



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

October 28, 2013

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 05000289/2013004

Dear Mr. Pacilio:

On September 30, 2013, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Three Mile Island, Unit 1 (TMI) facility. The enclosed inspection report documents the inspection results, which were discussed on October 18, 2013 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.

Based on the results of this inspection, no findings were identified.

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 the 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).

Sincerely,

/RA/

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

Docket Nos.: 50-289
License Nos.: DPR-50

Enclosure: Inspection Report 05000289/2013004
w/Attachment: Supplemental Information

cc w/encl: Distribution via ListServ

Mr. Michael 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 05000289/2013004

Dear Mr. Pacilio:

On September 30, 2013, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Three Mile Island, Unit 1 (TMI) facility. The enclosed inspection report documents the inspection results, which were discussed on October 18, 2013 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.

Based on the results of this inspection, no findings were identified.

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 the 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).

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

Docket Nos.: 50-289
 License Nos.: DPR-50

Enclosure: Inspection Report 05000289/2013004
 w/Attachment: Supplemental Information

cc w/encl: Distribution via ListServ

Distribution w/encl:

W. Dean, RA
 D. Lew, DRA
 D. Roberts, DRP
 M. Scott, DRP
 R. Lorson, DRS
 J. Trapp, DRS)

G. Hunegs, DRP
 B. Bickett, DRP
 T. Setzer, DRP
 A. Dugandzic, DRP
 G. Stock, DRP

D. Werkheiser, DRP, SRI
 J. Heinly, DRP, RI
 A. Diaz, DRP, OA
 D. Rich, RI OEDO
 RidsNrrPMThreeMileIsland Res
 RidsNrrDorLp1-2 Resource
 ROPReports Resource

Document Name: G:\DRP\BRANCH6\+++Three Mile Island\TMI Inspection Reports\TMI_Report_IR2013-004 rev 1.docx
ADAMS ACCESSION NUMBER: ML13301A503

| | | | | | |
|--|--------------------|---|--------------|---|--|
| <input checked="" type="checkbox"/> SUNSI Review | | <input checked="" type="checkbox"/> Non-Sensitive <input type="checkbox"/> Sensitive | | <input checked="" type="checkbox"/> Publicly Available <input type="checkbox"/> Non-Publicly Available | |
| OFFICE | RI/DRP | RI/DRP | RI/DRP | RI/DRP | |
| NAME | DWerkheiser/BB for | TSetzer/BB for | BBickett/ BB | GHunegs/GKH | |
| DATE | 10/22/13 | 10/22/13 | 10/25/13 | 10/28/13 | |

OFFICIAL RECORD COPY

Enclosure

U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No: 50-289

License No: DPR-50

Report No: 05000289/2013004

Licensee: Exelon Generation Company

Facility: Three Mile Island Station, Unit 1

Location: Middletown, PA 17057

Dates: July 1 through September 30, 2013

Inspectors: D. Werkheiser, Senior Resident Inspector, Division of Reactor Projects (DRP)
J. Heinly, Resident Inspector, DRP
T. Setzer, Senior Resident Inspector (Acting), DRP
T. O'Hara, Reactor Inspector, Division of Reactor Safety (DRS)
T. Moslak, Health Physicist, DRS
S. Pindale, Senior Reactor Inspector, DRS

Approved by: G. Hunegs, Chief
Reactor Projects Branch 6
Division of Reactor Projects

TABLE OF CONTENTS

| | |
|--|------|
| 1. REACTOR SAFETY | 4 |
| 1R01 Adverse Weather Protection..... | 4 |
| 1R04 Equipment Alignment | 4 |
| 1R05 Fire Protection | 5 |
| 1R06 Flood Protection Measures..... | 5 |
| 1R07 Heat Sink Performance | 6 |
| 1R11 Licensed Operator Requalification Program | 9 |
| 1R12 Maintenance Effectiveness..... | 10 |
| 1R13 Maintenance Risk Assessments and Emergent Work Control | 10 |
| 1R15 Operability Determinations and Functionality Assessments..... | 11 |
| 1R19 Post-Maintenance Testing..... | 12 |
| 1R22 Surveillance Testing | 12 |
| 1EP4 Emergency Action Level and Emergency Plan Changes | 13 |
| 2. RADIATION SAFETY..... | 13 |
| 2RS2 Occupational ALARA Planning and Controls | 13 |
| 2RS5 Radiation Monitoring Instrumentation | 14 |
| 2RS6 Radioactive Gaseous and Liquid Effluent Treatment | 15 |
| 4. OTHER ACTIVITIES..... | 17 |
| 4OA1 Performance Indicator Verification..... | 17 |
| 4OA2 Problem Identification and Resolution | 18 |
| 4OA6 Meetings, Including Exit..... | 20 |
| ATTACHMENT: SUPPLEMENTARY INFORMATION..... | 20 |
| SUPPLEMENTARY INFORMATION..... | A-1 |
| KEY POINTS OF CONTACT | A-1 |
| LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATED | A-2 |
| LIST OF DOCUMENTS REVIEWED..... | A-2 |
| LIST OF ACRONYMS..... | A-12 |

SUMMARY

IR 05000289/2013004, 07/01/2013 - 09/30/2013; Three Mile Island, Unit 1, Integrated Inspection Report.

This report covered a three-month period of inspection by resident inspectors and announced inspections performed by regional inspectors. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4.

No findings were identified.

REPORT DETAILS

Summary of Plant Status

Unit 1 began the inspection period at 100 percent power. On September 7, 2013, operators reduced power to approximately 89 percent for planned main turbine valve surveillance testing. Operators returned the unit to 100 percent the next day. The unit remained at or near 100 percent power for the remainder of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity

1R01 Adverse Weather Protection (71111.01 – 1 sample)

External Flooding

a. Inspection Scope

During the week of September 23, 2013, the inspectors performed an inspection of the external flood protection measures for Three Mile Island. The inspectors reviewed technical specifications, procedures, design documents, and the Updated Final Safety Analysis Report (UFSAR), Chapter 2.6, which depicted the design flood levels and protection areas containing safety-related equipment to identify areas that may be affected by external flooding. The inspectors conducted a focused inspection of the inflatable door seals into the Auxiliary and Fuel Handling Building to ensure that Exelon erected flood protection measures in accordance with design specifications. The inspectors also reviewed operating procedures for mitigating external flooding during severe weather to determine if Exelon planned or established adequate measures to protect against external flooding events.

b. Findings

No findings were identified.

1R04 Equipment Alignment

Partial System Walkdowns (71111.04Q – 3 samples)

a. Inspection Scope

The inspectors performed partial walkdowns of the following systems:

- Nuclear Service System after pump rebuild on July 29, 2013
- Control Building envelope after damper inspections on July 29, 2013
- 'B' Emergency Feedwater System following surveillance testing on September 10, 2013

The inspectors selected these systems based on their risk-significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors reviewed applicable operating procedures, system diagrams, the UFSAR, technical specifications,

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.

1R05 Fire Protection

Resident Inspector Quarterly Walkdowns (71111.05Q – 7 samples)

a. Inspection Scope

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

- Auxiliary Transformer A, TB-FA-1(11), on August 6, 2013
- Alligator Pit, IB-FZ-8, on August 7, 2013
- 'A' Emergency Diesel Generator Room, DG-FA-1, on August 14, 2013
- Makeup Pump 1A Cubicle, MU-P-1A, on August 21, 2013
- Relay Room and Cardox System, CB-FA-3D, on August 29, 2013
- 'A' Inverter Room, CB-FA-2D, on September 19, 2013
- Unit 1 Control Room, CB-FA-4B, on September 26, 2013

b. Findings

No findings were identified.

