



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION III  
2443 WARRENVILLE ROAD, SUITE 210  
LISLE, ILLINOIS 60532-4352

February 27, 2019

Mr. Bruce Hinkley  
General Manager  
Zion Restoration Project  
ZionSolutions, LLC  
2701 Deborah Avenue, Suite 2F  
Zion, IL 60099

SUBJECT: NRC INSPECTION REPORT NO. 05000295/2018002(DNMS);  
05000304/2018002(DNMS) – ZION NUCLEAR POWER STATION

Dear Mr. Hinkley:

On January 21, 2019, the U.S. Nuclear Regulatory Commission (NRC) completed onsite inspection activities from August 22, 2018, through January 21, 2019, at the permanently shutdown Zion Nuclear Power Station in Zion, Illinois. The purpose of the inspection was to determine whether decommissioning activities were conducted safely and in accordance with NRC requirements. The enclosed report presents the results of this inspection, which were discussed with a member of your staff on January 22, 2019.

During the inspection period, the NRC inspectors reviewed the following aspects of onsite activities: organization, management, and cost controls; occupational radiation exposure; inspection of remedial and final surveys; radioactive waste treatment, and effluent and environmental monitoring; solid radioactive waste management; and transportation of radioactive materials. The inspection consisted of an examination of activities at the site 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, observation of work activities, and interviews with personnel.

Based on the results of this inspection, no violations of NRC requirements were identified.

This letter and its enclosure will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* (CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

**/RA/**

Michael A. Kunowski, Chief  
Materials Control, ISFSI, and  
Decommissioning Branch  
Division of Nuclear Materials Safety

Docket No: 50-295; 50-304  
License No: DPR-39; DPR-48

Enclosure:  
IR 05000295/2018002(DNMS);  
05000304/2018002(DNMS);

cc w/encl: *ZionSolutions*, Service List

Letter to Mr. Bruce Hinkley from Michael A. Kunowski, dated February 27, 2019.

SUBJECT: NRC INSPECTION REPORT NO. 05000295/2018002(DNMS);  
05000304/2018002(DNMS) – ZION NUCLEAR POWER STATION

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U.S. NUCLEAR REGULATORY COMMISSION  
REGION III

Docket No: 50-295; 50-304

License No: DPR-39; DPR-48

Report No: 05000295/2018002(DNMS);  
05000304/2018002(DNMS);

Enterprise Identifier: I-2018-002-0049

Licensee: Zion*Solutions*, LLC

Facility: Zion Nuclear Power Station, Units 1 and 2

Location: Zion, Illinois

Dates: August 22, 2018, through January 21, 2019

Inspectors: Bill C. Lin, Health Physicist  
Rhex A. Edwards, Senior Health Physicist  
Peter J. Lee, Reactor (Decom) Inspector, Ph.D., CHP

Approved by: Michael A. Kunowski, Chief  
Materials Control, ISFSI, and  
Decommissioning Branch  
Division of Nuclear Materials Safety

Enclosure

## **EXECUTIVE SUMMARY**

### **Zion Nuclear Power Station, Units 1 and 2 NRC Inspection Report 05000295/2018002(DNMS); 05000304/2018002(DNMS)**

The Zion Nuclear Power Station is a permanently shutdown and defueled power reactor facility that was maintained in a safe storage condition from 1998 through 2010. Active decommissioning began in 2011 and continued throughout this inspection period. This periodic safety inspection reviewed licensed activities associated with organization, management, and cost controls; occupational radiation exposure; inspection of remedial and final surveys; radioactive waste treatment, and effluent and environmental monitoring; solid radioactive waste management; and transportation of radioactive materials.

#### **Organization, Management, and Cost Controls**

- The licensee adequately implemented organization, management, and cost controls in accordance with regulatory requirements and license conditions. (Section 1.0)

#### **Occupational Radiation Exposure**

- The inspectors determined that the licensee and supplemental workforce conducted decommissioning activities in accordance with the regulations and license requirements. (Section 2.0)

#### **Inspection of Remedial and Final Surveys**

- The inspectors performed a confirmatory survey for the Waste Water Treatment Facility (WWTF) and various selected land area. (Section 3.0)

#### **Radioactive Waste Treatment, and Effluent and Environmental Monitoring**

- The licensee controlled, monitored, and quantified releases of radioactive materials to the environment to ensure offsite doses were within regulatory limits and were As Low As Is Reasonably Achievable (ALARA). (Section 4.0)

#### **Solid Radioactive Waste Management and Transportation of Radioactive Materials**

- Radioactive materials planned for shipment were classified, characterized, and packaged appropriately, in accordance with NRC and Department of Transportation (DOT) regulations, to meet low-level waste burial site criteria. (Section 5.0)

## Report Details

### Summary of Plant Activities

During the inspection period, the licensee completed demolition of Unit 1 and Unit 2 Containment buildings. Additionally, they continued performing Final Status Surveys (FSSs), shipping radioactive waste, and backfilling areas around the site.

