

August 23, 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 05000295/20001-004(DNMS);
05000304/2001-004(DNMS) - ZION

Dear Mr. Kingsley:

On August 10, 2001, 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 August 10, 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

Enclosure: Inspection Report 05000295/2001-004(DNMS); 05000304/2001-004(DNMS)

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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

Report No: 05000295/2001004(DNMS);
05000304/2001004(DNMS)

Licensee: Exelon Generation Company, LLC

Facility: Zion Nuclear Plant, Units 1 and 2

Location: 101 Shiloh Boulevard
Zion, IL 60099

Dates: June 25 through August 10, 2001

Inspectors: Roy J. Leemon, Decommissioning Branch, DNMS
Robert V. Ganser, Illinois Department of Nuclear Safety
Jeffrey L. Roman, Illinois Department of Nuclear Safety

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 05000295/2001-004(DNMS); 05000304/2001-004(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. A 23 minute loss of spent fuel pool cooling occurred when power was lost to one transformer on August 9, 2001.

Facility Management and Control

- 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. (Section 1.3)
- Plant housekeeping was good during this inspection period. Control room staffing met regulatory requirements. Fire loading was controlled in the radiologically controlled area. (Section 1.3)
- The licensee's screening evaluations reviewed by the inspectors met regulatory requirements and appeared adequate to assure public health and safety. The 10 CFR 50.59 Review Process procedure was adequate. Changes to the ZDSAR were being performed as needed. (Section 1.4)

Decommissioning Support Activities

- Regulatory requirements were being met for the maintenance activities observed, resulting in the safe storage of spent fuel and reliable operation of radiation monitoring and effluent control equipment. (Section 2.1)
- The licensee's scheduling and documentation of radiation monitor calibration activities was adequate. (Section 2.3)
- The procedure used to perform preventive maintenance on 480 volt circuit breakers was adequate. (Section 2.4)

Spent Fuel Safety

- The safety of the stored spent fuel was being maintained by the SFP cooling and ventilation systems. (Section 3.1)

Radiological Safety

- Workers conducted routine duties and received minimal radiation exposure. Only one contamination event occurred in three months. (Section 4.2)
- The licensee's control of radioactive materials and contaminated areas was adequate. (Section 4.3)

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. A 23 minute loss of spent fuel pool cooling occurred when power was lost to one transformer on August 9, 2001.

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

1.2.1 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.

1.2.2 Monitored Decommissioning Activities

a. Inspection Scope

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

b. Observations and Findings

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.

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

c. Conclusions

Decommissioning activities were conducted in accordance with license requirements and docketed commitments

1.3 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.

During a walk down inspection to observe housekeeping, fire protection, and the licensee's control of contamination and storage of radioactive materials, the inspectors noted that additional areas of the plant were posted as abandoned areas. These areas were marked with placards which directed anyone entering the areas to notify the Shift Manager. This was done primarily as a safe guard against personal injury, as lighting and other equipment in these areas would cease to be maintained. At the time of the inspection, abandoned areas were in overall good material condition for a decommissioned plant. There were no findings in this inspection area.

Housekeeping was good , but numerous overhead lights in the SFP area were not working. The licensee was aware of the condition and has plans to replace the lights after the high August temperatures cool, and improve working conditions in the hot overhead of the SFP. The loss of lighting was not an operational problem.

Continued cooling of the spent fuel pool was not challenged. Installed fire suppression equipment was well identified and accessible. Also, fire loading in the radiologically controlled areas was reduced to a minimum.

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 during this inspection period. Control room staffing met regulatory requirements. Fire loading was controlled in the radiologically controlled area.

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

a. Inspection Scope

The inspectors reviewed a selection of licensee screening evaluations. The inspectors reviewed the licensee procedure for the 10 CFR 50.59 Review Process dated March 9, 2001, and discussed the safety review process with licensee personnel. The inspectors also reviewed the updates to the Zion Defueled Safety Analysis Report (ZDSAR) and the associated safety evaluations.

b. Observations and Findings

The inspectors verified that the Zion Administrative Procedure (ZAP)-100-06 Revision 16, "10 CFR 50.59 Review Process," was adequate. The procedure was being followed. The screening/safety evaluations reviewed by the inspectors were performed correctly. Site management has approved three changes to the ZDSAR. The changes were appropriate and the safety evaluations supporting the changes were adequate.

c. Conclusions

The licensee's screening evaluations reviewed by the inspectors met regulatory requirements and appeared adequate to assure public health and safety. The 10 CFR 50.59 Review Process procedure was adequate. Changes to the ZDSAR were being performed as needed. There were no findings in this area.

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 maintenance activities observed, resulting in the safe storage of spent fuel and reliable operation of radiation monitoring and effluent control equipment.

2.2 Conduct of Maintenance (IP 62801)

a. Inspection Scope

The inspectors interviewed the Station Maintenance Manager to ascertain whether the station maintenance department was able to adequately identify and correct maintenance problems.

b. Observations and Findings

The Maintenance Manager adequately illustrated how the station prioritized and scheduled corrective work activities. The primary vehicle for establishing work priority was through periodic meetings of the senior staff. The Maintenance Manager indicated that the station was currently able, even considering the small work force assigned to a decommissioned plant, to keep up with overall station maintenance requirements. These included both the planned maintenance activities and corrective maintenance tasks as they emerged.

c. Conclusions

There were no findings in this inspection area.

