

February 20, 2004

Mr. John L. Skolds
President and Nuclear Officer
Exelon Nuclear
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: NRC INSPECTION REPORT 05000295/2003-005(DNMS) - ZION

Dear Mr. Skolds:

On January 23, 2004, 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, the inspectors evaluated safety reviews, emergency preparedness, decommissioning support activities, spent fuel safety, and radiological waste. At the conclusion of the inspection on January 23, 2004, the NRC inspectors discussed the findings with members of your staff.

The inspection consisted of an examination of decommissioning activities at the Zion Nuclear Station 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, 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 2.790 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 NRC's document system (ADAMS), 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/

Christopher G. Miller, Chief
Decommissioning Branch

Docket No. 05000295
License No. DPR-39

Enclosure: Inspection Report 05000295/2003-005 (DNMS)

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cc w/encl: Zion Nuclear Power Station Decommissioning Plant Manager
 Regulatory Assurance Engineer - Zion
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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No. 05000295
License No. DPR-39

Report No. 05000295/2003-005 (DNMS)

Licensee: Exelon Generation Company, LLC

Facility: Zion Nuclear Station

Location: 101 Shiloh Boulevard
Zion, IL 60099

Dates: *July 7-8, 2003
*July 21-22, 2003
*August 7-8, 2003
*August 18-19, 2003
*September 2-3, 2003
*September 16-17, 2003
*December 17-18, 2003
November 5-6, 2003
December 17-18, 2003
January 23, 2004

*IEMA-IDNS INSPECTION REPORT SUMMARY

IDNS Inspectors: Jane Yesinowski
Clifford Thompson
Robert Ganser
Jeffrey Roman

NRC Inspectors: Edward L. Kulzer, CIH, CSP
Radiation Specialist
Division of Nuclear Materials Safety (DNMS)

Christopher R. Martin
Radiation Specialist, DNMS

Approved by: Christopher G. Miller, Chief
Decommissioning Branch, DNMS

EXECUTIVE SUMMARY

Zion Nuclear Station NRC Inspection Report 05000295/2003-005 (DNMS)

This routine decommissioning inspection covered aspects of licensee safety reviews, emergency preparedness, decommissioning support activities, spent fuel safety, and radiological safety.

Decommissioning Performance and Status Review at Permanently Shut Down Reactors

- The licensee's Safety Review Committee made effective independent reviews that contributed to plant safety. There were no findings in this area. (Section 1.1)
- The inspectors determined that, for the items reviewed, the licensee's corrective action program effectively identified, evaluated, and resolved potential problems. (Section 1.2)
- The licensee adequately maintained the material condition of the facilities and equipment observed. (Section 1.3)
- The inspectors determined that the licensee met the objectives for the emergency preparedness exercise. The inspectors did not identify any issues related to inspections performed in accordance with NRC Temporary Instruction (TI) 2561/004, "Safeguards and Emergency Preparedness Inspection of Interim Compensatory Measures at Decommissioning Power Reactors." (Section 1.4)

Spent Fuel Safety

- Based on inspections of plant radiation instrumentation, spent fuel pool (SFP) parameters, and the SFP leakage detection system, the inspectors determined that the licensee was maintaining the safety of the Spent Fuel Nuclear Island in accordance with applicable regulatory requirements. (Section 2.1)
- The inspectors determined that the licensee appropriately scheduled and prioritized the maintenance work requests, which were reviewed. (Section 2.2)

Radiological Safety

- The licensee adequately controlled exposure to radiation and maintained effective contamination control processes. (Section 3.1)

Report Details^{1, 2}

Summary of Plant Activities

During the period covered by this inspection, the plant remained in a condition ensuring safe storage of the spent fuel.

