

UNITED STATES NUCLEAR REGULATORY COMMISSION

REGION III 2443 WARRENVILLE ROAD, SUITE 210 LISLE, IL 60532-4352

May 13, 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: QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2 – NRC TEMPORARY INSTRUCTION 2515/183 INSPECTION REPORT 05000254/2011010; 05000265/2011010

Dear Mr. Pacilio:

On April 26, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Quad Cities Nuclear Power Station, Units 1 and 2, using Temporary Instruction 2515/183, "Followup to the Fukushima Daiichi Nuclear Station Fuel Damage Event." The enclosed inspection report documents the inspection results which were discussed on April 26, 2011, with Mr. Prospero and other members of your staff.

The objective of this inspection was to promptly assess the capabilities of Quad Cities Nuclear Power Station to respond to extraordinary consequences similar to those that have recently occurred at the Japanese Fukushima Daiichi Nuclear Station. The results from this inspection, along with the results from this inspection performed at other operating commercial nuclear plants in the United States, will be used to evaluate the U.S. nuclear industry's readiness to safely respond to similar events. These results will also help the NRC to determine if additional regulatory actions are warranted.

All of the potential issues and observations identified by this inspection are contained in this report. The NRC's Reactor Oversight Process will further evaluate any issues to determine if they are regulatory findings or violations. Any resulting findings or violations will be documented by the NRC in the next quarterly report. You are not required to respond to this letter.

M. Pacilio

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be made 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), accessible from the NRC Web site at <u>http://www.nrc.gov/reading-rm/adams.html</u> (the Public Electronic Reading Room).

Sincerely,

/**RA**/

Mark A. Ring, Chief Branch 1 Division of Reactor Projects

Docket Nos. 50-254; 50-265 License Nos. DPR-29; DPR-30

Enclosure: Inspection Report 05000254/2011010; 05000265/2011010

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U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos: License Nos:	50-254, 50-265 DPR-29, DPR-30
Report No:	05000254/2011010 and 05000265/2011010
Licensee:	Exelon Generation Company, LLC
Facility:	Quad Cities Nuclear Power Station, Units 1 and 2
Location:	Cordova, IL
Dates:	March 23 through April 29, 2011
Inspectors:	J. McGhee, Senior Resident Inspector B. Cushman, Resident Inspector C. Mathews, Illinois Emergency Management Agency
Approved by:	M. Ring, Chief Projects Branch 1 Division of Reactor Projects

SUMMARY OF FINDINGS

IR 05000254/2011010; 05000265/2011010, 03/23/2011 – 04/29/2011; Quad Cities Nuclear Power Station Temporary Instruction 2515/183 - Followup to the Fukushima Daiichi Nuclear Station Fuel Damage Event.

This report covers an announced Temporary Instruction inspection. The inspection was conducted by Resident and Region III 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, dated December 2006.

INSPECTION SCOPE

The intent of the TI (Temporary Instruction) is to provide a broad overview of the industry's preparedness for events that may exceed the current design basis for a plant. The focus of the TI was on (1) assessing the licensee's capability to mitigate consequences from large fires or explosions on site, (2) assessing the licensee's capability to mitigate station blackout (SBO) conditions, (3) assessing the licensee's capability to mitigate internal and external flooding events accounted for by the station's design, and (4) assessing the thoroughness of the licensee's walk downs and inspections of important equipment needed to mitigate fire and flood events to identify the potential that the equipment's function could be lost during seismic events possible for the site. If necessary, a more specific follow-up inspection will be performed at a later date.

INSPECTION RESULTS

All of the potential issues and observations identified by this inspection are contained in this report. The NRC's Reactor Oversight Process will further evaluate any issues to determine if they are regulatory findings or violations. Any resulting findings or violations will be documented by the NRC in a separate report.

