

April 6, 2007

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

SUBJECT: NRC INSPECTION REPORT 050-00295/07-01(DNMS) -
ZION NUCLEAR STATION

Dear Mr. Crane:

On March 22, 2007, the NRC completed an inspection at the Zion Nuclear Station. The purpose of the inspection was to determine whether decommissioning activities were conducted safely and in accordance with NRC requirements. Specifically, during on-site inspection on March 5 through 7, 2007, the inspector evaluated organization and management controls, spent fuel safety, radiological safety, and the circumstances regarding your February 28, 2007, telephonic report of your staff's identification of potentially missing incore detectors containing small quantities of uranium 235. In addition, on March 22, 2007, the inspectors completed an in-office review of the March 15, 2007 License Event Report regarding missing incore detectors. At the conclusion of the on-site inspection, the NRC inspector discussed the findings with members of your staff.

The inspection consisted of an examination of activities at the facility as they relate to safety and compliance with the Commission's rules and regulations. 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, field observations of activities in progress, and interviews with personnel.

Based on the results of this inspection, the NRC did not identify any cited violations. Based on our review of the circumstances regarding your report of the missing incore detectors, we concur that the issue involves a lack of adequate record keeping documenting the proper disposal of the detectors, rather than actual loss of special nuclear material.

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>.

C. Crane

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We will gladly discuss any questions you may have regarding this inspection.

Sincerely,

/RA by W. Snell Acting for/

Jamnes L. Cameron, Chief
Decommissioning Branch

Docket No. 050-00295
License No. DPR-39

Enclosure:
Inspection Report 050-00295/07-01(DNMS)

cc w/encl: Zion Nuclear Power Station Decommissioning Plant Manager
Regulatory Assurance Engineer - Zion
Senior Vice President - Nuclear Services
Vice President of Operations - Mid-West Pressurized Water Reactor
Vice President - Licensing and Regulatory Affairs
Director Licensing and Regulatory Affairs
T. O'Neill, Associate General Counsel
Document Control Desk - Licensing
J. Dale, Bureau Chief, Office of Attorney General
K. Nollenberger, County Administrator
Mayor, City of Zion
State Liaison Officer
State Liaison Officer, Wisconsin
Chairman, Illinois Commerce Commission
A. C. Settles, Illinois Emergency Management Agency
Illinois State Senator Susan Garrett

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No. 050-00295
License No. DPR-39

Report No. 050-00295/07-01(DNMS)

Licensee: Exelon Generation Company, LLC

Facility: Zion Nuclear Station

Location: 101 Shiloh Boulevard
Zion, IL 60099

Date: March 5 through 7, 2007 (on-site inspection)
March 22, 2007 (in-office review and telephone exit)

Inspector: Peter J. Lee, Ph.D., CHP, Health Physicist

Approved by: Jamnes L. Cameron, Chief
Decommissioning Branch
Division of Nuclear Materials Safety

Enclosure

EXECUTIVE SUMMARY

Zion Nuclear Station NRC Inspection Report 050-00295/07-01(DNMS)

This routine decommissioning inspection focused on the evaluation of the licensee's facility management and control, spent fuel safety, radiological safety, and the licensee's February 28, 2007, telephonic report of missing incore detectors containing small quantities of uranium 235.

Facility Management and Control

- The inspector concluded that the licensee adequately maintained the material condition of its facilities and equipment. (Section 1.1)
- The inspector concluded that the licensee adequately implemented its audit and corrective action programs in accordance with the licensee's Quality Assurance Program, and that the programs were consistent with NRC requirements. Based on discussions with plant personnel and a review of the licensee's March 15, 2007 License Event Report, the inspector concluded that the licensee's assessment of the disposition of 43 missing incore reactor detectors was adequate. (Section 1.2)

Spent Fuel Safety

- The inspector determined that the licensee properly maintained the spent fuel pool water level, temperature, chemistry, cleanliness control, and criticality control to ensure the safe wet storage of the spent fuel. The inspector also determined that the licensee had adequately performed the functional tests to ensure that abnormal spent fuel pool conditions would be made known to the operators in a timely fashion. (Section 2.1)

Radiological Safety

- The inspector concluded that the licensee effectively monitored and controlled personnel exposures to radiation, and adequately controlled contamination. (Section 3.1)
- The inspector determined that the licensee effectively implemented radiological effluent control programs and processes. The inspectors determined that no detectable tritium was found beyond the plant boundary. (Section 3.2)

Report Details

Summary of Plant Activities

During the period covered by this inspection, the licensee maintained the spent fuel in storage within the spent fuel pool.

