October 28, 2011

Mr. John A. Christian, President
Zion*Solutions*, LLC
1750 Tysons Boulevard, Suite 1500
McLean, VA 22102

SUBJECT: NRC INSPECTION REPORTS 050-00295/11-07(DNMS); 050-00304/11-07(DNMS) - ZION NUCLEAR POWER STATION

Dear Mr. Christian:

On September 28, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed onsite inspection activities for the third calendar quarter of 2011 at the permanently shut-down 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 members of your staff on October 14, 2011.

Specifically, the inspectors reviewed elements of the occupational radiation exposure control program, focusing on the development and implementation of the as-low-as-is-reasonably-achievable (ALARA) program. In addition, the inspectors reviewed the radioactive waste packaging and transportation program including methods for waste classification. Portions of the spent fuel assembly Instrument Tube Tie Rod (ITTR) modification was also reviewed during the inspection period. After an in-office review following onsite inspection activities, on October 14, 2011, one of the NRC inspectors involved in the inspection discussed the findings with Messrs. Daly, Bouchard and others of your staff at the site.

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, observations of activities in progress, and interviews with personnel.

Based on the results of this quarterly inspection effort, the inspectors did not identify any violations of NRC requirements that were of greater than minor safety significance.

In accordance with Title 10 of the Code of Federal Regulations (CFR) 2.390 of the NRC's "Rules of Practice," a copy of this letter and the enclosed report will be available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Document Access and Management 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/

Christine A. Lipa, Chief
Materials Control, ISFSI, and
Decommissioning Branch
Division of Nuclear Materials Safety

Docket Nos. 050-00295; 050-00304
License Nos. DPR-39; DPR-48

Enclosure:
Inspection Report 050-00295/11-07(DNMS);
050-00304/11-07(DNMS)

cc w/encl: C. Settles, Head Resident Inspection, Illinois Emergency Management Agency
The Honorable Suzi Schmidt, Illinois General Assembly
The Honorable JoAnn D. Osmond, Illinois General Assembly
Barry A. Burton, Lake County Administrator
Mark C. Curran, Jr., Lake County Sheriff
Laurie Cvengros, Village Clerk, Village of Beach Park, Illinois
Willard R. Helander, Lake County Clerk
Joseph G. Klinger, Illinois Emergency Management Agency
Jana Lee, Village Clerk, Village of Winthrop Harbor, Illinois
Judy L. Mackey, City Clerk, City of Zion, Illinois
Kent McKenzie, Lake County, Illinois
Irene T. Pierce, Lake County, Illinois
General Manager, Zion Nuclear Power Station, Zion*Solutions*, LLC
Director Regulatory Affairs, Zion Nuclear Power Station, Zion*Solutions*, LLC
Security Manager, Zion Nuclear Power Station, Zion*Solutions*, LLC

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

Sincerely,

/RA/

Christine A. Lipa, Chief
Materials Control, ISFSI, and
Decommissioning Branch
Division of Nuclear Materials Safety

Docket Nos. 050-00295; 050-00304
License Nos. DPR-39; DPR-48

Enclosure:
Inspection Report 050-00295/11-07(DNMS); 050-00304/11-07(DNMS)

cc w/encl: C. Settles, Head Resident Inspection, Illinois Emergency Management Agency
The Honorable Suzi Schmidt, Illinois General Assembly
The Honorable JoAnn D. Osmond, Illinois General Assembly
Barry A. Burton, Lake County Administrator
Mark C. Curran, Jr., Lake County Sheriff
Laurie Cvengros, Village Clerk, Village of Beach Park, Illinois
Willard R. Helander, Lake County Clerk
Joseph G. Klinger, Illinois Emergency Management Agency
Jana Lee, Village Clerk, Village of Winthrop Harbor, Illinois
Judy L. Mackey, City Clerk, City of Zion, Illinois
Kent McKenzie, Lake County, Illinois
Irene T. Pierce, Lake County, Illinois
General Manager, Zion Nuclear Power Station, Zion*Solutions*, LLC
Director Regulatory Affairs, Zion Nuclear Power Station, Zion*Solutions*, LLC
Security Manager, Zion Nuclear Power Station, Zion*Solutions*, LLC

DISTRIBUTION w/encl:

Bruce Watson	Patrick Louden	Linda Linn
John Hickman	Harral Logaras	Patricia Buckley
Jennifer Uhle	Alan Barker	Tammy Tomczak
Anne Boland	Carol Ariano	MCID Branch

DOCUMENT NAME:G:\DNMSIII\WORK IN PROGRESS\IR- ZION INSP2011-007 DNMS DRAFT.DOCX
☒ Publicly Available ☐ Non-Publicly Available ☐ Sensitive ☒ Non-Sensitive
To receive a copy of this document, indicate in the concurrence box "C" = Copy without attach/encl "E" = Copy with attach/encl "N" = No copy