03.01 Assess the licensee's capability to mitigate conditions that result from beyond design basis events, typically bounded by security threats, committed to as part of NRC Security Order Section B.5.b issued February 25, 2002, and severe accident management guidelines and as required by Title 10 of the Code of Federal Regulations (10 CFR) 50.54(hh). Use Inspection Procedure (IP) 71111.05T, "Fire Protection (Triennial)," Section 02.03 and 03.03 as a guideline. If IP 71111.05T was recently performed at the facility, the inspector should review the inspection results and findings to identify any other potential areas of inspection. Particular emphasis should be placed on strategies related to the spent fuel pool. The inspection should include, but not be limited to, an assessment of any licensee actions to:

Licensee Action	Describe what the licensee did to test or inspect equipment.
a. Verify through test or inspection that equipment is available and functional. Active equipment shall be tested and passive equipment shall be walked down and inspected. It is not expected that permanently installed equipment that is tested under an existing regulatory testing program be retested.	Licensee actions included the identification of equipment (active and passive) utilized for implementation of B.5.b actions and any additional equipment credited for use in Severe Accident Management Guidelines (SAMGs). The scope of the equipment was defined as that equipment specifically designated for B.5.b or SAMG implementation (i.e., hoses, fittings, etc.). Permanent plant equipment was not considered in the scope since it is normally in service, subjected to planned maintenance, and/or checked on operator rounds. The licensee then identified surveillances for the identified equipment and reviewed the results of recent tests. Active equipment within the defined scope that had not been tested recently was tested as part of the licensee's evaluation. Passive equipment within the scope was walked down and inspected.
This review should be done for a reasonable sample of mitigating strategies/equipment.	Describe inspector actions taken to confirm equipment readiness (e.g., observed a test, reviewed test results, discussed actions, reviewed records, etc.). The licensee's actions as discussed above were completed prior to the issuance of NRC TI 2515/183. The inspectors assessed the licensee's capabilities by conducting a review of the licensee's walkdown activities and reviewed all items entered into the licensee's corrective actions program (CAP) as a result of these activities. In addition, the inspectors independently walked down and inspected all major B.5.b equipment on site. The inspectors' independent walkdowns confirmed the results obtained by the licensee.

Discuss general results including corrective actions by licensee.
All equipment designated for use in the SAMGs is considered permanent plant equipment. The licensee verified all equipment credited for B.5.b, and the SAMGs was able to be implemented using approved procedures. All passive equipment was walked down and verified to be in place and ready for use. Passive equipment which had surveillance and/or preventative maintenance tasks had those activities reviewed to verify readiness for use.
All active equipment was verified in place by the licensee. The licensee performed a 24-hour endurance run of the B.5.b pump as well as performing a surveillance to run the portable diesel-driven direct current generator.
No loss of function or inability to perform was identified. No performance deficiencies that relate to the state of readiness were identified. Minor enhancements were entered into the licensee's CAP.

Describe the licensee's actions to verify that procedures are in place and can be executed (e.g., walkdowns, demonstrations, tests, etc.).
Licensee actions included the identification of the procedures utilized to mitigate the consequences of a B.5.b and 10 CFR 50.54(hh) related events and severe accidents. The licensee verified procedures were current, and personnel were assigned to conduct walkdowns of applicable procedures to verify the ability of the procedures to be executed.
Describe inspector actions and the sample strategies reviewed. Assess whether procedures were in place and could be used as intended.
The licensee's actions as discussed above were completed prior to the issuance of NRC TI 2515/183. The inspectors assessed the licensee's capabilities by conducting a review of the licensee's walkdown activities and reviewed all items entered into the licensee's CAP as a result of these activities. In addition, the inspectors selected a sample of the procedures walked down by the licensee and walked those down to independently verify the licensee's conclusions.

Discuss general results including corrective actions by licensee.
The licensee reviewed SAMG strategies and did not identify any issues. Procedures used for B.5.b and SAMG implementation were reviewed by the licensee, and walkdowns were performed to ensure actions taken could be performed. Minor enhancements were identified by the licensee and entered into the CAP.

Licensee Action	Describe the licensee's actions and conclusions regarding training and qualifications of operators and support staff.
c. Verify the training and qualifications of operators and the support staff needed to implement the procedures and work instructions are current for activities related to Security Order Section B.5.b and severe accident management guidelines as required by 10 CFR 50.54 (hh).	Licensee actions included the identification of training/qualification requirements for operators for the implementation of actions needed to mitigate a B.5.b-related event and for the implementation of actions needed for the SAMGs. In addition, the licensee identified the training/qualification requirements for applicable emergency response organization (ERO) command and support staff for the implementation of actions needed to mitigate a B.5.b related event, and for the implementation of actions needed for the SAMGs, and documented that ERO command and support staff training requirements were current.
	Describe inspector actions and the sample strategies reviewed to assess training and qualifications of operators and support staff.
	The licensee's actions as discussed above were completed prior to the issuance of NRC TI 2515/183. The inspectors assessed the licensee's training and qualification activities by conducting a review of training and qualification materials and records related to B.5.b and SAMG event response.

