

**NUCLEAR REGULATORY COMMISSION**

**[Docket Nos. 50-295, 50-304, and 72-1037; NRC-2014-0199]**

**ZionSolutions, LLC.; Zion Nuclear Power Station, Units 1 and 2**

**Independent Spent Fuel Storage Installation**

**AGENCY:** Nuclear Regulatory Commission.

**ACTION:** Exemption; issuance.

**DATES:** Notice of issuance of exemption given on **[INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

**SUMMARY:** The U.S. Nuclear Regulatory Commission (NRC) is issuing an exemption in response to a request submitted by ZionSolutions on June 25, 2014, for its general license to operate an independent spent fuel storage installation (ISFSI) at the Zion Nuclear Power Station (ZNPS). The exemption would permit ZionSolutions to load NAC International, Inc. (NAC), Modular Advanced Generation Nuclear All-purpose STORage (MAGNASTOR<sup>®</sup>) casks (Certificate of Compliance (CoC) No. 1031) in a manner different than permitted by any amendment to the MAGNASTOR<sup>®</sup> CoC. The ZionSolutions is currently loading MAGNASTOR<sup>®</sup> storage casks and maintains that relief from requirements provides flexibility in operations, minimizes equipment runtime and repair, and minimizes personnel dose.

**ADDRESSES:** Please refer to Docket ID NRC-2014-0199 when contacting the NRC about the availability of information regarding this document. You may obtain publicly-available information related to this document using any of the following methods:

- **Federal Rulemaking Web site:** Go to <http://www.regulations.gov> and search for Docket ID NRC-2014-0199. Address questions about NRC dockets to Carol Gallagher; telephone: 301-287-3422; e-mail: [Carol.Gallagher@nrc.gov](mailto:Carol.Gallagher@nrc.gov). For technical questions, contact the individual listed in the **FOR FURTHER INFORMATION CONTACT** section of this document.

- **NRC's Agencywide Documents Access and Management System (ADAMS):** You may obtain publicly-available documents online in the ADAMS Public Documents collection at <http://www.nrc.gov/reading-rm/adams.html>. To begin the search, select "[ADAMS Public Documents](#)" and then select "[Begin Web-based ADAMS Search](#)." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to [pdr.resource@nrc.gov](mailto:pdr.resource@nrc.gov). For the convenience of the reader, the ADAMS accession numbers are provided in a table in the "Availability of Documents" section of this document. Some documents referenced are located in the NRC's ADAMS Legacy Library. To obtain these documents, contact the NRC's PDR for assistance.

- **NRC's PDR:** You may examine and purchase copies of public documents at the NRC's PDR, Room O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852.

**FOR FURTHER INFORMATION CONTACT:** Bernard White, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington DC 20555-0001; telephone: 301-287-0810; e-mail: [Bernard.White@nrc.gov](mailto:Bernard.White@nrc.gov).

## I. Background.

In February 1998, ZNPS, Units 1 and 2, were permanently shut down. On February 13, 1998, Commonwealth Edison Company, the ZNPS licensee at that time, submitted a letter certifying the permanent cessation of operations at ZNPS, Units 1 and 2. On March 9, 1998, Commonwealth Edison Company submitted a letter certifying the permanent removal of fuel from the reactor vessels at ZNPS. On May 4, 2009, the NRC issued the order to transfer the ownership of the permanently shut down ZNPS facility, and responsibility for its decommissioning to ZionSolutions. This transfer was effectuated on September 1, 2010. ZionSolutions was established solely for the purpose of acquiring and decommissioning the ZNPS facility for release for unrestricted use, while transferring the spent nuclear fuel and Greater-Than-Class C radioactive waste to the ZNPS ISFSI. ZionSolutions holds Facility Operating License Nos. DPR-39 and DPR-48, which authorize possession of spent fuel from the operation of ZNPS, Units 1 and 2, in Zion, Illinois, pursuant to Part 50 of Title 10 of the *Code of Federal Regulations* (10 CFR). The licenses provide, among other things, that the facility must comply with all applicable NRC requirements.

Consistent with 10 CFR Part 72, Subpart K, a general license is issued for the storage of spent fuel in an ISFSI at power reactor sites to persons authorized to possess or operate nuclear power reactors under 10 CFR Part 50. ZionSolutions is currently authorized to store spent fuel at the ZNPS ISFSI under the 10 CFR Part 72 general license provisions.

The conditions of the 10 CFR Part 72 general license, specifically 10 CFR 72.212(a)(2), 72.212(b)(3), 72.212(b)(5)(i), and 72.212(b)(11), require a general licensee to store spent fuel in an approved spent fuel storage cask listed in 10 CFR 72.214, and to comply with the conditions

specified in the cask's CoC. The ZNPS ISFSI is currently loading and storing spent fuel in MAGNASTOR® storage casks, approved by the NRC under CoC No. 1031, Amendment No. 3.

