

December 30, 2019

ZS-2019-0107

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

Subject: Request for an Exemption to the Requirements of Certificate of Compliance  
No. 1031 for the NAC MAGNASTOR Storage System  
Zion Nuclear Power Station, Units 1 and 2  
Facility Operating License Nos. DPR-39 and DPR-48  
NRC Docket Nos. 50-295 and 50-304  
Independent Spent Fuel Storage Installation Docket No. 72-1037

Reference: 1. U.S. Nuclear Regulatory Commission (NRC) Certificate of Compliance No.  
72-1031 for the NAC International MAGNASTOR Cask System,  
Amendment No. 6

Pursuant to 10 CFR 72.7, "Specific Exemptions", *ZionSolutions* requests an exemption to the requirements of 10 CFR 72.212(b)(3) and 10 CFR 72.212(b)(11) for 53 MAGNASTOR Transportable Storage Canisters (TSCs) as listed in Enclosure 1 due to two nonconforming conditions associated with the procurement of material used in their fabrication. Specifically, an exception to the ASME Code Section III, Division 1, Subsection NG-2300, Charpy testing direction requirement for carbon steel plate material  $> \frac{5}{8}$ " thick and an exception to the post heat treatment UT requirements for ASME Section III, Division 1, Subsection NG-2500, for rolled carbon steel plate material  $> \frac{3}{4}$ " is being requested.

Reference 1, Appendix A, Section 4.2 requires the TSC spent fuel basket conform to the requirements of the ASME Code, 2001 Edition with Addenda through 2003, Section III, Subsection NG, for the design, material procurement, fabrication and testing. Contrary to this requirement, the TSCs listed in Enclosure 1 do not fully conform to the Code requirements. NAC International, the certificate holder for the MAGNASTOR cask system, has identified that those TSCs listed in Enclosure 1 have sub-components of the spent fuel basket which do not meet the test specimen orientation requirements detailed in the Code. Enclosure 2 provides a list of those affected spent fuel basket sub-components. In addition, NAC International has identified that those systems listed in Enclosure 1 have sub-components of the spent fuel basket which do not meet the post-heat treatment Ultrasonic Examination (UT) requirements detailed in the Code. Enclosure 3 provides a list of those affected spent fuel basket sub-components.

AD47  
NM5526  
NRR  
NM55

Enclosure 4 provides the exemption request including a description of the need and justification for the issuance of an exemption. The exemption request provides the basis and technical justification for the continued use of TSCs already loaded and in storage. In summary, the exemption request has determined that contrary to the Code requirements for impact testing and post-heat treatment UT examination, the material used in the fabrication of the spent fuel baskets is the required material and that the affected sub-components will continue to perform their intended safety functions. ZionSolutions requests the approval of this exemption request no later than August 1, 2020.

Respectfully,



Gerard van Noordennen

Senior Vice President Regulatory Affairs

Enclosures:

- Enclosure 1: List of Affected Transportable Storage Canisters (TSCs)
- Enclosure 2: List of Spent Fuel Basket Non-Compliant Sub-Components - Charpy V-notch Impact Testing
- Enclosure 3: List of Spent Fuel Basket Non-Compliant Sub-Components - Post-Heat Treatment UT Examination
- Enclosure 4: Exemption Request Need and Justification
- Enclosure 5: 71160-WP-020, NAC International Assessment of Longitudinal Versus Transverse Charpy Impact Testing for A537 and A517 Materials, Rev. 1
- Enclosure 6: Sperko Engineering Services, Inc., Subject: Ultrasonic Examination After Normalizing, October 23, 2019

cc:

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John Hickman, U.S. NRC Senior Project Manager  
Regional Administrator, U.S. NRC, Region III  
Service List (Cover letter only, no enclosures)

**NAC INTERNATIONAL**  
**AFFIDAVIT PURSUANT TO 10 CFR 2.390**

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George Carver (Affiant), Vice President, Engineering and Licensing, of NAC International, hereinafter referred to as NAC, at 3930 East Jones Bridge Road, Norcross, Georgia 30092, being duly sworn, deposes and says that:

1. Affiant has reviewed the information described in Item 2 and is personally familiar with the trade secrets and privileged information contained therein, and is authorized to request its withholding.
2. The information to be withheld includes the following NAC Proprietary Information that is being provided to support the technical review of NAC's Request for a Certificate of Compliance (CoC) (No. 1031) for the NAC International MAGNASTOR Cask System.
  - Enclosure 5 – 71160-WP-020, NAC International Assessment of Longitudinal Versus Transverse Charpy Impact Testing for A537 and A517 Materials, Rev. 1
  - Enclosure 6 – Sperko Engineering Services, Inc., Subject: Ultrasonic Examination After Normalizing, October 23, 2019

NAC is the owner of the information contained in the above documents. Thus, all of the above identified information is considered NAC Proprietary Information.

3. NAC makes this application for withholding of proprietary information based upon the exemption from disclosure set forth in: the Freedom of Information Act ("FOIA"); 5 USC Sec. 552(b)(4) and the Trade Secrets Act; 18 USC Sec. 1905; and NRC Regulations 10 CFR Part 9.17(a)(4), 2.390(a)(4), and 2.390(b)(1) for "trade secrets and commercial financial information obtained from a person, and privileged or confidential" (Exemption 4). The information for which exemption from disclosure is herein sought is all "confidential commercial information," and some portions may also qualify under the narrower definition of "trade secret," within the meanings assigned to those terms for purposes of FOIA Exemption 4.
4. Examples of categories of information that fit into the definition of proprietary information are:
  - a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by competitors of NAC, without license from NAC, constitutes a competitive economic advantage over other companies.
  - b. Information that, if used by a competitor, would reduce their expenditure of resources or improve their competitive position in the design, manufacture, shipment, installation, assurance of quality or licensing of a similar product.
  - c. Information that reveals cost or price information, production capacities, budget levels or commercial strategies of NAC, its customers, or its suppliers.
  - d. Information that reveals aspects of past, present or future NAC customer-funded development plans and programs of potential commercial value to NAC.
  - e. Information that discloses patentable subject matter for which it may be desirable to obtain patent protection.

**NAC INTERNATIONAL**  
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The information that is sought to be withheld is considered to be proprietary for the reasons set forth in Items 4.a, 4.b, and 4.d.

5. The information to be withheld is being transmitted to the NRC in confidence.
6. The information sought to be withheld, including that compiled from many sources, is of a sort customarily held in confidence by NAC, and is, in fact, so held. This information has, to the best of my knowledge and belief, consistently been held in confidence by NAC. No public disclosure has been made, and it is not available in public sources. All disclosures to third parties, including any required transmittals to the NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements, which provide for maintenance of the information in confidence. Its initial designation as proprietary information and the subsequent steps taken to prevent its unauthorized disclosure are as set forth in Items 7 and 8 following.
7. Initial approval of proprietary treatment of a document/information is made by the Vice President, Engineering, the Project Manager, the Licensing Specialist, or the Director, Licensing – the persons most likely to know the value and sensitivity of the information in relation to industry knowledge. Access to proprietary documents within NAC is limited via “controlled distribution” to individuals on a “need to know” basis. The procedure for external release of NAC proprietary documents typically requires the approval of the Project Manager based on a review of the documents for technical content, competitive effect and accuracy of the proprietary designation. Disclosures of proprietary documents outside of NAC are limited to regulatory agencies, customers and potential customers and their agents, suppliers, licensees and contractors with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.
8. NAC has invested a significant amount of time and money in the research, development, engineering and analytical costs to develop the information that is sought to be withheld as proprietary. This information is considered to be proprietary because it contains detailed descriptions of analytical approaches, methodologies, technical data and/or evaluation results not available elsewhere. The precise value of the expertise required to develop the proprietary information is difficult to quantify, but it is clearly substantial.
9. Public disclosure of the information to be withheld is likely to cause substantial harm to the competitive position of NAC, as the owner of the information, and reduce or eliminate the availability of profit-making opportunities. The proprietary information is part of NAC’s comprehensive spent fuel storage and transport technology base, and its commercial value extends beyond the original development cost to include the development of the expertise to determine and apply the appropriate evaluation process. The value of this proprietary information and the competitive advantage that it provides to NAC would be lost if the information were disclosed to the public. Making such information available to other parties, including competitors, without their having to make similar investments of time, labor and money would provide competitors with an unfair advantage and deprive NAC of the opportunity to seek an adequate return on its large investment.