Discuss general results including corrective actions by licensee.
The training requirements, qualifications, and associated records needed for operators for the implementation of SAMGs and B.5.b event response were reviewed by the licensee. Training was identified for shift managers, shift engineers, and unit supervisors. Verification was made that the training requirements were embedded within the position qualifications for the operators. The licensee confirmed that all shift operators are required to verify their qualifications prior to assuming a shift position. The training requirements, qualifications, and associated records needed for ERO command and support staff for the implementation of actions needed to mitigate a B.5.b event or implement the SAMGs were also reviewed. All ERO command and support staff training requirements were verified as current by the licensee.

Licensee Action	Describe the licensee's actions and conclusions regarding applicable agreements and contracts are in place.
d. Verify that any applicable agreements and contracts are in place and are capable of meeting the conditions needed to mitigate the consequences of	Licensee actions included the identification of all applicable contracts and agreements committed to be in place for the mitigation of a B.5.b related event. The licensee verified that the contracts and agreements were current, and documented whether or not the contracts/agreements were capable of meeting the mitigation strategy.
these events. This review should be done for a reasonable sample of mitigating	For a sample of mitigating strategies involving contracts or agreements with offsite entities, describe inspector actions to confirm agreements and contracts are in place and current (e.g., confirm that offsite fire assistance agreement is in place and current).
strategies/equipment.	The licensee's actions as discussed above were completed prior to the issuance of NRC TI 2515/183. The licensee currently has one contract and one Memorandum of Understanding (MOU) within this scope. The licensee has a MOU with the Cordova Fire Protection District that is renewed annually and was signed on October 19, 2010. The licensee has a contract with Kidde Fire Fighting to be supplied with aqueous film forming foam; that contract will expire in 2021. The inspectors' review of the agreements verified that they were current, and that they were adequate for meeting the licensee's mitigation strategy.

Discuss general results including corrective actions by licensee.
The licensee reviewed their agreements with the Cordova Fire Protection District and Kidde Fire Fighting. Both agreements were verified current and adequate for meeting the licensee's mitigation strategy.

Licensee Action	Document the corrective action report number and briefly summarize problems noted by the licensee that have significant potential to prevent the success of any existing mitigating strategy.
e. Review any open corrective action documents to assess problems with mitigating strategy implementation identified by the licensee. Assess the impact of the problem on the mitigating capability and the remaining capability that is not impacted.	The inspectors reviewed each issue report (IR) that was generated as a result of these walkdowns for potential impact to the licensee's mitigation strategies. No items of significance were identified. No loss of function or inability to perform was identified. No performance deficiencies that relate to the state of readiness were identified.

Licensee Action	Describe the licensee's actions to verify the adequacy of equipment needed to mitigate a SBO event.
 Verify through walkdowns and inspection that all required materials are adequate and properly staged, tested, and maintained. 	Licensee actions included the identification of equipment utilized/required for mitigation of SBO. The licensee then conducted walkdowns of this equipment to ensure they were adequate and properly staged. Additionally, the licensee also conducted a review of open CAP items for potential SBO equipment impact.
	Describe inspector actions to verify equipment is available and useable.
	The inspectors assessed the licensee's capability to mitigate SBO conditions by conductin a review of the licensee's walkdown activities. In addition, the inspectors selected a samp of equipment utilized/required for mitigation of a SBO and conducted independent walkdowns of that equipment to verify that the equipment was properly aligned and staged
	Discuss general results including corrective actions by licensee.
	The licensee's reviews verified that SBO equipment was ready to respond to a SBO condition.
	The inspectors reviewed each IR that was generated as a result of these walkdowns for potential impact to the licensee's mitigation strategies. No loss of function or inability to perform was identified. No performance deficiencies that relate to the state of readiness were identified. Minor enhancements were entered into the licensee's CAP.