The MAGNASTOR® system provides for the vertical dry storage of spent fuel assemblies in a welded transportable storage canister (TSC). The storage system components for MAGNASTOR® consist of a vertical concrete cask (VCC), a TSC with an internal basket assembly that holds the spent fuel assemblies, and a transfer cask, which contains the TSC during loading, transfer, and unloading operations. The VCC is constructed of reinforced concrete designed to withstand all normal condition loads, as well as abnormal condition loads created by natural phenomena such as earthquakes and tornados. The storage system is also designed to withstand design-basis accident conditions.

## **II. Request/Action.**

By letter dated June 25, 2014, ZionSolutions submitted a request for exemptions from specific portions of the requirements of 10 CFR 72.212, "Conditions of general license issued under § 72.210," specifically 10 CFR 72.212(a)(2), 72.212(b)(3), 72.212(b)(5)(i), 72.212(b)(11), and 10 CFR 72.214, "List of approved spent fuel storage casks." Specifically, ZionSolutions has requested an exemption from the requirements of limiting condition of operation (LCO) 3.1.1, Section 1, Table A, of the technical specification (TS), regarding allowed transfer time from loading of a TSC inside the MAGNASTOR® transfer cask to placement into the VCC following the completion of helium backfill. ZionSolutions must connect the TSC to the annulus cooling water system (ACWS) for a certain minimum period prior to attempting the transfer. The length of time the TSC is connected to the ACWS prior to the transfer determines the maximum time ZionSolutions has to successfully complete the transfer to the VCC.

Currently, ZionSolutions connects the TSC to the ACWS for 8 hours, which then affords a maximum of 8 hours to complete the transfer. ZionSolutions could increase the maximum transfer time to 48 hours by TSC connected to the ACWS for an additional 24 hours. However, the proposed exemption would modify the allowable transfer time for pressurized-water reactor (PWR) spent fuel after helium backfill from a maximum of 8 hours to 600 hours for the movement of a TSC, with heat load  $\leq 20$  kW, from the decontamination pit into the VCC. In its request, ZionSolutions explained that this exemption will reduce maintenance and delays, and potentially reduce the dose received by workers during the transfer. If granted, ZionSolutions intends to use this exemption for the remainder of a loading campaign that began in January 2014.

The NRC has the authority to grant specific exemptions from these requirements under 10 CFR 72.7 if the exemption is authorized by law and will not endanger life or property or the common defense and security and the exemption is otherwise in the public interest. For the reasons described below, the NRC is granting an exemption to ZionSolutions. This exemption is valid until March 31, 2015.

### **III. Discussion.**

Pursuant to 10 CFR 72.7, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR Part 72 when the exemptions are authorized by law, will not endanger life or property or the common defense and security, and is otherwise in the public interest.

**A. Authorized by Law**

The Commission issued 10 CFR 72.7 under the authority granted to it under Section 133 of the Nuclear Waste Policy Act of 1982, as amended, 42 U.S.C. 10153. Section 72.7 allows the NRC to grant exemptions from the requirements of 10 CFR Part 72 if the exemption is authorized by law, will not endanger life or property or the common defense and security, and is otherwise in the public interest. As explained below, the proposed exemption will not endanger life or property, or the common defense and security, and is otherwise in the public interest. The ISFSI regulations cited in this exemption request are 10 CFR 72.212(a)(2), 72.212(b)(3), 72.212(b)(5)(i), 72.212(b)(11), and 10 CFR 72.214. The Commission has the legal authority to issue exemptions from the requirements of Part 72 as provided in 10 CFR 72.7. Issuance of this exemption is consistent with the Atomic Energy Act of 1954, as amended, and not otherwise inconsistent with NRC regulations or other applicable laws. Therefore, issuance of the exemption is authorized by law.

**B. The Exemption Will Not Endanger Life or Property or the Common Defense and Security**

In its exemption request, ZionSolutions referred to analyses performed by the cask vendor, NAC, in support of ZionSolutions' request.<sup>1</sup>

Approval of this exemption request will allow ZionSolutions to utilize a longer transfer time to place the canister in a VCC, may reduce operational dose associated with a shorter transfer time, in the event the licensee is unable to complete the transfer in the maximum 8-hour period allowed under the terms of the MAGNASTOR CoC. If the exemption is not granted and

---

<sup>1</sup> While the Amendment No. 4 application includes the addition of increased transfer time, the application also includes other changes not at issue in this exemption.

the ZionSolutions is unable to conclude the transfer within the 8 hours, it would have to reconnect the TSC to ACWS within the 8 hour transfer time. Alternately, ZionSolutions can connect the TSC to the ACWS for an additional 24 hours prior to transfer to be allowed more time for the transfer. The additional cooling time extends the permitted maximum time for the transfer from 8 hours to 48 hours, per Table B of LCO 3.1.1. Granting ZionSolutions' exemption to use the longer transfer time may reduce dose to the operators, which conforms to the NRC's as low as reasonably achievable (ALARA) requirements.