1.0 Decommissioning Support Activities

1.1 Safety Reviews, Design Changes, and Modifications (37801)

a. Inspection Scope

The inspectors reviewed and evaluated the work done by the licensee's on-site Safety Review Committee (SRC). The inspectors reviewed the minutes of the meetings from January to December 31, of 2003, and selected minutes and accompanying work packages to evaluate the effectiveness of the committee. The inspectors compared the SRC performance to requirements in the Defueled Technical Specification (DTS) 5.9.2, "Station Review Committee."

b. Observations and Findings

The inspectors reviewed the work packages from the March 27 and May 20, 2003, SRC meetings. In one work package, the SRC recommended personnel with specific American National Standards Institute (ANSI) training on the Off-Site Dose Calculation Manual (ODCM) to review and approve revisions to the ODCM. The licensee accepted this recommendation and modified procedures such that, in the future, these personnel would review and approve changes to the ODCM. Based on a review of the SRC work packages, the inspectors determined that this committee made effective independent reviews that contributed to plant safety.

c. Conclusions

The licensee's Safety Review Committee made effective independent reviews that contributed to plant safety. There were no findings in this area.

1.2 Self Assessment, Auditing, and Corrective Action at Permanently Shutdown Reactors (IP 40801)

a. Inspection Scope

The inspectors reviewed the list of Corrective Action Work Orders from September through December 2003, and selected three work orders to determine if the corrective actions taken by the licensee were completed, and resolved the identified problems.

¹A list of acronyms used in these "Details" is provided at the end of the report.

²All documents reviewed are listed at the end of this report.

b. Observations and Findings

Based on a review of corrective action work orders, the inspectors determined that the licensee was recommending and implementing good corrective actions. For example, based on the recommendations made in one corrective action work order, the licensee changed requirements for fire protection audits to require them to be conducted biennially by Quality Assurance (QA), and to require that a qualified fire protection engineer conduct these audits. In another case, the licensee corrected the process for ensuring that decommissioning expenditures by Exelon entities outside of the Zion Station were properly allocated and tracked. In a third instance, the licensee improved the efficiency of the review process for Zion Administrative Procedure (ZAP) 300-06R, "Operation Abnormal Plant Equipment Configuration Log," Revision 1.

c. Conclusions

The inspectors determined that, for the items reviewed, the licensee's corrective action program effectively identified, evaluated, and resolved potential problems.

1.3 Decommissioning Performance and Status of Permanently Shutdown Reactors (IP 71801)

a. Inspection Scope

The inspectors evaluated the material integrity of structures, systems, and components (SSCs) necessary for the safe storage of spent fuel. The inspectors evaluated the licensee's implementation of housekeeping and fire protection in Spent Fuel Nuclear Island (SFNI). The inspectors conducted a plant walk down to observe licensee staff conducting daily activities, which included operation of the synchronous condenser, and maintenance of the SFNI.

The inspectors observed the operation of the following equipment:

2 Spent Fuel Pool Heat Exchanger EPN 2SF 007,
2 Spent Fuel Pool Pump EPN 2SF 003,
B Cooling Tower EPN 2 SF 001, and
A Cooling Tower Pump EPN 1SF 004.

The inspectors reviewed preventive maintenance work orders to determine the maintenance history on this equipment.

b. Observations and Findings

During inspections of the SFNI, the inspectors did not identify any fire hazards or conditions adverse to plant equipment or personnel safety. The inspectors determined that preventive maintenance was current and in accordance with requirements of the Defueled Technical Specifications (DTS) Section 5.5.1 titled, "Administrative Controls." Housekeeping was adequate.

c. Conclusion

The licensee adequately maintained the material condition of the facilities and equipment observed.

1.4 **Licensee Implementation of Emergency Action Levels and Appropriate Notifications During an Exercise (Temporary Instruction (TI) 2561/004, “Safeguards and Emergency Preparedness Inspection of Interim Compensatory Measures at Decommissioning Power Reactors”)**

a. Inspection Scope

The inspectors evaluated the licensee’s performance during an emergency preparedness exercise that simulated a site-specific credible threat. The inspectors reviewed the licensee’s classification of the emergency action levels (EALs), communication methods, and practices for the notification of regulatory agencies during the exercise. This review corresponded to Section IV.B of Appendix C to NRC TI 2561/004. The inspectors observed two Exelon evaluators from Exelon’s corporate Emergency Planning Group who participated in the exercise and critique.

b. Objectives and Findings

The licensee conducted an emergency preparedness exercise at the Zion facility on November 5, 2003. The licensee used a scenario that involved a site-specific, Interim Compensatory Measure (ICM)-related event. The simulated event involved a tornado that touched down near the facility resulting in a loss of power, and took proper actions in response. The control room operators appropriately classified the event as a Notification of Unusual Event (NOUE). Offsite notifications regarding the NOUE were communicated as required, and were timely.

