UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PA 19406-1415

February 8, 2012

Mr. Michael J. Pacilio
Senior Vice President, Exelon Generation Company, LLC
President and Chief Nuclear Officer (CNO), Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: THREE MILE ISLAND STATION, UNIT 1 – NRC INTEGRATED INSPECTION REPORT 5000289/2011005

Dear Mr. Pacilio:

On December 31, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Three Mile Island, Unit 1 (TMI) facility. The enclosed inspection report documents the inspection results, which were discussed on January 27, 2012, with Mr. Rick Libra, Site Vice President, and other members of your staff.

The inspection 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.

This report documents one NRC-identified and one self-revealing finding of very low safety significance (Green). One finding was determined to involve a violation of NRC requirements. However, because of the very low safety significance, and because it was entered into your corrective action program, the NRC is treating this finding as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. If you contest the NCV 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 Station. In addition, if you disagree with the cross-cutting aspect assigned to any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region I, and the NRC Resident Inspector at Three Mile Island Station.

In accordance with 10 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 Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Website at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

We appreciate your cooperation. Please contact me at 610-337-5046 if you have any questions regarding this letter.

Sincerely,

Gordon K. Hunegs, Chief
Projects Branch 6
Division of Reactor Projects

Docket No: 50-289
License No: DPR-50

Enclosure: Inspection Report 05000289/2011005
w/Attachment: Supplemental Information

cc w/encl: Distribution via ListServ

We appreciate your cooperation. Please contact me at 610-337-5046 if you have any questions regarding this letter.

Sincerely,

/RA/

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U.S. NUCLEAR REGULATORY COMMISSION

REGION 1

Docket No:	50-289
License No:	DPR-50
Report No:	05000289/2011005
Licensee:	Exelon Generation Company
Facility:	Three Mile Island Station, Unit 1
Location:	Middletown, PA 17057
Dates:	October 1 through December 31, 2011
Inspectors:	D. Werkheiser, Senior Resident Inspector J. Heinly, Resident Inspector S. Barr, Senior Emergency Preparedness Specialist C. Cahill, Senior Reactor Analyst K. Cronk, Reactor Inspector D. Kern, Senior Reactor Inspector R. Nimitz, Senior Health Physicist T. O'Hara, Reactor Inspector J. Richmond, Senior Reactor Inspector
Approved by:	G. Hunegs, Chief Reactor Projects Branch 6 Division of Reactor Projects

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SUMMARY OF FINDINGS

IR 05000289/2011005; 10/01/2011-12/31/2011; Three Mile Island, Unit 1; Event Follow-up and Occupational ALARA Planning and Controls.

This report covered a three-month period of inspection by resident inspectors and announced inspections performed by regional inspectors. Inspectors identified two findings of very low safety significance (Green), where one finding was determined to be a non-cited violation (NCV). The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, Significance Determination Process (SDP). The cross-cutting aspects for the findings were determined using IMC 0310, Components Within Cross-Cutting Areas. Findings for which the SDP does not apply may be Green, or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, Reactor Oversight Process, Revision 4, dated December 2006.

Cornerstone: Initiating Event

- Green. An NRC identified non-cited violation (NCV) of 10 CFR 50, Appendix B, Criterion XVI, Corrective Actions, was identified because Exelon did not identify and correct a condition adverse to quality regarding the impact of a revised river stage discharge analysis result on Technical Specifications (TSs). Specifically, Exelon did not recognize that the revised river discharge analysis resulted in a lower flow-based river shutdown level, resulting in a non-conservative TS. The inspectors determined this was a performance deficiency because Exelon personnel did not promptly identify and correct a condition adverse to quality regarding the non-conservative TS 3.14.2. Exelon entered the issue into their corrective action program under IR 1272726.

  The finding is more than minor because the finding is associated with the protection against external factors attribute of the Initiating Event cornerstone to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. The inspectors evaluated the finding in accordance with IMC 0609, Attachment 4, Phase 1 – Initial Screening and Characterization of Findings, and determined it was of very low safety significance (Green) because the issue did not increase the likelihood of a fire or internal/external flood event.

  This finding has a cross-cutting aspect, as described in IMC 0310, in the area of Problem Identification and Resolution, Corrective Action Program, because Exelon failed to identify issues completely, accurately and in a timely manner commensurate with their safety significance. Specifically, Exelon failed to identify the non-conservative TS in a timely manner. [P.1(a)] (Section 4OA3)

Cornerstone: Occupational Radiation Safety

- Green. A self-revealing finding was identified because Exelon did not effectively manage and control Unit 1 reactor coolant let-down and clean-up during shutdown and cool-down in support of the 2011 TMI Unit 1 refueling and maintenance outage (T1R19) to maximize clean-up and thereby minimize ambient radiation dose rates for affected outage work. Specifically, during reactor shutdown and cooldown on October 25, 2011, reactor coolant

letdown flow rate decreased for a 20-hour period resulting in less clean-up volume. This reduction in flow, and clean-up, resulted in radioactive crud (from fuel deposits) being deposited at higher levels within the steam generators than previously encountered causing elevated occupational radiation dose rates and unintended occupational radiation exposure. Exelon entered the issue into their corrective action program under IR 1284066.

The finding is more than minor because it is associated with the IMC 0612 (Appendix B) Occupational Radiation Safety Cornerstone attribute of program and process (As Low As Reasonably Achievable [ALARA] Planning), and the finding adversely affected the cornerstone objective of ensuring the adequate protection of the worker health and safety from exposure to radiation from radioactive material during routine reactor operations. The finding is also similar to the more-than-minor example (6,i) provided in IMC 0612 (Appendix E) since it involved an actual collective exposure for work activities greater than five person-rem and exceeded the planned, intended dose by more than 50 percent. Using IMC 0609 (Appendix C), the finding was determined to have very low safety significance (Green), because the finding involved an ALARA planning issue and the three-year rolling average collective dose history was less than 135 person-rem (approximately 93 person-rem average annual exposure for 2008-2010).

The finding has a cross-cutting aspect, as described in IMC 0310, in the area of human performance (H) associated with a work control component aspect because Exelon's management and control of reactor shutdown and cool-down did not adequately incorporate effective measures to ensure occupational radiation exposures during the outage would be as low as reasonably achievable (ALARA). [H.3(a)] (Section 2RS02)

REPORT DETAILS

Summary of Plant Status

Three Mile Island, Unit 1 (TMI) began the inspection period at approximately 100 percent power. On October 24, TMI shutdown and began refueling outage 1R19. The reactor was brought critical on November 24th and synchronized to the power grid on November 25. Reactor power was returned to 100 percent on November 27. On December 3, TMI reduced power to 90 percent to perform planned turbine valve testing and returned to full power on December 4 and continued to operate at full power until the end of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01 – 1 sample)

Readiness for Seasonal Extreme Weather Conditions (Cold Weather)

a. Inspection Scope

The inspectors walked down risk significant plant areas during the week of October 3 to assess Exelon's preparation and protection for cold weather conditions. Focused inspections were conducted on the decay heat system, borated water storage tank, and condensate storage tanks to ensure availability during cold weather conditions. In addition, the inspectors reviewed the work maintenance backlog for the heat trace system and the scheduled corrective maintenance dates. The inspectors reviewed and observed the implementation of procedure WC-AA-107, Seasonal Readiness, Rev. 9. Specifically, the inspectors observed winter weather readiness meetings to ensure adequate attention was provided to potential cold weather impacts on safety equipment commensurate with its safety significance.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

a. Inspection Scope

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

The inspectors performed partial walkdowns of the following systems:

- 'A' train decay heat system during suction relief valve change-out on the 'B' train on September 14, 2011
- Alignment of the engineered safeguards feature ventilation system for operation during the refueling outage on October 24, 2011
- 'A' train decay heat system after realignment from maintenance outage and during 'B' train maintenance outage on November 9, 2011

- 'A' train reactor building emergency cooling system during a planned maintenance outage of the 'B' reactor river pump on December 12, 2011

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

b. Findings

No findings were identified.

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

a. Inspection Scope

On December 13 and 14, 2011, the inspectors performed a complete system walkdown of accessible portions of the 'A' emergency feedwater system (motor-driven) during 'B' heat sink protection system testing to verify the existing equipment lineup was correct. 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, hanger 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 – 2 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. Fire zones and areas inspected included:

- Intake screen pump house, 1R switchgear and pump area, 308' elevation on December 13, 2011
- Reactor building, all levels, during refueling outage 1R19

b. Findings

No findings were identified.

1R07 Heat Sink Performance (711111.07A – 1 sample)

a. Inspection Scope

The inspectors reviewed the decay closed 2A heat exchanger inspection results to determine its readiness and availability to perform its safety functions. ER-TM-340-1002, Guidance for Heat Exchanger Inspections and Cleaning at TMI, was used as the standard. The inspectors reviewed the design basis for the component and verified Exelon's commitments to NRC Generic Letter 89-13. The inspectors reviewed the results of previous inspections of the decay closed heat exchangers and validated no adverse trends would impact operability. The inspectors discussed the results of the most recent inspection with engineering staff and reviewed pictures and videos of the as-found and as-left conditions. The inspectors validated that chemical control of the piping and heat exchanger surfaces was effective in preserving the integrity of the components. The inspectors verified that Exelon initiated appropriate corrective actions for identified deficiencies (IRs 802386, 802393, 802399, 802415, and 1287008). 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 Inservice Inspection (ISI) (711111.08 – 1 sample)

a. Inspection Scope

The inspectors observed a sample of nondestructive examination (NDE) activities in process. The inspectors observed the ultrasonic testing (UT) examination of a weld overlay of a dissimilar metal weld completed in a prior outage on the hot leg to pressurizer surge line piping. Additionally, the inspectors observed the installation of a weld overlay on the pressurizer spray line to spray nozzle including the liquid-penetrant testing and the final UT of the completed overlay. Also, the inspectors reviewed the

records of selected additional samples of completed NDE and repair/replacement activities. The sample selection was based on the inspection procedure objectives and risk priority of those components and systems where degradation would result in a significant increase in risk of core damage. The inspectors' observations and documentation reviews were performed to verify that the activities inspected were performed in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code requirements.

The inspectors reviewed records for UT, visual testing (VT), penetrant testing (PT) and magnetic particle testing (MT) NDE processes. Exelon did not perform any radiographic testing (RT) during this outage. The inspectors reviewed inspection data sheets and documentation for these activities to verify the effectiveness of the examiner, the process, and the equipment used in identifying degradation of risk significant systems, structures and components and to evaluate the activities for compliance with the requirements of the ASME Boiler and Pressure Vessel Code, Section XI requirements.

