



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

November 4, 2011

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 5000289/2011004

Dear Mr. Pacilio:

On September 30, 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 October 12, 2011, with Mr. Glen Chick, 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 of significance 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 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,

A handwritten signature in cursive script, appearing to read "Travis L. Tate".

Travis L. Tate, Acting Chief
Projects Branch 6
Division of Reactor Projects

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

Enclosure: Inspection Report 05000289/2011004
w/Attachment: Supplemental Information

cc w/encl: Distribution via ListServ

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ML113080106

SUNSI Review Complete: TLT (Reviewer's Initials)

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U.S. NUCLEAR REGULATORY COMMISSION
REGION 1

Docket No: 50-289

License No: DPR-50

Report No: 05000289/2011004

Licensee: Exelon Generation Company

Facility: Three Mile Island Station, Unit 1

Location: Middletown, PA 17057

Dates: July 1 through September 30, 2011

Inspectors: D. Werkheiser, Senior Resident Inspector
J. Heinly, Resident Inspector
R. Nimitz, Senior Health Physicist
D. Kern, Senior Reactor Inspector

Approved by: T. Tate, Acting Chief
Reactor Projects Branch 6
Division of Reactor Projects

Enclosure

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SUMMARY OF FINDINGS

IR 05000289/2011004; 7/1/2011-9/30/2011; Three Mile Island, Unit 1; Integrated Inspection Report.

The report covered a three-month period of baseline inspection conducted by resident inspectors and announced inspections by a regional specialist inspector. 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.

No findings of significance were identified.

REPORT DETAILS

Summary of Plant Status

Three Mile Island, Unit 1 (TMI) began the inspection period at approximately 100 percent power. On September 2, TMI reduced power to perform turbine valve testing and then continued to reduce power to 50 percent to perform planned condenser water box leak search and repairs. Reactor power was returned to 100 percent on September 5 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 (711111.01 – 3 samples of AW)

Impending Adverse Weather (AW)

a. Inspection Scope

The inspectors reviewed Exelon's readiness and response to the listed three adverse weather events. The inspectors reviewed station implementation of OP-AA-108-111-1001, Severe Weather and Natural Disaster Guidelines, Rev. 5 and OP-TM-108-111-1001, TMI Site Inaccessibility Plan, Rev. 3. The inspectors performed station walkdowns, interviewed operators and security officers, and observed plant operations prior to, during, and after each of the events to verify TMI operation was consistent with Technical Specifications (TS), that the security plan was properly implemented, and emergency response organization (ERO) capabilities were maintained in accordance with EP-AA-1009, Radiological Emergency Plan Annex for TMI Station, Rev. 16. As a result of the storms, emergency notification sirens became inoperable after hurricane Irene and Lee. Exelon instituted appropriate compensatory actions to maintain adequate emergency notification, as necessary. The inspectors reviewed the compensatory actions as well as reportability criteria. In addition, the inspectors walked down plant area to identify indications of rain water intrusion and reviewed its potential impact on plant equipment. Documents reviewed are listed in the Attachment.

- Severe thunderstorms and high winds (July 25)
- High winds and precipitation associated with Hurricane Irene (August 26-28)
- High winds, precipitation, and flooding associated with Hurricane Lee (September 7-10)

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

a. Inspection Scope

Partial System Walkdowns (71111.04Q – 2 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
- 'A' train motor-driven emergency feedwater system during 'B' train testing on September 15

The inspectors selected these systems based on their risk-significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors reviewed applicable operating procedures, system diagrams, the Updated Final Safety Analysis Report (UFSAR), technical specifications, work orders, 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. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R05 Fire Protection

.1 Resident Inspector Quarterly Walkdowns (71111.05Q – 3 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. Documents reviewed are listed in the Attachment. Fire zones and areas inspected included:

- Fire Zone FH-FZ-2, Fuel Handling Building Elevation 305', General Area
- Fire Zone DG-FA-2, Diesel Generator Building, EG-Y-1B Room and Control Panel
- Fire Zone SBO Fuel Oil Tank Room, SBO Diesel Fuel Oil Tank Room

b. Findings

No findings were identified.

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

a. Inspection Scope

The inspectors observed a fire brigade drill scenario conducted on September 6, 2011 that involved a simulated fire in the Intermediate Building 295-foot level, at the instrument air compressor cubicle. The inspectors evaluated the readiness of the plant fire brigade to fight fires. The inspectors verified that Exelon personnel identified deficiencies, openly discussed them in a self-critical manner at the debrief, and took appropriate corrective actions as required. The inspectors evaluated specific attributes as follows:

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

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

b. Findings

No findings were identified.