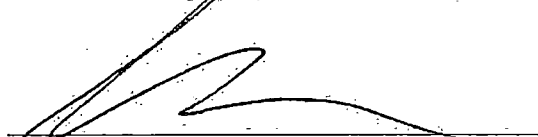
**NAC INTERNATIONAL  
AFFIDAVIT PURSUANT TO 10 CFR 2.390**

State of Georgia, County of Gwinnett

Mr. George Carver, being duly sworn, deposes and says:


That he has read the foregoing affidavit and the matters stated herein are true and correct to the best of his knowledge, information and belief.

Executed at Norcross, Georgia, this 16<sup>th</sup> day of December, 2019.

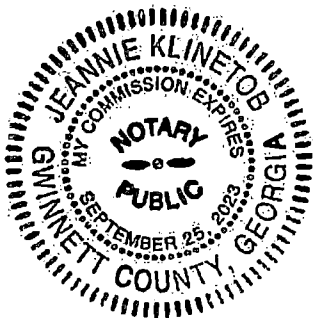


George Carver  
Vice President, Engineering and Licensing  
NAC International

Subscribed and sworn before me this 16<sup>th</sup> day of December, 2019.



Notary Public



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## **Enclosure 1**

List of Affected Transportable Storage Canisters (TSCs)

| <b>ZionSolutions</b> |              |                                   |
|----------------------|--------------|-----------------------------------|
| <b>Serial Number</b> | <b>Model</b> | <b>Non-Compliance<sup>1</sup></b> |
| MAG-TSC-418-053      | MAGNASTOR    | A and B                           |
| MAG-TSC-418-054      | MAGNASTOR    | A and B                           |
| MAG-TSC-215555-01    | MAGNASTOR    | A                                 |
| MAG-TSC-215555-02    | MAGNASTOR    | A                                 |
| MAG-TSC-215555-03    | MAGNASTOR    | A                                 |
| MAG-TSC-215555-04    | MAGNASTOR    | A                                 |
| MAG-TSC-215555-05    | MAGNASTOR    | A                                 |
| MAG-TSC-215555-06    | MAGNASTOR    | A                                 |
| MAG-TSC-215555-07    | MAGNASTOR    | A                                 |
| MAG-TSC-215555-08    | MAGNASTOR    | A                                 |
| MAG-TSC-215555-09    | MAGNASTOR    | A                                 |
| MAG-TSC-215555-10    | MAGNASTOR    | A                                 |
| MAG-TSC-215555-11    | MAGNASTOR    | A                                 |
| MAG-TSC-215555-12    | MAGNASTOR    | A                                 |
| MAG-TSC-215555-13    | MAGNASTOR    | A                                 |
| MAG-TSC-215555-14    | MAGNASTOR    | A                                 |
| MAG-TSC-215555-15    | MAGNASTOR    | A                                 |
| MAG-TSC-215555-16    | MAGNASTOR    | A                                 |
| MAG-TSC-215555-17    | MAGNASTOR    | A                                 |
| MAG-TSC-215555-18    | MAGNASTOR    | A                                 |