OFFICE	RIII DNMS		RIII DMMS		RIII DNMS		RIII	
NAME	WJSlawinski:jm CAL for		JETapp CAL for		CALipa CAL			
DATE	10/28/11		10/28/11		10/28/11			

OFFICIAL RECORD COPY

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Nos.:	050-00295; 050-00304
License Nos.:	DPR-39; DPR-48
Report Nos.:	050-00295/11-07(DNMS) 050-00304/11-07(DNMS)
Licensee:	Zion*Solutions*, LLC
Facility:	Zion Nuclear Power Station (permanently shut-down)
Location:	101 Shiloh Boulevard Zion, IL 60099
Dates:	On-site inspections on July 18, 20 and 28, August 22 – 25, September 19 – 23, and September 28, 2011
NRC Inspectors:	Wayne Slawinski, Senior Health Physicist Jeremy Tapp, Health Physicist Matt Learn, Reactor Engineer Rhex Edwards, Reactor Engineer
Approved by:	Christine A. Lipa, 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 050-00295/11-07(DNMS); 050-00304/11-07(DNMS)

The Zion Nuclear Power Station is a permanently shut-down and defueled power reactor facility maintained in SAFSTOR condition (spent fuel is in wet storage). In 2011, the site transitioned to active decommissioning status as staffing was expanded, organizational and institutional controls were developed to support the decommissioning project, engineering evaluations were performed and dismantlement work commenced. This routine decommissioning inspection reviewed the licensee's preparations and its execution of the site decommissioning project focusing on the as-low-as-is-reasonably-achievable (ALARA) and radioactive waste transportation programs.

Safety Reviews, Design Changes and Modifications

- The licensee performed an adequate 10 CFR 50.59 safety screening and an associated design change evaluation, and properly assessed the decommissioning impact of the Instrument Tube Tie Rod (ITTR) modification to the spent fuel assemblies (Section 1.1).

Decommissioning Performance and Status

- Work activities in the fuel handling building associated with the ITTR modification and during relocation of a fuel canister within the spent fuel pool were performed adequately to meet procedural requirements (Section 2.1).

- Plant material condition and housekeeping were adequate and have not adversely impacted safe decommissioning. Workers at the site followed established work plans and safety protocols and were aware of job controls specified in work instructions with some exceptions, which the licensee captured in its corrective action program (Section 2.2).

Occupational Radiation Exposure

- Radiological evaluations, survey plans, and radiological work packages were adequately developed and generally executed appropriately to reduce occupational worker dose and to control the release of radioactivity to the environment (Section 3.1).

- Air samples were collected to assess both area and worker breathing zone airborne conditions as provided in radiation work permits. Samples were analyzed appropriately to quantify airborne radioactivity including the presence of transuranic isotopes. However, the licensee had not yet completed its evaluation of the site specific radionuclide mix and established beta-gamma to alpha ratios throughout the plant, as is the industry practice (Section 3.2).

- Radiological surveys were performed adequately to identify the hazards present. Work controls were established as prescribed in radiation work permits and workers followed the required controls with isolated exceptions, which the licensee documented in its corrective action program (Section 3.3).

- An ALARA program was adequately developed in that procedures and dedicated staff were in-place to allow execution of a sound program. Adequate mechanisms were developed for management involvement through a Station ALARA Committee, and mechanisms for dose tracking and for ongoing ALARA evaluations as work progressed. ALARA plans and work-in-progress reports were generated as provided by procedure, but were not always consistent as they varied in the level of detail and therefore value added (Section 3.4).

- The licensee identified a locked high radiation area problem but failed to generate a corrective action document to ensure the issue was timely evaluated through the corrective action program process (Section 3.5).

Solid Radioactive Waste Management and Transportation of Radioactive Material

- The waste operations staff were knowledgeable of waste handling and package loading, and had completed Department of Transportation (DOT) required 49 CFR 172.704 (Subpart H) training. However, DOT required Subpart H training was not completed by all radiation protection staff involved in hazardous material transportation activities, which represents a violation of minor safety significance (Section 4.1).

- The licensee properly identified, sampled and analyzed its site radioactive waste streams, and implemented a waste classification program to satisfy the requirements of 10 CFR 61.55 and 10 CFR 61.56, as provided by Appendix G of 10 CFR Part 20 (Section 4.2).

- Radioactive material and waste shipments were prepared and manifested consistent with the licensee's procedures to meet the requirements of 10 CFR Parts 20 and 61 and those of the DOT in 49 CFR Parts 170-189 (Section 4.3).

