

December 21, 2004

Mr. Christopher M. Crane
President and Chief Nuclear Officer
Exelon Nuclear
Exelon Generation Company, LLC
Quad Cities Nuclear Power Station
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2
NRC INSPECTION REPORT 07200053/2004-002(DNMS)

Dear Mr. Crane:

On November 10, 2004, the NRC completed its onsite inspection activities at your Quad Cities Nuclear Power Station. The purpose of this routine team inspection was to determine whether the dry cask storage pad construction activities were conducted safely and in accordance with NRC requirements. Specifically, the inspectors observed site construction activities at the proposed dry cask storage pad site and its associated haul road. At the conclusion of onsite inspections on September 23, September 29, and November 10, 2004, the NRC inspectors discussed the preliminary inspection findings with members of your staff. A final exit meeting was conducted by telephone between members of your staff and the inspectors on December 17, 2004, to discuss the final disposition of the issues identified during the inspection.

The inspection consisted of an examination of the dry cask storage pad construction activities at the Quad Cities Nuclear Power Station as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. Areas examined during the inspection are identified in the enclosed report. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations of activities in progress, and interviews with personnel.

Based on the results of this inspection, the NRC has identified two issues. One issue was associated with a failure to space the reinforcing steel and to sample the concrete properly during the construction of an Independent Spent Fuel Storage Installation (ISFSI) pad. A second issue was associated with a failure to obtain appropriate batch plant certification signatures. The NRC has also determined that violations are associated with these issues. The violations are being treated as Non-Cited Violations (NCVs), consistent with Section VI.A of the Enforcement Policy. The current Enforcement Policy is included on the NRC web site at www.nrc.gov; select **What We Do, Enforcement**, then **Enforcement Policy**. The NCVs are described in the subject inspection report. If you contest the violation or significance of the NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001, with copies to the Regional Administrator, Region III, and the Director, Office of Enforcement, United States Nuclear Regulatory Commission, DC 20555-0001, and the Resident Inspector at the Quad Cities Nuclear Power Station.

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

Please note that on October 25, 2004, the NRC terminated public access to ADAMS and initiated an additional security review of publicly available documents to ensure that potentially sensitive information is removed from the ADAMS database accessible through the NRC's web site. Interested members of the public may obtain copies of the referenced documents for review and/or copying by contacting the Public Document Room pending resumption of public access to ADAMS. The NRC Public Documents Room is located at NRC Headquarters in Rockville, MD, and can be contacted at (800) 397-4209 or (301) 415-4737 or pdr@nrc.gov. We will gladly discuss any questions you may have regarding these inspection activities.

Sincerely,

/RA by W. Snell Acting for/

Kenneth G. O'Brien, Chief
Decommissioning Branch

Docket No. 072-00053

Enclosure: Inspection Report 07200053/2004-002(DNMS)

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No. 072-00053

Report No. 07200053/2004-002(DNMS)

Licensee: Exelon Generation Company, LLC

Facility: Quad Cities Nuclear Power Station, Units 1 and 2

Location: 22710 206th Avenue North
Cordova, IL 61242

Inspection Dates: September 21 through 23, 2004,
September 28 through 29, 2004, and
November 9 through 10, 2004

Final Exit Meeting: December 17, 2004

Inspectors: Ross B. Landsman, Project Engineer
Christopher R. Martin, Reactor Inspector
Magdalena R. Gryglak, Reactor Inspector

Approved by: Kenneth G. O'Brien, Chief
Decommissioning Branch
Division of Nuclear Materials Safety

EXECUTIVE SUMMARY

Quad Cities Nuclear Power Station NRC Inspection Report 07200053/2004-002(DNMS)

The purpose of the inspection was to review the licensee's construction activities involving its proposed dry cask storage pad located at the Quad Cities Nuclear Power Station. During this inspection period, the inspectors reviewed soil and engineering evaluations and site construction work associated with the proposed dry cask storage pad.

Independent Spent Fuel Storage Pad Construction

- The inspectors concluded that overall the construction of the proposed Independent Spent Fuel Storage Installation (ISFSI) pad met the structural provisions of the Holtec Final Safety Analysis Report (FSAR). The inspectors identified one Non-Cited Violation of 10 CFR 72.150, "Instructions, Procedures, and Drawings." Specifically, the licensee failed to: 1) appropriately space the reinforcing steel, and 2) appropriately sample concrete during a pour of an ISFSI pad. These findings are being treated as a Non-Cited Violation (NCV) consistent with Section VI.A of the NRC Enforcement Policy. (Section 1.1)
- The inspectors identified one Non-Cited Violation of Section (b) of 10 CFR 72.154, "Control of purchased material, equipment, and services." Specifically, the licensee failed to obtain an acceptable concrete batch plant Illinois Department of Transportation (IDOT) certification document that contained the appropriate signatures. This finding is being treated as a Non-Cited Violation (NCV) consistent with Section VI.A of the NRC Enforcement Policy. In addition, the inspectors identified one Unresolved Item associated with the licensee's relaxation of the requirement for (National Ready Mix Concrete Association) NRMCA certification of the concrete batch plant. (Section 1.2)

