of NS-V-11 and NS-V-15, Revision 1
- MA-TM-245-201, RB Personnel Hatch – Local Leak Rate Testing, Revision 0
- WC-TM-430, Surveillance Testing Program, Revision 0
- WC-TM-430-1001, Surveillance Testing Program Database Interface and Maintenance, Revision 1

Miscellaneous

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| IRs: | 2582432 | 2584207 | 2567920 | 2568432 | 1583961 | 2570319 |
| | 2585279 | 2570880 | | | | |
| WOs: | R2229733 | R2010670 | R2010087 | C2035218 | R2221634 | R2229858 |
| | R2191244 | R2228814 | R2228815 | R2228816 | R2190807 | R2190811 |
| | C2034392 | | | | | |

Section 2RS1: Radiological Hazard Assessment and Exposure ControlsProcedures

RP-AA-300-1002, "Electron Capture Isotope Control," Revision 4
 RP-AA-376, "Radiological Postings, Labeling, and Marking," Revision 8
 RP-AA-376-1001, "Radiological Postings, Labeling, and Standard," Revision 12
 RP-AA-460, "Controls for High and Locked High Radiation Areas," Revision 26
 RP-AA-500, "Radioactive Material (RAM) Control," Revision 17
 RP-AA-503, "Unconditional Release Survey Method," Revision 10

Miscellaneous

RWPs/ALARA Plans:

| | |
|--|---|
| TM1-15-00505, Revision 00 | Auxiliary Building Outage Scaffold |
| TM1-15-00605, Revision 00 | Containment Outage Scaffold |
| TM1-15-00632, Revision 00 | MSIP in Reactor Building |
| TM1-15-00633, Revision 00 | Fuke Flex |
| TM1-15-00634, Revision 00 | Pressurizer Insulation |
| TM1-15-00635, Revision 00 | Reactor Coolant Pump 1D Motor Replacement |
| AP 15-019, T1R21 Scaffold Construction/Dismantlement | |
| AP 15-022, MSIP of RCP Discharge and Suction Nozzles | |
| AP 15-024, RCP-1D Motor Replacement | |
| AP 15-025, Pressurizer Insulation Replacement | |

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1RB 100 15 02030, 10/30/2015 @ 0220
 1RB 200 15 02027, 10/30/2015 @ 0315
 1RB 520 15 02029, 10/30/2015 @ 0230
 1RB 515 15 02031, 10/30/2015 @ 0230
 1AB 100 15 02066, 10/30/2015 @ 0515

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| IRs: | 02579535 | 02580014 | 02580055 | 02581051 | 02584206 |
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Section 2RS3: IN-Plant Airborne Radioactivity Control and MitigationProcedures

RP-AA-220, "Bioassay Program", Revision 10
 RP-AA-224, "CEDE Dose Tracking Using Lapel Air Samples", Revision 1

Miscellaneous

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 TMI Dose Information 2014 1/28/2015
 Three Mile Island Nuclear Generating, Station 2015 – 2019, Exposure Reduction Plan,
 Revision 0, 3/27/2015

Section 2RS4: Occupational Dose Assessment

Procedures

RP-AA-203, "Exposure Control and Authorization," Revision 3
RP-AA-203-1001, "Personnel Exposure Investigations," Revision 9
RP-AA-203-1002, "Response to Electronic Dosimeter (EPD) Alarms," Revision 1
RP-AA-210, "Dosimetry Issue, Usage, and Control," Revision 25
RP-AA-210-1001, "Dosimetry Logs and Forms," Revision 9
RP-AA-215, "Calculating and Crediting Dose from Noble Gas Exposure," Revision 1
RP-AA-220, "Bioassay Program," Revision 10
RP-AA-220-1001, "Collection and Handling of In-Vitro Bioassay Samples," Revision 1
RP-AA-222, "Methods for Estimating Internal Exposure from In-Vivo and In-Vitro Bioassay Data," Revision 5
RP-AA-223, "Calculating and Crediting Dose from Tritium Exposure," Revision 1
RP-AA-224, "CEDE Dose Tracking Using Lapel Air Samples," Revision 1
RP-AA-250, "External Dose Assessments from Contamination," Revision 6