Report Details

Summary of Plant Activities

During the three-month inspection period, active decommissioning work continued and focused on the removal of interferences within the Unit 2 Containment Building and ongoing planning/preparations for reactor vessel segmentation. The licensee initiated the spent nuclear fuel assembly instrument tube tie rod modification, while engineering and planning activities related to the nuclear fuel dry cask storage campaign continued. Also, during the inspection period, the licensee commenced radioactive waste shipments to the Energy Solutions low-level-waste burial site in Utah, and continued radioactive waste stream classification activities for other upcoming shipments including the Unit 2 reactor vessel head.

1.0 Safety Reviews, Design Changes and Modifications (IP 37801)

1.1 Design Changes, Tests and Modifications

a. Inspection Scope

The inspectors reviewed portions of the 10 CFR 50.59 screening, the associated design change documentation and 10 CFR 50.82 Decommissioning Impact Evaluation for the installation of the instrument tube tie rod (ITTR) into fuel assemblies identified as susceptible to intergranular stress corrosion cracking (IGSCC). The inspectors reviewed the documentation to determine whether safety judgments were appropriate and whether key considerations were effectively evaluated. The inspectors determined whether the licensee appropriately considered any inter-relationships between the ITTR modification and other components or systems potentially affected by the activity.

b. Observations and Findings

The licensee planned to complete the ITTR modification on 1452 spent fuel assemblies which the licensee identified as susceptible to IGSCC. The tie rod is composed of a stainless steel tube of sufficient length to extend from the top nozzle adapter plate of the fuel assembly through the instrument tube and protrude out the bottom nozzle. The modification is designed to physically reinforce the connection between the top nozzle and the remainder of the spent fuel assembly.

The inspectors determined that the licensee's safety evaluation screening and associated design change evaluation included appropriate considerations and addressed the necessary safety questions. The inspectors determined that the licensee's conclusion that installation of the ITTR had no adverse effect on fuel storage or fuel handling systems or related functions described in the Defueled Safety Analysis Report (DSAR) was adequately founded. The inspectors also determined that the licensee's evaluation included appropriate engineering judgment and management reviews.

No findings of significance were identified.

c. Conclusions

The licensee performed an adequate 10 CFR 50.59 safety screening, associated design change evaluation and properly assessed the decommissioning impact of the ITTR modification.

2.0 Decommissioning Performance and Status Review (IP 71801)

2.1 Decommissioning Operations - Control & Conduct of Facility Activities

a. Inspection Scope

On July 20, 2011, the inspectors observed licensee contractor personnel relocate a fuel rod storage canister which housed damaged fuel rods into a different region of the spent fuel pool. The inspectors selectively reviewed the qualifications of personnel performing the move, observed testing of the fuel handling tool prior to use, and evaluated whether the canister was handled and the move executed consistent with procedure.

The inspectors observed contractor staff perform ITTR installation work in the Fuel Handling Building on several occasions during the inspection period to determine if those activities were conducted as specified by procedure. The inspectors attended pre-job briefings to determine whether appropriate information was exchanged and worker responsibility was delineated adequately.

For these activities, the inspectors reviewed the level of licensee management and contractor supervisory involvement to determine if oversight was appropriate and whether an adequate safety perspective existed.

b. Observations and Findings

The inspectors determined that the fuel storage canister was relocated successfully as prescribed by procedure. The inspectors concluded that adequate command and control was established and that communications were effective during the move. Work was halted when uncertainty existed during the process and did not resume until all questions were resolved.

The inspectors found that ITTR work was performed adequately by qualified individuals, and included a sufficient level of management involvement. Individuals performing ITTR tasks in the fuel handling building communicated adequately to ensure work met safety standards.

No findings of significance were identified.

c. Conclusions

Activities in the fuel handling building associated with the ITTR modification and during relocation of a fuel canister were performed adequately to meet procedural requirements.

2.2 Plant Tours/Walkdowns

a. Inspection Scope

The inspectors routinely performed plant tours to observe field conditions, discuss job safety with workers, and to assess the potential impact of work activities on safe decommissioning. During these walkdowns, the inspectors evaluated material condition and housekeeping, assessed area radiological conditions, radiological access control and associated posting/labeling, and reviewed the overall condition of systems, structures and components that support decommissioning. Independent radiation measurements were made by the inspectors in several of the areas toured and were compared to licensee measured results and postings. The inspectors observed ongoing work in the Unit 2 Containment Building in preparation for isolation of the reactor coolant system piping.

b. Observations and Findings

The inspectors found that controls associated with Unit 2 Containment Building work included administrative controls necessary to prevent unauthorized entry into highly contaminated areas and high radiation areas. Air sampling was performed within the containment building as required by the Offsite Dose Calculation Manual during periods when the containment construction doors were open and/or the containment purge system was secured. Air samples were also routinely collected in general areas of the Unit 2 containment building to monitor work conditions, as provided in job specific radiation work permits (RWPs).