1.0 Facility Management and Control

1.1 Decommissioning Performance and Status Review (IP 71801)

a. Inspection Scope

The inspector conducted a plant tour to assess field conditions and to evaluate the material condition of structures, systems, and components important for the safe storage of spent fuel.

b. Observations and Findings

During the plant tour, the inspector did not identify any adverse conditions which could effect plant equipment or personnel safety. The inspector did not identify any transient materials that would impact the function of structures, systems, and components important for the safe storage of spent fuel or hinder plant personnel access to important equipment.

c. Conclusions

The inspector concluded that the licensee adequately maintained the material condition of its facilities and equipment.

1.2 Self-Assessment, Auditing, and Corrective Actions (IP 40801)

a. Inspection Scope

The inspector reviewed the licensee's annual audit (NOSA-ZIN-06-12), which was conducted from December 11 through December 15, 2006. The inspector reviewed selected corrective action work orders, which were associated with deficiencies identified during the annual audit. The inspector reviewed the circumstances regarding the licensee's February 28, 2007 telephonic report concerning an accountability discrepancy of licensed material. The inspector also reviewed the March 15, 2007 Licensee Event Report (LER) regarding that loss of licensed material.

b. Observations and Findings

The licensee's annual audit included the evaluation of activities affecting plant systems, structures, and components necessary for the safe storage of spent fuel. The annual audit was consistent with license requirements in both scope and level of detail, and the licensee initiated appropriate corrective actions to resolve audit findings.

While reviewing special nuclear material (SNM) records during February 2007, the licensee identified that none of the disposition records for 43 reactor incore detectors could be found. The incore detectors were received onsite between 1972 and 1987, and were used to monitor reactor power during plant operation. The reactor incore detectors contained small quantities of U-235, with an aggregate quantity of U-235 of approximately 0.22 microcuries. While this quantity posed no significant safety hazard, it exceeded the 10 CFR 20.2201(a)(1)(ii) reportability criteria for U-235 of 0.01 microcuries. An onsite search of storage locations failed to locate the detectors. The licensee also requested that the disposal facility to which the detectors were likely sent as radioactive waste search its records of SNM waste shipments from Zion, but the detectors were not identified in any of the records reviewed.

To determine what may have become of the detectors, the licensee interviewed several former nuclear material custodians regarding record keeping and disposal practices for small quantities of SNM. Based on the interviews, and a search of site historical records, the licensee determined that it was common practice to dispose of reactor incore detectors as radioactive waste. The licensee found no evidence that the incore detectors were missing due to theft or diversion. Although the licensee determined that the detectors were likely disposed of as radioactive waste at a licensed low-level radioactive waste disposal facility, without more information, they chose to classify the detectors as "missing."

c. Conclusions

The inspector concluded that the licensee adequately implemented its audit and corrective action programs in accordance with the licensee's Quality Assurance Program, and that the programs were consistent with NRC requirements. Based on discussions with plant personnel and a review of the licensee's March 15, 2007 LER, the inspector concluded that the licensee's assessment of the disposition of 43 missing unirradiated incore reactor detectors was adequate.