The inspectors reviewed Exelon's Technical Specification 4.19, Steam Generator Tube Integrity, Steam Generator (SG) Programs, Exelon's Engineering Report No. IP3-RPT-06-00186, Rev. 1, and Steam Generator Degradation Assessment for 1R19 Refueling Outage. During 1R19, Exelon completed a 100 percent eddy current inspection of both EOTSG's. The inspectors reviewed the inspection results, evaluations and analyses.

During 1R19, the inspectors participated in conference calls with Exelon and NRC headquarters communicating the results of the SG inspections. The inspectors reviewed the Areva eddy current testing procedures and verified that Exelon had completed the steam generator inspections in accordance with the requirements of NEI 97-06, Pressurized Water Reactor Steam Generator Examination Guidelines, Rev. 7. The inspectors also reviewed the Areva procedure qualification certifications and a sample of data analysts' personnel certifications.

The inspectors reviewed the licensee's performance of a VT examination of the Unit 1 reactor vessel closure head (RVCH) penetrations. The inspectors reviewed the VT inspection data sheets, a sample of the personnel qualifications of the Exelon inspectors performing the inspections and reviewed the inspection report documenting the inspection results.

The inspectors reviewed the repair (overlay) of Class 1 weld 228/RC0134BMWELD. This weld is a dissimilar metal weld which had been mitigated by weld overlay under Work Order C2019617-03 during the prior outage. The inspectors reviewed the post weld automated ultrasonic examination summary and calibration data, the post weld manual calibration data and calibration data. The inspectors also reviewed the completed overlay profile and thickness/contour measurements. All indications were interrogated, documented and evaluated as acceptable.

The inspectors reviewed Design Change Package (DCP) ECR TM-09-00128-001, which removed the original axial power shaping rods (APSD) control rod drive mechanisms from the Unit 1 reactor vessel head during 1R19. The original APSD control rod drive (CRD) mechanisms were removed and replaced with gasketed and bolted flanges in the original CRD locations. The inspectors also reviewed the 10 CFR 50.59 screening for this plant change. This change did not involve NDE or welding evolutions.

The inspectors reviewed a sample of originally rejectable indications from previous outage inspections which were accepted for continued use after evaluation. The inspectors also reviewed the evaluations performed to justify continued operations with the conditions reported.

The inspectors reviewed IR 990641, which documented a bulge in the Unit 1 containment liner identified by a visual inspection. This condition was originally reported as a non-conforming condition. Exelon performed additional inspections with ultrasonic methods to show that the bulge was supported by the concrete structure, and was thus acceptable for further service without repair.

The inspectors reviewed the results of a magnetic particle inspection of weld 06-00759-W-45, a mainsteam system piping weld with reported rejectable inclusions in the weld. Further ultrasonic testing and evaluation of the weld demonstrated that the indications were acceptable for further service.

The inspectors reviewed a sample of IRs, listed in Attachment 2, which involved in-service inspection related activities, to ensure that nonconforming conditions are being promptly identified, reported and resolved. The inspectors observed that non-conformances are being reported, screened, evaluated and resolved in a manner commensurate with the safety significance of the issue.

The inspectors reviewed the Exelon boric acid corrosion control program (BACC) procedures. The resident inspectors observed Exelon personnel performing boric acid walkdown inspections inside containment at the beginning of 1R19, on October 24 and 25, 2011. The inspectors reviewed a sample of the IRs generated by the walkdowns and the BACC evaluations that were performed to disposition the IRs. The inspectors also interviewed the BACC Program Manager and selected BACC inspectors. The inspectors also reviewed several past IRs, boric acid program evaluations and corrective actions completed to repair the reported conditions.

b. Findings

Introduction: The NRC inspectors identified an unresolved item (URI), because Exelon did not implement boric acid inspections of the reactor coolant system (RCS) thermal barrier flange joints of reactor coolant pumps (RCP) RC-P-1A, RC-P-1B, RC-P-1C and RC-P-1D during a plant shutdown on October 24, 2011, as required by quality-related procedure ER-AP-331-1001, Rev. 5, step 4.1.4.2.

Description: During a plant shutdown on October 24, 2011, Exelon BACC inspectors did not inspect the flanged, gasketed joints of RCP thermal barrier flanges of RC-P-1A, RC-P-1B, RC-P-1C and RC-P-1D, while the plant was at hot shutdown conditions. The affected joints use flexitalic gaskets to seal the thermal barrier housing to the RCP motor and to the RCP volute.

Exelon inspected the RCP flanges on October 11, 2011, after an Exelon NDE inspector observed a significant amount of boric acid on the flange of RCP RC-P-1B and on the pump's discharge piping inside containment. However, when this inspection was performed on November 1, 2011, the RCS was cold, depressurized and drained. Thus, the inspection conditions did not meet those specified in ER-AP-331-1001, Rev. 5, step 4.1.4.2., to complete "A walkdown inspection of borated systems/components inside

containment shall be performed to identify evidence of boric acid leakage as soon after plant shutdown . . . as practical, at each refueling." Because this inspection was not completed at operating pressure as specified, Exelon had missed an opportunity to determine the actual leak rate of the component because the RCS was drained and depressurized when the leakage evidence was discovered, i.e. the plant was no longer at hot shutdown conditions. Upon inspection on November 1, 2011, at cold shutdown, Exelon attributed the significant leakage to a damaged flange gasket, an equipment failure. Subsequent examination of the affected carbon steel flange bolts identified degradation of one of the flange bolts. The inspectors reviewed Exelon's evaluation of the bolt for continued use.

Exelon had identified the presence of the boric acid residue coming from the B RCP flange on November 1, 2011, and placed the condition into the corrective action process. However, the inspectors noted that because the B RCP and associated piping had been drained and depressurized, when inspected, Exelon had missed an opportunity to fully characterize, or measure the actual leak rate. Exelon subsequently provided the NRC additional information and an understanding of past Exelon BACC practices at TMI. To completely resolve this issue, the inspectors need additional information from the licensee to evaluate the issue against the current licensing basis and determine if the apparent performance deficiency is more than minor. A summary of the unresolved issue follows:

(1) Determine whether commitments made by the licensee in response to Generic Letter 88-05 (part of the current licensing basis) have been completely and accurately carried forward by procedures 1303-8.1, Rev. 31, and OP-TM-220-261, Rev. 7, when they were replaced by ER-AP-331-1001 in 2003.

(2) Determine whether the inspection effectiveness (per 10 CFR 50, Appendix B, Criterion IX, Control of Special Processes and/or Criterion XI, Test Control) of procedures 1303-8.1, Rev. 31, and OP-TM-220-261, Rev. 7 has been maintained when the procedure was replaced by ER-AP-331-1001 in 2003. The specific issues to assess are:

- Determine what change management process was completed in 2003 when Exelon transitioned to ER-AP-331-1001, from 1303-8.1, Rev. 31, and OP-TM-220-261, Rev. 7;
- Identify how Exelon determined that procedure ER-AP-331-1001, performed at depressurized cold shutdown conditions, will provide the same leak detection sensitivity as the original 1303-8.1, Rev. 31, and OP-TM-220-261, Rev. 7, which required RCS pressure of 2155 psig before and during the boric acid control (BAC) inspections; and
- Determine if the removal of the inspection target listings, which were originally contained in procedures 1303-8.1, Rev. 31, and OP-TM-220-261, Rev. 7, and not incorporated into ER-AP-331-1001, was evaluated by Exelon for its effect on test and leak detection sensitivity.

(3) Understand Exelon's justification that inspecting the RCP flanges at hot shutdown (HSD) conditions was unsafe or impractical. The inspectors noted that Exelon has historically performed BAC inspections at HSD conditions in accordance with procedures 1303-8.1, Rev. 31, and OP-TM-220-261, Rev. 7, between 1988 and 2003.

(4) WCAP 15988NP is a self-imposed industry standard which Exelon has adopted. By using ER-AP-331-1001, Exelon does not appear to meet the following elements: Key Element 1: Identification of Inspection Locations; Key Element 2: Obstructions to Visual Inspections; Key Element 7: Data Collection and Documentation; and Key Element 11: Continuous Improvement and Self-Assessment, as required by WCAP 15988NP.

This area is unresolved, pending further licensee action and subsequent NRC review. **(URI 05000289/2011005-01, Inspect and Disposition Leakage Event from B RCP Flange from 1R19)**.

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

Licensed Operator Simulator Training

a. Inspection Scope

On October 11, 2011, the inspectors observed licensed operator requalification training at the control room simulator for the 'E' operator crew and pre-simulator demonstration on the to-be-installed next outage digital control rod system. The inspectors observed the operators' simulator drill performance and compared it to the criteria listed in TMI Operational Simulator Scenario TQ-TM-106-622-S001, DCRS Demonstration, and TQ-TM-106-S005, Feedwater Pump Trip, Steam Generator Tube Leak and Emergency Declaration.

On November 15, 2011, licensed operators performed just-in-time training (JITT) in preparation for plant startup from the Unit 1 refueling outage. The inspectors observed the licensed operators' simulator performance and compared it to the criteria listed in TMI operational simulator scenario TQ-TM-104-GOP-S017, Startup JITT for Cycle Physics Testing from 1R19 Outage. The inspectors reviewed the JITT training material to validate that it accurately represented expected plant startup conditions.

The inspectors observed supervisory oversight, command and control, communication practices, and crew assignments to ensure they were consistent with normal control room activities. The inspectors observed operator response during the simulator drill transients. The inspectors verified the accuracy and timeliness of the emergency classification made by the shift manager and technical specification (TS) action statements entered by the crew. The inspectors evaluated training instructor effectiveness in recognizing and correcting individual and operating crew errors. The inspectors attended the post-drill critique and reviewed the written crew critique in order to evaluate the effectiveness of problem identification.

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

- Fuel Handling Building Exhaust Air-Particulate Area Radiation Monitor (RM-A-4P) on October 16, 2011
- Multiple decay heat removal valve repairs during refueling outage from October through November, 2011

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 5 samples)

a. Inspection Scope

The inspectors reviewed station evaluation and management of plant risk for the maintenance and emergent work activities listed below to verify that Exelon performed the appropriate risk assessments prior to removing equipment for work. The inspectors selected these activities based on potential risk significance relative to the reactor safety cornerstones. As applicable for each activity, the inspectors verified that Exelon personnel performed risk assessments as required by 10 CFR 60.65(a)(4) and that the assessments were accurate and complete. When Exelon performed emergent work, the inspectors verified that operations personnel promptly assessed and managed plant risk. The inspectors reviewed the scope of maintenance work and discussed the results of the assessment with the station's probabilistic risk analyst to verify plant conditions were consistent with the risk assessment. The inspectors also reviewed the technical specification requirements and inspected portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met.

