

June 7, 2001

Mr. Oliver D. Kingsley, President
Exelon Nuclear
Exelon Generation Company, LLC
1400 Opus Place, Suite 500
Downers Grove, IL 60515

SUBJECT: NRC INSPECTION REPORT 05000295/20001-003(DNMS);
05000304/2001-003(DNMS) - ZION

Dear Mr. Kingsley:

On May 24, the NRC completed an inspection at the Zion 1 and 2 reactor facilities which examined decommissioning activities. The enclosed report documents the inspection findings which were discussed on May 24, 2001, with Mr. D. Bump and other members of your staff.

The inspection was an examination of activities at the Zion facilities as they related to safety and to compliance with the Commission's rules and regulations. Activities in the areas of facility management and control, decommissioning support, spent fuel safety, and radiological safety were examined. Within these areas, the inspection consisted of selective examinations of procedures and representative records, field observations and interviews with personnel.

No violations of NRC requirements nor other findings of significance were identified.

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

Sincerely,

/RA/

Bruce L. Jorgensen, Chief
Decommissioning Branch

Docket Nos. 05000295; 05000304
License Nos. DPR-39; DPR-48

Enclosures: Inspection Report 05000295/2001-003(DNMS); 05000304/2001-003(DNMS)

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos: 05000295; 05000304
License Nos: DPR-39; DPR-48

Report No: 05000295/2001003(DNMS);
05000304/2001003(DNMS)

Licensee: Exelon Generation Company, LLC

Facility: Zion Nuclear Plant, Units 1 and 2

Location: 101 Shiloh Boulevard
Zion, IL 60099

Dates: April 23 through May 24, 2001

Inspectors: Roy J Leemon, Decommissioning Inspector, DNMS
Clifford K. Thompson, Illinois Department of Nuclear Safety
Inspector
Peter J. Lee, Health Physics Inspector, DNMS
Terry J. Madedo, Physical Security Inspector, DRS

Approved by: Bruce L. Jorgensen, Chief
Decommissioning Branch
Division of Nuclear Materials Safety

EXECUTIVE SUMMARY

Zion Nuclear Plant, Units 1 and 2
NRC Inspection Report 05000295/2001-003(DNMS); 05000304/2001-003(DNMS)

This routine decommissioning inspection covered aspects of licensee facility management and control, decommissioning support activities, spent fuel safety, and radiological safety.

During the inspection the plant was being maintained in a SAFESTOR [safe storage of the spent fuel] condition, with no major decommissioning work activities in progress. The metering current transformers have been returned to service for metering power used by the spent fuel pool nuclear island.

Facility Management and Control

- Action requests discussed by the condition review group were properly categorized in accordance with the plant's corrective action programs during this inspection period.
- The material integrity of structures, systems, and components necessary for the safe storage of spent fuel and for the conduct of safe decommissioning activities was being monitored and maintained.
- Plant housekeeping was good.
- Control room staffing met regulatory requirements.

Decommissioning Support Activities

- Regulatory requirements were being met for the activities observed, resulting in the safe storage of spent fuel and reliable operation of radiation monitoring and effluent control equipment.
- Westinghouse could not determine a cause for the spent fuel pool nuclear island motor control center supply breaker failure. Licensee practices will be compared to the vendor manual maintenance frequency and recommended breaker maintenance practices.
- The inspectors will continue to review the licensee's commitments, the plant's design basis, and regulatory guidelines to ensure that all required surveillances are known and completed.
- Power line metering current transformers on lines A-151 and A-8251 feeding power to the spent fuel pool nuclear island are operating properly.
- The licensee's safeguards and security plan changes were in accordance with 10 CFR 50.54(p)(2) regulatory requirements.

Spent Fuel Safety

- The safety of the stored spent fuel was being maintained by the SFP cooling and ventilation systems.

Radiological Safety

- The licensee had complied with procedural requirements for conducting surveys and had been successful in controlling exposures and preventing the spread of contamination.
- Use of a G-M detector to assess airborne hazards, as was being done at Zion, is not appropriate in any setting where α -emitters may be present in addition to β -emitters. The licensee agreed to examine the air sampling program to ensure the accuracy of internal exposure assessments.
- The 2000 Effluent and Environmental Monitoring Reports and results from the Inter-laboratory Confirmatory Measurements Program indicated that the Effluent and Environmental monitoring programs had been implemented in accordance with the Offsite Dose Calculations Manual and NRC regulations.

Report Details¹

Summary of Plant Activities

During the period covered by this inspection, the plant remained in SAFESTOR with no major decommissioning work activities in progress.