As discussed below, the NRC staff finds that ZionSolutions' proposal to increase its transfer time after helium backfill from 8 to 600 hours for heat loads  $\leq 20$  kW is acceptable for PWR spent fuel and will not endanger life or property or common defense and security. The thermal evaluation for the increased transfer time was evaluated using guidance in NUREG-1536, "Standard Review Plan for Spent Fuel Dry Storage Systems at a General License Facility, Rev. 1."

Safety Evaluation: *ZionSolutions* proposed to increase the maximum transfer time for the TSC specified in LCO 3.1.1, Section 1, Table A, of the TS from 8 to 600 hours for decay heat loads less than 20 kW.

The cask vendor, NAC, performed a steady state analysis for the TSC located in the transfer cask, which had no additional cooling, and calculated a peak cladding temperature of 653°F for the  $\leq 20$  kW PWR heat load condition. The analysis by NAC shows that the peak cladding temperature during the extended transfer times proposed by ZionSolutions is below the limit of 752°F by a significant margin ( $\sim 100^\circ\text{F}$ ). As discussed below, because the peak cladding temperature during the extended transfer times proposed by ZionSolutions will remain below the

limit of 752°F, the NRC staff concludes that the additional cooling is not required for loading heat loads  $\leq$  20 kW at ZNPS.

As part of its review of ZionSolutions' exemption request, the NRC staff referred to NAC's modeling methods, initial conditions, and boundary conditions and determined the analyses show that the extended transfer times requested by ZionSolutions are acceptable. First, the NRC staff determined that the mesh discretization used in the model is acceptable to support this exemption because it does not significantly change the results from the prior model for laminar flows inside the canister and in the annulus between the canister and transfer cask inner shell. Second, the NRC staff determined that the flow resistance factor, used to model fluid flow through the 14x14 PWR fuel assembly as a porous media, is acceptable because it conforms to known thermal-hydraulic measurements on a PWR fuel assembly. The analysis is also acceptable to support this exemption because the methodology used is the same as the methodology used in the thermal evaluation for the initial issuance of Certificate of Compliance No. 1031, which the NRC staff had previously found to be acceptable. Finally, the NRC staff has determined that the analysis is acceptable to support this exemption because the results of the calculation show that the fuel temperatures will remain below the fuel temperature limit of 752°F, as specified in NUREG-1536, Rev. 1, "Standard Review Plan for Dry Cask Storage Systems," and Interim Staff Guidance No. 11, Rev. 3, "Cladding Considerations for the Transportation and Storage of Spent Fuel." Therefore, the NRC staff concludes that ZionSolutions will meet the requirements of Part 72 while operating with this exemption.

Security Evaluation: Modification of the transfer time when a canister's thermal output is  $\leq$  20 kW for PWR spent fuel does not affect the ISFSI security plans. Accordingly, the ZNPS ISFSI will continue to be physically protected under ZionSolutions' ISFSI Physical Security Plan to the same level of security. Additionally, the changes do not affect the confinement barriers of



the canisters or affect the integrity of the spent nuclear fuel. Therefore, confinement of the spent fuel stored at the ISFSI facility is not affected.

As discussed above, the safety and security requirements associated with transferring the loaded TSC in a transfer cask to a VCC at the ZNPS ISFSI will continue to be met if the exemption is granted. Therefore, issuance of the exemption will not endanger life or property or the common defense and security.

**C. The Exemption is Otherwise in the Public Interest**

The ZionSolutions stated that adoption of the revised transfer times as proposed will maintain doses ALARA by ensuring that the time needed to prepare the canister for storage is minimized. Based on its review of ZionSolutions' request, the NRC staff concludes that allowing the use of the extended maximum transfer time reduces time constraints during transfer operations on operators and thereby reduces dose to ZNPS operators for the following reasons.

If the operator is unable to conclude the activity within 8 hours due to operational delays or complications, ZionSolutions stated that it reconnects the MAGNASTOR transfer cask to annulus cooling water system (ACWS) within the 8 hour transfer time. Zion Solutions' exemption request indicated that operators include a 2-hour buffer in the transfer time to account for the possibility that the transfer cask will need to be reconnected to the ACWS. As a result, the transfer time available to the operator is limited to approximately 6 hours. Performing the ACWS reconnection increases dose to the operators and, as discussed above, the NRC staff has concluded that successfully completing the transfer within 600 hours is sufficient to provide adequate protection of the public health and safety.