- Planned entry into reduced-inventory and mid-loop operations on October 28 and 29, 2011 to support refueling outage activities
- Planned station refueling outage activities during a significant winter storm on October 29, 2011 which affected the reliability of offsite AC power
- Invalid red risk profile from the station risk assessment system as documented in IR 1284993 on November 2, 2011
- Several durations of planned maintenance on the spent fuel pool cooling system from October 30 through November 2, 2011

- Planned maintenance and testing or reactor building purge exhaust valves during initial plant heat-up on November 18, 2011

b. Findings

No findings were identified.

1R15 Operability Evaluations (71111.15 – 4 samples)

a. Inspection Scope

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

- 'A' emergency diesel generator jacket water heater degraded and adverse condition monitoring plan as documented in IRs 1274089 and 1274371 on October 17, 2011
- Emergency feedwater containment isolation check valve, EF-V-12B, suspected seat leakage as documented in IR 1280164 on October 24, 2011
- 'A' and 'B' train of the emergency core cooling system (ECCS) sump level indications out of tolerance as documented in IRs 1283655 and 1284138 on October 31, 2011
- Decay heat valve, DH-V-14A/B, IST prerequisite requirements not met as documented in IR 1289748 on November 13, 2011

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

.1 Temporary Modifications

a. Inspection Scope

The inspectors reviewed the temporary modification listed below to determine whether the modifications affected the safety functions of systems that are important to safety. The inspectors reviewed 10 CFR 50.59 documentation and post-modification testing results, and conducted field walkdowns of the modifications to verify that the temporary

modifications did not degrade the design bases, licensing bases, and performance capability of the affected systems.

- Engineering Change Request (ECR) TM-11-00512, Rev.0, "Alternate Design for OTSG Cold Leg Nozzle Dams," to use and install steam generator nozzle dams with an alternate diaphragm seal.

b. Findings

No findings were identified.

.2 Permanent Modifications

a. Inspection Scope

The inspectors evaluated a modification to install a digital rod control drive control system and replace the AC and DC control rod drive trip breakers under ECRs 07-01037, 07-01038, 07-01039. 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 change. The inspectors also reviewed revisions and newly created control room alarm response procedures. The inspectors reviewed 10 CFR 50.59 documentation and post-modification testing results, and conducted field walkdowns of the modifications.

b. Findings

No findings were identified.

1R19 Post Maintenance Testing (71111.19 – 6 samples)

a. Inspection Scope

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

- Engineered safeguards actuation system channel RC3 timer adjustments and restoration per 1303-4.11, HPI/LPI Logic and Analog Channel Test, Rev. 58 and WO R2186320 on October 21, 2011
- Installation and testing of alternate steam generator nozzle dams per ECR 11-00512 on October 27, 2011
- Replacement of the fuel bridge grapple and tested per 1303-11.4, Refueling System Interlock Tests, Rev. 49A on October 31, 2011

- Planned overhaul of 'A' decay heat removal pump and operations retest performed via OP-TM-212-213, DH-P-1A Refueling IST, Rev. 6 and WO R2155992 on November 7, 2011
- 1301-10.1, Reactor Vessel Internal Vent Valve Inspection and Exercise, Rev. 19, after issues with internal vent valve excessive hold-open force on November 3 through November 5, 2011
- OP-TM-220-555, Fill RCS From RCBT via Waste Transfer Pump, Rev. 4A (R2011927), as the post maintenance test after performing planned maintenance on safety-related check valve MU-V-107A on November 14, 2011

b. Findings

No findings were identified.

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

Planned Refueling Outage (1R19)

a. Inspection Scope

The inspectors reviewed the station's work schedule and outage risk plan for the Unit 1 maintenance and refueling outage (1R19), which was conducted October 24 through November 24, 2011. 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 secondary containment as required by TSs
- Refueling activities, including fuel handling and fuel receipt inspections
- Fatigue management
- Identification and resolution of problems related to refueling outage activities

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 6 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:

- IC-56.SP8A-DPT-2, Calibration of Heath Balance Instrument: SP8A-DPT-2, Rev. 0, on October 18, 2011
- ST 1303-11.3, Surveillance Testing and Set Main Steam Safety Valves, Rev. 34A, on October 17 and 18, 2011 (in-service test)
- ST 1303-4.13, Reactor Building Emergency Cooling and Isolation System Analog Test, Rev. 043, on October 17 and 18, 2011 (containment isolation valve)
- OP-TM-424-211, IST Close Test for EF-V-12A and EF-V-12B, Rev. 004, on October 26 and 27, 2011 (in-service test)
- OP-TM-642-232, ES Train B Emergency Sequence and Power Transfer Test, Rev. 004, on October 31, 2011
- OP-TM-220-251, RCS Leak Rate Determination, Rev. 9, on December 14, 2011 (RCS leak rate)

b. Findings

No findings were identified.

2. RADIATION SAFETY

Cornerstone: Occupational Radiation Safety

2RS01 Access Control to Radiologically Significant Areas (71124.01 - 1 sample)

a. Inspection Scope

The inspectors reviewed selected activities and associated documentation in the below listed areas. The evaluation of Exelon's performance was against criteria contained in 10 CFR Part 20, applicable TSs, and applicable station procedures. The inspectors also reviewed the results of recent radiation protection program audits and assessments and any reports of operational occurrences.

Radiological Hazard Assessment

The inspectors discussed plant operations during the current outage, as applicable, to identify any significant new radiological hazard for onsite workers or members of the public. The inspectors assessed the potential impact of the changes, as applicable, and the periodic monitoring, as appropriate, to detect and quantify the radiological hazard. The inspectors evaluated Exelon's evaluations of plant radioactivity source terms.

The inspectors toured the radiological controlled area and reviewed radiological surveys from selected plant areas (e.g., reactor building, auxiliary building, spent fuel pool area, and containment access area) to verify that the thoroughness and frequency of the surveys were appropriate for the given radiological hazard. The inspectors reviewed survey activities for loose surface contamination. The inspectors made independent radiation surveys to verify conditions during tours.

The inspectors selected radiologically risk-significant work activities that involve exposure to radiation to verify that that appropriate pre-work surveys were performed to identify and quantify the radiological hazard and to establish adequate protective measures and to determine if hazards were properly identified. The inspectors also selected air sample survey records to verify that samples were properly collected and counted. The inspectors observed work (e.g., steam generator work) to verify that air samples were representative of the breathing air zone.

Instructions to Workers

The inspectors toured the radiological controlled area and reviewed the labeling of radioactive material containers. The inspectors selectively reviewed occurrences where a worker's electronic dosimeter noticeably malfunctioned or alarmed. The inspectors verified workers responded properly and that the issue was included in the corrective action program, as applicable, for review and evaluation, as appropriate.

The inspectors selectively reviewed radiation work permits (RWPs) used to access high radiation areas (HRAs) to identify what work control instructions or control barriers have been specified. The inspectors verified that allowable stay times or permissible dose (including from the intake of radioactive material) for radiologically significant work under each RWP was appropriately identified. The inspectors verified that electronic personal dosimeter alarm set-points were appropriate for conditions.

The inspectors selectively reviewed and discussed air sample survey records (e.g., reactor building work to verify that samples were collected and counted in accordance with procedures).

Contamination and Radioactive Material Controls

The inspectors observed locations where the licensee monitors potentially contaminated material leaving the radiological controlled area and inspected the methods used for control, survey, and release from these areas. The inspectors observed the performance of personnel surveying and releasing material for unrestricted use to verify that the work was performed in accordance with plant procedures and the procedures were sufficient to prevent unintended release of radioactive materials. The inspectors

selectively verified that radiation monitoring instrumentation had appropriate sensitivity for the type(s) of radiation present.

The inspectors reviewed the criteria for the survey and release of potentially contaminated material. The inspectors verified that there was guidance on how to respond to an alarm that indicates the presence of licensed radioactive material.

The inspectors reviewed procedures and records to verify that the radiation detection instrumentation is used at its typical sensitivity level based on appropriate counting parameters (i.e., counting times and background radiation levels). The inspectors verified that the licensee did not establish a de facto "release limit" by altering the instrument's typical sensitivity through such methods as raising the energy discriminator level or locating the instrument in a high radiation background area.

Radiological Hazard Control and Work Coverage

The inspectors toured the facility and reviewed ongoing radiological work to evaluate ambient radiological conditions. The inspectors made independent radiation surveys to verify existing conditions were consistent with posted surveys and/or information provided by workers and radiological controls personnel.

The inspectors conducted job performance observations to verify the adequacy of radiological controls (e.g., required surveys, radiation protection job coverage, contamination controls). The inspectors evaluated the use of electronic personnel dosimeters in high noise areas as monitoring devices.

The inspectors selectively verified that dosimeters were placed on the individual's body consistent with the method that the licensee was employing to monitor dose from external radiation sources. The inspectors selectively reviewed dosimeter placement, in the location of highest expected dose, if employing an NRC-approved method of determining effective dose equivalent for external exposure. The inspectors reviewed dosimeter placement for work in significant dose rate gradients.

The inspectors selectively reviewed various RWPs for work within airborne radioactivity areas or areas with the potential for individual worker internal exposures to verify adequacy of monitoring and controls including evaluation of potential airborne transuranics or other hard-to-detect radionuclides.

The inspectors examined the licensee's physical and programmatic controls for highly activated or contaminated materials (nonfuel), as applicable, stored within spent fuel and other storage pools. The inspectors verified that appropriate controls (i.e., administrative and physical controls) are in place to preclude inadvertent removal of these materials from the pool.

The inspectors conducted selective inspection of posting and physical controls for HRAs and very high radiation areas (VHRAs), to the extent necessary to verify conformance with the Occupational Radiation Safety PI.

Risk-Significant High Radiation Area and Very High Radiation Area Controls

The inspectors discussed with the Radiation Protection Manager (RPM) the controls and procedures for high-risk HRAs and VHRAs, including any procedural changes since the last inspection and the methods employed by the licensee to provide stricter control of VHRA access. The inspectors verified that any changes made did not substantially reduce the effectiveness and level of worker protection. During plant tours, the inspectors verified access controls to such areas.

The inspectors discussed with first-line health physics (HP) supervisors the controls in place for special areas that have the potential to become VHRAs during certain plant operations. The inspectors selectively verified, as applicable, that controls for VHRAs, and areas with the potential to become a VHRA, were controlled to prevent unauthorized access.

Radiation Worker Performance

The inspectors observed and interviewed workers in the field during tours to evaluate general conformance with radiation protection procedures and practices, and general knowledge and understanding of ambient radiological conditions.

The inspectors reviewed radiological problem reports since the last inspection to identify the cause of the event to be human performance errors. The inspectors determined, as applicable, if there was an observable pattern traceable to a similar cause and if corrective action was appropriate.

Radiation Protection Technician Proficiency

The inspectors observed radiation protection personnel and discussed ongoing activities to evaluate general conformance with applicable radiation protection procedures and practices.

The inspectors reviewed radiological problem reports since the last inspection to identify the cause of the event to be radiation protection technician error. The inspectors determined if there was an observable pattern traceable to a similar cause and if corrective actions were appropriate.