2.0 Spent Fuel Safety

2.1 Spent Fuel Pool Safety (IP 60801)

a. Inspection Scope

The inspector verified the safe wet storage of spent fuel in the fuel building. The review included spent fuel pool (SFP) instrumentation, alarms, cleanliness control, chemistry, criticality controls, and the results of the October 2006 through February 2007 spent fuel pool water temperatures, levels, and chemistry and gamma spectrum analyses. The inspector also observed the licensee's personnel perform analyses of water conductivity, chemistry, radioactivity, and boron content. The inspector reviewed the records of functional tests of alarms to alert operating personnel by pager for: spent fuel pool high and low water level, high water temperature, fuel building high radiation, cooling tower pump trip, and abnormal fuel building ventilation system operation. The inspector also observed the licensee's personnel perform the monthly functional test for high radiation in the spent fuel pool area.

b. Observations and Findings

The results of the analyses reviewed indicated that all parameters were within procedural limits. The licensee maintained the boron concentration in the spent fuel pool at approximately 2000 parts per million (ppm) versus the Technical Specifications limit of greater than 500 ppm. The licensee's personnel were knowledgeable of spent fuel pool water analyses, and all analyses were performed in accordance with the required procedures.

The licensee had performed the monthly test of high radiation in the spent fuel pool area, and other annual functional tests to verify proper pager function in response to anticipated control room alarms affecting spent fuel pool safety. The licensee's personnel were knowledgeable of all functional tests; and all tests were performed in accordance with the required procedures.

c. Conclusions

The inspector determined that the licensee properly maintained the spent fuel pool water level, temperature, chemistry, cleanliness control, and criticality control to ensure the safe wet storage of the spent fuel. The inspector also determined that the licensee had adequately performed the functional tests to ensure that abnormal spent fuel pool conditions would be made known to the operators in a timely fashion.

3.0 Radiological Safety

3.1 Occupational Radiation Exposure

a. Inspection Scope (IP 83750)

The inspector reviewed the external dosimetry records for the second half of 2006. The inspector reviewed the general air sampling, direct radiation survey, and smear sample results from the Fuel Building and the Auxiliary Building from October 2006 to February 2007.

b. Observations and Findings

No workers received any detectable external radiation dose during the second half of 2006. The results of general area air sampling in the fuel and auxiliary buildings did not positively identify the presence of any licensed materials. The results of the routine quarterly surveys in the Fuel Building and the Auxiliary Building had not identified any significant removal contamination.

c. Conclusions

The inspector concluded that the licensee effectively monitored and controlled personnel exposures to radiation, and adequately controlled contamination.

3.2 Radioactive Waste Treatment, Effluent, and Environmental Monitoring

a. Inspection Scope (IP 84750)

The inspector reviewed analytical data of effluent release from October 2006 to February 2007. The inspector also reviewed analytical data of groundwater samples taken during October 2006 from 15 monitoring wells around the perimeter of the plant.

b. Observations and Findings

The licensee's gaseous effluent release data demonstrated that the concentrations of released effluent conformed to limits in 10 CFR Part 20, Appendix B, Table 2. The results of ground water sampling did not show any detectable tritium. The minimum detectable concentration was 200 picocuries per liter.

c. Conclusions

The inspector determined that the licensee effectively implemented radiological effluent control programs and processes. The inspectors determined that no detectable tritium was found beyond the plant boundary.

4.0 Exit Meeting

The inspector presented the inspection results to licensee management at the conclusion of the inspection on March 7, 2007. A telephone exit interview was conducted with the Plant Manager on March 22, 2007, to discuss the results of the in-office review of the Licensee Event Report. The licensee acknowledged the findings presented, and did not identify any of the documents or processes reviewed by the inspector as proprietary.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

- * R. Schuster, Plant Manager
- * J. Ashley, Design Engineering
- * M. Petersen, Administration/Training Supervisor

- * Present at the March 7, 2007 exit meeting.

INSPECTION PROCEDURES (IP) USED

IP 70801	Decommissioning Performance and Status Review
IP 83750	Occupational Radiation Exposure
IP 40801	Self-Assessment, Auditing, and Corrective Actions
IP 60801	Spent Fuel Pool Safety
IP 84750	Radioactive Waste Treatment, and Effluent and Environmental Monitoring

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened	None
Closed	None
Discussed	None

LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
DNMS	Division of Nuclear Materials Safety
IP	Inspection Procedures
NRC	Nuclear Regulatory Commission
ppm	parts per million
SFP	Spent Fuel Pool
SNM	Special Nuclear Material
LER	Licensee Event Report

LICENSEE DOCUMENTS REVIEWED

Licensee documents reviewed and utilized during the course of this inspection are specifically identified in the "Report Details" above.

Attachment