Report Details

1.0 Independent Spent Fuel Storage Pad Construction (60853)

1.1 Concrete Construction Activities

a. Inspection Scope

The inspectors evaluated whether construction of the concrete Independent Spent Fuel Storage Installation (ISFSI) pad complied with the structural provisions of the Holtec Final Safety Analysis Report (FSAR), Revision 2, "Final Safety Analysis Report for the Holtec International Storage and Transfer Operation Reinforced Module Cask System (Hi-Storm 100 Cask System)."

b. Observations and Findings

The inspectors observed that the proposed ISFSI pad concrete forms were clean and free of debris as required by applicable American Concrete Institute (ACI) standards. The inspectors observed that the concrete was transported by conveyor belt into the forms for placement. The inspectors noted that the contractor's staff ensured that concrete had an unrestricted vertical drop to the point of placement to prevent segregation of the aggregate. The contractor used a systematic pattern of vibration to ensure proper consolidation, thereby preventing voids in the concrete slabs. The inspectors also noted that the licensee and its contractor incorporated selected lessons learned from other nuclear facilities during construction of the proposed ISFSI pad.

The licensee's contractor constructed the proposed ISFSI pad in three segments due to the volume of concrete necessary to complete the project. The inspectors noted that the contractor's choice of segmentation resulted in reinforcing steel touching the form between two of the sections. If left uncorrected, the reinforcing steel would not have adequately bonded with the concrete from the adjacent pour due to a lack of horizontal embedment depth. The inspectors discussed this issue with the licensee and its contractor, who immediately resolved the issue by the addition and relocation of reinforcing steel to meet the minimum design requirements. The licensee also generated a condition report in the corrective action program (CAP) to document the finding as CAP 271839. Subsequently, the inspectors determined that the reinforcing steel was appropriately sized, and was spliced and tied as specified in Holtec Engineering Drawing No. B-2155, "Dry Fuel Storage Project Cask Storage Pad," Sheet 2, dated October 6, 2003.

The inspectors identified that the contractor staff performed the appropriate concrete testing in accordance with the appropriate ACI standard during construction of the first concrete pad segment. However, the inspectors observed the contractor sample at the beginning of a selected concrete truck pour as oppose to the ACI 301-89 standard, "Standard Specifications for Structural Concrete," that specifies testing of the concrete from mid-truck pour. The licensee committed to complying with the ACI 301-89 standard requirements in the pad design specifications, No. R-4452, "Concrete Work, Inspection and Testing for ISFSI Facilities," Revision 0, dated March 24, 2004. The inspectors engaged the licensee concerning the sampling technique and the contract

staff immediately began collecting samples during mid-pour. The licensee also documented the issue in its corrective action program, CAP 258391, Item 7. The inspectors determined that the proposed ISFSI pad concrete testing results would not be greatly affected due to the limited number of samples drawn at the beginning of a pour.

Title 10 CFR 72.150, "Instructions, Procedures, and Drawings," requires, in part, a licensee to prescribe activities affecting quality by documented instructions, procedures, or drawings of a type appropriate to the circumstances. In addition, 10 CFR 72.150 requires that these instructions, procedures, and drawings be followed.

Contrary to the above, on September 21 and September 28, the inspectors observed that the licensee did not follow the instructions, procedures, and drawings, as specified in 10 CFR 72.150. Specifically, the licensee failed to: 1) appropriately space the reinforcing steel as specified in Holtec Engineering Drawing No. B-2155, "Dry Fuel Storage Project Cask Storage Pad," Sheet 2, dated October 6, 2003, and 2) appropriately sample concrete during a pour of an ISFSI pad as specified in the ACI 301-89 standard, "Standard Specifications for Structural Concrete." These findings are considered to be a Non-Cited Violation of 10 CFR 72.150 (Violation 07200053/2004-002-01). The licensee entered these issues in its corrective action program as CAP 271839 and CAP 258391, respectively.

c. Conclusions:

The inspectors concluded that overall the construction of the proposed ISFSI pad met the structural provisions of the Holtec Final Safety Analysis Report (FSAR). The inspectors identified one Non-Cited Violation of 10 CFR 72.150, "Instructions, Procedures, and Drawings." Specifically, the licensee failed to: 1) appropriately space the reinforcing steel, and 2) appropriately sample concrete during a pour of an ISFSI pad. These findings are being treated as a Non-Cited Violation (NCV) consistent with Section VI.A of the NRC Enforcement Policy.