|                     |              |         |
|---------------------|--------------|---------|
| MAG-TSC-215555-19   | MAGNASTOR    | A       |
| MAG-TSC-215555-20   | MAGNASTOR    | A       |
| MAG-TSC-215555-21   | MAGNASTOR    | A       |
| MAG-TSC-215555-22   | MAGNASTOR    | A       |
| MAG-TSC-215555-23   | MAGNASTOR    | A       |
| MAG-TSC-215555-24   | MAGNASTOR    | A       |
| MAG-TSC-215555-25   | MAGNASTOR    | A       |
| MAG-TSC-215555-26   | MAGNASTOR    | A       |
| MAG-TSC-215555-27   | MAGNASTOR    | A       |
| MAG-TSC-215555-28   | MAGNASTOR    | A       |
| MAG-TSC-215555-29   | MAGNASTOR    | A       |
| MAG-TSC-215555-30   | MAGNASTOR    | A       |
| MAG-TSCDF-215555-08 | MAGNASTOR-DF | A and B |
| MAG-TSCDF-215555-11 | MAGNASTOR-DF | A and B |
| MAG-TSCDF-215555-12 | MAGNASTOR-DF | A and B |
| MAG-TSCDF-215555-13 | MAGNASTOR-DF | A and B |
| MAG-TSCDF-215555-14 | MAGNASTOR-DF | A and B |
| MAG-TSCDF-215555-15 | MAGNASTOR-DF | A and B |
| MAG-TSCDF-215555-16 | MAGNASTOR-DF | A and B |
| MAG-TSCDF-215555-17 | MAGNASTOR-DF | A and B |
| MAG-TSCDF-215555-18 | MAGNASTOR-DF | A and B |
| MAG-TSCDF-215555-19 | MAGNASTOR-DF | A and B |
| MAG-TSCDF-215555-20 | MAGNASTOR-DF | A and B |

|                     |              |         |
|---------------------|--------------|---------|
| MAG-TSCDF-215555-21 | MAGNASTOR-DF | A and B |
| MAG-TSCDF-215555-22 | MAGNASTOR-DF | A and B |
| MAG-TSCDF-215555-23 | MAGNASTOR-DF | A and B |
| MAG-TSCDF-215555-24 | MAGNASTOR-DF | A and B |
| MAG-TSCDF-215555-25 | MAGNASTOR-DF | A and B |
| MAG-TSCDF-215555-26 | MAGNASTOR-DF | A and B |
| MAG-TSCDF-215555-27 | MAGNASTOR-DF | A and B |
| MAG-TSCDF-215555-28 | MAGNASTOR-DF | A and B |
| MAG-TSCDF-215555-29 | MAGNASTOR-DF | A and B |
| MAG-TSCDF-215555-30 | MAGNASTOR-DF | A and B |

1 – Designation “A” indicates non-compliance with Charpy V-notch test specimen orientation requirements. Designation “B” indicates non-compliance with post-heat treatment UT examination requirements.

## **Enclosure 2**

List of Spent Fuel Basket Non-Compliant Sub-Components  
Charpy V-notch Impact Testing

| <b>License Drawing<br/>Number</b> | <b>Bill of Materials<br/>Item Number</b> | <b>Component<br/>Name</b>       |
|-----------------------------------|--|---------------------------------|
| 71160-574                         | 1  | Corner Support Bar <sup>1</sup> |
|                                   | 10                                       | Center Plate                    |
|                                   | 11                                       | Center Plate                    |
| 71160-575                         | 15                                       | Drive Pin <sup>1</sup>          |
|                                   | 16                                       | Spacer <sup>1</sup>             |
| 71160-674                         | 1  | Inner-Formed Plate              |
|                                   | 2  | Inner-Formed Plate              |
|                                   | 3  | Outer-Formed Plate              |
|                                   | 4  | Ridge Gusset                    |
| 71160-675                         | 15                                       | Drive Pin <sup>1</sup>          |
|                                   | 16                                       | Spacer <sup>1</sup>             |

1 – If made from plate.

## **Enclosure 3**

### **List of Spent Fuel Basket Non-Compliant Sub-Components Post-Heat Treatment UT Examination**

| <b>License Drawing<br/>Number</b> | <b>Bill of Materials<br/>Item Number</b> | <b>Component<br/>Name</b>       |
|-----------------------------------|--|---------------------------------|
| 71160-551                         | 12                                       | Mounting Boss <sup>1</sup>      |
| 71160-574                         | 1  | Corner Support Bar <sup>1</sup> |
| 71160-575                         | 15                                       | Drive Pin <sup>1</sup>          |
|                                   | 16                                       | Spacer <sup>1</sup>             |
| 71160-674                         | 1  | Inner-Formed Plate              |
|                                   | 2  | Inner-Formed Plate              |
| 71160-675                         | 15                                       | Drive Pin <sup>1</sup>          |
|                                   | 16                                       | Spacer <sup>1</sup>             |

1 – If made from plate.