Problem Identification and Resolution

The inspectors selectively verified through review of corrective action documents that problems associated with radiation monitoring and exposure control were being identified by the licensee at an appropriate threshold and were properly addressed for resolution in the licensee corrective action program. The inspectors also selectively evaluated the appropriateness of the corrective actions for a selected sample of problems documented.

b. Findings

No findings were identified.

2RS02 Occupational ALARA Planning and Controls (71124.02 – 1 sample)

a. Inspection Scope

The inspectors selectively reviewed site-specific procedures associated with maintaining occupational exposures ALARA.

Radiological Work Planning

The inspectors compared accrued results achieved (dose rate reductions, person-rem used), as available, with the intended dose established in the licensee's ALARA planning for these work activities, including person-hour estimates (e.g., in-service inspection, reactor disassembly and re-assembly, refueling, scaffolding work, reactor coolant pump work, and steam generator work). The inspectors determined the reasons for inconsistencies between intended and actual work activity doses, as accrued. The inspectors evaluated implementation of occupational exposure reduction measures (ALARA requirements) contained in 10 CFR 20.1101, "Radiation Protection Programs." The inspectors also reviewed post-job reviews to determine if identified ALARA problems were placed in the corrective action program.

Verification of Dose Estimates and Exposure Tracking Systems

The inspectors evaluated the licensee's methods of adjusting estimates or re-planning work, when unexpected change in scope or emergent work was encountered. The inspectors determined if adjustments to exposure estimates (intended dose) were based on sound radiation protection and ALARA principles. The inspectors reviewed station ALARA Committee reviews of on-going work.

Problem Identification and Resolution

The inspectors determined if problems associated with ALARA planning and controls were being identified by the licensee at an appropriate threshold and were properly addressed for resolution in the licensee corrective action program. The inspectors reviewed supplemental evaluations for identified concerns (e.g., root cause analyses). The inspectors discussed corrective actions for identified ALARA concerns.

b. Findings

Introduction: A Green self-revealing finding was identified because Exelon did not effectively manage and control reactor coolant let-down during reactor shutdown on October 24, 2011, for the 1R19, in order to maximize let-down flow and coolant radioactivity clean-up, and, thereby, minimize radiation dose rates for affected outage related work activities.

Description: During 1R19, Exelon experienced an expected 'crud' burst of radioactivity on October 25, 2011, within the reactor coolant system, as the reactor was being shutdown and cooled down for the start of the unit refueling and maintenance outage. This crud burst, as during previous outages, is managed and controlled by maximizing reactor coolant let-down and clean-up flow in order to: 1) maximize radioactivity clean-up and; 2) minimize ambient radiation occupational radiation dose rates for outage workers working near primary reactor systems (e.g., steam generators). The need to

effectively manage and control the let-down was particularly important for this outage since Exelon had replaced its Unit 1 steam generators the previous refueling outage and available industry operational experience indicated that reactor coolant systems experienced elevated post-shutdown radioactivity concentrations following the first outage after steam generator replacement.

On October 24, 2011, at about 12:23 p.m., Exelon began cool-down of the reactor coolant system and shutdown two of its reactor coolant pumps (RCPs). However, as the reactor was being shutdown and cooled-down, reactor coolant let-down flow decreased from an expected nominal flow of approximately 110 gallons per minute (gpm) to less than 40 gpm to a subsequent low flow rate of approximately 20 gpm. This reduction in flow and clean-up, over a period of approximately 20 hours, occurred when reactor coolant radioactivity concentrations were elevated resulting in radioactive crud (from fuel deposits) being deposited at much higher levels within the steam generators than previously encountered. This elevated radioactivity was preferentially deposited in the 'B' once through steam generator (OTSG) due to its having both reduced and reversed flow since its RCPs had been shutdown. Exelon personnel had recognized that coolant letdown-flow had decreased but no effective action was taken to restore letdown flow and maximize reactor coolant letdown until about 10:00 a.m. October 25, 2011, when it was realized that additional system valves could be opened, as provided in procedure guidance (1102-11 and OP-TM-211-441), to maintain letdown flow and maximize reactor coolant clean-up.

Exelon conducted a Root Cause Evaluation (RCE) of this issue and concluded that the reduced letdown flow-rate resulted in considerably less clean-up volume than had been experienced during the previous refueling outage. Exelon estimated a loss of effective reactor coolant clean-up volume of approximately 90,000 gallons resulting in an increase in reactor coolant particulate radioactivity of about a factor of 3.5. The radioactivity deposited within the OTSGs, particularly, the 'B' OTSG, was subsequently 'dragged' out of the steam generator by eddy current probes used to conduct non-destructive analysis of the steam generator tubes as steam generator eddy current work progressed. This resulted in significantly elevated contact radiation dose rates on steam generator eddy current components and specialty contamination filter systems for the probes. The elevated contamination levels caused increased ambient radiation dose rates for steam generator workers (e.g., platform workers) as well as increased ambient radiation dose rates for workers working near the steam generators and other locations.

Exelon's RCE of this issue identified a number of causes for this failure to implement effective clean-up of the elevated radioactivity concentrations (source term). Specifically, Exelon concluded that management did not monitor primary system cleanup effectiveness during cooldown. Other causes involved: 1) failure to effectively implement operational procedures for control and maximization of let-down flow during reactor shut-down and cool-down; 2) poor operational knowledge of augmented letdown flow methods at low RCS pressures; 3) ineffective procedure controls to ensure adequate RCS clean-up; and 4) failure of the Chemistry organization to implement appropriate control and indicators of RCS clean-up effectiveness. In addition, Exelon also identified a programmatic and organizational weakness involving failure to implement adequate barriers and controls to effectively manage potential source term changes associated with first cycle operation with new steam generators.

This issue resulted in additional collective occupational radiation exposure that Exelon could have reasonably avoided had sufficient attention been directed to effective management and control of reactor coolant let-down and source term control. Exelon estimated that the lack of adequate let-down control effectively resulted in an estimated additional 37 person-rem of occupational radiation exposure during its 2011 refueling and maintenance outage. In addition, the increased ambient radiation dose rates resulted in at least two RWPs exceeding their originally estimated work activity occupational radiation dose goals by 50 percent and also exceeding at least 5 person-rem each. Specifically, RWP Nos. 1-11-600/604, radiation protection and radioactive waste support, experienced an increase in occupational accrued dose from an estimated 1.2 person-rem to an actual accrued dose of approximately 8.2 rem due to elevated radiation dose rates and additional support needed to manage radiological conditions. RWP No. TM1-11-605, steam generator work activities, such as eddy current testing, tube repair activities and steam generator manipulations; experienced an increase in occupational radiation dose from an estimated 3.6 person-rem to an actual accrued dose of approximately 13.2 person-rem due to increases in radiation dose rates as well as efforts to manage source term impacts, such as filter changes for eddy current equipment. In addition, other radiation work permits accrued additional exposures due to the source term. These matters were placed in the corrective action program (IRs 1284066, 1286597).

Exelon identified the elevated contamination levels as a result of increased radiation contamination and contact radiation dose rates on test equipment during initiation of eddy current steam generator work activities, particularly non-destructive examination activities. Exelon promptly initiated various actions to mitigate potential occupational radiation doses associated with the increased radiation levels. These activities included suspension of work activities pending evaluation and implementation of mitigating activities, work rescheduling, enhanced supervisor and management oversight of work, establishment of an exposure reduction team for steam generator work, enhanced radiological controls oversight, modification of work practices, enhanced oversight by the Station ALARA Committee, increased shielding measures, enhanced ALARA planning, minimization of contamination levels via frequent filter change-outs for test equipment, and enhanced housekeeping activities. Exelon subsequently developed an action plan to provide for enhanced management of clean-up of the reactor coolant system to minimize elevated ambient radiation dose rates post-outage.

Analysis: The performance deficiency associated with this finding was that Exelon did not effectively manage and control the letdown-flow of reactor coolant during reactor shut down for the 2011 Unit 1 1R19 outage to maximize clean-up of reactor coolant radioactivity for purposes of occupational radiation dose minimization during the outage. The finding is that Exelon did not meet a performance standard to minimize occupational radiation exposure that was reasonably within Exelon's ability to foresee and prevent. This finding is not subject to traditional enforcement in that it was not willful and did not involve an actual violation because the Statements of Consideration for the ALARA rule (56 FR 23366; 10 CFR Part 20.1101) indicates that compliance with the ALARA requirement will be judged on whether the licensee has incorporated measures to track and, if necessary, to reduce exposures, and not whether exposures and doses represent an absolute minimum or whether the licensee has used all possible methods to reduce exposures. The finding is more than minor because it is associated with the IMC 0612 (Appendix B), Occupational Radiation Safety Cornerstone attribute of program and process (ALARA Planning), and it adversely affected the cornerstone objective of

ensuring the adequate protection of the worker health and safety from exposure to radiation from radioactive material during routine reactor operations. This finding is also similar to the more-than-minor example (6.i) provided in IMC 0612 (Appendix E) since it involved an actual collective exposure, for work activities, greater than five person-rem and exceeded the planned, intended dose by more than 50 percent. Using IMC 0609 (Appendix C), the finding was determined to have very low safety significance (Green) because the finding involved an ALARA planning issue and the three-year rolling average collective dose history was less than 135 person-rem for pressurized water reactors (approximately 93 person-rem average annual exposure for 2008-2010). The cause of the finding is related to the IMC 0310 cross-cutting area of Human Performance (H), Work Control component aspect [H.3(a)], because Exelon's management and control of reactor shutdown and cool down did not adequately incorporate effective measures to maximize letdown and reactor coolant clean-up in order to ensure occupational radiation exposures during the outage would be as low as reasonably achievable (ALARA). [H.3(a)]

Enforcement: No violation of regulatory requirements occurred. The Statements of Consideration for the ALARA rule (56 FR 23366; 10 CFR Part 20.1101) indicates that compliance with the ALARA requirement will be judged on whether the licensee has incorporated measures to track and, if necessary, to reduce exposures, and not whether exposures and doses represent an absolute minimum or whether the licensee has used all possible methods to reduce exposures. Since Exelon does have a defined ALARA program to track and reduce occupational exposure, and Exelon has entered this issue into its CAP (IR 1284066), this finding is not considered a violation of 10 CFR 20.1101(b). Because this finding does not involve a violation, has very low safety significance (Green), and was entered into Exelon's corrective action process as RCR/(IR) 1284066, is identified as a finding **(FIN 05000289 / 2011005-02, Inadequate Control of Reactor Coolant Letdown and Clean-up to Minimize Occupational Radiation Dose)**.

2RS03 In-Plant Airborne Radioactivity Control and Mitigation (71124.03 – 1 sample)

a. Inspection Scope

The inspectors reviewed the reported PIs to identify any related to unintended dose resulting from intakes of radioactive materials.