1.2 Concrete Batch Plant

a. Inspection Scope

The inspectors evaluated whether the concrete batch plant used by the licensee's contractor met the licensee's design criteria and structural provisions of the Holtec FSAR, Revision 2.

b. Observations and Findings

The inspectors conducted an onsite inspection of the concrete batch plant responsible for mixing concrete for the licensee's proposed ISFSI pad. The inspectors noted that a typical concrete batch plant had numerous aggregate and cement types, and the specific aggregate and cement type is selected to meet design specifications. The inspectors identified that the licensee's proposed batch plant had one coarse and one fine aggregate and one type of cement. However, the inspectors determined that the available aggregate and cement types at the facility could be mixed to meet the concrete strength requirements in Holtec's FSAR.

The inspectors observed that the three inch diameter water line meter (newly installed) was not calibrated at the time of the inspection. The inspectors noted this condition and the concrete batch plant personnel decided to use the two inch diameter water line (previous installation), which had a current calibration, to fulfill the proposed ISFSI pad concrete order. The inspectors also noted that the dry material scale indicating devices within the facility had current calibration certificates.

The inspectors reviewed the proposed concrete batch plant's Illinois Department of Transportation (IDOT) certification and determined that the certification documentation was incomplete, which made the certification package unacceptable. The inspectors determined that after the batch plant personnel had used "correction fluid" to make changes to portions of the document, they failed to obtain the signature of the certifying employee and appropriate Illinois State official. The inspectors raised this issue with licensee personnel who subsequently obtained an acceptable concrete batch plant IDOT certification document that contained the appropriate signatures. The licensee also documented this issue in its corrective action program as CAP 258391, Item 9.

Section (b) of 10 CFR 72.154, "Control of Purchased Material, Equipment, and Services," requires, in part, that the licensee have available documentary evidence that material and equipment conform to the procurement specifications prior to installation or use of material or equipment. The licensee should ensure that the evidence is sufficient to identify the specific requirements met by the purchased material and equipment.

Contrary to the above, the licensee failed to ensure that the documentary evidence was sufficient and complete to identify that the batch plant certification requirements were met. Specifically, the licensee failed to obtain an acceptable concrete batch plant IDOT certification document that contained the appropriate signatures. This finding is considered to be a Non-Cited Violation of 10 CFR 72.150 (Violation 07200053/2004-002-02). The licensee entered this issue in its corrective action program as CAP 258391, Item 9.

The inspectors identified that the contractor's proposed concrete batch plant was certified in accordance with IDOT specifications. However, the licensee's ISFSI pad design criteria prepared by Sargent & Lundy, LLC, "Concrete Work, Inspection and Testing for ISFSI Facilities," required that the concrete batch plant be certified by the National Ready Mix Concrete Association (NRMCA). The licensee consulted with Sargent & Lundy, LLC who reviewed the certification requirements of IDOT and NRMCA and determined that the IDOT certification was almost the same and documented the evaluation in a letter to the licensee dated September 24, 2004. The licensee's staff subsequently revised the design criteria to reflect certification of the concrete batch plant in accordance with IDOT requirements.

Upon further review, the inspectors determined that, although the inspection attributes were similar, the IDOT certification requirements differed from those of NRMCA. The NRMCA requirements specify that a licensed professional engineer must independently certify that the requirements (inspection attributes) are satisfied, while the IDOT certification requires only that an employee of the facility verify that the requirements are satisfied. Because no independent review by a registered NRMCA professional engineer was performed, the acceptability of the certification package was uncertain. The inspectors were informed by the licensee that it had not performed a 10 CFR 72.48 evaluation of the change from a NRMCA certification to IDOT certification. The

acceptability of the licensee's relaxation of the requirement for NRMCA certification in the design of the proposed ISFSI pad and the need for the licensee to perform a 10 CFR 72.48 evaluation if the change will be the subject of further review by the inspectors and is being tracked as Unresolved Item (URI) 07200053/2004-002-01.

c. Conclusions:

The inspectors identified one Non-Cited Violation of 10 CFR 72.154, "Control of Purchased Material, Equipment, and Services," Section (b). Specifically, the licensee failed to obtain an acceptable concrete batch plant IDOT certification document that contained the appropriate signatures. This finding is being treated as a Non-Cited Violation (NCV) consistent with Section VI.A of the NRC Enforcement Policy. In addition, the inspectors identified one Unresolved Item associated with the licensee's relaxation of the requirement for NRMCA certification of the concrete batch plant.

2.0 Inspector Follow-up Items

- a. (CLOSED) IFI 07200053/2004-001-01: Licensee analyses and calculations of the potential for soil liquefaction and its translation of earthquake data from the reactor site to the ISFSI pad location and elevation.