The licensee accomplished its objectives for the exercise. The objectives were to: prioritize work, monitor temperature and level in the SFP, monitor radiological effluents, secure the Fuel Building for ingress and egress, and communicate with outside agencies. The licensee conducted a constructive critique and received input from several of the attendees. The licensee demonstrated that it could adequately implement the Defueled Station Emergency Plan (DSEP).

c. Conclusion

The inspectors determined that the licensee met the objectives for the emergency preparedness exercise. The inspectors did not identify any issues related to inspections performed in accordance with NRC Temporary Instruction (TI) 2561/004, “Safeguards and Emergency Preparedness Inspection of Interim Compensatory Measures at Decommissioning Power Reactors.”

2.0 Spent Fuel Safety

2.1 Spent Fuel Pool Safety (IP 60801)

a. Inspection Scope

The inspectors reviewed the DTS, Defueled Safety Analysis Report (DSAR), and various procedures relevant to the operation of the SFNI. The inspectors evaluated: SFNI instrumentation, alarms, and leakage detection; cleanliness control; and chemistry of the spent fuel pool (SFP). The inspectors discussed monitoring the SFP parameters with the Operations Manager. The inspectors conducted inspections within the SFNI area, and evaluated instrumentation readings, local electrical breaker positions, and local valve line-ups. The inspectors reviewed the chemistry of the SFP for August, September, and October 2003.

b. Observations and Findings

During a plant inspection on December 17, 2003, the inspectors did not identify any problems or concerns related to spent fuel safety. The SFP cooling system maintained the temperature of the SFP at 85 degrees Fahrenheit (°F). The SFP heat up rate, if cooling were lost, was 0.7 °F per hour. The time it would take for the SFP to boil with no SFP cooling was 181 hours. The SFP level, temperature, and boron concentration were within DTS limits in Section 3.1 titled, "Defueled Plant Systems."

The licensee staff monitored the SFP liner and transfer canal leakage, and trended data on a six-month frequency. The Work Order (WO) referenced Procedure TSS 15.6.104, "Determination of Spent Fuel Pit Liner and Transfer Canal Liner Leakage," Revision 2, which provided guidance for observing, estimating, and evaluating any leakage. The inspectors determined that the licensee adequately monitored the SFP for leakage.

c. Conclusions

Based on inspections of plant radiation instrumentation, SFP parameters, and the SFP leakage detection system, the inspectors determined that the licensee was maintaining the safety of the SFNI in accordance with applicable regulatory requirements.

2.2 Maintenance and Surveillance at Permanently Shutdown Reactors (IP 62801)

a. Inspection Scope

The inspectors reviewed the licensee's maintenance program including the scheduling and prioritizing of work requests against established procedures relative to the safe storage, maintenance, and control of spent fuel.

b. Observations and Findings

The inspectors determined that the licensee properly scheduled and prioritized maintenance activities following Procedure ZAP-0400-16, titled, "Work Management Manual Guide." The licensee followed ZAP-0400-16 when conducting the daily work request screening meeting, which was attended by maintenance, engineering, operations, and radiation protection personnel. This procedure included requirements

for systems and/or components associated with Technical Specification items important to the defueled condition to normally take precedence in the scheduling process. The Maintenance Coordinator prioritized work requests at the daily meeting. On weekends, back-shifts, and holidays, the Shift Supervisor prioritized work.

c. Conclusions

The inspectors determined that the licensee appropriately scheduled and prioritized the maintenance work requests, which were reviewed.

3.0 Radiological Safety

3.1 Occupational Radiation Exposure (IP 83750)

a. Inspection Scope

The inspectors examined and evaluated materials related to external and internal exposure control, radiological surveys, control of radioactive materials, and contamination control. The inspectors examined and evaluated the following records: general air sampling data taken from the Fuel Building and Auxiliary Building during the third quarter of 2003, exposure records for the second half of 2003, direct radiation survey and smear sample results from the Fuel Building and the Auxiliary Building for the third quarter of 2003, and calibration records for five Eberline RO-2 radiation survey meters that were selected at random.

b. Observations and Findings

Workers received no significant exposure from airborne contamination during the period evaluated. The inspectors determined that the licensee complied with procedural requirements and that contaminated areas were adequately controlled. The licensee kept contamination levels within the facility to a minimum. The licensee calibrated the radiation survey meters properly and in accordance with procedures.

c. Conclusions

The licensee adequately controlled exposure to radiation and maintained effective contamination control processes.