## **Enclosure 4**

### **Exemption Request Need and Justification**

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# Exemption Request for Nonconforming Transportable Storage Canisters (TSCs)

## Executive Summary

NAC International, the Certificate of Compliance (CoC) holder for the MAGNASTOR storage system, recently brought to the attention of *ZionSolutions* that they had identified two compliance issues with the fabrication of several transportable storage canisters (TSCs) delivered to *ZionSolutions*.

The first issue was identified during the review of Certified Material Test Reports (CMTRs) for a current NAC project. NAC noted that certain components of the spent fuel basket were not impact tested in accordance with NAC's fabrication specification and purchase orders. These fabrication specifications and purchase orders reflect the requirements detailed in the CoC, which requires the spent fuel baskets, in part, to be designed, material procured, fabricated and tested in accordance with the requirements of the ASME Code, Section III, 2001/2003, Subsection NG, minus any Code exceptions previously approved by the NRC. Specifically, Article NG-2322.2(a)(4) requires Charpy V-notch impact specimens for carbon steel plate material  $> \frac{1}{8}$  inches thick to be oriented in a direction normal to the principal rolling direction during the test. NAC identified that some impact tests were performed incorrectly (i.e., the test specimens were impact tested in the longitudinal direction). NAC entered this into their Corrective Action Program (CAP) as Corrective Action Report (CAR) 19-01.

After NAC identified the impact testing issue, NAC further engaged their suppliers. Upon this action, existing relevant suppliers began to perform their own internal reviews. At this point Hitachi Zosen (HZ), which was an impact testing affected supplier, further identified that plate material greater than 0.750 inches thick that had been procured from Kobe Steel was not being ultrasonically examined (UT) after heat treatment. This second issue was entered into NAC's CAP as CAR 19-02 and a stop work order was placed on HZ until their internal reviews were complete and accepted by NAC. As previously described, the MAGNASTOR spent fuel baskets are to be designed, material procured, fabricated and tested in accordance with the ASME Code, Section III, Subsection NG, minus any Code exceptions previously approved by the NRC. Specifically, Article NG-2500, NG-2531, and NG-2532 require a post heat-treatment UT for carbon steel plate material  $> \frac{3}{4}$  inches thick. HZ identified that Kobe Steel was performing UT prior to heat treatment. This heat treatment was a normalization of the base material. In this process, the material is elevated in temperature and then allowed to naturally cool in an ambient environment.

NAC has performed a detailed review of these two issues and has completed their technical evaluations. NAC has determined that these two issues do not present a safety issue since all affected hardware will perform their intended safety functions. However, the MAGNASTOR CoC requires *ZionSolutions* to implement the MAGNASTOR system in accordance with the CoC. Thus, *ZionSolutions* is requesting, here with, NRC approval of an exemption request to 10 CFR 72.212(b)(3) and 72.212(b)(11) because this affects previously loaded systems that are currently in storage operations.

## **1.0 Background**

ZionSolutions currently has 53 MAGNASTOR systems in storage operations that are not in compliance with the Code requirements for Charpy V-notch impact testing and post-heat treatment UT requirements. Enclosure 1 lists all the affected TSCs. MAGNASTOR CoC, Appendix A, Section 4.2, states that the ASME Code, 2001 Edition with Addenda through 2003, Section III, Subsection NG, is the governing Code for the design, material procurement, fabrication and testing of the spent fuel baskets, minus any Code exception detailed in Section 4.2.1.

### **1.1 Charpy V-notch Impact Testing Requirements**

ASME Code, Section III, 2001/2003, Subsection NG, Article NG-2322.2(a)(4) requires Charpy V-notch impact specimens for carbon steel plate material  $> \frac{5}{8}$  inches thick to be oriented in a direction normal to the principal rolling direction during the test.

### **1.2 Post-Heat Treatment Ultrasonic Examination (UT) Requirements**

ASME Code, Section III, Subsection NG, Articles NG-2500, NG-2531, and NG-2532 require a post heat-treatment UT for carbon steel plate material  $> \frac{3}{4}$  inches thick.