Miscellaneous

National Voluntary Laboratory Accreditation Program for TMI dosimetry vendor for 2015

Section 2RS5: Radiation Monitoring Instrumentation

Miscellaneous

Powerlabs environmental data for the period of June 15, 2013 through May 15, 2014
AR: 01676075

Section 4OA2: Problem Identification and Resolution

Procedures

E-21, Thermal Overload Devices Inspection and Testing, Revision 41
E-29, Electrical Heaters – Maintenance, Revision 12
ES-024T, Overload Heater Selection for Electrical Motors, Revision 4
OP-AA-103-105, Limitorque Motor-Operated and Chainwheel Operated Valve Operations, Revision 4
OP-TM-212-501, Cleanup of the BWST, Revision 4A
OP-TM-212-501, Cleanup of the BWST, performed 10/12/15
OP-TM-534-901, RB Emergency Cooling Operations, Revision 14
OP-TM-AOP-003, Earthquake, Revision 4
PI-AA-120, Issue Identification and Screening Process, Revision 1
PI-AA-125, Corrective Action Program (CAP) Procedure, Revision 2

Calculations

C-1101-730-5350-001, GL 89-10 MOV Heating Effects due to Jogging or Frequent Cycling, Revision 12
C-1101-730-5350-002, GL-89-10 MOVs Thermal Overload Heater Determination, Revision 4
C-1101-730-E420-014, Thermal Overload Evaluation for Jogging GL 89-10 MOVs, Revision 0

Drawings

201-052, sht. 1, 1A 480V Control Center, Engineered Safeguards Valves, Revision 46
201-053, sht. 1, 1B 480V Control Center, Engineered Safeguards Valves, Revision 48

302-691, Liquid Waste Disposal Flow Diagram, Revision 8
 302-630, Spent Fuel Cooling System Flow Diagram, Revision 32
 302-640, Decay Heat Removal Flow Diagram, Revision 84

Miscellaneous

IEEE Std 741-2007, Protection of Class 1E Power Systems and Equipment in Nuclear Power Generating Stations dated February 1, 2008
 LER 2015-001-00, Seismically Qualified BWST Aligned to Non-Seismic Piping, dated 10/05/15
 Letter from Robert Gladney, (USNRC) to Exelon, Three Mile Island Nuclear Station, Unit 1 – Issuance of Amendment for Temporary Restoration of the Borated Water Storage Tank Cleanup and Recirculation Operation, dated 10/01/15
 Letter from James Barstow (Exelon Generation Company, LCC) to USNRC, “License Amendment Request – Temporary Restoration of Borated Water Storage Tank Cleanup and Recirculation Operation, dated 7/23/15
 Letter from David Helker (Exelon Generation Company, LCC) to USNRC, “Supplement to License Amendment Request – Temporary Restoration of Borated Water Storage Tank Cleanup and Recirculation Operation,” dated 7/28/15
 Limitorque Technical Update 93-03, Reliance 3-Phase Limitorque Corporation Actuator Motors (Starting Torque @ Elevated Temperature) dated September 1993
 ML15155A300, Task Interface Agreement 2015-01, Assessment of Three Mile Island Nuclear Station’s Use of a Non-Seismic Qualified Cleanup Path for the Borated Water Storage Tank, dated 9/06/15
 NES-EIC-10.02, Standard for Thermal Overload Relay Element Selection for MOVs, Revision 0
 Test Report TR14T2365-01-01, Westinghouse Thermal Overload Relays Part Numbers AA13P and AA23P and Thermal Overload Heaters Part Numbers FH29, FH30, FH40, and FH41, Revision 0
 Topical Report 113, TMI GL 89-10 MOV Program Site Specific Information, Rev. 8

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|------|----------|----------|---------|---------|---------|----------|
| IRs: | 1347306 | 1602025 | 1631468 | 1661859 | 2555030 | 2574453* |
| | 2574459* | 2574469* | 2574777 | | | |

