September 28, 2006

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 050-00295/06-02 (DNMS) - ZION NUCLEAR STATION

Dear Mr. Crane:

On September 21, 2006, 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 inspections on April 19, July 17 and 28, and August 7 through 9, 2006, the inspectors evaluated maintenance and surveillance, radiological safety, and environmental monitoring for tritium. At the conclusion of the on-site inspections, the NRC inspectors discussed the findings with members of your staff. In addition, on September 21, 2006, the inspectors completed an in-office review of laboratory analysis results for water samples collected by the NRC during the April and July inspections, and by Exelon personnel between April 19 and July 28, 2006; and conducted a telephone exit interview with the Zion plant manager to discuss the results of the in-office review of the laboratory results.

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 violations.

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.

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

Sincerely,

/RA/

Jamnes L. Cameron, Chief
Decommissioning Branch

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

Enclosure:
Inspection Report 050-00295/06-02(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
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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.	050-00295/06-002(DNMS)
Licensee:	Exelon Generation Company, LLC
Facility:	Zion Nuclear Station
Location:	101 Shiloh Boulevard Zion, IL 60099
Date:	April 19, 2006, (on-site inspection) July 17 and 28, 2006, (on-site inspections) August 7 through 9, 2006, (on-site inspections) September 21, 2006 (in-office review and telephone exit)
Inspector:	William G. Snell, Senior Health Physicist Peter J. Lee, Ph.D., CHP, Health Physicist Eugenio A. Bonano, Health Physicist
Approved by:	Jamnes L. Cameron, Chief Decommissioning Branch Division of Nuclear Materials Safety

Enclosure

EXECUTIVE SUMMARY

Zion Nuclear Station
NRC Inspection Report 050-00295/06-02(DNMS)

This routine decommissioning inspection focused on the evaluation of the licensee's decommissioning support activities, radiological safety, and the collection of environmental water samples for tritium analysis.

Decommissioning Support Activities

- The inspectors determined that the licensee implemented its maintenance and surveillance programs in accordance with its procedures and NRC regulations. (Section 1.1)

Radiological Safety

- The inspectors concluded that the licensee effectively monitored and controlled personnel exposures to radiation. (Section 2.1)

- The inspectors determined that no detectable tritium was found beyond the plant boundary. (Section 2.2)

- The analysis of the results of the water sampling conducted at Zion for tritium showed good agreement between the NRC and licensee. Only a few samples from one of the on-site monitoring wells showed detectable tritium at levels that were close to the minimum detectable concentrations of 180 to 190 pCi/L, well below the Environmental Protection Agency drinking water standard for tritium of 20,000 pCi/L. Licensee personnel were capable and proficient in the collection of environmental water samples. (Section 2.3)

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 Decommissioning Support Activities

1.1 Maintenance and Surveillance (62801)

a. Inspection Scope

The inspectors reviewed the licensee's procedure, ZAP 500-13A, for the performance monitoring, evaluation, and goal setting within the Maintenance Rule (MR) program of 10 CFR 50.65. The inspectors also reviewed the work orders associated with MR summary of performance for the year of 2005, to verify that maintenance and surveillance for structures, systems, and components (SSCs) important to spent Fuel Storage Safety, were conducted in a manner that provided adequate protection of spent fuel.

b. Observations and Findings

The licensee reviewed the following aspects of its MR program: changes in scope, review of goals, review of performance, corrective action effectiveness, balance of availability and reliability, and expert panel recommendations. The licensee's staff reviewed 19 MR functions, 9 high importance functions and 10 low importance functions, that were documented in Attachment A of ZAP 500-13C. During the assessment period of 2005, the licensee identified four functional failures. All failures were associated with low importance functions and corrective actions had been satisfactory and performed in a timely manner.

c. Conclusions

The inspectors determined that the licensee implemented its maintenance and surveillance programs in accordance with its procedures and NRC regulations.

2.0 Radiological Safety

2.1 Occupational Radiation Exposure

a. Inspection Scope (83750)

The inspectors reviewed the external dosimetry records for the first half of 2006. The inspectors interviewed the licensee's personnel, and reviewed the calibration procedures and records of the Thermo Electron MK2 electronic dosimeters to ensure all the dosimeters were calibrated in accordance with the required procedures.

b. Observations and Findings

The highest external radiation exposure received by workers during the first half of calendar year 2006 was about 20 millirem, well below the 10 CFR Part 20 limit.