During walkdowns, the inspectors found that personnel followed work plans and safety protocols, and were aware of job controls specified in work instructions with some exceptions. Specifically, early in the inspection period, the inspectors identified that workers were not always aware of radiological restrictions such as stop work conditions and/or were unclear about their electronic dosimetry setpoints. Also, the inspectors noted that the licensee had identified instances when workers conducted activities in a manner that was inconsistent with the RWP or was beyond the scope of that authorized by the work plan. For these issues, condition reports were generated to document the problems and initiate corrective actions. Improvements were noted late in the inspection period as workers gained experience and demonstrated better radiation worker practices.

No findings of significance were identified.

c. Conclusions

Plant material condition and housekeeping were adequate and have not adversely impacted safe decommissioning. Workers followed work plans and safety protocols and were aware of job controls specified in work instructions with some exceptions early in the inspection period, which the licensee captured in its corrective action program.

3.0 Occupational Radiation Exposure (IP 83750)

3.1 Radiological Work Planning and Preparations

a. Inspection Scope

The inspectors reviewed work packages including RWPs, radiological work instructions, as-low-as-is-reasonably-achievable (ALARA) plans and total effective dose equivalent (TEDE) ALARA evaluations (i.e., respiratory protection analyses) to determine if the licensee developed appropriate measures to identify and address radiological hazards and thereby reduce worker dose.

Work control instructions and control barriers including electronic dosimeter alarm setpoints were reviewed for conformity with work area radiological conditions. The inspectors discussed how industry operating experience was incorporated into the planning of radiologically significant work to determine whether lessons learned were applied when beneficial.

Radiological information was reviewed and planning related to isolation of the reactor coolant system (RCS) was discussed with the licensee to determine if planning, preparation and management support for the work activity was adequate. Consideration for special training including mockup training was reviewed. Provisions for engineering controls including the use of auxiliary ventilation systems to limit airborne radioactivity was also reviewed.

b. Observations and Findings

The inspectors found that work packages were adequately developed and work was executed acceptably to control worker dose. The inspectors observed interference removal work associated with the cut and capping of the RCS piping in preparation for cavity flood-up and subsequent vessel segmentation. The inspectors determined through direct observation that the licensee used process and/or engineering controls to the extent practicable to control contamination and limit concentrations of airborne radioactivity. The inspectors noted that portable ventilation systems and air monitoring were used routinely as provided in RWP packages.

No findings of significance were identified.

c. Conclusions

Radiological evaluations, survey plans, and radiological work packages were adequately developed and generally executed appropriately to reduce occupational worker dose and control the release of radioactivity to the environment.

3.2 Internal Exposure Controls

a. Inspection Scope

The inspectors reviewed RWPs for those work activities with the potential for airborne radioactivity to determine if appropriate engineering controls were prescribed to reduce

the potential for worker intakes. Additionally, work areas with the potential for transuranic isotopes were evaluated to determine whether the licensee had included adequate means to identify the hazards, and provided for appropriate worker protection through engineering controls and through the use of respiratory protection equipment.

The methods and calculations used by the licensee to perform respiratory protection evaluations were examined to assess compliance with the requirements of 10 CFR 20.1701 and 20.1702.

The inspectors observed work in progress to determine whether air sampling was performed in locations and in a manner that provided data representative of area radiological conditions. This included worker breathing zone air samples for those situations where localized, elevated airborne radioactivity could be generated. Air sample field measuring techniques were observed to determine if practices were adequate.

b. Observations and Findings

The inspectors determined that representative air samples were collected in work areas and worker breathing zones as provided in RWPs. Samples were analyzed adequately in the field by radiation protection staff as an immediate assessment of airborne conditions. Subsequent quantitative (gamma spectroscopy) analyses were completed as warranted for air samples with identifiable activity.

The inspectors found that radiation protection staff analyzed an appropriate percentage of smear surveys and air samples for the presence of transuranic isotopes consistent with industry practices. However, the inspectors noted that the licensee had not yet completed its evaluation of the Zion station specific radionuclide mix. That evaluation was underway. Therefore, the licensee had not yet fully established plant specific beta-gamma to alpha ratios which are desirable to establish protocols for the assessment of transuranic nuclides on occupational dose.

No findings of significance were identified.

c. Conclusions

Air samples were collected to determine work area and worker breathing zone airborne conditions as provided in RWPs. Samples were analyzed appropriately to quantify airborne radioactivity including the presence of transuranic isotopes. However, the licensee had not yet completed an evaluation of the site specific radionuclide mix and established beta-gamma to alpha ratios necessary to develop radiation protection protocols for the assessment of non-gamma emitters.