1R06 Flood Protection Measures (71111.06 – 1 sample)

Internal Flooding Review

a. Inspection Scope

The inspectors reviewed the UFSAR, site flooding analysis, and plant procedures to assess susceptibilities involving internal flooding. The inspectors also reviewed the

corrective action program to determine if Exelon identified and corrected flooding problems and whether operator actions for coping with flooding were adequate. The inspectors also focused on intermediate building internal flood protection features to verify the adequacy of equipment seals located below the flood line, floor and water penetration seals, watertight door seals, common drain lines and sumps, sump pumps, level alarms, and control circuits.

b. Findings

No findings were identified.

1R07 Heat Sink Performance (71111.07T – 3 samples)

a. Inspection Scope

Triennial Heat Sink and Heat Exchanger Sample Selection

Based on the Three Mile Island, Unit 1 risk ranking of safety-related heat exchangers, past triennial heat sink inspections, recent operational experience, and resident inspector input, the inspector selected two ultimate heat sink samples (decay heat removal system and the nuclear river water system) and one heat exchanger sample (nuclear service closed cycle cooling water system cooler NS-C-1D) for inspection.

For the samples selected the inspector reviewed program and system health reports, self-assessments, and Exelon's methods (inspection, cleaning, maintenance, and performance monitoring) used to ensure heat removal capabilities for the safety-related heat exchangers and ultimate heat sinks and compared them to Exelon's commitments made in the revised response to Generic Letter (GL) 89-13, "Service Water System Problems Affecting Safety-Related Equipment", dated June 6, 1996.

Unit 1 Decay Heat Removal System (Ultimate Heat Sink)

The inspector completed an ultimate heat sink inspection sample of the decay heat removal system (DHRWS) in accordance with the applicable steps of inspection procedure 71111.07, Sections 02.02(d)(4), 02.02(d)(6) and 02.02(d)(7). The decay heat river water system (DHRWS) is used to transfer heat from the DHRWS to the ultimate heat sink.

The inspector reviewed Exelon's DHRWS pipe inspection and monitoring programs to assess the condition and structural integrity of the DHRWS piping. The inspector reviewed a sample of DHRWS pipe nondestructive examination records, intake structure silt inspections, maintenance history, structures monitoring inspection results and associated engineering evaluations to ensure that Exelon was appropriately addressing any degradation in DHRWS piping and the intake structure.

The inspector reviewed the operation of the DHRWS. The review included design changes, procedures, intake structure operation, abnormal DHRWS operations, loss of the DHRWS/main intake structure, adverse weather condition procedures, and DHRWS leak isolation. The inspector verified that Exelon maintained design drawings, design basis calculations and procedures consistent with their design and licensing basis and that plant operators could reasonably implement the procedures. The inspector performed a walkdown of the DHRWS and intake structure to verify that instrumentation

relied upon by operators for decision making tasks was available and functional. The inspector verified that the DHRWS piping had been analyzed to demonstrate resistance to water hammer forces. Also, the inspector verified that Exelon's in-service testing (IST) procedures test for the correct operation of the DHRWS pump discharge check valves, precluding the potential for weak-pump/strong-pump interaction during operation.

The inspector reviewed Exelon's disposition of a sample of active thru-wall DHRWS piping leaks, including structural evaluations and completed or planned corrective actions. Exelon's engineering evaluations determined that the dominant corrosion mechanism was inside diameter microbiologically induced pitting corrosion (MIC) causing pin-hole leaks in the piping. The ultrasonic testing examinations were appropriately performed in accordance with American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code. The operability determination evaluations determined that structural integrity was maintained and the piping is structurally acceptable.

The inspector reviewed the buried piping inspection program, and a sample of completed piping examination records to verify structural integrity, and to ensure that any leakage or degradation had been appropriately identified and dispositioned.

The inspector verified that Exelon had established chemistry procedures to control, detect, and prevent system degradation due to macro-fouling of the DHRS piping. Biocide treatments of the DHRS are controlled, monitored, trended and evaluated to ensure adequate biotic control. The inspector reviewed DHRS performance testing, in-service testing results of the DHRS pumps, DHRS flow balance test results and flow balance calculations to verify that the minimum calculated DHRS flow rates were properly maintained to essential safeguards equipment and met the acceptance criteria in the UFSAR.

The inspector performed a walkdown of the Intake Building (including the trash racks, DHRWS pumps, traveling water screens, and structural supports), and the accessible areas of the Auxiliary Building containing DHRS piping to look for indications of piping leakage and/or degradation. The inspector verified that intake structure pump bay silt accumulation is monitored, trended, and maintained at an acceptable level. The inspector interviewed the responsible Exelon engineering personnel, reviewed silt deposition inspection documentation, and the results of past completed bay silt cleaning work orders.

Unit 1 Nuclear Services Riverwater System (Ultimate Heat Sink)

The inspector completed an ultimate heat sink inspection of the nuclear services river water system (NSRWS) in accordance with applicable steps of inspection procedure 71111.07, Sections 02.02(d)(4), 02.02(d)(6) and 02.02(d)(7). The intermediate closed cooling system (ICCS) provides cooling water for safety-related Reactor Building heat loads and transfers heat to the NSRWS.

The inspector reviewed Exelon's NSRWS pipe inspection and monitoring program to assess the condition and structural integrity of the NSRWS piping. The inspector reviewed a sample of NSRWS pipe nondestructive examination records, intake structure silt inspections, maintenance history, and associated engineering evaluations to ensure that Exelon appropriately identified and dispositioned NSRWS piping or intake structure

degradation. The inspector reviewed operation of the NSRWS, which encompassed design changes, procedures, intake structure operation, abnormal NRWS operations, loss of the NRWS/main intake structure, adverse weather conditions, and NRWS leak isolation conditions. The inspector verified that Exelon maintained design drawings, calculations and procedures consistent with their design and licensing basis. The inspector also verified that plant operators could reasonably implement the procedures as written.

The inspector performed a walkdown of the NSRWS and intake structure to independently verify that the instrumentation that operators rely on for decision making was available and functional. The inspector verified that the NSRWS piping had been analyzed to demonstrate resistance to water hammer forces. The inspector also verified that Exelon's IST procedures test for the correct operation of the NSRWS pump discharge check valves, precluding the potential for weak-pump/strong-pump interaction during operation.

The inspector reviewed Exelon's disposition of a sample of active thru wall NSRWS piping leaks, including structural evaluations and planned corrective actions. Exelon's engineering evaluations determined that the dominant corrosion mechanism was inside diameter MIC causing pin-hole leaks in the piping. The inspector reviewed UT results of the degraded NSRWS piping and operability determination records to verify structural integrity of the existing piping. The UT examinations were verified to have been appropriately performed in accordance with ASME Boiler and Pressure Vessel Code.

The inspector reviewed the buried piping inspection program, and reviewed a sample of completed piping examination records to verify structural integrity, and ensure that any leakage or degradation has been appropriately identified and dispositioned.

The inspector verified that Exelon had established maintenance and chemistry procedures to control, detect, and prevent system degradation due to macro-fouling of the NSRWS. The inspector reviewed the associated chemistry procedures, macro-fouling trending reports, river/service water system control and monitoring program, and interviewed responsible chemistry and engineering personnel.

The inspector reviewed NSRWS performance testing, in-service testing, NSRWS flow balance test results and flow balance calculations to verify that calculated NSRWS flow rates were properly maintained to essential safeguards equipment and met the acceptance criteria in UFSAR. The inspector performed walkdowns of the intake area (including the trash racks, the NSRWS pumps, traveling water screens, and structural supports) and the accessible areas of the Auxiliary Building containing NSRWS piping to look for indications of piping leakage and/or degradation.

To verify that NRWS pump bay silt accumulation is monitored, trended, and maintained at an acceptable level; the inspector interviewed the responsible engineering personnel and reviewed silt deposition inspection documentation.