The licensee's personnel were knowledgeable of electronic dosimeter calibrations, and all dosimeters were calibrated in accordance with the required procedures.

c. Conclusions

The inspectors concluded that the licensee effectively monitored and controlled personnel exposures to radiation.

2.2 Radioactive Waste Treatment, Effluent, and Environmental Monitoring

a. Inspection Scope (84750)

The inspectors reviewed aspects of the licensee's routine program for on-site laboratory tritium analyses, interviewed laboratory personnel, and reviewed analytical data of groundwater samples taken from 15 monitoring wells around the perimeter of the plant.

b. Observations and Findings

The laboratory was equipped with a liquid scintillation counter for tritium analyses. The results of routine ground water sampling did not show any detectable tritium. Based on the requirement of the licensee's Off-site Dose Calculation Manual, the current detection limit is about 1000 picrocuries per liter. If necessary, the licensee has the capability to bring down the detection limit to about 300 picrocurties per liter or lower.

c. Conclusions

The inspectors determined that no detectable tritium was found beyond the plant boundary.

2.3 Tritium Environmental Monitoring Initiative

a. Inspection Scope (83750)

Water samples were collected independently by the inspectors and by licensee personnel and sent to the NRC's contract laboratory for the analysis of tritium to verify the accuracy of the licensee's tritium analytical capabilities, evaluate the sample collection proficiency of licensee personnel, and to ensure that the scope of the tritium groundwater contamination was fully understood.

b. Observations and Findings

In response to the identification of groundwater contaminated with tritium at Exelon's Braidwood Nuclear Generating Station in Illinois, Exelon initiated an expanded water sampling program at each of its Illinois sites, including Zion. In conjunction with this initiative, NRC Region III began independent sampling activities and assessments of the sampling programs at each of these same Exelon plants. At Zion, this initiative included the licensee's installation of new permanent and temporary monitoring wells, where the licensee and NRC collected samples for analysis for tritium.

Independent water sampling was conducted by the inspectors on April 19, July 17 and July 28, 2006. Additional water sampling was conducted by the licensee during which the licensee collected samples for the NRC. The NRC samples were sent to the NRC's contract laboratory, the Oak Ridge Institute for Science and Education (ORISE), for analysis in five separate batches; Batch Z-06-1 through Batch Z-06-5. The results of the ORISE analyses were provided to the NRC by letter report from ORISE, and the letters are available electronically for public inspection in the Publicly Available Records (PARS) component of NRC's document system (ADAMS).

By letters dated May 1 (see ADAMS ML061280146), June 30 (see ADAMS ML061860447), August 3 (see ADAMS ML062200307), August 10 (see ADAMS ML062270162), and August 17, 2006 (see ADAMS ML062340364), the NRC received the results from ORISE of samples collected by the inspectors, as well as water samples collected for the NRC by Exelon personnel between April 19 and July 28, 2006. The licensee provided the NRC with the results of the samples they collected for their analysis at the same time samples were collected for or by the NRC.

During the on-site inspections on April 19, July 17 and July 28, 2006, the inspectors verified licensee personnel were capable and proficient in the collection of water samples. The workers followed established procedures, were attentive to the work being performed, maintained accurate and complete records, and treated every sample as potentially radioactively contaminated.

The results of the sample analyses from the NRC (as analyzed by ORISE) and the licensee were reviewed and compared by the inspectors. Comparisons was based on the Confirmatory Measurements Program criteria provided in Inspection Procedure 84750, "Radioactive Waste Treatment, and Effluent and Environmental Monitoring," dated March 15, 1994.

Following is a discussion of the results of the water sample analyses for each sample batch:

Batch Z-06-1

No tritium was detected in any of the samples analyzed. The inspectors collected two samples, one from an on-site potable water source and one from along the shore of Lake Michigan. Since the licensee did not collect samples at these locations, no

licensee data was available with which a comparison can be made; both samples showed less than the minimum detectable concentrations (MDCs) for tritium. The remaining four NRC samples were independent samples collected at the Zion Radiological Environmental Monitoring Program (REMP) locations. Although the NRC samples were single grab samples and the licensee's samples represented a quarterly composite of weekly grab samples collected from April 5 to June 28, 2006, they were reviewed together for comparative purposes. The NRC and licensee sample results were less than the MDCs.