1.0 Facility Management and Control

1.1 General

The inspectors conducted reviews of ongoing plant activities and attended licensee meetings addressing these activities in order to assess overall facility management and controls. Specific events and findings are detailed in the following sections.

1.2 Corrective Action Program (40801)

a. Inspection Scope

An inspector attended a meeting of the condition review group (CRG) on May 24, 2001.

b. Observations and Findings

The items the CRG discussed were as follows:

- | | |
|----------------------------------|---|
| 1) Action Request (AR) 990147089 | Spent fuel pool nuclear island spent fuel pit pump 2 breaker did not operate as expected. |
| 2) AR 990141926 | 1B Service Air Compressor would not start after being secured for oil addition. |
| 3) AR 990145580 | Changes to the matrix for the defueled shutdown emergency plan-errors found in electronic transmittal of data. |
| 4) AR 990144797 | Spent fuel building heater number 4 has come loose and is now damaged. |
| 5) AR 990144141 | It was determined, that the preventative maintenance database was not current for some of the spent fuel pool nuclear island breakers in the program. |

After discussion, the CRG determined whether the items fit any of the following categories:

- Maintenance Rule Functional Failure (Items 1 and 5)
- Station Significant Event Clock Reset (None)

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

- Operator Workaround (None)
- Maintenance Rework (None)
- Nuclear Operations Notification (NON), (None)
- Important to Defueled Condition (ITDC), (Items 1 and 5)
- Safety Review Committee Review (None)

c. Conclusions

Action requests discussed by the condition review group were properly categorized in accordance with the plant's corrective action programs during this inspection period.

1.3 Decommissioning Performance and Status Review at Permanently Shut Down Reactors (71801)

1.3.1 General

The status of decommissioning activities and the licensee's conduct of decommissioning activities, in accordance with licensed requirements and commitments, were evaluated. Control and conduct of facility decommissioning activities were examined to verify that NRC requirements were being met including the Defueled Technical Specifications (DTS) and requirements and commitments described in the Defueled Safety Analysis Report (DSAR), the Post Shutdown Decommissioning Activities Report (PSDAR) and the Emergency Plan.

1.3.2 Monitored Decommissioning Activities

The inspectors attended the following licensee meetings involving the planning, reviewing, assessing, and scheduling of decommissioning activities.

- Zion Station Schedule Meeting
- Zion Station Priority Meeting
- Health Physics Individual Department Meeting
- Corrective Action Review Group

The activities observed were conducted in accordance with license requirements and docketed commitments as stated in Title 10 of the Code of Federal Regulations (CFR), DTSS, PSDAR, Regulatory Guide 1.33, and station procedures.

1.4 Plant Tours to Evaluate Material Conditions and Housekeeping

a. Inspection Scope (IP 71801)

The inspectors performed a plant tour of the control room and the Spent Fuel Pool to evaluate the material condition of Structures, Systems, and Components (SSC) necessary for the safe storage of spent fuel. Plant areas were also inspected for housekeeping and fire protection.

b. Observations and Findings

In the control room, the operator was cognizant of plant status and equipment in service. Control room alarms were acknowledged and silenced in a timely manner.

The inspectors walked down all accessible areas associated with the Spent Fuel Pool which contain SSCs for the safe storage of spent nuclear fuel. Also, motor control centers installed to supply electricity to SSCs in the Fuel Pool area were inspected and the surveillance history was reviewed. No deficiencies were identified.

Housekeeping was good. Continued cooling of the spent fuel pool was not challenged. Installed fire suppression equipment was well identified and accessible.

c. Conclusions

The material integrity of structures, systems, and components necessary for the safe storage of spent fuel and for the conduct of safe decommissioning activities was being monitored and maintained. Plant housekeeping was good. Control room staffing met regulatory requirements.

1.5 Follow-up On Previous Inspection Findings (92700)

Open: Inspector Followup Item (IFI) 05000295/2001-001-01, "Evaluation of the cause of loss of offsite power to the SFNI and communication weakness." The status of actions to address this IFI was discussed with the licensee. The actions for Zion Station have been completed but some actions for off-site departments have not been completed.

The time for entry into the Emergency Plan in case of loss of all power to the spent fuel nuclear island (SFNI) has been changed from 1 hour to 24 hours. Also, if an emergency generator is used to restore power to the SFNI, no entry to the emergency plan under the loss of power emergency action level would be required. This change became effective on April 26, 2001.

This IFI remains open to be reviewed further during subsequent inspections.