Nuclear Service Closed Cooling Water System, Cooler NS-C-1D

The inspector reviewed the programs and procedures for maintaining the safety functions of the nuclear service closed cooling water system, Cooler NS-C-1D, in

accordance with applicable steps of inspection procedure 71111.07, Sections 02.02 (b)(2) and 02.02(c).

The closed cooling water cooler NS-C-1D accepts heat from engineered safeguard equipment and rejects the heat to the NSRWS. The inspector reviewed the design basis heat capacity calculation for this cooler. During operation Exelon relies upon periodic inspections (visual and eddy current) and cleaning of the tubes in cooler NS-C-1D to ensure system heat removal capability.

The inspector reviewed the most recent completed inspection/cleaning work orders to verify that the as-found and as-left condition of the cooler NS-C-1D was bounded by assumptions in the engineering analyses and provided reasonable assurance of continued operability. The inspector compared cooler NS-C-1D surveillance test data to the established acceptance criteria to verify that the results were acceptable and that operation was consistent with design. The inspector reviewed the NSRWS flow balance calculation to verify that the minimum calculated NSRWS flow rate, in conjunction with the heat transfer capability of the cooler NS-C-1D, supports the minimum heat transfer rates assumed during accident and transient conditions described in the UFSAR.

Review of Corrective Action Reports

The inspector selected and reviewed a sample of corrective action program reports related to the heat sink and heat exchanger samples chosen for this inspection. The review verified that Exelon is appropriately identifying, characterizing, and correcting problems related to these systems and components, and that the planned or completed corrective actions for the reported issues were appropriate.

b. Findings

No findings were identified

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

.1 Quarterly Review of Licensed Operator Requalification Testing and Training

a. Inspection Scope

The inspectors observed licensed operator simulator training on September 17, 2013. The inspectors evaluated operator performance during the simulated event and verified completion of risk significant operator actions, including the use of abnormal and emergency operating procedures. The inspectors assessed the clarity and effectiveness of communications, implementation of actions in response to alarms and degrading plant conditions, and the oversight and direction provided by the control room supervisor. The inspectors verified the accuracy and timeliness of the emergency classification made by the shift manager and the technical specification action statements entered by the shift technical advisor. Additionally, the inspectors assessed the ability of the crew and training staff to identify and document crew performance problems.

b. Findings

No findings were identified.

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

a. Inspection Scope

The inspectors observed control room operations in support of reactor building emergency cooling and isolation system analog testing, as well as routine plant operations conducted September 23 - 27, 2013. The inspectors observed licensed operators performance to verify that procedure use, crew communications, and coordination of activities between work groups met the criteria specified in Exelon's OP-AA-1, "Conduct of Operations," Revision 0. In addition, the inspectors verified that licensee supervision and management were adequately engaged in plant operations oversight and appropriately assessed control room operator performance and similarly met established expectations and standards.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12Q – 1 sample)

a. Inspection Scope

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

- Nuclear river and nuclear service cooling system issues documented in IRs 1452875, 1518403 on July 30, 2013

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 3 samples)

a. Inspection Scope

The inspectors reviewed station evaluation and management of plant risk for the maintenance and emergent work activities listed below to verify that Exelon performed the appropriate risk assessments prior to removing equipment for work. The inspectors

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

- Station risk during week 1329 involving hot weather, grid conditions, and planned emergency diesel generator maintenance on July 16 and 17, 2013
- Elevated (Yellow) station risk during planned maintenance on the 'A' emergency diesel generator on August 6, 2013
- Elevated (Yellow) station risk during maintenance on the IA-P-4 air compressor and 1C Makeup pump MU-P-1C on August 13, 2013

b. Findings

No findings were identified.

1R15 Operability Determinations and Functionality Assessments (71111.15 – 2 samples)

a. Inspection Scope

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

- Corrosion and leakage from 'C' nuclear service water cooler NS-C-1C documented in IR 1542811, on August 2, 2013
- Nuclear service closed cooling water containment isolation valve removal from service under IR 1552223, on August 29, 2013

The inspectors selected these issues based on the risk significance of the associated components and systems. The inspectors evaluated the technical adequacy of the operability determinations to assess whether technical specification operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the technical specifications and UFSAR to Exelon's evaluations to determine whether the components or systems were operable. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled by Exelon. The inspectors determined, where appropriate, compliance with bounding limitations associated with the evaluations.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 5 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.

- 'B' CB envelope vent. equip. on July 16, 2013
- Joslyn Clark relay contact replacement on July 23, 2013
- NS-P-1A after bearing replacement on July 29, 2013
- 1B emergency diesel generator fuel oil leak repair on August 14, 2013
- Containment isolation valve WDL-V-303 following repairs on August 22, 2013

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 5 samples)a. Inspection Scope

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

- OP-TM-122-301, Severe flood mitigation system pump surveillance, R2189056 on July 10, 2013
- STOP-TM-211-204, In-service test of make-up valves 36 & 37, R2219691 on July 18, 2013 (in-service test)
- ER-TM-330-006, Reactor building tendon cap leakage checks, R2205116 on July 18, 2013
- Review of Surveillance Frequency Control Program on September 3, 2013
- 1301-9.1, RB structural integrity tendon surveillance, R2153606, on September 16, 2013

b. Findings

No findings were identified.

Cornerstone: Emergency Preparedness

1EP4 Emergency Action Level and Emergency Plan Changes (71114.04 – 1 sample)

a. Inspection Scope

The Office of Nuclear Security and Incident Response (NSIR) headquarters staff performed an in-office review of the latest revisions of various Emergency Plan Implementing Procedures (EPIPs) and the Emergency Plan located under ADAMS accession numbers ML13162A199 and ML13200A124 as listed in the Attachment.

The licensee determined that in accordance with 10 CFR 50.54(q), the changes made in the revisions resulted in no reduction in the effectiveness of the Plan, and that the revised Plan continued to meet the requirements of 10 CFR 50.47(b) and Appendix E to 10 CFR Part 50. The NRC review was not documented in a safety evaluation report and did not constitute approval of licensee-generated changes; therefore, this revision is subject to future inspection. The specific documents reviewed during this inspection are listed in the Attachment.

b. Findings

No findings were identified.

2. RADIATION SAFETY

Cornerstone: Occupational/Public Radiation Safety

2RS2 Occupational ALARA Planning and Controls (71124.02)

a. Inspection Scope

During September 23 - 27, 2013, the inspector conducted the following activities to verify that the licensee was properly implementing operational, engineering, and administrative controls to maintain personnel exposure as low as is reasonably achievable (ALARA) for tasks performed during power operations, and in preparing for the fall (1R20) refueling outage. Implementation of these controls was reviewed against the criteria contained in 10 CFR Part 20, applicable industry standards, and the licensee's procedures.

Radiological Work Planning

The inspector reviewed the ALARA preparations made for the 1R20 refueling outage. The inspector reviewed the ALARA plans for various jobs that had the potential for high personnel exposures. Included in this review were the replacement of the in-core detectors (AP 13-015), replacement of the pressurizer heater bundles (AP 13-021), installation/removal of scaffolding (AP 13-020), under reactor vessel inspections (AP 13-019), and replacement of the control rod drive mechanisms (AP 13-016). The inspector evaluated the departmental interfaces between radiation protection, operations,

maintenance crafts, and engineering to identify missing ALARA program elements and interface problems. The evaluation was accomplished by reviewing station ALARA committee meeting minutes, a root cause investigation report (IR 1284066) for the 1R19 crud burst, and interviewing the radiation protection manager.

Source Term Reduction and Control

The inspector reviewed pertinent exposure information to identify current dose trends occurring during power operations in 2013. The inspector reviewed the source term reduction action plan items that were developed in response to an unanticipated crud burst occurring during the past 1R19 outage. The action plan resulted in increasing operational controls during plant shutdown, and enhancing temporary shielding, system flushes, and radiological postings.

b. Findings

No findings were identified.