#### **1.0 Organization, Management, and Cost Controls at Permanently Shutdown Reactors (Inspection Procedure (IP) 36801)**

##### **1.1 Inspection Scope**

The inspectors reviewed documents and interviewed plant personnel to assess the licensee's performance in the following areas:

- Procedures and processes the licensee established to resolve employee and safety concerns, and to assess the licensee's effectiveness at resolving identified problems;
- Implementation of Corrective Action Program (CAP) procedures;
- Implementation of a cost and personnel reduction strategy that did not adversely challenge public health and safety; and
- Regulatory requirements were properly implemented with respect to the site organization, staffing, and staff qualifications.

As part of the inspection, the inspectors verified that licensee programs and procedures were appropriately implemented by licensee staff. In addition, the inspectors verified that when issues were identified, licensee personnel appropriately documented the issue in the CAP.

##### **1.2 Observations and Findings**

The inspectors determined through direct licensee observation, reviews of licensee programs and procedures, sampling of training programs, qualification matrices, corrective action documents, and interviews with licensee personnel that the appropriate regulatory requirements and commitments were followed.

No findings were identified.

##### **1.3 Conclusions**

The licensee adequately implemented organization, management, and cost controls in accordance with regulatory requirements and license conditions.

## **2.0 Occupational Radiation Exposure (IP 83750)**

### **2.1 Inspection Scope**

The inspectors reviewed documents and interviewed plant personnel to assess the licensee's performance in the following areas:

- Personal dosimetry for external exposure meets requirements;
- Survey and monitoring activities were performed as required;
- Control of radioactive materials and contamination met requirements;
- Effective implementation of the ALARA program; and
- Identifying, resolving, and preventing issues, events, and problems in the area of radiological controls.

### **2.2 Observations and Findings**

During this inspection period, the inspectors reviewed the radiation and contamination surveys performed by the licensee as low-level radioactive waste was loaded. The inspectors observed the licensee perform required radiation and contamination surveys per the licensee's approved procedure.

The inspectors also reviewed the licensee's corrective actions regarding all recorded personnel contamination events. The licensee performed the required surveys to ensure that they captured the source of the contamination and performed the necessary decontamination procedure.

No findings were identified.

### **2.3 Conclusions**

Workers adhered to the radiological controls provided in the radiation work permits (RWPs) and ALARA plans and followed the radiation protection staff instruction. Decommissioning activities were executed in general alignment with planning documents and as provided in RWPs and ALARA reviews. Radiation surveys were performed adequately to identify the hazards present.

## **3.0 Inspection of Remedial and Final Surveys at Permanently Shutdown Reactors (IP 83801)**

### **3.1 Inspection Scope**

The inspectors observed the confirmatory surveys on the remaining foundation of the WWTF and selected land areas conducted by Oak Ridge Associated Universities (ORAU), a contractor for the NRC. The inspectors also reviewed the results of the licensee's FSSs and ORAU's confirmatory surveys.

### 3.2 Observations and Findings

The inspector observed ORAU perform confirmatory survey of the WWTF. Thallium doped sodium iodide (NaI[Tl]) detectors were used to evaluate direct gamma radiation levels on accessible WWTF surfaces and in Land Area 7. For Land Area 6, the area was inaccessible to perform a surface scan; however, the NRC inspectors observed ORAU take soil samples in this area. In addition to the surface scan of the WWTF, the NRC inspectors also observed ORAU perform six-inch core samples of the remaining WWTF foundation. The inspectors reviewed ORAU confirmatory survey results of the WWTF, Land Area 6, and Land Area 7. The inspectors also reviewed the licensee's FSS results.

No findings were identified.

### 3.3 Conclusions

Based on a review of ORAU's confirmatory survey results and the licensee's FSS results, the inspector did not identify issues that would preclude the FSS data from demonstrating compliance with the release criteria.