3.2 Radioactive Waste Treatment, and Effluent and Environmental Monitoring (IP 84750)

a. Inspection Scope

The inspectors observed the material condition of the equipment used for liquid releases from the station during a walkdown of the Lake Discharge Tank and the Boric Acid Monitor Tank areas. The inspectors reviewed the audit findings from the annual audit performed by the Corporate Nuclear Oversight Group.

The inspectors reviewed the following: monthly and yearly meteorological monitoring reports, monthly dose summary reports for both liquid and gaseous releases, and release packages R-03-07, for material released from October 2 - 4, 2003, and R-03-08, for material released from October 8 - 10, 2003.

b. Observations and Findings

The licensee used the Lake Discharge Tanks to make liquid radioactive discharges in the past. The tanks and piping were degraded because of microbiological induced corrosion (MIC). The licensee recently bypassed the Lake Discharge Tanks and the associated corroded piping, and used the Boric Acid Monitor Tanks for liquid radioactive discharges. The discharges are now processed through a hose with a flow indicator and an in-line radiation monitor. The inspectors determined that effluent releases were well below limits found in 10 CFR Part 20, Appendix B.

The Corporate Nuclear Oversight Group conducted the Decommissioning Functional Area Audit that listed one deficiency with effluent releases, in regard to not performing beta energy determination. The beta energy determination is not a requirement, but serves as a check for the content and ratio of Cs-137 and Co-60 isotopes contained in the effluent material to be released. Zion Station planned to perform beta energy determinations in the future, and has the data to calculate them for past releases. The licensee entered this item into its corrective action program. The inspectors determined that this audit and the licensee's response were adequate.

c. Conclusions

The inspectors had no findings in this area.

3.3 Solid Radioactive Waste Management and Transportation of Radioactive Materials IP (86750)

The licensee shipped no radioactive waste during 2003. The inspectors interviewed the individual responsible for radiological waste shipments to assure that technical proficiencies were being maintained in this area. This individual received the three-year refresher training required by the Department of Transportation, 49 CFR Part 172, in August 2003.

4.0 Exit Meeting

The inspectors presented inspection results to a member of the licensee's staff at the conclusion of the inspection on January 23, 2004. The licensee did not identify any of the documents or processes reviewed by the inspectors as proprietary.

PARTIAL LIST OF PERSONS CONTACTED

- A. Daniels, Plant Manager
- * J. Ashley, Design Engineering
- R. Landrum, Operations and Engineering Manager
- R. Schuster, Radiation Protection and Chemistry Supervisor
- * Present at the January 23, 2004, exit meeting.

INSPECTION PROCEDURES (IP) USED

IP 37801	Safety Reviews, Design Changes, and Modifications at Permanently Shut Down Reactors
TI 2561/04	Safeguards and Emergency Preparedness Inspection of Interim Compensatory Measures at Decommissioning Power Reactors
IP 40801	Self-Assessment, Auditing, and Corrective Actions
IP 60801	Spent Fuel Pool Safety at Permanently Shut Down Reactors
IP 62801	Maintenance and Surveillance at Permanently Shut Down Reactors
IP 71801	Decommissioning Performance at Permanently Shut Down Reactors
IP 83750	Occupational Radiation Exposure
IP 84750	Radioactive Waste Treatment, and Effluent and Environmental Monitoring
IP 86750	Solid Radioactive Waste Management and Transportation of Radioactive Materials

LIST OF ACRONYMS USED

ANSI	American National Standards Institute
CFR	Code of Federal Regulations
DNMS	Division of Nuclear Materials Safety
DSAR	Decommissioning Safety Analysis Review
DSEP	Defueled Station Emergency Plan
DTS	Defueled Technical Specifications
EAL	Emergency Action Level
EPN	Equipment Part Number
ICM	Interim Compensatory Measures
IDNS	Illinois Department of Nuclear Safety
IEMA	Illinois Emergency Management Agency
MIC	Microbiological Induced Corrosion
NOUE	Notification of Unusual Event
NRC	Nuclear Regulatory Commission
ODCM	Off-Site Dose Calculation Manual
QA	Quality Assurance
SFNI	Spent Fuel Nuclear Island
SFP	Spent Fuel Pool
SRC	Safety Review Committee
SSC	Structures, Systems, Components
TI	Temporary Instruction
ZAP	Zion Administrative Procedure