2RS5 Radiation Monitoring Instrumentation (71124.05 – 1 sample)

During September 23 - 27, 2013, the inspector conducted the following activities to verify that the licensee is assuring the accuracy and operability of radiation monitoring instruments that are used to quantify gaseous and liquid effluent releases. The inspector used the requirements in 10 CFR Part 20, 10 CFR 50 Appendix I, the Technical Specifications, Offsite Dose Calculation Manual, and the licensee's procedures as criteria for determining compliance.

a. Inspection Scope

Inspection Planning

The inspector reviewed the UFSAR to identify radiation monitoring instruments associated with monitoring liquid and gaseous effluents, and post-accident conditions.

The inspector reviewed a licensee self-assessment report and system health report of the radiation monitoring instrumentation to determine the status of instrument operability and maintenance issues.

The inspector reviewed the effluent monitor set points and the calculation methods for these set points for various instruments.

Walkdowns and Observations

Based on the radiation monitoring system health report, the inspector identified monitors that have been problematic, requiring increased maintenance. Subsequently, the inspector walked down five instruments, identified in the report, that have been upgraded or are scheduled for upgrade or removal. The instruments include RM-G-5 (reactor building personnel hatch monitor), RM-A-2G (the reactor building atmosphere gaseous monitor), ALC-RMI-18 (the chemical cleaning building gaseous monitor), RM-A-14 (fuel handling building ventilation exhaust monitor), and RM-A-13 (spent fuel pool area

gaseous monitor). During the walkdown, the inspector evaluated the operability and material condition of these monitors.

Calibration and Testing Program

The inspector selected various gaseous and liquid monitors and post-accident monitors to evaluate whether the channel calibration and functional tests were being performed consistent with Technical Specifications/Offsite Dose Calculation Manual (ODCM). The inspector assessed whether the calibrations were performed with radioactive sources that adequately represented the plant's nuclide mix. The inspector assessed whether the effluent monitor alarm set points were established as prescribed in the ODCM and station procedures.

Effluent monitors evaluated included:

Gaseous Discharge Monitors:

- Fuel Handling ESF Ventilation monitor, RM-A-14

Liquid Discharge Monitors:

- Liquid Radioactive Waste Discharge monitor, RM-L-6
- Plant Water Discharge monitor, RM-L-7

Post-Accident Monitors:

- High Range Containment Area Monitor, RM-G-22
- High Range Containment Area Monitor, RM-G-23
- Reactor Building Purge Duct Exhaust Accident Monitor, RM-G-24

b. Findings

No findings were identified.

2RS6 Radioactive Gaseous and Liquid Effluent Treatment (71124.06 – 1 sample)

During September 23 - 27, 2013, the inspector conducted the following activities to ensure that gaseous and liquid effluent processing systems are maintained so radiological discharges are properly monitored, and evaluated, and to verify the accuracy of effluent releases and public dose calculations resulting from radioactive effluent discharges.

The inspector used the requirements in 10 CFR Part 20, 10 CFR 50 Appendix I, 10 CFR 50.75(g), applicable industry standards, and the licensee's procedures as criteria for determining compliance.

a. Inspection Scope

Event Report and Effluent Report Reviews

The inspector reviewed the 2012 Annual Radioactive Effluent Release Report to determine if the report was submitted as required by the ODCM. The inspector reviewed sampling results, and trends identified by the licensee. The inspector determined if these releases were evaluated, and any off-normal releases entered in the corrective action program, and adequately resolved.

The inspector reviewed abnormal radioactive effluent issues reported by the licensee as provided in the 2012 Annual Radioactive Effluent Release Report. The inspector determined that the issues were entered into the corrective action program and that appropriate measures were implemented to assure that effluents were properly monitored and evaluated.

ODCM and Updated Final Safety Analysis Report Review

The inspector reviewed the UFSAR descriptions of the radioactive effluent monitoring systems, treatment systems, and effluent flow paths to identify system design features and required functions.

The inspector reviewed a change to the ODCM made by the licensee since the last inspection. The inspector reviewed the evaluation for the change and determined that it was technically justified and maintained effluent releases ALARA.

Groundwater Protection Initiative (GPI) Program

The inspector reviewed reported groundwater monitoring sample results and changes to the licensee's program for identifying, controlling, and remediating contaminated spills/leaks to groundwater. The inspector determined that an additional eight (8) on-site monitoring wells have been installed to better identify the source and migration of tritiated groundwater.

The inspector reviewed the actions taken to mitigate a potential tritiated groundwater source, the borated water storage tank (BWST) sump. Corrective actions include inspections of the concrete sump and preparing the surfaces for applying a sealant. These actions will limit potential seepage of BWST leakage from the sump structure into the ground.

The inspector reviewed the licensee's 10 CFR 50.75(g) file to assure that any recent spill/leak was documented in the decommissioning records.

Procedures, Special Reports, and Other Documents

The inspector reviewed issue reports related to the effluent program issued since the previous inspection to identify any additional focus areas for the inspection based on the scope of problems described in these reports. The inspector reviewed effluent program implementing procedures, including those associated with effluent sampling, effluent monitor set-point determinations, and dose calculations. The inspector reviewed copies of licensee assessment reports of the effluent monitoring program since the last inspection to gather insights into the effectiveness of the licensee's program.

Instrumentation and Equipment

The inspector walked down selected components of the gaseous and liquid discharge systems, with the responsible system engineer, to verify system operability and material condition. The inspector reviewed the calibration records for selected radiation monitors.

The inspector reviewed the calibration records for the liquid and gaseous flow rate instruments, used to determine the liquid discharges rates and gaseous effluent stack and vent flow rates, to verify that the flow rates are accurately measured and consistent with technical specification/ODCM and UFSAR values. Instruments reviewed included RM-G-14, RM-L-6, and RM-L-7.

Dose Calculations

The inspector reviewed three radioactive gaseous and two liquid waste discharge permits to verify that the projected doses to members of the public were accurate and based on representative samples from the discharge path. The inspector evaluated the methods used to determine the isotopes that are included in the source term to ensure all applicable radionuclides are included. The inspector determined that the calculated doses are within the 10 CFR 50, Appendix I and ODCM dose criteria. The inspector determined that the licensee was tracking cumulative doses on a monthly, quarterly, and annual basis, and comparing dose to the regulatory criteria.

Problem Identification and Resolution

The inspector assessed whether problems associated with the effluent monitoring and control program are being identified by the licensee at an appropriate threshold and are properly addressed for resolution in the licensee's corrective action program. In addition, the inspector evaluated the effectiveness of the corrective actions for a selected sample of problems documented by the licensee.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

.1 Safety System Functional Failures (1 sample)

a. Inspection Scope

The inspectors sampled Exelon's submittals for the Safety System Functional Failures performance indicator for TMI for the period of July 1, 2012 through June 30, 2013. To determine the accuracy of the performance indicator 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," Revision 6, and NUREG-1022, "Event Reporting Guidelines 10 CFR 50.72 and 10 CFR 50.73." The inspectors reviewed Exelon's operator narrative logs, operability assessments, maintenance rule records, maintenance work orders, condition reports, event reports and NRC integrated inspection reports to validate the accuracy of the submittals.

a. 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 July 1, 2012 through June 30, 2013:

- [MS 06] Emergency alternate current (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 performance indicator data reported during those periods, the inspectors used definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6. The inspectors also reviewed Exelon's operator narrative logs, condition reports, mitigating systems performance index derivation reports, event reports, and NRC integrated inspection reports to validate the accuracy of the submittals.

b. Findings

No findings were identified.