2.0 Decommissioning Support Activities

2.1 Maintenance and Surveillance at Permanently Shut Down Reactors (62801)

a. Inspection Scope

The inspectors evaluated maintenance and surveillance of structures, systems, and components that could affect the safe storage of spent fuel and reliable operation of radiation monitoring equipment. Direct observations, reviews, and interviews of licensee personnel were conducted to assess whether maintenance and surveillance activities were being conducted in accordance with regulatory requirements.

b. Observations and Findings

The inspectors attended briefings to determine if maintenance activities were on schedule and if these activities were keeping pace with plant shutdown activities. The maintenance program was functioning well and work activities were effectively discussed and prioritized at work status meetings. The plant manager provided extra focus on items being discussed related to the spent fuel pool nuclear island, and ensured they had priority in the work schedule.

c. Conclusions

Regulatory requirements were being met for the activities observed, resulting in the safe storage of spent fuel and reliable operation of radiation monitoring and effluent control equipment.

2.2 Failure of a 480 V Motor Control Center Breaker to Open (IP 61726)

a. Inspection Scope

The inspectors reviewed the licensee's surveillance program for Westinghouse 480 V switchgear breakers. A 480 V breaker failed to open locally during a loss of power to the Spent Fuel Pool.

b. Observations and Findings

The breaker that failed to open had to be manually opened by electrical maintenance personnel. The breaker cover plate had to be removed and electrical maintenance personnel used a redundant method for tripping the breaker. The licensee sent the faulted breaker to Westinghouse for failure evaluation. The inspectors verified that the licensee had the breakers in a surveillance program. The frequency of maintenance is three to six years depending on the breaker's cycling demand.

c. Conclusions

Westinghouse could not determine a cause for the breaker failure. The vendor manual maintenance recommendations will be compared to the licensee's breaker maintenance procedure, and the vendor recommended breaker maintenance frequency will be compared with the licensee's breaker maintenance frequency. This is an Inspector Follow-up Item (IFI 05000295/2001-003-01 (DNMS)).

2.3 Required Surveillance (IP 61726)

a. Inspection Scope

The inspectors reviewed the Technical Specifications, Defueled Safety Analysis Report, and Offsite Dose Calculation Manual (ODCM) to identify surveillance activities to be performed by the licensee.

b. Observations and Findings

The licensee has a Zion Station tracking item to review the surveillance program and determine which surveillance requirements apply to the decommissioned plant and to disposition the other surveillances. The tracking item is scheduled for completion at the end of September 2001. After the licensee's surveillance review, the inspectors will evaluate the completeness and accuracy of the licensee's surveillance requirement list.

c. Conclusions

Review of the licensee's commitments, the plant's design basis, and regulatory guidelines to ensure that all required surveillances are known and completed is

considered an inspector follow-up item to verify that the licensee effectively documents, controls, and implements their total surveillance program. (IFI 05000295/2001-003-02 (DNMS)).

2.4 Return of Metering Current Transformers to Service

a. Inspection Scope

The inspector reviewed work tasks 99027483-02 and 99027484-02 for restoring the primary metering on line A-151 and line A-8251, and discussed these tasks with station management.

b. Observations and Findings

Inspection report 0500-295/304-2001-001, Section 1.3.4, "Unusual Event Due to Loss of Both Sources of Electrical Power to Spent Fuel Pool Nuclear Island" and Section 1.4.1, "Improperly Sized Revenue Metering Installation Resulted in Loss of Offsite Power" discusses the burning of the undersized current transformers for lines A-151 (South Line) and A-8251 (North Line).

At 8:15 a.m. on January 26, 2001, an Unusual Event was declared due to loss of power to the SFNI. The loss of power was due to a failure of in-line current transformers associated with metering installations that were installed in December 2000 on the feeder lines supplying power to the site. The initiating event was removal from service of the un-metered line supplying the service building. This caused the service building load to be transferred to the South feeder line which contained the undersized metering installation.

At 1:41 a.m. on January 26, 2001, the South Line de-energized due to the revenue metering current transformer burning open. The Joliet Dispatch Center dispatched a troubleshooter to investigate the problem. The troubleshooter discovered the metering current transformer on the South Line damaged beyond repair and opened the circuit at this meter installation. The troubleshooter was then instructed by Joliet Dispatch to crosstie to the North line. The South and North lines were crosstied at 7:05 a.m. Shortly thereafter, at 7:15 a.m., the North Line de-energized due to similar failure of its associated revenue metering current transformer. This caused a loss of all cooling for the spent fuel pool nuclear island. Power was restored in a few hours by jumpering around the faulted transformers.

The correct size current transformers have been installed and the line metering has been re-energized as of May 9, 2001. The current transformers were operating properly at the end of the inspection period.

c. Conclusions

Power line metering current transformers on lines A-151 and A-8251 feeding power to the spent fuel pool nuclear island are operating properly.