## **2.0 Requested Exemption**

In accordance with 10 CFR 72.7, "Specific Exemptions", ZionSolutions requests NRC approval of an exemption for the Zion Independent Spent Fuel Storage Installation (ISFSI) from the following requirements of 10 CFR 72.212, due to two non-compliance issues with Appendix A, Section 4.2 of CoC No. 1031, Amendment 6:

- 10 CFR 72.212(b)(3), which states the general licensee must "[e]nsure that each cask used by the general licensee conforms to the terms, conditions, and specifications of a CoC or an amended CoC listed in § 72.214"
- The portion of 10 CFR 72.212(b)(11) which states that "[t]he licensee shall comply with the terms, conditions, and specifications of the CoC ...".

The list of affected TSCs and their serial numbers are listed in Enclosure 1. Enclosures 2 and 3 list the affected spent fuel basket sub-components for impact testing and post-heat treatment UT, respectively. These systems and components are currently loaded and in storage operations on the ISFSI pad. This exemption request would allow the continued use of these loaded systems for the term specified in the CoC. This exemption request does not apply to 10 CFR Part 71 transportation designs and applications. NAC has already submitted a request to revise the associated transportation certificate (i.e., MAGNATRAN) to support these Code exceptions. This exemption request concludes, along with supporting technical documentation from NAC, that the affected systems and components still maintain their ability to perform their safety functions.

## **3.0 Technical Assessment**

The proposed exemption is limited in scope to only those affected TSCs listed in Enclosure 1 and relates to ASME Code compliance with material procurement of carbon steel plate material for

the MAGNASTOR spent fuel baskets. Specifically, Charpy V-notch impact testing and post-heat treatment UT for carbon steel plate of specific thicknesses.

### **3.1 Charpy V-notch Impact Testing Exemption Request Justification**

NAC's CAP generated CAR 19-01 to assess Charpy V-notch testing of A537 and A517 materials in the both the longitudinal versus transverse directions. This assessment was documented by NAC International in 71160-WP-020, Revision 1. This document concludes that the materials confined to the extent of condition review demonstrate adequate fracture toughness requirements when scaled to the approximate transverse specimen orientation, in conjunction with the material's relative susceptibility to brittle fracture. This document is provided in Enclosure 5 as justification for granting *ZionSolutions* an exemption request for this issue.

### **3.2 Post-Heat Treatment Ultrasonic Examination (UT) Exemption Request Justification**

NAC's CAP generated CAR 19-02 to assess the history of the ASME Code requirement for post-heat treatment UT and whether it was intended to apply to a normalization. NAC has requested a re-examination of existing procured material, which had a UT performed prior to being normalized. All material that was re-examined passed its UT and when compared to the pre-normalization UT results, no indications were identified. In addition, NAC consulted with an ASME Code expert for their input on whether a UT is necessary after normalization. The Code experts' input was that normalization would not result in the creation of any indications in the material, which aligns with the re-examination UT results. This Code expert's letter to NAC is provided in Enclosure 6 as justification for granting *ZionSolutions* an exemption request for this issue.

## **4.0 Basis for Approval**

The proposed exemption request is limited in scope in that it only relates to compliance with certain material testing and examination requirements specified in the ASME Code, as invoked by the MAGNATOR CoC. The proposed exemption request involves no physical change to the spent fuel basket design, and no change to the basket materials.

The Technical Assessment (Section 3.0) provides the basis for the conclusions that there is reasonable assurance that safety margin exists for the affected TSCs listed in Enclosure 1, for their initial 20-year service lifetime. Even though 10 CFR 72.212(b)(3), and (b)(11) are not explicitly met. Thus, the requested exemption is authorized by law since it does not endanger life, property, or common defense and security and is otherwise in the public interest as described below.

#### **4.1 Authorized by Law**

*ZionSolutions* is requesting an exemption from the requirements of 10 CFR 72.212(b)(3) and 72.212(b)(11). 10 CFR 72.7 gives the NRC the authority to grant exemptions from the requirements of 10 CFR Part 72 provided they do not endanger life or property or the common defense and security and are otherwise in the public interest. This exemption request documents that these criteria are met. The exemption is authorized by law.