4OA2 Problem Identification and Resolution (71152 – 1 sample)

.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 Annual Sample: OTSG Tube-Tube Interaction Root Cause (IR 1287166)

a. Inspection Scope

A problem identification and resolution annual sample inspection was conducted during the period August 19-22, 2013. The inspector performed an in-depth review of Exelon's evaluation and corrective actions associated with corrective action reports IR-1287166 (Exelon) and CR-2011-8212 (AREVA), which were initiated to assess the unpredicted tube-to-tube wear discovered in both the A and B replacement Enhanced Once Through Steam Generators (EOTSG) in November 2011. The replacement EOTSGs had been in operation for one fuel cycle when this degradation was detected. In addition to the tube-to-tube wear, Exelon also detected tube-to-tube support plate (TSP) wear, which had been predicted to occur, during this inspection.

Areva, the designer and fabricator, of the TMI-1 EOTSG's was contracted by Exelon to determine the root cause(s) of the tube-to-tube wear. Exelon and Areva postulate that the root cause is a combination of the following four factors:

- (1) An over prediction of the margin to buckling (bowing) of the EOTSG tubes.
- (2) Based upon thermocouple data the TMI-1 EOTSG's shell is significantly cooler than the design temperature value causing additional compressive loading on the tubes.
- (3) Installed tube preload was substantially less tensile (more compressive) than the value used in the design analysis, and
- (4) Compressive loads higher than the buckling caused the tubes to bow. The bowed tubes were subjected to turbulent flow or dynamic instability which caused the tubing to wear against adjacent tubing.

After discovering the unexpected tube-to-tube wear in 2011, Exelon completed a Condition Monitoring (CM) calculation and an Operational Assessment (OA) of the tube-to-tube wear and the tube-to-tube wear and determined that the structural and leakage criteria of the Electric Power Research Institute Steam Generator Guidelines were satisfied. Exelon restarted the plant in 2011 and is presently completing a two year fuel cycle. Exelon will begin a refueling outage (T1R20) in October 2013, and will perform a 100% EOTSG eddy current inspection at that time. This issue has been entered into the Exelon corrective action program.

The inspector assessed Exelon's problem identification threshold, prioritization and timeliness of corrective actions to determine whether Exelon was appropriately identifying, characterizing, and correcting problems associated with this issue and whether the planned or completed corrective actions were appropriate. The inspector performed documentation reviews and interviewed engineering and design personnel to assess the effectiveness of any implemented corrective actions. The inspector compared the actions taken to the requirements of Exelon's corrective action program and 10 CFR 50, Appendix B.

b. Findings and Observations

No findings were identified.

The inspector concluded that the postulated causes were reasonable and would account for the tube-to-tube wear identified during the eddy current testing. Exelon plans to perform eddy current examinations during the next refueling outage to assess any change in the number and/or size of tube-to-tube wear indications and any change in the number and/or size in tube-to-tube wear. The eddy current inspection data will inform the CM evaluation and an OA to determine the next required EOTSG inspections. All CM and OA evaluations will be performed in accordance with the Electric Power Research Institute Steam Generator Guidelines. The inspector did not identify any issues of concern regarding Exelon's corrective actions.

4OA6 Meetings, Including Exit

On October 18, 2013, the inspectors presented the inspection results to Mr. Rick Libra, Site Vice President, and other members of the TMI staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

ATTACHMENT: SUPPLEMENTARY INFORMATION

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

| | |
|---------------|---|
| R. Libra | Site Vice President |
| T. Alvey | Manager, Chemistry |
| G. Aston | Manager, Critical Skills |
| D. Atherholt | Manager, Regulatory Assurance |
| R. Campbell | Manager, Site Security |
| D. Divittore | Manager, Radiological Protection |
| J. Dullinger | Director, Site Engineering |
| M. Fitzwater | Senior Regulatory Assurance Engineer |
| R. Green | GL 89-13 Program Owner |
| J. Grove | Regulatory Affairs |
| M. Harrison | Manager, System Engineering |
| T. Heindle | SG Engineer |
| K. Heisey | MOV Program Manager |
| T. Holden | System Engineer, GL 89-13 Program Owner |
| B. Hreha | Risk Engineer |
| A. Krause | Engineering Manager |
| R. Masoero | IST Program Manager |
| G. McCarty | Supervisor, Radiation Protection |
| R. McLaughlin | Manager, Site Nuclear Oversight |
| R. Miller | Manager, Regulatory Assurance |
| M. Myers | Systems Engineer, Radiation Monitoring |
| M. Newcomer | Plant Manager |
| J. Piazza | Senior Manager, Design Engineering |
| G. Smith | Director, Maintenance |
| B. Shumaker | Manager, Emergency Preparedness |
| C. Six | Director, Site Operations |
| G. Smith | Director, Site Maintenance |
| T. Stertzel | System Engineer |
| M. Torborg | SG Program Manager |
| W. Vuxta | Manager, Radiological Engineering |
| L. Weber | Environmental Chemist |
| V. Zeppos | Mechanical Design Engineer |

Other Personnel

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

LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATED

None

LIST OF DOCUMENTS REVIEWED

Section 1R01: Adverse Weather Protection

Procedures

OP-TM-122-901, Inflate Aux and FHB Door Seals, Rev. 0

Miscellaneous

VM-TM-2917, Aux/FH BLDG Missile Door Inflatable Seals, Rev. 0

IR 1563640

Section 1R04: Equipment Alignment

Procedures

1301-1, Shiftly Checks, Rev. 170

CC-AA-201, Plant Barrier Impairment Program, Rev. 10

ER-TM-390-1001, Control Room Habitability Program Implementation, Rev. 2

MA-TM-141-100, Control Room 'A' Train Envelope Boundary Differential Pressure Testing Procedure, Rev. 3a

OP-TM-424-202, In-Service Testing of EF-P-2B, Rev. 8

OP-TM-424-271, Standby Lineup and Flowpath Verification Check of Emergency Feedwater System, Rev. 8

OP-TM-541-000, Primary Component Cooling, Rev. 17

OP-TM-541-461, IC & NS Temperature Control, Rev. 7

Drawings

302-610, Nuclear Services Closed Cycle Cooling Water, Rev. 81

302-842, Control Building and Machine Shop Ventilation, Sheet 1, Rev. 57

302-842, Control Building and Machine Shop Ventilation, Sheet 2, Rev 8

Miscellaneous

WO R2148739

| | | | | | | |
|----|---------|---------|---------|---------|--------|--------|
| IR | 1534960 | 1532822 | 1522491 | 1459074 | 968154 | 929503 |
| | 906811 | | | | | |