LICENSEE DOCUMENTS REVIEWED

Inspection Procedure 37801; Safety Reviews, Design Changes at Permanently Shut Down Reactors

"Minutes for the March 4, 2003, Station Review Committee (SRC) Meeting," dated March 27, 2003;

"Minutes for February 20, 2003, Station Review Committee (SRC) Meeting," dated March 12, 2003;

"Minutes for the May 20, 2003, Station Review Committee (SRC) Meeting," dated May 19, 2003;

WO 00455166, "Effectiveness Review of Security Department Corrective Actions," dated March 3, 2003;

WO 00518264, "LLEA Letter of Agreement," dated March 3, 2003;

WO 99269743, "PDTs Amendment Implementation," dated March 3, 2003;

WO 00494347, "Momentary Loss of SFNI Feeder A-8215," dated March 11, 2003;

Memo, "Qualified Technical Review of Off-site Dose Calculation Manual (ODCM) Revision," dated April 18, 2003;

50.59 Review Cover Sheet, "Bypass Lake Discharge Tank and Associated Piping," dated April 4, 2003.

Inspection Procedure 40801; Corrective Actions

WO 00612794, Corporate Engineering Audit of Fire Protection Report;

WO 00616131, Zion Decommissioning Expense Review Closeout; and

WO 00598378, ZAP-300-06R Does Not Require 50.59.

Inspection Procedure 60801, Spent Fuel Pool Safety

Work Orders reviewed for equipment observed during walk down of the SFNI;

WO 9915733, SFNI Cooling Tower A Fan Bearing & Blade INSP/Belt Tension;

WO 00560704, SFNI Vibration Readings on SFNI Cooling Pumps;

WO 95039846, # 2 SFNI Cooling Pump Bearings Lube;

WO 95039845, #1 SFNI Cooling Pump Bearings Lube;

WO 99136818, SFNI Cooling Loop B Lube Pump Motor Bearings;

WO 99140805, SFNI Cooling Loop A Lube Motor Bearings;

WO 99243619, SFNI Cooling B Tower Pan & Strainer Cleaning;

WO 99157330, SFNI Cooling Tower B Fan Bearing & Blade INSP/Belt Tension;

WO 99243529, SFNI Cooling Tower A Pan & Strainer Cleaning.

Inspection Procedure 83750, Occupational Radiation Exposure

Zion Radiation Procedure (ZRP), 5823-9, titled, "Operation and Calibration of the Eberline Models RO-2 and RO-2A Ionization Chambers," dated March 13, 2003;

ZRP 6021-29, Revision 12, titled, "Routine Radiological Surveys," dated March 17, 2003;

ZRP 6020-3, Revision 9, titled, "Radiological Surveys," dated March 17, 2003.

Inspection Procedure 84750, Radioactive Waste Treatment , Effluent and Environmental Monitoring

"Monthly Report on the Meteorological Monitoring Program at the Zion Nuclear Station," for October 2003, by Murray and Trettel, Incorporate, and "Annual Report on the Meteorological Monitoring Program at the Zion Nuclear Station," for 2002, by Murray and Trettel, Incorporate;

"Liquid Release and Dose Summary Report," for October 2003;

"Gaseous Release and Dose Summary Report," for October 2003;

"Annual Report on the Meteorological Monitoring Program at the Zion Nuclear Station," for 2002;

"Decommissioning Functional Area Audit Report NOS Audit No. NOSA-ZN-03-12 (AR 189525), Zion Station," dated December 8-18, 2003.

Inspection Procedure 62801, Maintenance and Surveillance of Permanently Shut down Reactors

"Work Management Manual Guide," ZAP-0400-16, Revision 0;

Condition Review Group (CRG) Review Package dated July 17, 2003;

Work Order No. 00582157;

Work Priority matrix job aid;

Zion Station Schedule dated July 21, 2003.