3.3 Control of Radioactive Materials, Contamination, Surveys and Monitoring

a. Inspection Scope

The inspectors reviewed radiological survey data, RWPs and associated ALARA planning information for activities that presented the greatest radiological risk to workers. The inspectors discussed how highly contaminated items were identified and labeled,

how the areas were demarcated and how workers were made aware of conditions. During plant walkdowns, the inspectors observed work controls to determine whether the required measures were in-place and work was executed as provided in the work package.

Inspectors evaluated the adequacy of radiation, contamination and airborne radioactivity surveys during system breaches and for other radiologically significant activities. Radiation protection job coverage was assessed to determine if sufficient oversight was provided and included the use of remote job coverage equipment such as tele-dosimetry, as specified in work packages. Additionally, survey records including air sampling data and worker dose information were reviewed to validate the effectiveness of the work controls.

b. Observations and Findings

The inspectors determined that radiological surveys were adequately performed to ensure workplace radiological hazards were identified. Through field observations, the inspectors verified that controls were implemented as dictated by RWPs and related work planning documents.

The inspectors assessed work activities in the Unit 2 containment building on several occasions during the assessment period. In particular, the radiological controls used during interference removal and during RCS piping torch cutting was found to align with prescribed RWP controls and industry protocols.

Overall, the inspectors determined that work controls were established as prescribed in RWPs and workers followed the required controls with isolated exceptions (refer to Section 2.2), which the licensee documented in its corrective action program

No findings of significance were identified.

c. Conclusions

Surveys were performed adequately by radiation protection staff to identify the radiological hazards present. Work controls were established as prescribed in RWPs and workers followed the required controls with isolated exceptions, which the licensee documented in its corrective action program.

3.4 Maintaining Occupational Exposures ALARA

a. Inspection Scope

Procedures associated with maintaining occupational exposures ALARA were reviewed to determine whether they were developed consistent with industry standards and included thresholds for work-in-progress and post-job reviews, and for station ALARA committee (SAC) involvement. The inspectors interviewed the licensee's ALARA staff to understand the approach and philosophy used to implement the ALARA program and to determine whether procedures were used as intended. The inspectors reviewed ongoing and near-term planned work activities in order to assess current dose performance and radiation exposure challenges.

The inspectors reviewed several work activities of highest exposure significance that were either ongoing or being planned. For these activities, the inspectors evaluated dose projections, reviewed the ALARA plan, total effective dose equivalent ALARA evaluations (i.e., respirator use evaluations) and RWP packages in order to determine whether the licensee established radiological engineering and work controls based on sound radiation protection principles in order to achieve occupational exposures that were ALARA. Work activities with the potential for generating airborne transuranics were evaluated to determine whether the licensee identified the hazard and provided appropriate worker protection.

The inspectors compared person-hour estimates provided by maintenance planning and other groups with the actual work activity time expenditures to evaluate the accuracy of time estimates. Reasons for inconsistencies between the projected versus actual time and dose accruals were discussed with the licensee.

The licensee's process for adjusting exposure estimates when unexpected changes in scope or higher than anticipated radiation levels may be encountered was reviewed. For the work activities selected, the inspectors reviewed work-in-progress (WIP) reports to determine how exposure problems were captured and corrected, and therefore whether this ALARA tool was used in the manner intended.

b. Observations and Findings

ALARA program procedures were found to align with industry standards and included appropriate thresholds for generating ALARA plans, WIP reviews and for station ALARA committee involvement. The inspectors attended one SAC meeting and noted that management sought ways to improve worker efficiency and challenged the ALARA planning; therefore the inspectors concluded that information was exchanged adequately during the meeting. However, the inspectors identified that the licensee had not developed quantitative criteria for use of extremity monitoring or for dosimetry placement should significant dose gradients exist that may warrant relocation of personnel monitoring devices to whole body locations other than the standard chest location.

Also, the inspectors found that ALARA plans were not always consistent because they varied in the level of information and detail provided. Specifically, while some ALARA plans articulated specific methods to ensure radiological controls are maintained and to reduce dose, others generalized actions to undertake at the direction of the radiation protection staff. Similarly, WIP reports did not consistently document actions to reduce dose or better control the work. The inspectors also noted that respiratory evaluations did not routinely document the justification for the use of respiratory protection devices when their use was not warranted based solely on radiological conditions.

The inspectors determined that ALARA and maintenance planning staff worked cooperatively in an effort to develop reasonable time/dose projections. However, time estimates were not always accurate because limited job history information was available given that much of the decommissioning work was unique. The inspectors found that ALARA criteria were adequately integrated into RWP documents, when specified in ALARA plans, to help ensure that the work force was aware of job specific dose reduction initiatives.