2.3 Maintenance Procedures and Documentation (IP 62801)

a. Inspection Scope

The inspectors reviewed the following calibration documentation for plant radiation monitors:

- | | | |
|---|-----------------------|---|
| ● | Work Order # 98086707 | Lake Discharge (liquid) Monitor |
| ● | Work Order # 99260968 | Lake Discharge (liquid) Monitor |
| ● | Work Order # 99252452 | FB SFP Area Radiation Monitor |
| ● | Work Order # 98049876 | Auxiliary Building Area Radiation Monitor |
| ● | Work Order # 99246523 | Vent Stack SPING Functional Test |
| ● | Work Order # 99243011 | Turbine Building Fire Sump Monitor |
| ● | Work Order # 99243012 | Vent Stack SPING Functional Test |

b. Observations and Findings

All monitors were within calibration. There were no findings in this inspection area.

c. Conclusions

The licensee's scheduling and documentation of radiation monitor calibration activities was adequate.

2.4 480 Volt (V) Circuit Breaker Maintenance Procedure

a. Inspection Scope

The inspectors reviewed the procedure for performing preventive maintenance on Westinghouse type DS 480 V circuit breakers.

b. Observations and Findings

Zion Station was using the corporate procedure, "Preventive Maintenance on Westinghouse Type DS 480 V Circuit Breakers," Revision 0, to perform preventive maintenance. The procedure was comprehensive and was used by other Excelsior nuclear facilities.

c. Conclusions

The procedure used to perform preventive maintenance on 480 volt circuit breakers was adequate. There were no findings in this area.

3.0 **Spent Fuel Safety (60801)**

3.1 Cooling the Spent Fuel Pool

a. Inspection Scope

The inspection evaluated the spent fuel pool (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. The inspectors reviewed plant documents to determine the requirements and evaluations for SFP temperature and level.

The inspectors conducted plant tours of the control room and SFP to evaluate the material conditions of structures, systems, and components (SSCs) necessary for the safe storage of spent fuel, held discussions with plant management and reviewed station logs related to the loss of SFP cooling on August 9, 2001.

b. Observations and Findings

The inspectors reviewed the Defueled Technical Specifications (DTS), Defueled Safety Analysis Report (DSAR), local spent fuel pool area instrumentation, and portions of local electrical breaker positions and local valve line-ups. On August 9, 2001, the SFP temperature was being controlled at about 93°F with a heat up rate of 0.9°F per hour, and the time to boil the SFP (with no cooling) was 132 hours. The spent fuel pool level was 614' 8". The SFP boron concentration was 2083 parts per million (ppm) versus the TS limit of greater than 500 ppm. All the above parameters were within required limits.

In the control room the operator was cognizant of plant status and equipment in service. The inspectors walked down all accessible areas associated with the SFP, which contained SSCs for the safe storage of spent fuel. No deficiencies were identified.

Continued cooling of the SFP was challenged on August 9, 2001, when electric power was lost to the equipment supplying the cooling water. Power was lost due to a thunderstorm causing a power line to come down in the city of Zion. Power was restored approximately 23 minutes after it was lost by cross-connecting the cooling equipment to the other spent fuel nuclear island buss. The down power line was repaired about three hours later. The SFP heated up less than one degree during the loss of cooling. Spent fuel safety was maintained during this loss of SFP cooling.

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 inspections examined and evaluated internal and external dose assessments and contamination controls.

b. Observations and Findings

Zion's Dose Performance

(In Person-Rem)

Dose Performance	May		June		July	
	Goal	Actual	Goal	Actual	Goal	Actual
Monthly Dose Goals Routine Duties	0.075	0.058	0.075	0.001	0.75	0.015
Yearly Site Total	0.375	0.166	0.450	0.167	0.525	0.182

Zion's Contamination Control

(In Personnel Contamination Events(PCEs)/1000 hours in the Radiation Protection Area (RPA))

	May		June		July	
	Goal	Actual	Goal	Actual	Goal	Actual
Personnel Contamination Events	5.5	0	5.5	1	5.5	0
Year to Date PCEs/1000 RPA Hours	0.5	0	0.5	0	0.5	0

c. Conclusions

Workers conducted routine duties and received minimal radiation exposure. Only one contamination event occurred in three months.

4.3 Control of Radioactive Materials and Contamination, Surveys, and Monitoring (83726)

a. Inspection Scope

The inspectors reviewed the licensee's current survey data for the Fuel Building and discussed the results with the Radiation Protection Manager. The inspectors discussed the criteria for establishing survey frequency.

b. Observations and Findings

The licensee survey maps were updated every 90 days. Area surveys were conducted weekly on a rotational basis and daily on an as-needed basis.

Accompanied by the Radiation Protection Manager, the inspectors performed a walk down inspection of the radioactive materials storage areas in the plant. Also included were the tool storage area and laundry areas. The licensee continued to make progress in their effort to minimize radioactive material storage areas and the amounts of stored radioactive materials. All radioactive material storage areas and contaminated areas were properly barricaded and posted. Contaminated areas were adequately surveyed and controlled.

Review of the licensee's history of personal contamination incidents with the Radiation Protection Manager indicated that the licensee's controls were effective.

The inspectors verified the availability and proper use of personnel monitoring instruments.

c. Conclusions

The licensee's control of radioactive materials and contaminated areas was adequate. There were no findings in this inspection activity.

5.0 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management during a meeting on August 10, 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 60801	Spent Fuel Pool Safety at Permanently Shut Down Reactors
IP 62801	Maintenance and Surveillance at Permanently Shut Down Reactors
IP 71801	Decommissioning Performance and Status Review at Permanently Shut Down Reactors
IP 83750	Occupational Radiation Exposure
IP 83726	Control of Radioactive Materials and Contamination, Surveys, and Monitoring

DOCUMENTS REVIEWED²

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
Station Daily Status Sheets for 6/13/01 and 6/14/01
Calibration Documentation for Radiation Monitors
Current Fuel Building Radiation Survey - dated 5/21/01

²Other documents or records reviewed during this inspection are identified in the Report Details.

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