Use of Respiratory Protection Devices

The inspectors selectively verified that respiratory protection devices used to limit the intake of radioactive materials were certified by the National Institute for Occupational Safety and Health/Mine Safety and Health Administration or have been approved by the NRC per 10 CFR 20.1703(b) and were used properly.

Problem Identification and Resolution

The inspectors reviewed and discussed problems associated with the control and mitigation of in-plant airborne radioactivity to evaluate the licensee's identification and resolution in the corrective action program.

b. Findings

No findings were identified.

2RS04 Occupational Dose Assessment (71124.04 – 1 sample)

a. Inspection Scope

The inspectors reviewed the most recent National Voluntary Laboratory Accreditation Program accreditation report for the licensee dosimetry.

Problem Identification and Resolution

The inspectors selectively reviewed corrective action documents to verify that problems associated with occupational dose assessment were being identified by the licensee at an appropriate threshold and were properly addressed for resolution in the licensee corrective action program.

b. Findings

No findings were identified.

2RS05 Radiation Monitoring Instrumentation (71122.05 – 1 sample)

a. Inspection Scope

Calibration and Testing Program / Post-Accident Sampling and Monitoring

The inspectors selectively reviewed Exelon's capability to collect high-range, post-accident iodine effluent samples.

Whole Body Counter

The inspectors selectively reviewed methods and sources used to perform whole-body counter (WBC) functional checks before daily use of the instrument and the check source(s) relative to the stations isotopic mix. The inspectors reviewed WBC calibration reports completed since the last inspection to verify that calibration sources were representative of the plant source term and that appropriate calibration phantoms were used.

Personnel and Material Contamination Monitors

The inspectors selectively reviewed personnel contamination and materials monitors to verify that the alarm set-point values were reasonable under the circumstances to ensure that licensed material was not released from the site.

Portable Radiological Survey, Monitoring, and Sampling Instrumentation

The inspectors reviewed calibration documentation for various portable radiological survey, monitoring, and sampling instruments and discussed the calibration methods with the licensee to determine consistency with the manufacturer's recommendations,

adequacy, and capability. During station tours, the inspectors compared instrument readings with posted surveys to identify potential issues associated with calibration or response.

The inspectors discussed actions taken for portable instruments that did not meet acceptance criteria during calibration or source checks to verify that the licensee had evaluated the possible consequences of instrument use since the last successful calibration or source check.

Instrument Calibrator

The inspectors reviewed calibration of the licensee's onsite instrument calibrator to verify that the licensee periodically measures calibrator output over the range of the instruments used through measurements by ion chamber/electrometer (or equivalent measuring devices).

The inspectors verified that the measuring devices have been calibrated by a facility using appropriate traceable sources and that correction factors for these measuring devices were properly applied by the licensee in its output verification.

Problem Identification and Resolution

The inspectors selectively reviewed corrective action documents associated with radiation monitoring instrumentation to determine if the licensee identified issues at an appropriate threshold and placed the issues in the corrective action program for resolution. In addition, the inspectors evaluated the appropriateness of the corrective actions for a selected sample of problems documented by the licensee that involve radiation monitoring instrumentation.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151 – 8 samples total)

.1 Safety System Functional Failures (1 sample)

a. Inspection Scope

The inspectors sampled Exelon's submittals for the [MS 05] Safety System Functional Failures (SSFFs) performance indictor (PI) for TMI for the period of September 2010 through September 2011. To determine the accuracy of the PI data reported during those periods, inspectors used definitions and guidance contained in the Nuclear Energy Institute (NEI) Document 99-02, Regulatory Assessment Performance Indicator Guideline, Rev. 6, and NUREG-1022, Event Reporting Guidelines 10 CFR 50.72 and 10 CFR 50.57." The inspectors reviewed Exelon's operator narrative logs, operability assessments, event reports, and SSFF databases to validate the accuracy of the submittals.

b. Findings

No findings were identified.

.2 Mitigating Systems Performance Index (5 samples)

a. Inspection Scope

The inspectors reviewed Exelon's submittal of the Mitigating Systems Performance Index for the following systems for the period of September 2010 through September 2011:

- [MS 06] Emergency AC Power System (Emergency Diesel Generators)
- [MS 07] High Pressure Safety Injection System (Makeup)
- [MS 08] Emergency Feedwater System
- [MS 09] Decay Heat Removal
- [MS 10] Cooling Water Support Systems (Decay Closed, Decay River, Nuclear Closed, Nuclear River)

To determine the accuracy of the PI data reported during those periods, the inspectors used the definitions and guidance contained in NEI 99-02, Regulatory Assessment Performance Indicator Guideline, Rev. 6. The inspectors also reviewed selected station narrative logs, system health reports, maintenance rule databases, and Licensee Event Reports. The inspectors also reviewed selected calculation methods, definition of terms, use of clarifying notes, Consolidated Data Entry Mitigating Systems Performance Indicators (MSPI) Derivation Reports for unavailability and unreliability information, and corrective action program documents (IR 1281920, 1281901, 1143917). In addition, the inspectors reviewed the TMI MSPI basis documentation and the latest approved frequently asked questions.

b. Findings

No findings were identified.

.3 Occupational Exposure Control Effectiveness (1 sample)

a. Inspection Scope

The implementation of the Occupational Exposure Control Effectiveness PI Program was reviewed. The inspectors selectively reviewed corrective action program records for occurrences involving HRAs, VHRAs, and unplanned personnel radiation exposures since the last inspection in this area. The review was against the applicable criteria specified in NEI 99-02, Regulatory Assessment Performance Indicator Guideline, Rev. 6. The purpose of this review was to verify that occurrences that met NEI criteria were recognized and identified as PIs.

b. Findings

No findings were identified.

.4 RETS/ODCM Radiological Effluent Occurrences (1 sample)

a. Inspection Scope

The implementation of the Radiological Effluents Technical Specification/Offsite Dose Calculation Manual (RETS/ODCM) PIs was reviewed. The inspectors selectively reviewed corrective action program records and projected monthly and quarterly dose assessment results due to radioactive liquid and gaseous effluent releases for the past four complete quarters. The review was against the applicable criteria specified in NEI 99-02, Regulatory Assessment Performance Indicator Guideline, Rev. 6. The purpose of this review was to verify that occurrences that met NEI criteria were recognized and identified as Performance Indicators.

As part of this review, the inspectors also reviewed Exelon's evaluations and public dose assessments associated with identification of localized groundwater contamination.

b. Findings

No findings were identified.

4OA2 Identification and Resolution of Problems (71152 – 3 annual samples)

.1 Routine Review of Problem Identification and Resolution Activities

a. Inspection Scope

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

b. Findings

No findings were identified.

.2 Semi-Annual Trend (1 sample)

a. Inspection Scope

The inspectors performed a semi-annual review of site issues, as required by Inspection Procedure 71152, Problem Identification and Resolution, to identify trends that might indicate the existence of more significant safety issues. In this review, the inspectors included repetitive or closely-related issues that may have been documented by Exelon outside of the corrective action program, such as trend reports, performance indicators, major equipment problem lists, system health reports, maintenance rule assessments, and maintenance or corrective action program backlogs. The inspectors also reviewed Exelon's corrective action program database for the third and fourth quarters of 2011 to

assess issue / action reports written in various subject areas (equipment problems, human performance issues, etc.), as well as individual issues identified during the NRCs daily condition report review (Section 4OA2.1).

b. Findings and Observations

No findings were identified. The inspectors determined that challenges continue with issues regarding configuration control performance deficiencies since late 2011, notwithstanding previously implemented corrective actions. The number of configuration control related deficiencies has increased in the fourth quarter of 2011. No common cause was identified. Station management has taken action to enforce standards and have increased the number of in-field observations.

The inspectors discussed these issues with various station personnel, including station management. Station management acknowledged the issues, verified they were captured in the corrective action program, and continues to re-emphasize worker performance fundamentals. The inspectors determined these corrective actions were appropriate.

.3 Radiation Safety (71151, 71124.01, 71124.02, 71124.03, 71124.04, 71124.05)

a. Inspection Scope

The inspectors selectively reviewed corrective action documents to determine if identified problems were entered into the corrective action program for resolution and to evaluate Exelon's threshold for entering issues into the program. The review included a check of possible repetitive issues, such as radiation worker or radiation protection technician errors. Also selectively reviewed were recent audits and assessments, as appropriate and corrective action program documents.

The review was against the criteria contained in 10 CFR Part 20, TSs, and applicable station procedures.

b. Findings

No findings were identified.

.4 Annual Sample: External Flood Protection System (1 sample)

a. Inspection Scope

TMI Updated Final Safety Analysis Report (UFSAR) Section 2.6.4, "Flood Studies," stated that the Army Corp of Engineers (ACOE) had originally established the probable maximum flood (PMF) as a river flow rate of 1,083,000 cubic feet per second (cfs). In 1967, when the licensee submitted TMI's Preliminary Safety Analysis Report (PSAR), the site's flood protection features were based on a design basis PMF river flow rate of 1,100,000 cfs. Based on that design PMF, the predicted maximum river water level at the TMI water intake structure was 303 feet (ft). The design basis flood protection features were a system of dikes, with surface elevation of 309 ft. The dikes provided a freeboard of nominally 6 ft which protected the site from wind generated wave action for the design flood.

The UFSAR further stated that in 1969, the ACOE revised the PMF to 1,625,000 cfs, while the plant was still under construction. As a result, TMI committed that the plant would be provided with component protection to the degree which would assure a safe and orderly shutdown for the river water levels associated with a PMF of 1,625,000 cfs. Comprehensive studies, in part, based on water level contour maps, profiles of midstream points, the velocities of the water, and the curvatures of the river, predicted an on-site maximum water level of approximately 5 ft above ground level or a reference value of 310 ft, for a PMF of 1,625,000 cfs.

TMI's probabilistic risk assessment identified river flooding as a large contributor to overall plant risk. In 2010, to better quantify the flood risk, Exelon took the initiative to update the original licensing basis flooding analysis. In 2011, C-1101-122-E410-003, "River Stage Discharge and Discharge Frequency Analysis," concluded that although the frequency for severe flooding decreased, the predicted maximum flood height would be greater, by approximately 3.5 feet (i.e., a reference value of 313.5 ft). As a result Exelon initiated IR 01268247 to assess the site impact and take appropriate corrective actions.

The inspectors performed an in-depth review of Exelon's corrective actions associated with the TMI external flood re-analysis. The inspectors assessed Exelon's problem identification threshold, problem analysis, extent of condition reviews, compensatory actions, and the prioritization and timeliness of corrective actions to determine whether they were appropriately identifying, characterizing, and correcting problems associated with this issue and whether the planned or completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of Exelon's corrective action program and 10 CFR 50 Appendix B.