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

Procedures

OP-TM-212-501, Cleanup of the BWST, Revision 4A
 OP-TM-AOP-001, Fire, Revision 8
 OP-TM-AOP-003, Earthquake, Revision 4
 OP-TM-AOP-013, Loss of 1D 4160V Bus, Revision 8
 OP-TM-AOP-023, “A” DC System Failure, Revision 6
 E-5.1, Westinghouse 480V DB-25 Circuit Breaker Maintenance and Testing, Revision 8 and 8A
 EP-AA-1009 Addendum 3, TMI Emergency Action Level (EAL) Matrix – Hot, Revision 0

Miscellaneous

EP-MA-114-100-F-01, State / Local Event Notification Form, for DC-P-1A Motor and Breaker fire dated October 5, 2015
 LER 2015-001-00, Seismically Qualified BWST Aligned to Non-Seismic Piping, dated 10/05/15
 Letter from Robert Gladney, (USNRC) to Exelon, Three Mile Island Nuclear Station, Unit 1 – Issuance of Amendment for Temporary Restoration of the Borated Water Storage Tank Cleanup and Recirculation Operation, dated 10/01/15

Letter from James Barstow (Exelon Generation Company, LCC) to USNRC, "License Amendment Request – Temporary Restoration of Borated Water Storage Tank Cleanup and Recirculation Operation," dated 7/23/15

Letter from David Helker (Exelon Generation Company, LCC) to USNRC, "Supplement to License Amendment Request – Temporary Restoration of Borated Water Storage Tank Cleanup and Recirculation Operation," dated 7/28/15

ML15155A300, Task Interface Agreement 2015-01, Assessment of Three Mile Island Nuclear Station's Use of a Non-Seismic Qualified Cleanup Path for the Borated Water Storage Tank, dated 9/06/15

NRC Event Notification #51455, dated October 5, 2015

Plant Computer Critical Parameter Trends for DC-P-1A, dated October 5 – 6, 2015

PM000403, Preventive Maintenance order for DB-25 breakers

PO# 80-025057, TMI request to refurbish DB-25 breaker

Root Cause Report 2566171: DC-P-1A Motor and Breaker Fire, dated December 30, 2015

TMI Shift Narrative Logs, dated October 5 – 6, 2015

TMI Technical Support Center Logs, dated October 5 – 6, 2015

TMI-15-133, 10 CFR 21.21(a)1 Notification Due to Breaker Defect, dated December 28, 2015

Various WOs to inspection DB-25 and DB-50 breakers as extent of condition for Root Cause Report 2566171: DC-P-1A Motor and Breaker Fire

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|------|---------|---------|----------|---------|---------|---------|
| IRs: | 2566102 | 2566104 | 2581866 | 2578236 | 2567444 | 2567245 |
| | 2566844 | 2566777 | 2566646* | 2566530 | 2566390 | 2566248 |
| | 2568285 | 2568412 | | | | |

LIST OF ACRONYMS

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| ADAMS | Agencywide Documents Access and Management System |
| ASME | American Society of Mechanical Engineers |
| ALARA | as low as reasonably achievable |
| BACC | boric acid corrosion control |
| BWST | borated water storage tank |
| CAP | corrective action program |
| CFR | Code of Federal Regulations |
| DBA | design basis accident |
| EACE | equipment apparent cause evaluation |
| ECT | eddy current testing |
| EDG | emergency diesel generator |
| EPRI | Electric Power Research Institute |
| IMC | Inspection Manual Chapter |
| INPO | Institute of Nuclear Power Operations |
| ISI | in-service inspection |
| IST | in-service test |
| LCO | limiting condition of operation |
| LER | licensee event report |
| MOV | motor operated valve |
| MSIP | material stress improvement process |
| NCV | non-cited violation |
| NDE | nondestructive examination |
| NRC | Nuclear Regulatory Commission |
| OTSG | once-through steam generator |
| PI | performance indicator |
| PT | liquid penetrant testing |
| PWR | Pressurized Water Reactor |
| RCS | reactor coolant system |
| RG | regulatory guide |
| SSC | structure, system, and component |
| TMI | Three Mile Island Unit 1 |
| TOL | thermal overload |
| TS | technical specifications |
| TTS | tube-to-tube support sheet |
| TTW | tube-to-tube wear |
| UFSAR | updated final safety analysis report |
| UT | ultrasonic testing |
| VT | visual testing |
| WO | work order |