Section 1R05: Fire Protection

Procedures

1038, Administrative Controls-Fire Protection Program, Rev. 76

AOP-001, Fire, Rev. 8

OP-MA-201-007, Fire Protection System Impairment Control, Rev. 6

Miscellaneous

CC-AA-309-101, Engineering Technical Evaluations, Rev. 11

Fire Hazard Analysis Report, Rev. 24

Three Mile Island Nuclear Station, Pre-Fire Plan, September, 25, 2013

AR A2314220
 IR 1548212
 WO R2216380

Section 1R06: Flood Protection Measures

Procedures

OP-TM-214-251, BS/DH Floor Drain Inspection, Rev 1

Miscellaneous

IR 1079153 1562747
 WO R2208327 R2208270 R2222087

Section 1R07: Heat Sink Performance

Procedures

Exelon Generation Procedure OP-TM-541-000, Revision 17; Primary Component Cooling (541)
 Exelon Generation Procedure OP-TM-541-234, Revision 4; IST OF NR-P-1A –
AND NSRW VALVES DURING SINGLE PUMP OPERATIONS
 Exelon Generation Procedure ER-AA-340-1002, Revision 5;
SERVICE WATER HEAT EXCHANGER INSPECTION GUIDE
 Exelon Generation Procedure ER-TM-340-1002, Revision 3;
GUIDANCE FOR HEAT EXCHANGER INSPECTIONS AND CLEANING AT TMI
 Exelon Generation Procedure ER-AA-5400-1001, Revision 6;
RAW WATER CORROSION PROGRAM GUIDE
 Exelon Nuclear Procedure ER-AA-5400, Revision 5;
BURIED PIPING AND RAW WATER CORROSION PROGRAM (BPRWCP) GUIDE
 Exelon Generation Procedure OP-TM-541-231, Revision 5;
IST OF NR-P-1A AND VALVES - MULTIPLE PUMP OPERATIONS
 Exelon Generation Procedure 1301-9.7, Revision 28;
INTAKE PUMP HOUSE FLOOR, SILT ACCUMULATION AND INSPECTIONS
 AmerGen Procedure 1301-6.7, Revision 22, 3/18/09; Monitoring of Silt Buildup in
 River Water Screen House
 Exelon Generation Procedure CY-AA-120-4000, Revision 5;
CLOSED COOLING WATER CHEMISTRY STRATEGIC PLAN
 Exelon Generation Procedure CY-AA-120-400, Revision 14;
CLOSED COOLING WATER CHEMISTRY
 Exelon Nuclear Procedure OP-TM-533-000, Revision 10;
DECAY HEAT RIVER SYSTEM
 Exelon Nuclear Procedure OP-TM-AOP-005, Revision 9;
RIVER WATER SYSTEMS FAILURES
 Exelon Nuclear Procedure OP-TM-541-462, Revision 1;
NS-T-1 LEVEL CONTROL
 Exelon Nuclear Procedure OP-TM-543-461, Revision 2;
MAKEUP TO DC-T-1A
 Exelon Nuclear Procedure OP-TM-543-462, Revision 2;
MAKEUP TO DC-T-1B
 Exelon Nuclear Procedure ER-TM-340-1002, Revision 3;
GUIDANCE FOR HEAT EXCHANGER INSPECTIONS AND CLEANING AT TMI

Action Requests

| | | |
|---------|---------|---------|
| 1428966 | 1174556 | 1418338 |
| 1428966 | 1206549 | 1424080 |
| 1486386 | 1208373 | 1487143 |
| 1486335 | 1207001 | 1104892 |
| 1106572 | 1230188 | 1161546 |
| 1149979 | 1283464 | 1262612 |
| 1151347 | 1318927 | 1264278 |
| 1131737 | 1333285 | 1318597 |
| 1129820 | 1378335 | 1447589 |
| 1131002 | 1364232 | 1133761 |
| 1131230 | 1371900 | 1133190 |
| 1136511 | 1418327 | |

Ultrasonic Data Sheets:

BOP-UT-2013-057, 12" Line, Leak area upstream of NR-V-12 (6 pages), 8/5/13
 NDE Report# 2009-022-001, NR-V-1A Discharge Piping, 4/16/09 (1 page)
 NDE Report# 2008-013-113, River Water Discharge Piping, 8/15/08 (1 page)
 NDE Report# 2008-013-119, River Water Discharge Piping, 12/17/08 (1 page)
 NDE Report# 2008-032-001, NDE for MIC leak repairs, 12/11/08 (2 pages)
 NDE Report# 2008-033-001, UT for cut lines D/S RR-V-33, 12/15/08 (1 page)
 NDE Report# 2007-042-001, NR 30" elbow downstream of NR-4A & 4B, 9/26/07 (1 page)

Plant Modifications

ECR: TM 12-00343-000; DH-V-4B MSO MOD (control circuit wiring change), 8/14/12
 ECR: TM 11-00031-000; ISSUE NS IST FLOW ACCURACY CALC, 1/28/11
 ECR: TM 09-00787-000; T1R18 DC-C-2A HEAT TRANSFER PERFORMANCE -
 (GL 89-13 TEST), using temporarily installed temperature instrumentation.
 ECR: TM 08-01045-000; N-513 ANALYSIS FOR MIC LEAK IDENTIFIED VIA IR 846049, 11/19/08

Engineering Calculations:

C-1101-542-E540-014, Revision 0; Subject: TMI-1 DECAY HEAT SERVICE CLOSED
 COOLING WATER HYDRAULIC ANALYSIS, 8/29/97
 C-1101-541-5360-020, Revision 2; Subject: LAI 88-9011 Effect of 95 degree River Water on
 NSCCW, 12/18/98
 C-1101-541-5310-024, Revision 2; Subject: TMI-1 NSCCW Hydraulic Model, 10/21/11
 C-1101-533-E410-013, Revision 4; Title: TMI-1 DR Hydraulic Performance Using Field Test
 Data, 9/12/03
 C-1101-531-E410-019, Revision 1; Subject: TMI-1: Nuclear River Water System (NR) Pipe-Flo
 Model, 5/19/02
 C-1101-530-5320-001, Revision 0; Subject: TMI-1: RIVER WATER SYSTEM WATER HAMMER
 ANALYSIS, 5/22/87
 C-1101-212-5360-008, Revision 0; Subject: Decay Heat Removal System, 7/16/85
 C-1101-212-E410-048, Revision 0; Subject: TMI-1 DH-C-1A/B Design Analysis, 11/6/01
 TMI Inservice Test Evaluation for Pumps or Valves, Number 223, Revision 0; NR-P-1C, 8/9/2011
 ASME Code Case N-789 Section 3, Design Compliance Evaluation
 TMI-1 River Water System Water Hammer Analysis, C-1101-500-5320-001, Revision 0, 5/9/87

Operational Evaluation:

OPE-13-001, IR#1542811, ECR 13-00333, 8/2/13; Leak in Nuclear Service River Water

ASME Code References:

American Society of Mechanical Engineers, Code Case N-789; Alternative Requirements for Pad Reinforcement of Class 2 and 3 Moderate-Energy Carbon Steel Piping for Raw Water Service, Section XI, Division 1, 6/25/2011

ASME Boiler and Pressure Vessel Code Case N-513-2, "Evaluation Criteria for Temporary Acceptance of Flaws in Moderate Energy Class 2 or 3 Piping Section XI, Division 1," NRC Letter Dated May 10, 2012 to Michael J. Pacilio, President and Chief Nuclear Officer, Exelon Nuclear. NRR Safety Evaluation for Proposed Alternative to Utilize ASME Code Case N-789

NRC Regulatory Information Summary (RIS) 2005-20, Revision 1.

Self-Assessments:

FOCUSED AREA SELF-ASSESSMENT; Three Mile Island Unit 1 2013 Pre-NRC Triennial Heat Sink and GL 89-13 FASA, AR 1452512, 5/28/13

Work Orders:

R2158672-(Recurring Task W.O.); Cooler NS-C-1D: PM/Clean and Inspect (Eddy Current), 12/20/12

ECR TM 11-00511-000, TIR19 GL 89-13 Treat OF Cooler DC-C-2B, 11/3/11, (Decay Heat Closed Cooling Water) Heat Exchanger, DC-C-2B during TIR19

W.O. TM 1-533-PIA, Decay Heat River Pump; Underground Leakage from a decay heat river system; 1/9/2012

W.O. R2112621 DC-C-2B Heat Load Test; Decay Heat Closed Cooling Water System – DC; 21/11/11

Root Cause Reports:

Root Cause Analysis for DR-S-1A Failure to Maintain Clean Strainer Condition, 2/25/99

Drawings

AmerGen Drawing 302-260, Revision 50, 4/21/08; TMI-1 Intermediate Cooling Flow Diagram
Exelon Nuclear Drawing 302-640, Revision 84, 6/7/12; TMI-1 Decay Heat Removal Flow Diagram

Exelon Nuclear Drawing 302-610, Revision 81, 11/16/11; TMI-1 Nuclear Services Closed Cycle Cooling Water Flow Diagram

Exelon Nuclear Drawing 302-202, Revision 79, 12/10/12; TMI-1 Nuclear Services River Water System Flow Diagram

Exelon Nuclear Drawing 302-201, Revision 59, 1/14/13; TMI-1 Circulating Water Flow Diagram