2.5 Physical Security Inspection (81700)

a. Inspection Scope

The inspection included a review of Revision 1 to the Zion Nuclear Power Station Defueled Physical Security Plan, Safeguards Contingency Plan, and Security Personnel Training and Qualification Plan. Revision 1 was submitted by licensee letter dated March 9, 2001.

b. Observation and Findings

Revision 1 was submitted to update the description of the security organizational structure. New descriptions were added for Corporate Nuclear Security, the Regional Operating Group (ROG), and Site Nuclear Security. Other changes, including position and title changes, were also made. All changes were considered administrative or editorial and were made due to the restructuring following the merger between Unicom Corporation and PECO Energy Company.

The Security Plan was also revised to replace all the references to the previous company name with the new company name (i.e., Exelon).

c. Conclusions

The licensee's safeguards and security plan changes were in accordance with 10 CFR 50.54(p)(2) regulatory requirements.

3.0 **Spent Fuel Safety (60801)**

3.1 Cooling the Spent Fuel Pool

a. Inspection Scope

The inspection evaluated the SFP and fuel pool safety. Factors considered in the evaluation included: siphon and drain protection; SFP instrumentation, alarms and leakage detection; SFP chemistry and cleanliness control; criticality controls; and SFP operation and power supplies. The inspectors also evaluated fuel pool safety as it related to the SFP cooling and ventilation modifications. The inspectors reviewed plant documents to determine the requirements and evaluations for SFP temperature and level.

b. Observations and Findings

The inspectors reviewed the DTS, DSAR, local spent fuel pool area instrumentation, and portions of local electrical breaker positions and local valve line-ups. SFP temperature was being controlled at about 90°F. The heat up rate was 0.9°F per hour. On May 23, 2001, the spent fuel pool temperature was 89°F; the spent fuel pool level was 6'14" 10.5"; the time to boil was 137 hours. All the above were within required limits.

c. Conclusions

The safety of the stored spent fuel was being maintained by the SFP cooling and ventilation systems.

4.0 Radiological Safety

4.1 General

The inspectors conducted reviews of ongoing activities in order to assess the overall Radiation Protection (RP) Program. Specific findings are detailed in the sections below.

4.2 Occupational Radiation Exposure

a. Inspection Scope (83750)

The inspection examined and evaluated aspects of the RP Program. Specific areas evaluated included internal and external dose assessments, radiological survey, control of radioactive materials and contamination control.

b. Observations and Findings

A review of the external dosimetry records for the first quarter of 2001 indicated that personnel exposures were well below 10 CFR 20 limits and accurately reflected the level of activity within the facility.

The licensee's air sampling program is designed to evaluate when airborne activity consists of β -emitters alone. However, if there were both α and β -emitters in the air, significant exposure due to the α -emitters could be undetected.

G-M detectors would be routinely used to count samples collected from the air sampling in the work place. If the concentration is less than 0.2 of the Derived Air Concentration (DAC) for β -emitters, the air samples will be disposed of and no further action taken. G-M detectors cannot distinguish between α and β ; only gross α plus β will be identified. Due to the unknown ratio of β to α , the concentrations cannot be correctly expressed as the total number of DAC based on the individual DAC of α -emitters and β -emitters.

The DAC of β -emitters such as Co-60 and Cs-137 are about 2×10^4 times that of α -emitters such as Pu-238, 239, 240 and Am-241. Thus, a β -emitters to α -emitters ratio of 2×10^4 would result in a same number of DAC for both α -emitter and β -emitter. Therefore, if gross α plus β were misidentified as β , the concentration expressed as total number of DAC would be significantly underestimated, even if α -emitters are only a small fraction of β -emitters. For example, if the licensee found 0.2 DAC, but one count out of each thousand counts identified by the G-M were α , then the actual concentration would be 4.2 DAC, including 0.2 DAC from β -emitters and 4.0 DAC from α -emitters.

A gas proportional counter can distinguish between α and β and can determine the total number of DAC based on the individual DAC of α -emitters and β -emitters.

The inspector also reviewed a sampling of radiation survey results and smear sample results from the fuel building and the auxiliary building for the first quarter of 2001. The

results indicated that the licensee had complied with applicable requirements. Contamination levels were well confined and controlled, and contaminated areas within the facility had been kept to a minimum.

c. Conclusions

The licensee had complied with procedural requirements for conducting surveys and had been successful in controlling exposures and preventing the spread of contamination. Use of a G-M detector is not appropriate in any setting where α -emitters may be present in addition to β -emitters. The licensee agree to examine the air sampling program to ensure the accuracy of internal exposure assessments.