The inspectors reviewed Exelon's external flood protection strategy, basis documents, engineering evaluations and calculations, condition reports, modification packages, and associated operator and maintenance procedures, to assess the adequacy of flood protection features compared to the revised maximum flood height. The inspectors interviewed engineering and maintenance personnel to assess the effectiveness of the implemented corrective actions, the reasonableness of the planned corrective actions, and to evaluate the extent of any on-going flood protection issues.

The inspectors performed walkdowns of TMI's flood protection system, including physical flood barriers (e.g., penetration seals, door and hatch plates, etc.) and pre-staged mitigation equipment (e.g., portable pumps, electrical generators, hoses, cables, and fittings, etc.) to determine whether the required materials were adequate and properly staged, tested, and maintained, and to independently assess material conditions. The inspectors assessed the physical barriers and mitigating equipment to verify whether the capability and capacity was adequate to provide the degree of flood protection required for the revised maximum flood height. Documents reviewed are listed in the attachment to this report.

b. Findings and Observations

.1 Adequacy of the Seismic Gap Flood Seal

Introduction. A URI was identified because additional information is required to determine whether a performance deficiency exists regarding the configuration and

qualification of the hydrostatic seal (i.e., flood seal) in the seismic gap between the reactor building and adjacent buildings and structures. The inspectors will review the results of Exelon's evaluation after it is completed, which had not occurred by the end of this inspection period.

Description. UFSAR Section 2.6.5, "Design of Hydraulic Facilities," stated that a system of dikes protected the site against inundation and wave action for the site design flood of 1,100,000 cfs. It further stated that the licensee committed to provide component protection to the degree which would assure a safe and orderly shutdown for the level of flooding postulated by a PMF of 1,625,000 cfs. As a result of that commitment, several modifications were performed to provide component protection, including a modification to make portions of the seismic gap watertight because those portions of the gap would be directly exposed to standing water during a PMF event. The seismic gap was a three inch nominal gap that separated the reactor building from other adjacent buildings and structures (e.g., fuel handling building, turbine building, etc.).

As a result of the TMI external flood re-analysis, Exelon modified the TMI flood barrier system to accommodate the higher maximum flood height. Modification ECR TM 11-00426, Raise Level of External Flood Protection, also re-evaluated the adequacy of the seismic gap flood seal capability. ECR Attachment-17, Reactor Building Elev. 305 ft. Seismic Gap Flood Seal Evaluation, described the seismic gap as filled with Dow Corning 3-6548 silicone RTV foam (i.e., a medium density fire resistant penetration seal) to a nominal depth of two feet, but conservatively assumed a gap depth of 9 inches for the watertight assessment. In order to evaluate the capability of the existing seal to withstand a higher water pressure, Exelon used a friction coefficient derived from test results for a similar material. NPB-92, BISCO Seal Test Equivalency for Use in Conduit Sealing, Rev. 1, documented the test results for BISCO SF-20 foam (i.e., a low density fire resistant penetration seal), which had been performed to determine seal blowout resistance, not to verify or test the seal hydrostatic properties. The inspectors identified that the NPB-92 test results also documented seal water leakage, but the leakage rates were not quantified or evaluated.

In addition, drawing E-107-012 provided the seismic gap installation configuration details. The inspectors identified that the drawing details differed from the assumptions in ECR TM 11-00426, such that the inspectors could not independently determine the depth of the foam seal or the specific material in the gap based their review of design and installation records. Therefore, the inspectors were not able to independently verify that the seismic gap was of sufficient depth or proper material to ensure an adequate watertight seal, not only at the revised flood level, but at any flood level that challenges the seal.

During this inspection period, Exelon was not able to provide sufficient additional engineering or installation documentation to demonstrate the adequacy of the seismic gap to function as a hydrostatic flood seal. Therefore, the inspectors concluded that the adequacy of the seismic gap to provide the required flood protection was an issue requiring further NRC review to determine if TMI was in compliance with their licensing bases for flood protection. Exelon entered this issue into their corrective action program as IR 1276881. **(URI 05000289/2011005-03, Adequacy of Seismic Gap Flood Seal)**

.2 Flooding Impact from Wind Generated Wave Activity

Introduction A URI was identified because additional information is required to determine whether a performance deficiency exists regarding the adequacy of the flood barrier system to protect the site from the PMF with attendant wind generated wave activity. The inspectors will review the results of Exelon's evaluation after it is completed, which had not occurred by the end of this inspection period.

Description UFSAR Section 2.6.5, "Design of Hydraulic Facilities," stated that a system of dikes protected the site against inundation and wave action for the site design flood of 1,100,000 cfs. It further stated that the licensee committed to provide component protection to the degree which would assure a safe and orderly shutdown for the level of flooding postulated by a PMF of 1,625,000 cfs. Exelon stated that the 1969 licensing basis commitment was to protect the site from the resultant static water level, but not any wind generated wave activity, for a PMF of 1,625,000 cfs.

As a result of the TMI external flood re-analysis, Exelon modified the TMI flood barrier system to accommodate the higher maximum flood height. During site walkdowns, the inspectors observed that the modified design to the flood barrier systems, provided little additional margin for any attendant wind generated wave activity. The inspectors noted that for most site areas, the impact from wind generated waves would be minimal. However, the inspectors identified some components, such as the emergency diesel generators (EDG) could be susceptible. Specifically, the EDG day tank vent could be exposed to attendant wind generated wave activity. The result could be the potential introduction of water into the fuel oil system which could potentially result in a diesel engine failure. In addition, the EDG underground fuel oil storage tank has vent pipes that could be potentially impacted by floating water borne debris. During an external flood event, the EDGs were the credited power source because the off-site power switchyard would be unavailable due to the flooding.

The inspectors concluded that the adequacy of the flood barrier system to protect the site for a PMF including the attendant wind generated wave activity was an issue requiring further NRC review to determine if TMI is in compliance with the licensing bases for flood protection. Exelon entered this issue into their corrective action program as IR 1268247, Assignment 21. **(URI 05000289/2011005-04, Adequacy of Flood Protection without Consideration of Wind Generated Wave Activity)**

.5 Annual Sample: Maintenance Practices to Maintain Reliability of Aging Components, including Electrolytic Capacitors (1 sample)

a. Inspection Scope

Emergency diesel generator (EDG) EG-Y-1A was declared inoperable in 2010 and again in 2011 due to two separate degraded material conditions. Evaluation of the 2010 excessive fuel oil leakage (IR 1064102) was inconclusive; however, engineers determined the most likely cause was clogged fuel injector drain lines. Engineers determined the 2011 EDG air start compressor failure (IR 1211448) was due to a sticking oil pressure control valve. Both failures were believed to result from gradual buildup of oil residue over a long time period. Corrective action for both issues involved establishing new preventive maintenance (PM) tasks to periodically clean the components. Additionally, Exelon identified that EG-Y-1B had three Agastat timing

relays which were beyond their vendor recommended service life and required replacement (IRs 1096946 and 1128613). The inspectors reviewed records, interviewed station personnel, and performed plant walkdowns to verify appropriate corrective actions were implemented in a timely manner.

In 2010 age-related electrolytic capacitor failures caused events at several nuclear power plants. In 2010, the inspectors reviewed TMI maintenance and storage practices for safety-related components containing electrolytic capacitors. The inspectors noted that performance centered maintenance (PCM) templates maintained by engineers specified that electrolytic capacitors in storage be energized and reformed at five year intervals. This differed from warehouse maintenance procedures which specified a 10 year interval. Station personnel initiated IR 1096928 to evaluate the apparent conflict between procedures. The inspectors selected this issue to verify associated station procedures were correct and verify electrolytic capacitors were properly maintained to support reliable equipment operation.

The inspectors independently reviewed resolution of IR 1096928, PCM templates for safety-related components containing electrolytic capacitors, warehouse operations procedures, shelf-life procedures, warehouse storage procedures, selected shelf-life extension evaluations covering the period January 2010 to November 2011, issue reports associated with equipment failures from 2010-2011, vendor manuals, and various industry guidelines for maintenance and testing of electrolytic capacitors. Additionally, the inspectors interviewed station personnel and performed plant walkdowns to verify maintenance and storage of components containing electrolytic capacitors was appropriate.

The inspectors assessed Exelon's problem identification threshold, cause analyses, extent-of-condition reviews, compensatory actions, and the prioritization and timeliness of corrective actions to determine whether Exelon was appropriately identifying, characterizing, and correcting problems associated with the above issues and whether planned or completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of Exelon's corrective action program and 10 CFR Part 50, Appendix B.

b. Findings and Observations

No findings were identified.

The inspectors determined corrective actions and extent-of-condition evaluations for the EDG related issues described above were properly implemented in a timely manner. Both immediate corrective actions and changes to the PM programs were appropriate.

The inspectors determined electrolytic capacitors stored at TMI were properly maintained in a manner consistent with vendor and industry guidance. Procurement and warehouse personnel were familiar with associated warehouse operations procedures and industry standards. Storage extensions beyond the original approved shelf life were infrequent. In each case reviewed, the shelf life extension evaluation was technically sound and the electrolytic capacitors were reformed, consistent with manufacturer recommendations, to extend shelf life when warranted.

Although electrolytic capacitors were properly maintained, the inspectors determined that IR 1096928 was improperly closed without resolving the discrepancy between PCM templates and the associated warehouse Shelf Life and In-Storage Maintenance procedures. Separate assignments within the IR reached differing conclusions regarding whether the PCM templates were correct, required revision, or whether they were intended to apply to components which were in storage. Each assignment was closed with no action take to resolve the differing conclusions. The inspectors discussed the inadequate IR closure with station personnel who initiated IR 1305973 to re-open and resolve the issue. The inspectors determined this issue was minor because it did not affect equipment operability or functionality. In accordance with NRC IMC 0612, Power Reactor Inspection Reports, this issue constituted a violation of minor significance that is not subject to enforcement action in accordance with the Enforcement Policy.

The inspectors identified the following additional issues related to warehouse storage conditions. Procedure SM-AA-102, Warehouse Operations, Rev. 17, requires Class A material storage to meet requirements including ".... temperature and humidity control within specified limits ...." Although Class A storage area temperature and humidity are recorded, Exelon did not implement controls or specify limits for temperature or humidity. Additionally, the inspectors observed the Class A storage area recorder indicated zero percent humidity. Although the indicated humidity level did not meet vendor requirements for storage of some of the components contained in the Class A storage, station personnel had not identified or investigated the issue. The room did not feel excessively dry and the inspectors concluded the recorder was most likely defective. The inspectors also reviewed temperature and humidity records for Class A and B storage areas for January 2011 through the end of this inspection period. The inspectors inspected numerous components within Class A storage, including components containing elastomer material, and all appeared in good material condition. The inspectors discussed these issues with station personnel, who entered these issues into the corrective action program (IR 1304640 and 1304644) for evaluation and associated corrective action. The inspectors determined the above issues were minor because they did not affect equipment operability or functionality. In accordance with NRC 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.