Licensee Action	Describe the licensee's actions to verify the capability to mitigate a SBO event.
b. Demonstrate through walkdowns that procedures for response to a SBO are executable.	Licensee actions included the identification of procedures required for response to a SBO, along with verification that the identified procedures were current and that no critical revision requests were in place. The licensee then verified that the mitigating procedures had been properly validated.
	Describe inspector actions to assess whether procedures were in place and could be used as intended.
	The inspectors assessed the licensee's capabilities by conducting a review of the licensee's walkdown activities. In addition, the inspectors selected a sample of the procedures walked down by the licensee and walked those down to independently verify the licensee's conclusions.
	Discuss general results including corrective actions by licensee.
	Actions to start the SBO diesel generators and supply electrical power to essential buses are performed from the control room with permanently installed plant equipment. All procedures credited for mitigation of a SBO event were able to be performed. No current issues were identified by the licensee.
	The inspectors reviewed each IR that was generated as a result of these walkdowns for potential impact to the licensee's mitigation strategies. No loss of function or inability to perform was identified. No performance deficiencies that relate to the state of readiness were identified. Minor enhancements were entered into the licensee's CAP.

03.03 Assess the licensee's capability to mitigate internal and external flooding events required by station design. Refer to IP 71111.01, "Adverse Weather Protection," Section 02.04, "Evaluate Readiness to Cope with External Flooding," as a guideline. The inspection should include, but not be limited to, an assessment of any licensee actions to verify through walkdowns and inspections that all required materials and equipment are adequate and properly staged. These walkdowns and inspections that accessible doors, barriers, and penetration seals are functional.

Licensee Action	Describe the licensee's actions to verify the capability to mitigate existing design basis flooding events.			
a. Verify through walkdowns and inspection that all required materials are adequate and properly staged, tested, and maintained.	Licensee actions included the identification of equipment and penetration seals utilized/required for mitigation of internal and external flooding. The licensee then conducted walkdowns of this equipment to ensure it was adequate and properly staged. Doors, barriers, and penetration seals that were utilized for mitigation of flooding were identified and inspected to ensure functionality. Where routine inspections were not performed or could not be relied upon to ensure functionality, the licensee performed walkdowns and inspections to ensure that the components were functional.			
	Describe inspector actions to verify equipment is available and useable. Assess whether procedures were in place and could be used as intended.			
	The inspectors assessed the licensee's capabilities to mitigate flooding by conducting a review of the licensee's walkdown activities. The inspectors conducted independent walkdowns of selected flood mitigation equipment. Licensee flood mitigation procedures were reviewed to verify usability.			
	Discuss general results including corrective actions by licensee.			
	The licensee's reviews confirmed that all flood doors were inspected as part of a routine maintenance program. Flood barriers and penetrations that also serve as fire barriers were determined by the licensee to have been inspected on a routine basis as part of the site's fire protection program. However, the barriers and penetrations, that were not part of the fire protection program, were identified as not being routinely inspected. Where accessible,			

the licensee walked down these flood barriers and penetrations as part of their review for this item. All of the flood doors were inspected and found to have no noted deficiencies.
The inspectors reviewed each IR that was generated as a result of these walkdowns for potential impact to the licensee's mitigation strategies. No loss of function or inability to perform was identified. No performance deficiencies that relate to the state of readiness were identified. Minor enhancements were entered into the licensee's CAP.

03.04 Assess the thoroughness of the licensee's walkdowns and inspections of important equipment needed to mitigate fire and flood events to identify the potential that the equipment's function could be lost during seismic events possible for the site. Assess the licensee's development of any new mitigating strategies for identified vulnerabilities (e.g., entered it in to the corrective action program and any immediate actions taken). As a minimum, the licensee should have performed walkdowns and inspections of important equipment (permanent and temporary), such as storage tanks, plant water intake structures, and fire and flood response equipment; and developed mitigating strategies to cope with the loss of that important function. Use IP 71111.21, "Component Design Basis Inspection," Appendix 3, "Component Walkdown Considerations," as a guideline to assess the thoroughness of the licensee's walkdowns and inspections.

Licensee Action	Describe the licensee's actions to assess the potential impact of seismic events on the availability of equipment used in fire and flooding mitigation strategies.				
a. Verify through walkdowns that all required materials are adequate and properly staged, tested, and maintained.	Licensee actions included the identification of equipment utilized/required for mitigation of fire and flood events. An engineering inspection plan was established by the licensee to govern the conduct of walkdowns and inspections. Licensee engineering personnel determined if the equipment was seismically qualified and assessed the resulting damage if the equipment failed during a seismic event. Seismic vulnerabilities, including storage locations, were identified, along with mitigating strategies for equipment that was not seismically qualified.				