During the previous inspection, Inspection Report No. 07200053/2004-001(DNMS), Section 1.2, the inspectors identified that the licensee's contractor drilled six soil borings in the vicinity of the ISFSI pad and obtained soil samples for analysis. The licensee and its contractor analyzed the soil column information obtained from the soil borings to determine the expected seismic response of the ISFSI pad. This resulted in a calculated best-estimate horizontal ground acceleration of 0.323 g and a best-estimate vertical acceleration of 0.192 g at the ISFSI pad. However, using the results and methodology in Holtec's FSAR, Section 3.4.7.1, these acceleration values could not meet the screening criteria specified in the Certificate of Compliance (CoC).

Upon further review, the inspectors determined that the data was time dependent and when applying the accelerations in all three directions at the same time, the licensee met the screening criteria. Therefore, the inspectors concluded that the licensee adequately identified subsurface conditions at the ISFSI pad. This Inspector Followup Item is closed.

3.0 Exit Meeting Summary

The NRC inspectors presented the preliminary inspection results to the licensee on September 23, 2004, September 29, 2004, and November 10, 2004. On December 17, the inspectors conducted a final exit meeting by telephone to present the final results of the inspection. The licensee acknowledged the findings presented and did not identify any information discussed as being proprietary.

PARTIAL LIST OF PERSONS CONTACTED

Dan Moore	Dry Cask Storage Project Manager
Brian Maze	Project Management
Darrell Hart	Project Management
David Wirps	Nuclear Oversight
Chuck Alguire	Design Engineering
Wally Beck	Regulatory Assurance Manager
Mark Wagner	Regulatory Assurance
Bill Hass	President, Valley Construction

INSPECTION PROCEDURE USED

IP 60853 Construction of an Independent Spent Fuel Storage Installation

ITEMS OPENED, CLOSED, AND DISCUSSED

<u>Opened</u>	<u>Type</u>	<u>Summary</u>
07200053/2004-002-01	NCV	Failure to space the reinforcing steel properly and to sample concrete.
07200053/2004-002-02	NCV	Failure to obtain appropriate batch plant certification signatures.
07200053/2004-002-01	URI	Licensee's relaxation of the requirement for NRMA certification in the design of the proposed ISFSI pad.
<u>Closed</u>		
07200053/2004-001-01	IFI	The licensee's analyses and calculations of soil liquefaction potential and its translation of earthquake data.
07200053/2004-002-01	NCV	Failure to space the reinforcing steel properly and to sample concrete.
07200053/2004-002-02	NCV	Failure to obtain appropriate batch plant certification signatures.
<u>Discussed</u>		
None		

LIST OF DOCUMENTS REVIEWED

Holtec Final Safety Analysis Report, "Final Safety Analysis Report for the Holtec International Storage and Transfer Operation Reinforced Module Cask System (Hi-Storm 100 Cask System)," Revision 2

Holtec Engineering Drawing No. B-2155, "Dry Fuel Storage Project Cask Storage Pad," Sheet 2, dated October 6, 2003

American Concrete Institute, ACI 301-89, "Standard Specifications for Structural Concrete"

Pad design specifications, No. R-4452, "Concrete Work, Inspection and Testing for ISFSI Facilities," Revision 0, dated March 24, 2004

Work Order, 708968-01, "Dry Cask Storage - ISFSI Pad Construction," Revision 6

Holtec Letter, "QCGS ISFSI Rebar Clarifications," dated September 24, 2004

Holtec Letter, "QCGS ISFSI Construction Joints," dated September 24, 2004

Letter, "Comments on Questions of NRMCA Certification," dated September 24, 2004

Condition Report, CAP 271839, "Rebar for ISFSI is not within the required spec," dated November 9, 2004

Condition Report, CAP 258391, "Dry cask storage issues raised by NRC inspector," dated September 28, 2004

Condition Report, Cap 256008, "Dry Cask Storage Project - Issue raised by NRC inspector," dated September 22, 2004

Condition Report, Cap 256013, "Dry Cask Storage Project - Issue raised by NRC inspector," dated September 22, 2004

Illinois Department of Transportation, "Concrete Plant Survey"

Illinois Department of Transportation, "Annual Inspection Certification for Concrete Plant," Attachment B

LIST OF ACRONYMS USED

ADAMS	Agencywide Documents Access Management System
CAP	Corrective Action Program
CFR	Code of Federal Regulations
CoC	Certificate of Compliance
FSAR	Final Safety Analysis Report
g	acceleration of gravity
IDOT	Illinois Department of Transportation
ISFSI	Independent Spent Fuel Storage Installation

IFI	Inspector Followup Item
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
NRMCA	National Ready Mix Concrete Association
PARS	Publicly Available Records
URI	Unresolved Item