1R06 Flood Protection (71111.06 – 1 sample)

a. Inspection Scope

On July 19, the inspectors reviewed the UFSAR, the applicable flooding analysis, plant procedures, and performed visual inspections of flood barriers, system boundaries, water line break sources, and floor drains located in the makeup pump cubicles vault where internal flooding could adversely affect safety related systems needed for safe shutdown of the plant. Specifically, the inspectors reviewed the design and execution of flood indications and mitigation strategies for internal flooding of the cubicles. The inspectors also reviewed the corrective action program to determine if internal flooding mitigation and indication deficiencies were identified and corrected. Documents reviewed are listed in the Attachment.

c. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program (71111.11Q – 1 sample)Resident Inspector Quarterly Reviewa. Inspection Scope

On August 19, 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.

The inspectors reviewed the operators' ability to correctly evaluate the simulator training scenario and implement the emergency plan. 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 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. Documents reviewed are listed in the Attachment.

- Fire service pump 1 overheat during testing, July 15, 2011 (IR 1240433)
- Decay river system piping integrity deficiencies, September 13, 2011 (IR 1262612)

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 4 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. Documents reviewed are listed in the Attachment

- Station planned activities during high grid load conditions and high Susquehanna River temperature on July 22
- Elevated station risk during adverse weather conditions and planned station blackout diesel generator maintenance on July 25
- Planned surveillance testing on the heat sink protection system and the preservation of 'green' risk condition by crediting operator actions to manipulate the emergency feedwater (EFW) injection valves on August 9
- The planned replacement of the 'A' decay heat relief valve, DH-V-60, and the review of station's evaluations to ensure availability of the decay heat removal system on August 31

b. Findings

No findings were identified.

1R15 Operability Evaluations (71111.15 – 2 samples)

a. Inspection Scope

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

- Issues identified in IR 01253738 regarding nuclear service to reactor river system check valve, NS-V-205, failing to seat on August 21

- Nuclear service to reactor river system cross connect valve, NS-V-135, failure on September 1

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. Documents reviewed are listed in the Attachment.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18 – 1 sample)

Temporary Modifications

a. Inspection Scope

The inspectors reviewed the temporary modifications 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. Documents reviewed are listed in the Attachment.

- Engineering Change Request (ECR) 11-00313, Rev. 1, Technical Evaluation to Justify Addition of Underwater Demineralizer in Spent Fuel Pool

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. Documents reviewed are listed in the Attachment.

- On July 15, the 'B' spent fuel pool cooling pump motor was replaced during planned preventive maintenance for the system. Operators performed 1300-3EB, IST of "B" SF Pump and Valves, Rev. 3 (WO R2180708) as a post maintenance test
- On July 27, maintenance activities to emergency diesel generator, EG-Y-1A, ventilation fan, AH-E-29A (AR A2282771)
- On August 4, the control building emergency ventilation filter, AH-F-3A, was removed from service for replacement of the selected charcoal filter banks. Operators performed 1303-11.13, Control Room Filtering System Test, Rev. 21 as a post maintenance test for operability (WO R2166809)
- On August 24, replacement of ESAS relays and subsequent testing and visual inspection per 1303-5.1A (WO R218295301)
- On September 17, testing of 'B' reactor river water pump after maintenance activities (OP-TM-534-204)
- On September 21, technicians replaced relays in the ESAS and operations performed post maintenance testing in accordance with 1303-5.2A, "A" Emergency Loading Sequence and HPI Logic Channel/Component test, Rev. 6 (WO R2184413)

b. Findings

No findings were identified.

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

a. Inspection Scope

The inspectors observed activities during the quarter to assess Exelon's preparation for a refueling outage. The inspectors reviewed or observed the following:

- New fuel receipt and inspection, including the movement of nuclear fuel in the spent fuel pool
- Attended pre-outage readiness meetings
- Observed the setup of scaffolding in safety-related and radiologically controlled areas

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 5 samples)

a. Inspection Scope (5 routine surveillance samples)

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. Documents reviewed are listed in the Attachment. The inspectors reviewed the following surveillance tests:

- On July 13, 3303-A3, Fire Pump Capacity Testing, Rev. 17
- On August 5, OP-TM-214-254, BS Leakage Exam Train B, Rev. 3, performance of a leakage exam on the 'B' building spray system
- On August 2, ST1303-11.37A, HSPS – OTSG Level and Pressure Channel I Tests, Rev. 28
- On September 15, OP-TM-300-302, Quadrant Power Tilt and Axial Power Imbalance Using the Out-of-Core Detector System, Rev. 1
- On September 30, ST1302-6.14, PORV and Code Safety D/P Monitors, Rev. 15b

b. Findings

No findings were identified.