Describe inspector actions to verify equipment is available and useable. Assess whether procedures were in place and could be used as intended.
Licensee flood and fire mitigation procedures were reviewed to verify usability.
The inspectors assessed the licensee's capabilities by conducting a review of the licensee's walkdown activities and reviewed all items entered into the licensee's CAP as a result of these activities. The inspectors performed an independent assessment of any potential vulnerabilities of non-seismic fire protection equipment impacting the operation of safety-related equipment.
Discuss general results including corrective actions by licensee. Briefly summarize any new mitigating strategies identified by the licensee as a result of their reviews.
The licensee's reviews determined that non-safety related structures, systems, and components were not considered to be seismically qualified due to a variety of issues. The majority of room flood mitigation sump pumps and flooding detectors were not designed as seismically qualified. Similarly, the fire protection system was not designed as seismically qualified, and the B.5.b equipment is not stowed in a seismically qualified building.
The inspectors reviewed each IR that was generated as a result of these walkdowns for potential impact to the licensee's mitigation strategies. No loss of function or inability to perform was identified. No performance deficiencies that relate to the state of readiness were identified. Minor enhancements were entered into the licensee's CAP.

Meetings

.1 Exit Meeting

The inspectors presented the inspection results to Mr. Prospero, and other members of licensee management, at the conclusion of the inspection on April 26, 2011. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

<u>Licensee</u>

- M. Prospero, Plant Manager
- D. Collins, Radiation Protection Manager
- S. Darin, Engineering Director
- K. Moser, Training Director
- P. Summers, Maintenance Director
- D. Thompson, Security Manager

Nuclear Regulatory Commission

M. Ring, Chief, Reactor Projects Branch 1

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

None

LIST OF DOCUMENTS REVIEWED

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety but rather that selected sections of portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

- QCOS 4100-36; Emergency Portable Pump Surveillance
- QCOS 4100-37; Portable DC Supply Diesel Driven Generator Surveillance
- QCOS 0010-15; Security Event Support Equipment Surveillance
- QCOP 4100-19; Emergency Portable Pump Operations
- QCOA 0010-20; Security Event
- QCOA 1900-01; Loss of Water Level in the Fuel Storage Pool or Reactor Cavity
- QCOP 1600-13; Post Accident Venting of the Primary Containment
- QCOP 0203-02; Emergency ADS Valve Operation Using Opposite Unit 125 Vdc or Portable dc Supply-Diesel Driven Generator
- QCOP 1300-09; RCIC Local Manual Operation
- QCOA 1900-02; Fuel Storage Pool High Temperature
- QCOA 1900-03; Loss of Fuel Pool Cooling with Unit Shutdown for Refueling
- QCOA 6100-03; Loss of Offsite Power
- QCOA 6100-04; Station Blackout
- QCOP 0201-10; Bypassing Isolation Signals to Allow Drywell Flooding or Alternate RPV Blowdown
- QCOP 1000-05; Shutdown Cooling Operation
- QCOP 1000-30; Post-Accident RHR Operation
- QCOP 6600-09; Filling of Diesel Generator Fuel Oil Tanks with Installed Systems Unavailable
- QCOP 6620-13; Energizing Bus 13-1 from SBO DG 1 during a LOOP or SBO Event
- QCOP 6620-14; Energizing Bus 14-1 from SBO DG 1 during a LOOP or SBO Event
- QOA 4700-06; Total Loss of Instrument Air
- -QOA 6900-07; Loss of AC Power to the 125 VDC Battery Chargers with Simultaneous Loss of Auxiliary Electric Power
- QCOA 0010-16; Flood Emergency Procedure
- Quad Cities Submittal to Exelon NER NC-11-009-RED

LIST OF ACRONYMS USED

- ADAMS Agencywide Documents Access and Management System
- CAP Corrective Action Program
- CFR Code of Federal Regulations
- ERO Emergency Response Organization
- IR Issue Report
- IP Inspection Procedure
- MOU Memorandum of Understanding
- NRC U.S. Nuclear Regulatory Commission
- PARS Publicly Available Records System
- SAMG Severe Accident Mitigation Guideline
- SBO Station Blackout
- TI Temporary Instruction

M. Pacilio

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Sincerely,

/**RA**/

Mark A. Ring, Chief Branch 1 Division of Reactor Projects

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Letter to M. Pacilio from M. Ring dated May 13, 2011

SUBJECT: QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2 – NRC TEMPORARY INSTRUCTION 2515/183 INSPECTION REPORT 05000254/2011010; 05000265/2011010

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