To avoid the 8hour transfer time limitation, ZionSolutions could use an alternative procedure that allows a 48 hour limit (LCO 3.1.1, Table B "PWR with Maximum TSC Backfill").

That alternate procedure requires the TSC to remain connected to the ACWS for an additional 24 hours prior to attempting the transfer. This alternate procedure is likely to be used to avoid needing to make multiple transfer attempts to account for operational delays or complications. However, that alternate procedure results in an additional 17 hours of operating time, per individual cask loading, and would include additional dose to personnel, increase equipment wear, and increase the risk of equipment failure during extended operation. The resulting system's lack of availability would also impact operations. The additional operational period is specifically a concern for the ZionSolutions fuel loading campaign, which involves 61 casks, because up to 43 days will be added to the transfer duration if the alternate procedure is adopted for all 61 casks. Based on the NRC staff's evaluation of the extended transfer times proposed by ZionSolutions, the NRC staff determines that those procedures are not necessary to meet the requirements of Part 72 because even without the alternate procedures the fuel temperature will remain below the temperature limit in NUREG-1536 and ISG-11 which limits fuel degradation and ensures ready retrievability as required in 10 CFR 72.122 (h) and (l).

Given the potential avoidance of additional radiological exposure to workers during the cask loading campaign, issuance of the exemption is in the public interest.

**D. Environmental Considerations**

The NRC staff also considered whether there would be any significant environmental impacts associated with the exemption. For this proposed action, the NRC staff performed an environmental assessment pursuant to 10 CFR 51.30. The environmental assessment concluded that the proposed action would not significantly impact the quality of the human environment. The NRC staff concluded that the proposed action will not result in any changes in the types or amounts of any radiological or non-radiological effluents that may be released

offsite, and there is no significant increase in occupational or public radiation exposure because of the proposed action. The Environmental Assessment and the Finding of No Significant Impact was published on October 16, 2014 (79 FR 62211).

#### **IV. Conclusions.**

Accordingly, the NRC has determined that, pursuant to 10 CFR 72.7, this exemption is authorized by law, will not endanger life or property or the common defense and security, and is otherwise in the public interest. Therefore, the Commission hereby grants ZionSolutions an exemption from 10 CFR Part 72.212(a)(2), 72.212(b)(3), 72.212(b)(5)(i), 72.212(b)(11) and 72.214, which states that the licensee shall comply with the terms, conditions, and specifications of the CoC only with regard to LCO 3.1.1, Section 1, Table A, of TS to MAGNASTOR® CoC No. 1031, Amendment No. 3, to change the time allowed after helium backfill from 8 hours to 600 hours for transferring a canister containing  $\leq 20$  kW of decay heat load from decontamination pit to a VCC. This exemption approval is only valid for authorizing a longer transfer time up to 600 hours for canisters with a decay heat load  $\leq 20$  kW at the ZionSolutions Nuclear Station ISFSI until March 31, 2015.

#### **V. Availability of Documents.**

The documents identified in the following table are available to interested persons in ADAMS. For information on accessing ADAMS see the ADDRESSES section of this document.

<b>Document</b>	<b>ADAMS Accession No.</b>
Commonwealth Edison Company letter certifying the permanent cessation of operations at ZNPS, Units 1 and 2	9802200407 (Legacy Library)
Commonwealth Edison Company letter certifying the permanent removal of fuel from the reactor vessels at ZNPS	9803110251 (Legacy Library)
NRC order and conforming amendments transferring ownership of ZNPS facility	ML090930037
Letter issuing conforming amendments relating to transfer of licenses for ZNPS	ML102290437
Zion exemption request	ML14182A474
NAC amendment request No. 4 to change LCO 3.1.1, Section 1, Table A	ML13171A031
NAC MAGANSTOR Amendment 4 response to NRC request for supplemental information	ML13261A278
NAC MAGANSTOR final safety analysis report, Revision 13C	ML13268A051
NAC supplement to correct TS error associated with additional cooling times for fuel assemblies containing control elements	ML14170A070
NAC supplement to correct typographical error in boron density in TS	ML14170A022

NAC request to have Amendment 3 to CoC 1031 be the basis for Amendment 4 instead of Amendment 2	ML14199A501
NUREG-1536, Rev. 1, "Standard Review Plan for Dry Cask Storage Systems," dated July 2010	ML101040620
Interim Staff Guidance No. 11, Rev. 3, "Cladding Considerations for the Transportation and Storage of Spent Fuel"	ML033230244
Initial issuance of Certificate of Compliance No. 1031	ML090350509

The exemption is effective upon issuance.

Dated at Rockville, Maryland, this      day of                      , 2014.

For the Nuclear Regulatory Commission.

**DRAFT**

Anthony H. Hsia, Deputy Director,  
Division of Spent Fuel Management,  
Office of Nuclear Material Safety  
and Safeguards.