The inspectors observed that ALARA initiatives specified in RWP documents or ALARA plans were implemented as intended for work activities conducted in the Unit 2 containment building. Radiation protection staff oversight of field activities was adequate as were communications with workers. Low dose waiting areas were observed being used by workers when appropriate.

No findings of significance were identified.

c. Conclusions

The ALARA program was adequately developed in that procedures and dedicated ALARA staff were in-place to allow execution of a sound program. Mechanisms were also in place for management involvement through a station ALARA committee, mechanisms for dose tracking and for ongoing ALARA evaluations as work progressed. ALARA plans and work-in-progress reports were generated as provided by licensee procedure, but were not always consistent because they varied in the level of detail provided.

3.5 Effectiveness of Licensee Controls

a. Inspection Scope

The inspectors reviewed the circumstances associated with an elevated radiation condition which the licensee identified in the Unit 1 containment building during down posting activities in June 2011. The inspectors examined the licensee's identification of the problem, the evaluation and extent of condition assessment and the implementation of corrective actions. The review was performed to determine if the licensee executed its corrective action program (CAP) effectively.

b. Observations and Findings

In June 2011, the licensee identified locked high radiation area conditions inside the Unit 1 missile barrier, and questioned whether the area was properly posted and controlled. Following identification of the problem, the licensee determined that the area was locked and secured with proper key control to prevent unauthorized entry. Following that, the licensee developed a work request to construct a physical barrier around the "hot spot" to cocoon the area and render it inaccessible as provided in Regulatory Guide 8.38, "Control of Access to High and Very High Radiation Areas in Nuclear Power Plants."

In August, 2011, the inspector walked-down the area and verified it was posted as required by Technical Specifications and was inaccessible by the physical barrier constructed by the licensee. However, the inspector identified that the licensee had not properly implemented its CAP program for this issue because a corrective action document was not timely generated following identification of the problem. Consequently, the issue was not timely evaluated through the management review committee process. While the area inside the missile barrier was subsequently determined to be posted and controlled as required by Technical Specification after the issue was raised by the inspectors, management was not afforded the opportunity to

review the problem and assess the significance of the issue against CAP criteria in a timely manner.

No findings of significance were identified.

c. Conclusions

The licensee identified a locked high radiation area problem but failed to generate a corrective action document to allow the issue to be evaluated through the intended management review process in a timely manner.

4.0 Solid Radioactive Waste Management and Transportation (IP 86750)

4.1 Training and Qualification of Personnel

a. Inspection Scope

The inspectors reviewed the training provided to radwaste operations personnel, to radiation protection staff, and to station laborers which have been or potentially could be involved in hazardous material (hazmat) transportation safety as defined in 49 CFR 171.8.

Selected staff involved in shipment activities were interviewed by the inspectors to determine if they had adequate skills to accomplish shipment related tasks and to determine if the shippers were knowledgeable of the applicable regulations to satisfy package preparation requirements for public transport with respect to NRC Bulletin 79-19, "Packaging of Low-Level Radioactive Waste for Transport and Burial," and 49 CFR Part 172 Subpart H. Also, lesson plans for Hazmat Subpart H training and for waste packaging certification were reviewed for compliance with the hazardous material training requirements of 49 CFR 172.704.

b. Observations and Findings

The inspectors determined that radwaste operations personnel had completed Department of Transportation (DOT) required Subpart H training and demonstrated adequate familiarization with hazmat transportation safety, security awareness and emergency response actions, and were knowledgeable of waste packaging requirements pertinent to their specific responsibilities.

However, the inspectors identified that radiation protection technician (RPT) staff, while trained and experienced in radiation survey protocols, had not all completed DOT required Subpart H training to satisfy the requirements of 49 CFR 172.704. According to the licensee, as of September 2011, only two RPTs were involved in final vehicle and package surveys. Of these two RPTs, one had not completed Subpart H training but typically worked under the direct supervision of the trained technician. Notwithstanding those two RPTs, the inspectors noted that many RPTs were involved in initial loading and surveys of radioactive waste and therefore directly affected hazmat transportation safety as defined in DOT regulations. As of September 2011, approximately 75% of the forty person RPT staff that were or could be involved in hazmat transportation safety related activities had not completed the required Subpart H training, including about 20%

that exceeded the 90-day grace period allowed by 49 CFR 172.704(c). One violation was identified for the failure to complete required Subpart H training, as provided in 49 CFR 172.704.

The violation was determined to be of minor safety significance as provided in the NRC Enforcement Policy because RPT staff involved in hazmat transportation related work: (1) were qualified and experienced in radiological surveys; and (2) most had prior experience in package loading and surveys at other facilities. Additionally, many of the RPT staff had completed Subpart H training at other facilities within three years prior to their employment at the Zion Station. The licensee generated condition report (CR) No. 00379801 to capture the DOT training violation.