4.3 Radioactive Waste Treatment, and Effluent and Environmental Monitoring

a. Inspection Scope (84750)

The inspectors reviewed the 2000 Radioactive Effluent Report and the Radiological Environmental Monitoring Reports.

b. Observations and Findings

The inspectors reviewed the effluent release data and determined that the concentrations of released effluent conformed to 10 CFR 20, Appendix B, Table 2 and the doses to the general public were in conformance with Appendix I of 10 CFR 50. The inspectors reviewed the environmental sampling results and determined that all activities found were at background levels with no distinct contribution from the licensee operation.

c. Conclusions

The 2000 Effluent and Environmental Monitoring Reports and results from the Inter-laboratory Confirmatory Measurements Program indicated that the Effluent and Environmental monitoring programs had been implemented in accordance with the Offsite Dose Calculations Manual and NRC regulations.

5.0 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management during a meeting on May 24, 2001. The licensee acknowledged the findings presented. The licensee did not identify any of the documents or processes reviewed by the inspectors as proprietary.

PARTIAL LIST OF PERSONS CONTACTED

J. Ashley, Design Engineering
D. Bump, Plant Manager
T. Hill, Maintenance Supervisor
R. Landrum, Operations/Engineering Manager
B. Leydens, Security Manager
M. Peterson, Adminstrating/Training Supervisor
R. Schuster, Rad/Chem Supervisor

INSPECTION PROCEDURES USED

IP 36801	Organization, Management, and Cost Controls at Permanently Shut Down Reactors
IP 37801	Safety Reviews, Design Changes, & Modifications
IP 40801	Self-Assessment, Auditing, & Corrective Action
IP 60801	Spent Fuel Pool Safety at Permanently Shut Down Reactors
IP 62801	Maintenance and Surveillance at Permanently Shut Down Reactors
IP 71707	Plant Operations
IP 71801	Decommissioning Performance and Status Review at Permanently Shut Down Reactors
IP 80721	Radiological Environmental Monitoring
IP 81700	Physical Security
IP 83750	Occupational Radiation Exposure
IP 84750	Radioactive Waste Treatment, and Effluent and Environmental Monitoring
IP 92701	Follow-up

ITEMS OPENED, CLOSED AND DISCUSSED

Opened

05000295/2001-003-01	IFI	Review of the vendor recommended breaker maintenance activities and frequency of maintenance
05000295/2001-003-02	IFI	Evaluation of the licensee's surveillance requirements

Closed

None

Discussed

05000295/2001-001-01	IFI	Evaluation of the cause of loss of offsite power to the SFNI and communication weakness
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DOCUMENTS REVIEWED

DSAR, "Defueled Safety Analysis Report"

DSEP, "Defueled Station Emergency Plan"

DTS, "Defueled Technical Specifications"

PSAR, "Post Shut-Down Activities Report"

Zion Station Work Activities Schedule

Zion Daily Plant Status Sheet

Zion Station procedure E 003-1, Revision 3, Inspection and Maintenance of Westinghouse 480 V Switchgear Breakers.

Offsite Dose Calculation Manual chapters 10, 11 and 12.

LIST OF ACRONYMS USED

ALARA	As-Low-As-Reasonably-Achievable
AOP	Abnormal Operating Procedure
AR	Action Request
CF	Causal Factors
CRG	Condition Review Group
CT	Current Transformer
DAC	Derived Air Concentration
DDC	Distribution Dispatch Center
DSAR	Defueled Safety Analyses Report
DSEP	Defueled Station Emergency Plan
DTS	Defueled Technical Specifications
EAL	Emergency Action Level
EF	Equipment Failure
ESB	East Service Building
IA	Inappropriate Action
IDNS	Illinois Department of Nuclear Safety
IFI	Inspector Follow-up Items
IP	Inspection Procedure
NGET	Nuclear General Employee Training
NRC	Nuclear Regulatory Commission
PIF	Problem Identification Form
PSDAR	Post-Shutdown Decommissioning Activities Reports
PT	Periodic Test
ODCM	Offsite Dose Calculation Manual
OSR	Onsite Review
RCR	Root Cause Report
RP	Radiation Protection
RPA	Radiologically Protected Area
RPT	Radiation Protection Technician
RWP	Radiation Work Permit
SDR	Shutdown Risk
SFNI	Spent Fuel Pool Nuclear Island
SFP	Spent Fuel Pool
SOI	System Operating Instruction
SSC	Structures, Systems, Components
T&D	Transmission & Distribution
TS	Technical Specification
TSS	Technical Staff Surveillance
ZAP	Zion Administrative Procedure