#### **4.2 Does Not Endanger Life, Property or Common Defense and Security**

As discussed in Section 3.0, the affected TSCs listed in Enclosure 1 can still perform their intended safety function. Even though the Charpy V-notch test specimens were not in the orientation required by the ASME Code, sufficient evidence exists to reasonably conclude that had they been tested in the transverse direction they would have met the Code acceptance requirements. Similarly, for the plate material that had UT performed prior to normalization, been examined after normalization, sufficient evidence exists to reasonably conclude that the UT results would have been the same as those observed prior to.

#### **4.3 Otherwise In The Public Interest – Alternatives**

*ZionSolutions* has evaluated replacement alternatives to the proposed exemption request. However, none of the alternatives provide the safety assurances and reduced radiological risk provided by the exemption request. To bring the affected TSCs into compliance with CoC 1031, Amendment 6 would involve an infrequent and high-risk series of actions. This includes removing the TSC from the concrete overpack, opening up the TSC, removing the fuel, reloading it into a TSC with a fuel basket that is in compliance, and returning the system into storage operations. The necessary equipment, personnel, facilities, time, and radiological exposure required to perform these actions is not in the interest of the public.

#### **4.4 Conclusion**

Based on the above discussion, the exemption request is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest as the exemption is the least risk, least dose, least radioactive waste and least cost option. Any campaign to discard and replace the affected TSCs would create operational challenges and risks associated with additional operational requirements, occupational doses, and generation of significant quantities of radioactive wastes

### **5.0 Environmental Consideration**

#### **5.1 Background**

MAGNASTOR storage casks are designed to mitigate the effects of design basis accidents that could occur during storage. Design basis accidents account for human-induced events and the most severe natural phenomena reported for the site and surrounding area. Postulated accidents analyzed for an ISFSI include tornado winds and tornado-generated missiles, a design basis earthquake, a design basis flood, an accidental cask drop, lightning effects, fire, explosions, and other incidents.

Considering the specific design requirements for each accident condition, the design of the cask would prevent loss of confinement, shielding, and criticality control. Without the loss of confinement, shielding, or criticality control functions, the risk to public health and safety is not compromised. The NRC staff performed a detailed safety evaluation of the CoC amendment under which the subject 53 canisters were loaded (i.e., Amendment 3) and found that an acceptable safety margin was maintained, that the proposed changes provided reasonable assurance that the spent fuel could be stored safely, met the acceptance criteria specified in 10 CFR Part 72, and that there continued to be reasonable assurance that public health and safety will be adequately protected.

## **5.2 No Significant Hazards Consideration**

In order to support the assertion in the following Section 5.3 that this exemption request meets the definition of a regulatory action eligible for a categorical exclusion or otherwise does not require an environmental review, *ZionSolutions* is providing the following No Significant Hazards Consideration (NSHC). The NSHC is being performed in accordance with 10 CFR 50.92, insofar as 10 CFR 72 does not establish separate criteria. *ZionSolutions* has evaluated the proposed exemption request in accordance with the standards in 10 CFR 50.92 and has determined that the requested exemption presents no significant hazards. *ZionSolutions* evaluation against each of the criteria in 10 CFR 50.92 follows.

### **1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?**

Response: No.

The probability (frequency of occurrence) of any Updated Final Safety Analysis Report (UFSAR) evaluated accident occurring is not affected by the requested exemption, because *ZionSolutions* continues to comply with the design basis criteria established for TSCs.

There is no change in consequences of postulated accidents, because enclosed supporting technical justifications demonstrates that the affected TSCs and sub-components of the spent fuel baskets will continue to perform their intended safety function. Thus, the results of accident evaluations remain within the NRC approved acceptance limits.

Therefore, the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

**2. Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?**

Response: No.

The exemption request does not create the possibility of a new operating mode, or accident scenario, nor does the exemption request rely on new equipment, or postulate a new equipment failure mode. In order for an activity to create the possibility for an accident of a different type, the activity would have to introduce a new material, a new man-machine interface, a new operational process, or other significant change that would initiate a new type of failure or cause a previously-described accident to propagate differently. As previously described, the proposed activity is purely an ASME Code material procurement testing and examination compliance issue in nature and involves no physical change to the spent fuel basket design, and no changes to the spent fuel basket materials or the loading operations. Therefore, the proposed activity does not create a possibility for an accident of a different type and does not result in more than a minimal increase in the likelihood of occurrence of a malfunction of an SSC important to safety previously evaluated in the UFSAR.