4OA3 Event Follow-up (71153 – 1 sample)

.1 Plant Events

a. Inspection Scope

For the plant event 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 Parts 50.72 and 50.73. The inspectors performed independent walkdowns and reviewed Exelon's follow-up actions related to the event to assure that Exelon implemented appropriate corrective actions commensurate with their safety significance.

- New River Analysis Indicates Level Above Existing UFSAR Flood Analysis, EN # 47294, September 26

b. Findings

Introduction: An NRC-identified NCV of very low safety significance of 10 CFR 50, Appendix B, Criterion XVI, Corrective Actions, was identified because Exelon did not identify and correct a condition adverse to quality regarding the impact of a revised river stage discharge analysis result on TSs. Specifically, Exelon did not recognize that the revised river discharge analysis resulted in a lower flow-based river shutdown level, resulting in a non-conservative TS.

Description: Exelon revised TMI's river stage discharge analysis on account of the significant input external flooding events have on their core damage frequency. The design basis and licensing basis is based on Susquehanna River flow, which the analysis also uses as an input and then derives a corresponding river level. Specifically, the river stage discharge analysis uses an input of flow in cubic feet per second (cfs) as measured in Harrisburg, Pa and converts the flow into an elevation at the intake screen and pump house (ISPH) at TMI. The licensing basis uses a maximum flow of 1,625,000 cfs which previously correlated to an elevation of 310' at the ISPH. TS 3.14.2 states a river level when TMI is to be shutdown and placed in hot standby. This level is based in a corresponding river flow of 1,000,000 cfs. This flow previously corresponded to 302'.

> TMI-1 TS 3.14.2, Amendment 157, "*If the river stage reaches elevation 302 feet at the River Water Intake Structure [aka ISPH], corresponding to 1,000,000 cfs river flow, the unit will be brought to the hot standby condition.*"

The original plant design river stage discharge detailed analysis was unable to be identified in historical records and a new analysis was performed using current methodology. On September 26, 2011, Exelon completed the revised analysis and concluded that the licensing basis flow of 1,625,000 cfs would correlate to a probable maximum flood (PMF) water level at the intake of 313.3'. The new level for a corresponding flow of 1,000,000 cfs is 299.8'.

Exelon performed a review for impact of applicable regulatory and site specific procedures. Specifically, Exelon reviewed TSs and failed to identify that the new river discharge analysis necessitated a lower shutdown elevation during an external flooding event.

Since the licensing basis of TMI relies on river flow and derives a river elevation, the inspectors noted that the technical specification elevation needed to be based upon the river height at 1,000,000 cfs. Therefore, based upon the revised analysis, a river flow of 1,000,000 cfs corresponds to a lower elevation of 299.8'. As a result, Exelon entered the issue into their corrective action program (IR 1272726) and implemented actions commensurate to guidance in NRC Administrative Letter AL 98-10 to address non-conservative TSs.

The inspectors noted the revised PMF resulted in an increase of 3.3' from the current Final Safety Analysis Report (FSAR) value of 310'. Based upon analysis results, Exelon had previously completed modifications to the flood barrier system to mitigate external flooding effects to 313.5'.

Analysis: The inspectors determined there was a performance deficiency because Exelon personnel did not promptly identify and correct a condition adverse to quality regarding the non-conservative TS 3.14.2. The inspectors determined the finding is more than minor because the finding is associated with the protection against external factors attribute of the initiating event cornerstone to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, Exelon personnel did not promptly identify and correct the non-conservative TS, 3.14.2, such that a timely plant shutdown would be initiated to ensure plant stability and not challenge critical safety functions. The inspectors evaluated the finding in accordance with IMC 0609, Attachment 4, Phase 1 – Initial Screening and Characterization of Findings, and determined it was of very low safety significance (Green) because the issue did not increase the likelihood of a fire or internal/external flood event.

This finding has a cross-cutting aspect in the area of Problem Identification and Resolution, Corrective Action Program, because Exelon failed to identify issues completely, accurately and in a timely manner commensurate with their safety significance. Specifically, Exelon failed to identify the non-conservative TS in a timely manner [P1(a)].

Enforcement: 10 CFR 50, Appendix B, Criterion XVI, Corrective Action, requires in part, that measures be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances are promptly identified and corrected. Contrary to the above, Exelon failed to identify that TS 3.14.2 was non-conservative based upon the revised river stage discharge analysis results. Because this violation was of very low safety significance and was entered into Exelon's corrective action program, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy. **(NCV 05000289/2011005-05, Failure to Identify a Non-Conservative Technical Specification following Revision to River Stage Discharge Analysis)**

4OA5 Other Activities

.1 Institute of Nuclear Power Operations (INPO) Report Review

a. Inspection Scope

The inspectors reviewed the final report for the INPO plant assessment of Three Mile Island Nuclear Station conducted in April 2011. The inspectors reviewed this report to ensure that any issues identified were consistent with NRC perspectives of Exelon performance and to determine if INPO identified any significant safety issues that require NRC follow-up.

b. Findings

No findings were identified.

.2 NRC Review of Exelon's Response to Non-Cited Violation EA-11-128 (92702)

a. Inspection Scope

On September 12, 2011, the NRC transmitted a Non-Cited Violation (NCV) and a Green finding to Exelon related to a change Exelon made to the emergency action level (EAL) basis for EAL HU6, which introduced a decrease in effectiveness to TMI's Emergency Plan and resulted in a violation of the requirements stipulated in 10 CFR 50.54(q). Specifically, the licensee modified the EAL Basis in EAL HU6, Rev.10, which extended the start of the 15-minute emergency classification clock beyond a credible notification that a fire is occurring or indication of a valid fire detection system alarm. This change decreased the effectiveness of the Emergency Plan by reducing the capability to perform a risk significant planning function in a timely manner. The NCV and finding were described in detail in NRC Inspection Report No. 05000289/2011503.

In response to the NCV and finding, Exelon entered the issue into their corrective action program as IR 01184333 and subsequently implemented Rev. 17 of the TMI Emergency Plan, which restored the EAL HU6 Basis to the Rev. 9 guidance, thereby removing the decrease in effectiveness. The inspectors reviewed IR 01184333 and the revised version of the HU6 Basis, and discussed the corrective actions with the TMI Emergency Preparedness staff.

b. Findings

No findings were identified. The inspectors determined that Exelon's response and corrective actions were reasonable and appropriate to address the NCV and finding, and their underlying performance deficiency. The NRC considers this issue closed.

4OA6 Meetings, Including Exit

1. In-service Inspection Activities (71111.08)
The results of this inspection were discussed with Mr. Glenn Chick, Three Mile Island Site Vice President, and other members of Exelon's staff on December 1, 2011 and January 10, 2012. The licensee acknowledged the results presented.

2. Radiological Inspection Activities (71151, 71124.01 - .05)
The results of these inspections were discussed with Mr. Rick Libra, TMI Plant Manager, and other members of Exelon's staff on November 4, 2011, December 1, 2011, and January 13, 2012. The licensee acknowledged the results presented.

3. PI&R Focus Sample – External Flood Protection System
The results of this inspection were discussed with Mr. John Piazza, TMI Senior Manager, Design Engineering, on October 14, 2011 and other members of Exelon's staff. The licensee acknowledged the results presented.

4. PI&R Focus Sample – Maintenance Practices to Maintain Reliability of Aging Components, including Electrolytic Capacitors
The results of this inspection were discussed with Ms. Jennifer Lytle, TMI Manager, Electrical Systems Engineering, and other Exelon staff at the conclusion of the inspection.

5. Quarterly Inspection Report Exit

On January 27, 2012, the inspectors presented the inspection results to Mr. Rick Libra, Site Vice President, Three Mile Island, and other members of the Three Mile Island 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

D. Atherholt	Manager, Regulatory Assurance
D. Auch	Procurement Engineer
P. Bennett	Manager, Design Engineering - Mechanical
M. Benson	TMI Boric Acid Corrosion Control Program Manager
G. Chick	Site Vice President
J. Cavanaugh	System Engineer
D. DiVittore,	Radiation Protection Manager
J. Dullinger	Operations Manager
M. Fitzwater	Senior Regulatory Assurance Engineer
R. Freeman	Chemist
R. Green	TMI Buried Piping Program Manager
M. Hardy	System Engineer-Flood Protection
J. Hawkins	Exelon, NDE Level III
L. Ibbs	Supervisor, Welding Services
C. Incorvati	Director, Maintenance
J. Karkoska	Manager, Site Security
M. Kersey	Risk Management Engineer
M. Krause	Component Monitoring Engineer
R. Libra	Plant Manager
J. Lytle	Manager, Electrical Systems Engineering
H. Malikowski	Exelon Engineering
R. Masoero	System Engineer-Inservice Testing Program Owner
M. McAllister	Exelon, NDE Level III
G. McCarth	Manager, Radiation Protection Technical Support
W. McSorley	Procedures and Flood Protection
A. Miller	Licensing Engineer
G. Navratil	TMI ISI Program Manager
D. Neff	Manager, Emergency Preparedness
S. Nowak	Component Monitoring Organization Specialist-Instrumentation & Control
T. Orth	Manager, Chemistry
J. Piazza	Senior Manager, Design Engineering
S. Queen	Exelon Corporate Director of Programs
M. Reed	System Engineer
D. Reese	TMI Reactor Coolant System Engineer
F. Reeser	System Engineer
C. Robles	System Engineer
W. Schucker	Procurement Supervisor
P. Steiner	Assistant Maintenance Director
M. Torborg	TMI Steam Generator Engineer
L. Weber	Chemist
S. Wilkerson	Manager, Design Engineering-Electrical and Instrumentation & Control
M. Willenbecher	Supervisor, Planning
G. Wright	Senior Work-Week Manager
M. Wyatt	Manager, Training Support
B. Young	Manager, Instrumentation and Control Department

A. Zemantis	System Engineer, Radiation Monitors

Other

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

LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATED

Opened/Closed

05000289/2011005-02	FIN	Inadequate Control of Reactor Coolant Let-down And Clean-up to Minimize Outage Occupational Radiation Dose (Section 2RS02)
05000289/2011005-05	NCV	Failure to Identify a Non-Conservative Technical Specification following Revision to River Stage Discharge Analysis (Section 4OA3.1)

Opened

05000289/2011005-01	URI	Inspect and Disposition Leakage Event from B RCP Flange from 1R19 (Section 1R08)
05000289/2011005-03	URI	Adequacy of Seismic Gap Flood Seal (Section 4OA2.4.b.1)
05000289/2011005-04	URI	Adequacy of Flood Protection without Consideration of Wind Generated Wave Activity (Section 4OA2.4.b.2)