Miscellaneous

Docket Nos. 50-289; Generic Letter 89-13 Revised Response, 6/6/96

EPRI NP-7552, Heat Exchanger Performance Monitoring Guidelines, December 1991

EPRI TR-1025318, Open Cooling Water Guideline, September 17, 2012

EPRI TR-107397, Service Water Heat Exchanger Testing Guidelines, March 1998

EPRI NP-5580, Sourcebook for Microbiologically Influenced Corrosion in Nuclear Power Plants
Exelon Nuclear, TMI-1 Generic Letter 89-13 Program Basis Document, ER-TM-340-1001, Revision 1

Generic Letter 89-13, Service Water System Problems Affecting Safety-Related Equipment, July 18, 1989

Generic Letter 89-13, Supplement 1, Service Water System Problems Affecting Safety-Related

Equipment, April 4, 1990
GPU Nuclear, Three Mile Island, Unit 1(TMI-1), Operating License Nos. DPR-50 and DPR-73;

Section 1R11: Licensed Operator Requalification Program

Procedures

AD-AA-101-F-01, Reactor Building Emergency Cooling and Isolation System Analog Test,
Rev. 5
OP-TM-211-000, Makeup and Purification System, Rev. 25

Miscellaneous

Out-of-Box Scenario plan conducted on September 17, 2013

Section 1R12: Maintenance Effectiveness

Procedures

ER-AA-310, Implementation of the Maintenance Rule, Rev. 8

Miscellaneous

| | | | | | | |
|----|----------|----------|----------|----------|----------|----------|
| IR | 1507570 | 1518631 | 1538219 | 1487234 | 1516755 | 1516756 |
| | 1518403 | 1518635 | 1519276 | 1520250 | 1520348 | 1527640 |
| | 1452875 | 1043479 | 1533208 | 1519280 | 1516337 | |
| AR | A2325916 | A2330805 | A2330804 | A2246951 | A2333632 | A2330707 |

Section 1R13: Maintenance Risk Assessments and Emergent Work Control

Procedures

1082.1, TMI Risk Management Program, Rev. 8
OP-AA-108-117, Protected Equipment Program, Rev. 3
WC-AA-101, On-Line Work Control Process, Rev. 18

Miscellaneous

A2333760
Protected Equipment Log, 8/6/13
Technical Specification 3.3.2, 3.5.7

Section 1R15: Operability Evaluations

Procedures

ER-AA-380, Primary Containment Leakrate Testing Program, Rev. 10
OP-AA-108-115, Operability Determinations, Rev. 10
OP-AA-108-115-1002, Supplemental Consideration for On-Shift Immediate Operability
Determinations, Rev. 2
TMI-IST-PLAN-INT4, Inservice Testing Program Fourth Ten Year Interval, Rev. 2

Miscellaneous

10 CFR 50, Appendix J Leakage Rate Testing Program Notebook, 9/3/13
ASME Code Case N-789
Ultrasonic Thickness Examination Report #BOP-UT-2013-057
IR 1552223 1542811

Section 1R18: Plant ModificationsProcedures

1303-4.16, Emergency Power System, Rev. 134
 MA-AA-716-012, Post Maintenance Testing, Rev. 16

Miscellaneous

CC-AA-102, Design Input and Configuration Change Impact Screening, Rev. 20
 CC-AA-103, Configuration Change Control, Rev. 21

Section 1R19: Post-Maintenance TestingProcedures

1303-4.11, HPI/LPI Logic and Analog Channel Test, Rev. 58F
 1303-5.1A, 'A' Reactor Building Emergency Cooling and Isolation System Logic Test, Rev. 8
 MA-AA-716-012, Post Maintenance Testing, Rev. 16
 OP-AA-108-106, Equipment Return to Service, Rev. 4
 OP-TM-541-208, IST of NS-P-1A/B/C, Rev 11
 OP-TM-642-301, ES Actuation Relay Inspection, Rev. 3

Miscellaneous

| | | | | | | |
|----|----------|----------|----------|----------|----------|----------|
| IR | 1538696 | 1539123 | 1540374 | 1540282 | 1535674 | 1537997 |
| | 1537060 | 1536267 | 1537879 | | | |
| AR | A2334695 | | | | | |
| WO | C2030646 | C2023901 | R2220633 | C2030663 | R2108861 | C2029906 |
| | R2184355 | | | | | |

Section 1R22: Surveillance TestingProcedures

1301-9.1, RB Structural Integrity Tendon Surveillance, Rev. 23
 ER-AA-425, Implementation of the Technical Specification Surveillance Frequency Control Program, Rev. 0
 ER-AA-425-1000, Selecting a Candidate to be Evaluated for a Proposed Surveillance Test Interval (STI) Change, Rev. 0
 ER-AA-425-1001, Surveillance Test Interval (STI) Evaluation Form, Rev. 0
 ER-AA-425-1002, Engineering Evaluation of Proposed Surveillance Test Interval Changes, Rev. 0
 ER-AA-425-1003, Surveillance Frequency Control Program – Integrated Decision Making Panel (IDP) Roles and Responsibility, Rev. 0
 ER-AA-425-1004, Implementing an Approved Surveillance Frequency Change, Rev. 0
 ER-AA-425-1005, Monitoring the Effects of Changes to the Surveillance Frequency Control Program (SFCP), Rev. 0
 ER-TM-330-006, Annual Reactor Building Tendon Cap Grease Leakage Inspection, Rev. 0
 LS-AA-1000, Surveillance Frequency Control Program (SFCP) List of Surveillance Frequencies Change Process, Rev. 0
 OP-TM-122-301, Flow Test of FP-P-1/3 and FP-P-2A/B, Rev. 0A
 Three Mile Island Nuclear Station Unit 1 Surveillance Frequency Control Program List of Surveillance Frequencies
 WC-TM-430, Surveillance Testing Program, Rev. 0

WC-TM-430-1001, Surveillance Testing Program Database Interface and Maintenance, Rev. 1

Miscellaneous

Topical Report 150, Annual Tendon End Cap Grease Leakage Inspection Reports, Rev. 7
TSTF-07-12, Submittal of TSTF-425, Revision 1, "Relocate Surveillance Frequencies to
Licensee Control – RITSTF Initiative 5,"

NEI 04-10, Risk-Informed Technical Specifications Initiative 5b, April 2007

IR 1537288 1564176 1534082

WO R2205116

Section 1EP4: Emergency Action Level and Emergency Plan Changes

EP-AA-110-200, "Dose Assessment," Revision 5

EP-AA-110-201, "On Shift Dose Assessment," Revision 1

EP-AA-1009, "Radiological Emergency Plan Annex," Revision 21

Section 2RS2: Occupational ALARA Planning and Controls

Procedures

RP-AA-401, Rev 14, Operational ALARA Planning and Controls

RP-AA-401-1002, Rev 2, Radiological Risk Management

RP-AA-403, Rev 3, Administration of the Radiation Work Permit Program

ALARA Plans (1R20)

13-013, Reactor Vessel Closure Head Inspection

13-015, In-Core Detector Replacement

13-016, Control Rod Drive Replacement

13-019, Under Vessel Inspections

13-020, Scaffolding Construction/Dismantlement in Rx Building

13-021, Pressurizer Heater Replacement

13-032, EOTSG Eddy Current Testing and Tube Plugging/Repair

Personnel Exposure Investigations

Electronic Dosimeter Dose Alarm, IR 1526714

Miscellaneous Reports

Electronic Dose and Dose Rate Alarm Report for 2013

NOSA-TMI-13-06 (AR 1518364), Radiation Protection Audit

Source Term Reduction Action Plan Items for 1R20

1R20 Temporary Shielding Plan

1R20 Posting Plan

1R20 Flushing Plan

IR 1284066 1545171 1526714 1508098 1529520 1535240
1536490

Section 2RS5: Radiation Monitoring Instrumentation

Procedures & Calibration Records

CC-AA-102, Design Input and Configuration Change Impact Screening, Rev 10

SP1302-3.1B, RM-L-6 and RM-L-7 Liquid Monitor Calibration, Rev 12

SP1302-15, High Range RMS Containment Monitor Calibration, RM-G-22/23, Rev 11

SP1302.17.2A, RM-G-24 Calibration, Rev 3
SP1302-17.7, RM-14 Radiation Monitor & Sampler Flow Instrument Channel Calibration,
Rev 17
SP1303-4.21, Post Accident Radiation Monitoring System Channel Test, for RM-A-5,
RM-A-8, RM-A-9, and RM-G-22/23/24/25/26/27, Rev 33
SP1305-4.15E, RM-A-14 Radiation Monitor & Sampler Flow Instrument Channel T, Rev 19