## 4.0 **Radioactive Waste Treatment, and Effluent and Environmental Monitoring (IP 84750)**

### 4.1 Inspection Scope

The inspectors reviewed documents and interviewed plant personnel to assess the licensee's performance in the following areas:

- Radioactive waste treatment systems were maintained and operated to keep offsite doses ALARA; and
- The radiological environmental monitoring programs were effectively implemented to ensure effluent releases were being adequately performed as required to minimize public dose.

As part of the inspection, the inspectors verified that licensee programs and procedures were appropriately implemented by licensee staff.

### 4.2 Observation

The inspectors reviewed the licensee's liquid effluent records and the environmental monitoring program to ensure that all effluents released were properly monitored and documented. Specifically, the inspectors reviewed the 2017 Annual Radiological Environmental Operating Report for compliance with the Offsite Dose Calculation Manual (ODCM) and Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20.

No findings were identified.

### 4.3 Conclusion

The licensee maintained effluent monitoring as described in the ODCM. The licensee's Annual Radiological Environmental Operating Report complied with the ODCM and 10 CFR Part 20.



## **5.0 Solid Radioactive Waste Management and Transportation of Radioactive Materials (IP 86750)**

### **5.1 Inspection Scope**

The inspectors reviewed documents and interviewed plant personnel to assess the licensee's performance in the following areas:

- Whether the licensee provided detailed instructions and operating procedures for transfer, packaging, and transport of low-level radioactive waste;
- Whether the material was properly classified, described, packaged, marked, and labeled for transportation; and
- Whether shipments made by the licensee complied with NRC and DOT regulations.

### **5.2 Observation**

The inspectors directly observed the licensee load waste and debris into rail cars. The inspectors also reviewed the qualification of the transportation personnel and reviewed the last five transportation manifests. The five manifests were properly filled out in accordance with all applicable regulatory requirements.

No findings were identified.

### **5.3 Conclusion**

Radioactive materials planned for shipment were classified, characterized, and packaged appropriately, in accordance with NRC and DOT regulations, to meet low-level waste burial site criteria.

## **6.0 Exit Meeting**

The inspectors presented the results of the inspection to Mr. Jerry Houff on January 21, 2019. The licensee acknowledged the results presented and did not identify any of the information discussed as proprietary.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## **SUPPLEMENTAL INFORMATION**

### **PARTIAL LIST OF PERSONS CONTACTED**

G. van Noordennen, Vice President of Regulatory Affairs  
J. Houff, Decommissioning Plant Manager  
D. Wojtkowiak, Characterization/License Termination Manager  
D. Villicana, Radiation Protection Manager/Training Manager/Waste

### **INSPECTION PROCEDURES (IPs) USED**

IP 36801	Organization, Management, and Cost Controls at Permanently Shutdown Reactors
IP 83750	Occupation Radiation Exposure
IP 83801	Inspection of Remedial and Final Surveys at Permanently Shutdown Reactors
IP 84750	Radioactive Waste Treatment, and Effluent and Environmental Monitoring
IP 86750	Solid Radioactive Waste Management and Transportation of Radioactive Materials

### **ITEMS OPENED, CLOSED, AND DISCUSSED**

<u>Opened</u>	<u>Type</u>	<u>Summary</u>
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None

<u>Closed</u>	<u>Type</u>	<u>Summary</u>
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None

### **PARTIAL LIST OF DOCUMENTS REVIEWED**

The following is a partial list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety, but rather that selected sections of portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

- 2017 Annual Radiological Environmental Operating Report; May 19, 2018
- Zion Backfill Request for Land Area 6
- Zion Backfill Request for Land Area 7
- ZS-LT-200-001-001, Revision 4, RA/RASS Survey Design for Land Area 6 and 7
- ZS-LT-300-001-001, Revision 4, FSS Sample Plan For Waste Water Treatment Facility
- ZS 2018 Waste Manifests
- ZS Final Status Survey Results for Waste Water Treatment Facility
- ZS Final Status Survey Results for Land Area 6 and Land Area 7
- Zion CR-2018-0202; Tritium Found In Water Pumped to Ground Surface; November 29, 2018

## **LIST OF ACRONYMS USED**

ADAMS	Agencywide Documents Access and Management System
ALARA	As Low As Is Reasonably Achievable
CAP	Corrective Action Program
CFR	Code of Federal Regulations
DNMS	Division of Nuclear Materials Safety
DOT	Department of Transportation
FSS	Final Status Survey
IP	Inspection Procedure
NRC	U.S. Nuclear Regulatory Commission
ODCM	Offsite Dose Calculation Manual
ORAU	Oak Ridge Associated Universities
RWP	Radiation Work Permit
WWTF	Waste Water Treatment Facility