Closed

05000289/2011503-01	NCV	(Traditional Enforcement) Changes to EAL Basis Decreased the Effectiveness of the Plan without Prior NRC Approval (4OA5.2)
05000289/2011503-02	FIN	Changes to EAL Basis Decreased the Effectiveness of the Plan without Prior NRC Approval (4OA5.2)

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather

Procedures
MA-TM-1003, Snow and Ice Removal Plan – TMI, Rev. 2

Other
System Health Report, Electrical Heat Tracing System, 9/20/11
TMI 2010/2011 Winter Readiness Critique
IRs: 740219 1267640 1267818 1267820 1267920

Section 1R04: Equipment Alignment

Procedures
1104-15D, Fuel Handling E.S.F. Ventilation System, Rev. 22A
1302-17.7, RM-A-14 Radiation Monitor and Sampler Flow Instrumentation Channel Calibration, Rev. 15
1303-5.15, Fuel Handling Building ESF Air Treatment System Operation Test, Rev. 19
1430-Y-22, Gas Flowmeter Maintenance/Calibration, Rev. 14
IC-17, Pressure Gauge Calibration, Rev. 11
OP-TM-212-000, Decay Heat Removal System, Rev. 15
OP-TM-424-271, Standby Lineupand Flow Path Verification Check of EFW System, Rev. 7
OP-TM-534-000, Reactor Building Emergency Cooling Water System, Rev. 1
OP-TM-534-271, Reactor Building Emergency Cooling Water ES Standby Mode Lineup Verification, Rev. 0

Drawings
302-611, Reactor Building Normal and Emergency Cooling Water System, Rev. 13
302-640, Decay Heat Removal Flow Diagram, Rev. 83
302-833, ESF Ventilation System 'A', Sheet 1, Rev. 5
302-833, ESF Ventilation System 'B', Sheet 1, Rev. 3

Other
IRs: 520199 956634 1262375 1262377 1277211
1277324 1279840 1280233 1285990 1286053

Section 1R05: Fire Protection

Procedures
1303-12.13, Fire System Testing Flush at 2" Drains – Deluge/Sprinkler Systems, Rev. 31
1303-12.14, Fire Protection Instrument Non-Supervised Circuits Test, Rev. 24

Drawings
302-231, Fire Service Water Flow Diagram – Yard Header and Out Bldgs End Users, Rev. 107

Other
Three Mile Island Nuclear Station Pre-Fire Plan #75
IR 1306491
WO M2290772

Section 1R08: Inservice Inspection

IRs

188281	1004057	1251457	1287012
391055	1008424	1283151	1287012
690418	1014587	1283157	1287165
976202	1017122	1283221	1287166
983613	1022581	1283310	1287475
988341	1024336	1283310	1287665
989092	1025223	1284050	1288163
989737	1031716	1284050	1288165
989754	1031767	1284066	1288288
989951	1041553	1284342	1288423
990641	1061491	1284342	1288656
990641	1066725	1284840	1288952
991068	1066728	1286116	1289836
991611	1086174	1286140	1289895
992274	1089254	1286142	1287289*
992497	1089723	1286177	1288964*
997631	1107440	1286381	1288964*
997799	1110906	1286513	1288988*
998789	1142328	1286776	1288988*
998789	1187808	1286903	1290718*
1002034	1211376	1286911	1293999*

**Denotes this issue report was generated as a result of this inspection*

Section XI Repair/Replacement Samples

ECR: TM-10-00309 000, Design Change Package(DCP): Perform Weld Overlay On Pressurizer Spray Nozzle

Drawings & Sketches

AREVA drawing 5056279F, Rev. 006; TMI EOTSG INTERNALS ASSEMBLY

Sketch - TMI High Risk Buried Pipes

Dwg. E-521-030, Rev. 10, 4192; Metropolitan Edison Company, Three Mile Island Nuclear Station, Unit 1; Reactor Building, Steel Liner

Dwg. TMI-1-0013, Rev. 0; IWE Component Rollout, Inside Containment Liner, Looking Up At Inside Of Dome

Dwg. TMI-1-0011, Rev.1; IWE Component Rollout Inside Containment Liner, Looking Out 0 degrees to 180 degree Azimuth

Engineering Evaluations, Analyses, Calculations & Standards

Areva Document 51-9106505-000, Confirm Size for CRDM Blind Flange Recess, 9/30/08

Areva Engineering Information Record, Document 51-9115105-001, Corrosion Evaluation of TMI-1 Replacement APSR CRDM with Blind Flange, 9/30/08

Cause Determination, Reactor Coolant Pump 1C Main Flange Leakage (13R), Report #: 990-2580, 10/26/99

Engineering Technical Evaluation 1284342-03 (BACC Evaluation of RC-P-1B Flange Leak

Engineering Technical Evaluation A2237152-01, Evaluation of IR 990641

Engineering Technical Evaluation: 1284342-03, Structural Integrity of RCP-B Main Flange Adverse Condition Monitoring and Contingency Plan, RCP-B Main Flange Monitoring,

11/12/11; Parameter: Potential RC-P-1B leakage at or near the pump main flange; IR#: 1284342, WR#: A2289543, OP EVAL#: NA
GPUN, TDR No. 946, TMI-1 Evaluation of Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components, 12/29/88
ODM: RC-P-1B Pump Main Flange, IR#: 1284342, Date: 11/12/11

Weld Records and Weld Process Guidance
WPS-08-08-T-001 – Buffer SS, 6/20/07
WPS-08-43-T-001 – Bridge SS, 3/27/08
WPS-01-08-T-804 – Bridge SS, 3/28/08
Code Case N-504-3, Alternative Rules for Repair of Class 1, 2 and 3 Austenetic Stainless Steel Piping, Section XI, Division 1
Code Case N-638-1, Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW Temper Bead Technique, Section XI, Division 1

Evaluation/Screening of Boric Acid Leakage
BACC Evaluation for IR1260538/AR2232453 (3/9/09)
BACC Evaluation for IR1215462 (5/27/11)
BACC Evaluation for IR1225334 (6/23/11)
BACC Evaluation for IR1232028 (7/21/11)
BACC Evaluation for IR1233020 (7/21/11)
BACC Evaluation for IR1233013 (7/21/11)
BACC Evaluation for IR1235970 (7/26/11)
BACC Evaluation for IR1247572 (8/22/11)
BACC Evaluation for IR1190306 (8/24/11)
BACC Evaluation for IR12475577 (8/29/11)
Engineering Technical Evaluation 1284342-03 (BACC Evaluation of RC-P-1B Flange Leak)

System & Program Health Reports & Self-Assessments
Three Mile Island Unit 1, 2011 Inservice Inspection Focused Area Self Assessment, Assignment 1051147-03

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OP-TM-122-928, RCS Inventory and Pressure Control using SFMS, Rev. 0
OP-TM-122-951, Unit 2 Flood Protection Actions, Rev. 0
OP-TM-AOP-002, Flood, Rev. 4

Issue Reports
1268247
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1276881*
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**Denotes this issue report was generated as a result of this inspection*

Miscellaneous
NRC Event Notification 47294, TMI New River Hydraulic Analysis Raises Maximum Flood Level, dated 9-26-11

NRC Information Notice (IN) 2005-03, Inadequate Design and Installation of Seismic-Gap Fire Barriers, dated 2-10-05
NRC IN 2007-01, Recent Operating Experience Concerning Hydrostatic Barriers, dated 1-31-07
NRC Regulatory Guide (RG) 1.59, Design Basis Floods, Rev. 2
NRC RG 1.102, Flood Protection, Rev. 1
NUREG-800 Section 2.4.10, Standard Review Plan - Flooding Protection Requirements, Rev. 3
TMI IPEEE, Section 5.2, Floods
UFSAR Section 2.6.4, Flood Studies, Rev. 20

Section 4OA5: Other Activities

EP-AA-1009; Radiological Emergency Plan Annex for Three Mile Island Station; Revs. 10 and 17

IR 01184333; EP Notice of Violation for EAL Change-Implement EAL Basis Change for HU6; March 7, 2011

LIST OF ACRONYMS

ACOE	Army Corp of Engineers
ADAMS	Agencywide Documents and Management System
ALARA	As Low As Reasonably Achievable
APSR	Axial Power Shaping Rods
ASME	American Society of Mechanical Engineers
BAC	Boric Acid Corrosion
BACC	Boric Acid Corrosion Control Program
CAP	Corrective Action Program
CFR	Code of Federal Regulations
cfs	Cubic Feet per Second
CR	Condition Reports
CRD	Control Rod Drive
DCP	Design Change Package
DRP	Division of Reactor Projects
EAL	Emergency Action Level
ECCS	Emergency Core Cooling System
ECR	Engineering Change Request
EDG	Emergency Diesel Generator
EFW	Emergency Feedwater
Elev.	Elevation
EOTSG	Enhanced Once Through Steam Generator
EPRI	Electric Power Research institute
ER	Engineering Request
ESAS	Engineered Safeguards Actuation System
FIN	Finding
FSAR	Final Safety Analysis Report
HRA	High Radiation Area
HSD	Hot Shutdown
INPO	Institute of Nuclear Power Operations
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IR	Issue Report
IST	In-service Testing
JITT	Just-In-Time Training
MT	Magnetic Particle Testing
MSPI	Mitigating Systems Performance Indicators
NCV	Non-cited Violation
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
NDE	Nondestructive Examination
ODCM	Offsite Dose Calculation Manual
OTSG	Once Through Steam Generator
PADEP	Pennsylvania Department of Environmental Protection
PARS	Publicly Available Records
PCM	Personnel Contamination Monitors (Section 2RS01-05) -or- Performance Centered Maintenance (Section 4OA2.4)
PD	Performance Deficiency
PDI	Performance Demonstration Initiative
PI	Performance Indicator

PI&R	Problem Identification and Resolution
PM	Preventive Maintenance
PMF	Probable Maximum Flood
PMT	Post Maintenance Testing
PSAR	Preliminary Safety Analysis Report
PT	Dye Penetrant Testing
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RETS	Radiological Effluents Technical Specification
RS	Radiation Safety
RT	Radiographic Test (Radiography)
RPM	Radiation Protection Manager
RPS	Reactor Protection System
RVCH	Reactor Vessel Closure Head
RWP	Radiation Work Permit
SDP	Significance Determination Process
SE	Safety Evaluation
SG	Steam Generator
SSC	Structures, Systems, and Components
SSFF	Safety System Functional Failure
TDR	Technical Document Report
TMI	Three Mile Island, Unit 1
TS	Technical Specifications
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
UT	Ultrasonic Testing/Examination
VHRA	Very High Radiation Area
VT	Visual Examination
WBC	Whole Body Counter
WO	Work Order
WPS	Weld Procedure Specification