No findings of significance were identified.

c. Conclusions

Waste operations staff was knowledgeable of waste handling and package loading, and had completed 49 CFR 172.704 required Subpart H training. However, a regulatory compliance issue of minor safety significance was identified for the failure to provide DOT required Subpart H training to RPT staff involved in hazmat transportation safety activities.

4.2 Waste Characterization and Classification

a. Inspection Scope

The inspectors reviewed the Zion site specific waste streams which generate material destined for disposal at a low-level radioactive waste burial site, to determine if those waste steams were properly defined by the licensee for purposes of classification as provided in 10 CFR 61.55. The inspectors reviewed the licensee's sample collection locations and the methods for each of those waste streams to determine if the samples collected were representative of the waste stream. The inspectors also reviewed waste stream sample radioanalysis results and the licensee's development of scaling factors to quantify difficult-to-measure radionuclides (e.g., pure alpha or beta emitting radionuclides). These reviews were conducted to determine whether the licensee's waste sampling and analysis program assured compliance with 10 CFR 61.55 and 10 CFR 61.56, as required by Appendix G of 10 CFR Part 20. The inspectors also reviewed the licensee's plan for further waste classification to determine whether potential changes in existing waste classification or profiles based on the origin of the waste would be properly identified.

b. Observations and Findings

The licensee identified dry-active waste (DAW) and spent resins as its principal radioactive waste streams and collected samples from locations and in a manner that was representative of those waste streams. Resin samples included resin beds of varying vintage and type, and DAW of various origins to ensure the waste classification encompassed the appropriate isotopic mixes. Waste in the form of filters was planned to be sampled and analyzed separately, as waste filters have not yet been shipped to the

low-level waste burial site. The licensee was also in the process of classifying the Unit 2 reactor vessel head in preparation for its future shipment to a low level waste burial site.

Waste stream analysis results were evaluated adequately by the licensee and scaling factors derived consistent with NRC Branch Technical Positions on "Radioactive Waste Classification" (Revision 0, May 1983), "Waste Form" (Revision 1, January 1991) and Information Notice No. 86-20.

No findings of significance were identified.

c. Conclusions

The licensee properly identified, sampled and analyzed its site radioactive waste streams, and implemented a waste classification program to satisfy the requirements of 10 CFR 61.55 and 10 CFR 61.56, as provided by Appendix G of 10 CFR Part 20.

4.3 Shipment Preparation and Shipment Manifests

a. Inspection Scope

The inspectors reviewed documentation of radioactive shipment packaging, radiation surveys, package labeling and marking, vehicle inspections and placarding, emergency instructions to the carrier, determination of waste classification/isotopic identification, and licensee verification of shipment readiness for several non-excepted radioactive material and radwaste shipments made in 2011. The shipment documentation reviewed consisted of:

- Three DAW/miscellaneous solid debris shipments to a low-level-waste burial site;
- One shipment of contaminated tools to a vendor;
- One shipment of contaminated equipment to a vendor.

For each shipment listed above, the inspectors determined if the requirements of 10 CFR Parts 20 and 61 and those of the DOT in 49 CFR Parts 170-189 were met. Documentation was reviewed, staff members involved in the shipment activities were interviewed, and the final preparations for a waste shipment were observed by the inspectors to determine whether package labeling and marking were appropriate, if package and transport vehicle surveys were performed with appropriate instrumentation, if radiation survey results satisfied DOT requirements, and if the quantity and type of radioactive material in each shipment were determined accurately. The inspectors also determined whether shipment manifests were completed in accordance with DOT and NRC requirements, if they included the required emergency response information, if the recipient was authorized to receive the shipment, and if shipments were tracked as required by 10 CFR Part 20, Appendix G.

b. Observations and Findings

The licensee initiated radwaste shipments to the Clive, Utah, Bulk Waste Facility (low-level waste disposal site) in August 2011. For each of these waste shipments, direct oversight was provided by a waste broker and the licensee's waste logistics manager to ensure that waste was properly packaged, radiological conditions met requirements and

to verify package and vehicle readiness. Shipments were also made to waste processors, vendors and other licensed entities in 2011.

The inspectors observed waste operations staff load individual packages, and prepare both a package and the transport vehicle for a shipment. Procedure compliance was verified as inspectors observed radiation protection staff perform a final package and vehicle survey, and other licensee staff completed vehicle readiness checks. Additionally, the inspectors performed independent measurements of a waste package and vehicle to verify that radiological conditions were consistent with licensee results.

No findings of significance were identified.

c. Conclusions

Radioactive material and waste shipments were prepared and manifested consistent with the licensee's procedures to meet the requirements of 10 CFR Parts 20 and 61 and those of the DOT in 49 CFR Parts 170-189.