In addition to the tritium analyses, one sample was also analyzed for gamma emitting nuclides. The results indicated radioactivity levels for cobalt-58, cobalt-60, cesium-134, and cesium-137, near or below the minimum detectable concentrations for these nuclides.

Batch Z-06-2

These samples were the licensee's initial samples collected from May 24 to May 26, 2006, from nine new on-site monitoring wells that were installed. In the first eight wells, a water sample was collected at the top of the water column in the well and at the bottom of the well. Only one sample was collected in the ninth well, and a Lake Michigan water sample was also collected. Only Well 1 contained any detectable tritium, and this was at very low levels. The maximum concentration detected was approximately three times the MDC. Although the lower level sample was in very good agreement with the NRC result, the licensee's upper level sample result was a little over twice the NRC result. As a follow up, the licensee collected additional samples from Well 1 on June 28, 2006. The results of those samples are discussed under Batch Z-06-3 and Z-06-5. With the exception of Well 1, all other monitoring well results and the Lake Michigan sample showed no detectable tritium above the MDCs.

In addition to the tritium analyses, three samples were also analyzed for gamma emitting nuclides. The results indicated radioactivity levels for cobalt-58, cobalt-60, cesium-134, and cesium-137, near or below the minimum detectable concentrations for these nuclides.

Batch Z-06-3

On June 28, 2006, the licensee collected additional upper and lower level samples from on-site monitoring Well 1. The licensee collected two separate samples for the NRC from each level in the well. One set of these was sent to ORISE for tritium analysis by Exelon. Very low levels of tritium were again detected, the highest being only 140 pCi/L above the MDC. Good agreement was obtained between the NRC and licensee results.

In addition to the tritium analyses, one sample was also analyzed for gamma emitting nuclides. The results indicated radioactivity levels for cobalt-58, cobalt-60, cesium-134, and cesium-137, near or below the minimum detectable concentrations for these nuclides.

Batch Z-06-4
On July 17, 2006, inspectors collected four independent samples at four temporary wells that the licensee had installed along the beach between the Zion plant and the shoreline. With the exception of one NRC sample that detected tritium slightly above the MDC, all results were less than the MDC and in agreement with the licensee's sample results.

In addition to the tritium analyses, one sample was also analyzed for gamma emitting nuclides. The results indicated radioactivity levels for cobalt-58, cobalt-60, cesium-134, and cesium-137, near or below the minimum detectable concentrations for these nuclides.

Batch Z-06-5
On July 28, 2006, inspectors collected four independent samples at two new monitoring wells that the licensee had installed on-site. All the NRC and licensee results were less than the MDCs. In addition, the inspectors took possession of two additional samples collected by the licensee from Well 1 on June 28, 2006, and discussed under Batch Z-06-3. The results were also below or close to the MDCs for tritium.

In addition to the tritium analyses, one sample was also analyzed for gamma emitting nuclides. The results indicated radioactivity levels for cobalt-58, cobalt-60, cesium-134, and cesium-137, near or below the minimum detectable concentrations for these nuclides.

c. Conclusions

The analysis of the results of the water sampling conducted at Zion for tritium showed good agreement between the NRC and licensee. Only a few samples from one of the on-site monitoring wells showed detectable tritium at levels that were close to the MDCs of 180 to 190 pCi/L, well below the Environmental Protection Agency drinking water standard for tritium of 20,000 pCi/L. Licensee personnel were capable and proficient in the collection of environmental water samples.

3.0 Exit Meeting

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The inspectors presented the preliminary inspection results to licensee management at the conclusion of the on-site inspections on April 19, July 17 and 28, and August 9, 2006. A telephone exit interview was conducted with the Plant Manager on September 21, 2006, to discuss the results of the in-office review of the laboratory soil sample analysis results. The licensee acknowledged the findings presented 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
R. Adams, Operations and Engineering Manager
L. Cunningham, Security Project Manager
M. Petersen, Administration/Training Supervisor

INSPECTION PROCEDURES (IP) USED

IP 62801	Maintenance and Surveillance
IP 83750	Occupational Radiation Exposure
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
DOT	Department of Transportation
IP	Inspection Procedures
MDC	Minimum Detectable Concentration
NRC	Nuclear Regulatory Commission
ORISE	Oak Ridge Institute for Science and Education
PARS	Publicly Available Records
REMP	Radiological Environmental Monitoring Program

LICENSEE DOCUMENTS REVIEWED

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