Issue Reports

1380277, 1438993, 1453075, 1372201, 1343818, 1519825, 1527695, 1532812

Miscellaneous Reports

Self-Assessment (AR 1343818), Radiation Monitoring System
System Health Report for Radiation Monitors- 3rd quarter 2013

Section 2RS6: Radioactive Gaseous and Liquid Effluent Treatment

Procedures

6610-ADM-4250.01, Releasing Radioactive Liquid Waste, Rev 23A
6610-ADM-4250.12, Releasing Radioactive Gaseous Effluents – Reactor Building
Purge, Rev 16
CY-TM-170-300, Offsite Dose Calculation Manual, Rev 3
CY-TM-170-301, Liquid and Gaseous Monthly Cumulative Dose Contributions and
Projections, Rev 0
EN-AA-408, Radiological Groundwater Protection Program, Rev 0
EN-AA-408-4000, Radiological Groundwater Protection Program Implementation, Rev 3
OP-1101-2.1, Radiation Monitoring System Setpoints, Rev 83
OP-1104-27, Waste Disposal – Gaseous, Rev 83
OP-TM-232-551, Liquid Release of “A” Waste Evaporator Condensate Storage Tank (WECST)
with WDL-P-14A, Rev 5
OP-TM-232-554, Liquid Release of “B” WECST with WDL-P-14B, Rev 4
RP-AA-228, 10 CFR 50.75(g) and 10 CFR 72.30(d) Documentation Requirements, Rev 4
SP1302-3.3, WDL-FT-84 Channel Calibration, Rev 14A

Effluent Discharge Permits:

Gaseous

G-2013-00027, Waste Gas Decay Tank (WGDT) – A
G-2013-08011, Reactor Building Purge
G-2013-09012, WGDT - B

Liquid

L-2013-09063, WDL-T-11B, WECST-B
L-2013-09068, WDL-T-11A, WECST-A

Effluent Radiation Monitor Calibration Procedure Records

SP-1302-17.7, RM-A-14 Radiation Monitor & Sampler Flow Instrumentation
Channel Calibration, Rev 17
SP-1302-3.1B, RM-L-6 and RM-L-7 Liquid Monitor Calibration, Rev 12
SP-1302-3.3, WDL-FT-84 Channel Calibration, Rev 14A
SP 1303-4.15E, RM-A14 Radiation Monitor & Sampler Flow Instrumentation
Channel Test, Rev 19

Miscellaneous Reports

50.75 (g) Decommissioning Files

2012 Annual Radioactive Effluent Release Report

Groundwater Protection Program Report for 2012

Groundwater Sampling Results for 2013 through September 9, 2013

Monthly, Quarterly, and Annual Dose Projections for 2013 through August 2013

IR 1427189 1537065 1385497 1515261 1500776

Section 40A1: Performance Indicator VerificationProcedures

LS-AA-2080, Monthly Data Element for NRC Safety System Functional Failures, Rev. 4

Miscellaneous

IR 1552178 1561496

Section 40A2: Problem Identification and ResolutionProcedures

Exelon Generation procedure ER-AP-420-0051, Revision 18;

CONDUCT OF STEAM GENERATOR PROGRAM ACTIVITIESAnalysis/Calculations

AREVA CALCULATION SUMMARY SHEET, 32-9075183-220, TMI-1, NEI 9706

AREVA ENGINEERING INFORMATION RECORD, Document No: 51-9121190-000, EOTSG
Empirical Wear ProjectionsAREVA NP Inc. 77-5071314-004, Enhanced Once-Through Steam Generator (EOTSG)
Report For Exelon Inc. Three Mile Island, October 2009

AREVA NP Inc., Engineering Information Record, Document No: 51-9121190-000,

AREVA NP Inc., Engineering Information Record, Document No: 51-9172250-000,

Condition Monitoring and Operational Assessment of TMI-1 Steam Generators at 1R19,
11/14/11Design Analysis No.: 32-9057611; TMI EOTSG Operational Transients FIV Analysis,
Revision 2, 12/3/09Design Analysis No.: 51-9023556; TMI EOTSG Tube Bundle FIV Summary Report, Revision 2,
11/17/09Design Specification For TMI-1 Replacement Steam Generator; 08-5056319-10, Revision 10,
12/17/2009; ATTACHMENT 4, OWNER'S REVIEW OF DESIGN SPECIFICATION
EOTSG Empirical Wear Projections, 9/30/09

ECR 06-00935, 50.59 SCREENING FORM - TMI-1 ONCE THROUGH STEAM, Revision 2

ECR 06-00935, 50.59 APPLICABILITY REVIEW FORM - TMI-1 ONCE THROUGH STEAM
GENERATOR REPLACEMENT, Revision 2ECR 06-00935, 50.59 REVIEW - TMI-1 ONCE THROUGH STEAM GENERATOR
REPLACEMENT, Revision 2TMI UNIT 1 OUTAGE T1R19 STEAM GENERATOR DEGRADATION ASSESSMENT,
REVISION 0, 10/19/11TMI UNIT 1 OUTAGE T1R19 STEAM GENERATOR CONDITION MONITORING
AND OPERATIONAL ASSESSMENT, REVISION 0, 11/16/11

TMI-1 RSG ASME Design Report, 33-9018465-003, Revision 003, 1/8/10; ATTACHMENT 7,

OWNER'S REVIEW FORM FOR DESIGN/STRESS REPORT, 1/9/10

Action and Condition Reports

IR-1287166: Exelon AR, Unexpected Degradation in EOTSGs

CR-2011-8212: AREVA EOTSG Tube-to-Tube Wear Root Cause Report, 6/13/13

LIST OF ACRONYMS

| | |
|-------|---|
| AC | Alternate Current |
| ADAMS | Agencywide Documents Access and Management System |
| ALARA | As Low As Reasonably Achievable |
| ASME | American Society of Mechanical Engineers |
| CFR | Code of Federal Regulations |
| CR | Condition Report |
| DHRS | Decay Heat Removal System |
| DRP | Division of Reactor Projects |
| DRS | Division of Reactor Safety |
| DRWS | Decay River Water System |
| EDG | Emergency Diesel Generator |
| EPIP | Emergency Plan Implementing Procedures |
| GL | [NRC] Generic Letter |
| HXs | Heat Exchangers |
| ICCS | Intermediate Closed Cooling System |
| IP | [NRC] Inspection Procedure |
| IR | Issue Report |
| IST | In-Service Testing |
| NEI | Nuclear Energy Institute |
| NRC | Nuclear Regulatory Commission |
| NSIR | Office of Nuclear Security and Incident Response |
| NSRWS | Nuclear Service River Water System |
| ODCM | Offsite Dose Calculation Manual |
| PARS | Publicly Available Records |
| SSC | Structure, System, or Component |
| TMI | Three Mile Island Unit 1 |
| TS | Technical Specifications |
| UFSAR | Updated Final Safety Analysis Report |
| UT | Ultrasonic Testing |
| WECST | Waste Evaporator Condensate Storage Tank |
| WGDT | Waste Gas Decay Tank |