5.0 Exit Meeting

The lead inspector presented the results to licensee management following the conclusion of the onsite inspection on October 14, 2011. The licensee acknowledged the results presented and did not identify any of the documents reviewed by the inspectors as proprietary.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

P. Daly, General Manager
G. Bouchard, Decommissioning Plant Manager
P. Thurman, Regulatory Affairs Manager
R. C. Keene, Director, Radiation Protection
P. Hoppe, Radiological Engineering/ALARA Manager
M. Wiskerchen, Manager, Waste Operations
S. Hitt, Manager, Waste Logistics

INSPECTION PROCEDURES (IPs) USED

IP 37801	Safety Reviews & Modifications at Permanently Shutdown Reactors
IP 71801	Decommissioning Performance and Status Review at Permanently Shutdown Reactors
IP 83750	Occupational Radiation Safety
IP 86750	Solid Radioactive Waste Management and Transportation of Radioactive Materials

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened/Closed	None
Discussed	None

LIST OF DOCUMENTS REVIEWED

Energy Solutions Clive, Utah, Bulk Waste Disposal and Treatment Facility Waste Acceptance Criteria, Revision 8

ZS-WM-122, Low Level Waste Scaling Factors and 10 CFR 61 Program, Revision 0

ZS-WM-127, Surveying Radioactive Material Shipments, Revision 0

ZS-WM-102, Exclusive Use and Emergency Response Information, Revision 0

ZS-WM-105, Inspection and Loading of Radioactive Material and Waste Shipments, Revision 0

ZS-WM-110, Packaging of Radioactive Material and Waste Shipments, Revision 0

ZS-WM-111, Shipping Radioactive Material, Revision 0

ZS-WM-115, Radioactive Material Shipped to Energy Solutions Clive, Utah, Bulk Waste Facility, Revision 0

RWP 2011-2-0019, Insulation Removal from Loops to Support RCS Cut & Plug, Revision 0 and Associated TEDE ALARA Review

RWP 2011-2-0022, Remove Interferences from Loops to Support RCS Cut & Plug , Revision 0 and Associated ALARA Plan, TEDE ALARA Review and WIP Reports (various dates)

RWP 2011-2-0030, Cut & Cap RCS Piping Inside Missile Barrier Unit, Revision 0 and Associated ALARA Plan, TEDE ALARA Review and WIP Report (various dates)

Energy Solutions Special Waste Shipment Authorization issued to Zion*Solutions*, Waste Stream No. 0958-01, dated August 22, 2011

ZS-RP-102-002-001, Dosimetry Issue, Change Out and Processing, Revision 0

ZAP-700-02, Corrective Action Program and Work Request Process, Revision 17

ZS-RP-103-000-000, ALARA Program, Revision 0

ZS-RP-103-001-001, ALARA Planning, Revision 0

RP-ZN-440, Respiratory Protection Program, Revision 0

ZRP-6020-3, Radiological Surveys, Revision 9

RP-ZN-441, Evaluation and Selection Process for Radiological Respirator Use, Revision 1

ZS-RP-105-002-001, Radiological Air Sampling Program for Job-Specific and General Air Monitoring, Revision 0

Lesson Plan No. ZS-GN-WPC-SELF, Zion Waste Packaging Certifier – Waste Operations Group, Revision 0

WR No. 00379801, DOT Subpart H Training for RPTs, dated September 21, 2011

Lesson Plan No. ZS-GN-HMH-Clas-0001, DOT Hazmat Subpart H Training, Revision 1

CR No. 364712, Intermodal Handling, dated April 11, 2011

CR No. 375925, RPT Stopped Work, dated August 5, 2011

CR No. 376703, RWP Issue, dated March 16, 2011

CR No. 379801, DOT Training

10 CFR Part 61 DAW and Resin Waste Stream Analyses. Comparisons and Waste Classification Assessments (various dates in 2011)

LIST OF ACRONYMS USED

ADAMS	Agencywide Document Access and Management System
ALARA	As-Low-As-Is-Reasonably-Achievable
CAP	Corrective Action Program

CFR	Code of Federal Regulations
DAW	Dry Active Waste
DNMS	Division of Nuclear Materials Safety
DOT	Department of Transportation
DSAR	Defueled Safety Analysis Report
Hazmat	Hazardous Material
IGSCC	Inter-granular Stress Corrosion Cracking
ITTR	Instrument Tube Tie Rod
NRC	U.S. Nuclear Regulatory Commission
RCS	Reactor Coolant System
RPT	Radiation Protection Technician
RWP	Radiation Work Permit
SAFSTOR	Safe Storage of Spent Fuel
TEDE	Total Effective Dose Equivalent
WIP	Work In Progress