**3. Does the proposed change involve a significant reduction in a margin of safety?**

Response: No.

As discussed in Section 3.0, herein, sufficient evidence exists to reasonably demonstrate that had the Charpy V-notch test specimens been tested in the correct orientation, they would have met the applicable ASME Code acceptance requirements. Thus, the material has been demonstrated to have the required fracture toughness. In addition, sufficient evidence exists to demonstrate the UT results prior to normalization are indicative of the results that would have been observed had the UT been performed post-normalization. Therefore, the proposed exemption request does not involve a significant reduction in a margin of safety.

Based on the considerations above, *ZionSolutions* has determined that storage of spent fuel in the affected TSCs listed in Enclosure 1, in accordance with the exemption request, does not involve a significant hazards consideration as defined in 10 CFR 50.92(c), in that it does not: (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety.

### **5.3 Environmental Impact of the Proposed Action**

Based on the technical review provided in Section 3.0, herein, the affected TSCs and sub-components will continue to perform their intended safety functions. Thus, there is no environmental impact of the proposed action. The proposed action would restore the affected TSCs listed in Enclosure 1 to a conforming and operable status, allowing them to remain in storage operations for the term specified in the CoC.

The exemption request provides the bases for acceptability of the affected TSCs. The exemption request meets the categorical exclusion of 10 CFR 51.22(c)(25) as a regulatory action eligible for a categorical exclusion or otherwise does not require an environmental review, because there is:

- (i) no significant hazards consideration;  
See Section 5.2.
- (ii) no significant change in the types or significant increase in the amounts of any effluents that may be released offsite;  
No significant changes of effluents or types of effluents are requested to be released under this exemption request.
- (iii) no significant increase in individual or cumulative public or occupational radiation exposure;  
No significant increases in radiation to individuals or the public are requested under this exemption request.
- (iv) no significant construction impact;  
No construction is being requested or impacted under this exemption request.
- (v) no significant increase in the potential for or consequences from radiological accidents; and  
No significant increase in the potential for or consequences of a radiological accident is being requested in this exemption request
- (vi) the requirements from which an exemption is sought involve:
  - (C) inspection or surveillance requirements;  
The exemption request seeks an exemption from CoC, Appendix A, Section 4.2, which invokes ASME Code, Section III, Subsection NG requirements for Charpy V-notch impact testing and post-heat treatment UT examination requirements.

Further, the proposed exemption does not require any changes to the Zion ISFSI Environmental Report and the applicable Safety Analysis Report analyses remain bounding.

#### **5.4 Environmental Impact of Alternatives to the Proposed Action**

As discussed in Section 4.3, *ZionSolutions* has considered alternatives to the proposed exemption, which is to unload the affected TSCs, discard, and replace them. The environmental impacts of this alternative would result in both real and potential environmental impacts. *ZionSolutions* has estimated that the implementation of these alternatives would result in a significant amount of occupational dose and low-level radioactive waste (LLRW) that would have to be processed and disposed.

This would involve the replacement of the TSC. Occupational doses would be significant as grinding and welding activities would be performed in the vicinity of spent nuclear fuel. Each discarded TSC would become radioactive waste. Radioactive wastes would be generated from the TSC opening operations performed to remove the welds from the existing TSC. Other radioactive wastes would be generated from radioactively contaminated consumables and anti-contamination clothing used during the unloading and reloading process. This radioactive waste would be transported and ultimately disposed of at a qualified LLRW disposal facility, potentially exposing it to the environment.

In addition, this evolution result in additional risks of both off-normal events and design basis accidents, such as a fuel handling or cask drop events, both of which could involve a radiological release to the environment.

## **5.5 Conclusion**

As a result of the environmental assessment, *ZionSolutions* concludes that the proposed action, which will allow *ZionSolutions* to maintain affected TSCs in their current state with non-compliant Charpy V-notch testing and post-heat treatment UT, is in the public interest in that it avoids the adverse environmental effects associated with the alternatives to the proposed action.

## **6.0 References**

1. MAGNASTOR Final Safety Analysis Report, Revision 10