1EP6 Drill Evaluation (71114.06 - 2 samples)

Emergency Preparedness Drill Observation

a. Inspection Scope

The inspectors evaluated the conduct of routine Exelon emergency drills on August 8 and September 20, 2011 to identify any weaknesses and deficiencies in the classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the simulator and technical support center to determine whether the event classification, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended the station drill critique to compare inspector observations with those identified by Exelon staff in order to evaluate Exelon's critique and to verify whether Exelon staff was appropriately identifying weaknesses and entering them into the corrective action program. Documents reviewed are listed in the Attachment.

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstone: Occupational Radiation Safety (OS)

2RS01 Access Control to Radiologically Significant Areas (71124.01)

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 Technical Specifications, and applicable station procedures.

The inspectors reviewed Performance Indicators (PIs) for the Occupational Exposure Cornerstone. The inspectors also reviewed the results of recent radiation protection program audits and assessments and any reports of operational occurrences related to occupational radiation safety since the last inspection. Documents reviewed are listed in the Attachment.

Radiological Hazard Assessment

The inspectors discussed plant operations to identify any significant new radiological hazard for onsite workers or members of the public. The inspectors assessed the potential impact of the changes (e.g., fuel integrity status) and the implementation of periodic monitoring, as appropriate, to detect and quantify the radiological hazard.

The inspectors toured various radiological controlled areas and reviewed radiological surveys from selected plant areas (auxiliary building and spent fuel pool areas) to verify that the thoroughness and frequency of the surveys were appropriate for the given radiological hazard. The inspectors selectively reviewed radiological controls for change-out of the make-up filter radiation work permit (RWP) No. 11-14.

The inspectors selectively reviewed posted radiological surveys during plant tours and compared measurements to independent survey measurements made by the inspectors. During plant tours, the inspectors selectively challenged three Locked High Radiation Areas doors.

Instructions to Workers

The inspectors toured the radiological controlled areas and reviewed the labeling of radioactive material containers.

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. (See Section 4OA2)

b. Findings

No findings were identified.

2RS02 Occupational ALARA Planning and Controls (71124.02)

a. Inspection Scope

The inspectors selectively reviewed information regarding plant collective exposure history, current exposure trends, and ongoing or planned activities in order to assess current performance and exposure challenges.

The inspectors determined the site-specific trends in collective exposures (using NUREG-0713, "Occupational Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities," and plant historical data) and source term.

The inspectors reviewed site-specific procedures associated with maintaining occupational exposures as low as reasonably achievable (ALARA) including processes used to estimate and track exposures from specific work activities. Documents reviewed are listed in the Attachment.

Radiological Work Planning

The inspectors obtained a list of completed and planned work activities ranked by actual or estimated exposure (> 5 person-rem or radiological risk significant). The inspectors attended a monthly Station ALARA Committee meeting (No. 11-07).

The inspectors reviewed the ALARA work activity evaluations (reactor disassembly/reassembly, fuel movement, scaffolding, steam generator inspection, cavity decontamination), exposure estimates, and exposure mitigation requirements. The inspectors determined if the licensee reasonably grouped the radiological work into work activities, based on historical precedence, industry norms, and/or special circumstances. The inspectors reviewed shutdown coolant clean-up plans.

The inspectors selectively verified that the licensee's planning identified appropriate dose mitigation features; considered, commensurate with the risk of the work activity, alternate mitigation features; and defined reasonable dose goals. The inspectors selectively verified that ALARA requirements were being incorporated into work procedure and RWP documents.

Verification of Dose Estimates and Exposure Tracking Systems

The inspectors selected work activities (> 5 person-rem work activities and selected risk significant activities) and reviewed the assumptions and basis (including dose rate and man-hour estimates) for the current annual collective exposure estimate for reasonable accuracy. The inspectors reviewed applicable procedures to determine the methodology for estimating exposures from specific work activities and the intended dose outcome.

The inspectors verified, for the selected work activities, that the licensee had established measures to track, trend, and if necessary to reduce, occupational doses for ongoing work activities. The inspectors selectively reviewed and verified that trigger points or