

**Non-Proprietary Request for Additional Information**  
**Docket No. 72-1031**  
**Certificate of Compliance No. 1031**  
**Model No. MAGNASTOR® Storage System**  
**Amendment No. 10**

By letter dated December 9, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19345E594), as supplemented on May 13, 2020 (ADAMS Accession No. ML20143A102), February 25, 2021 (ADAMS Package Accession No. ML21067A041), and April 20, 2021 (ADAMS Accession No. ML21118A043), NAC International (NAC) submitted an application for Amendment No. 10 to the Model No. MAGNASTOR® storage cask. The application proposes to add a new metal storage overpack (MSO). This request for additional information (RAI) identifies information needed by the U.S. Nuclear Regulatory Commission (NRC) staff in connection with its review of the application. The requested information is listed by chapter number and title in the applicant's safety analysis report (SAR). The NRC staff used NUREG-2215, "Standard Review Plan for Spent Fuel Dry Storage Systems at a General License Facility — Final Report," in its review of the application.

Each question describes information needed by the staff for it to complete its review of the application and to determine whether the applicant has demonstrated compliance with regulatory requirements.

**Structural Evaluation**

- 2-1 Provide an evaluation of the building structure mentioned in the Proposed Technical Specifications (TS) submitted as Enclosure 4 of NAC International's Responses to the NRC's RAI and the response to thermal RAIs in Enclosure 1 of the submission dated February 25, 2021. The evaluation of the building should include the following information:
- a) an assessment of the building's safety significance including a justification of the safety significance;
  - b) the design bases of the building including the design codes and standards and the methods used for load determination, particularly lateral loads from natural phenomena hazards;
  - c) the design criteria of the building including the design codes and standards and the methods used to determine the structural capacity of the building members and the design safety margin; and
  - d) an analysis or a description of an analysis demonstrating that the building will not affect the performance of the MSO cask under normal, off-normal, and accident conditions, including natural phenomena. The analysis should include the input parameters and methods of evaluation (e.g., the use of structural analysis software or finite element analysis software).

In proposed TS 4.3.1(j), the applicant included the requirement that the MSO cask must be stored in a building structure. The applicant described in the response to thermal RAI 4-1 that this storage building is necessary to assure protection from low speed wind. However, the applicant has not provided any description or evaluation related to the proposed storage building in the SAR or any referenced structural documents.

The applicant's statements about the building in the thermal RAI responses and the TS imply the building provides a safety related thermal function (i.e., eliminating the low

speed wind effects on the cask). Furthermore, the staff notes that a collapse of the building onto the cask could lead to a loss of containment, a loss of shielding, or a criticality. Thus, the building could be a system, structure, or component (SSC) whose failure could indirectly result in conditions adversely affecting public health and safety. Following guidance in NUREG/CR-6407, "Classification of Transportation Packaging and Dry Spent Fuel Storage System Components According to Importance to Safety," this could qualify the building as important to safety (ITS).

The regulations in Title 10 of *Code of Federal Regulations* (10 CFR) 72.236(b) requires that applicants for a certificate of compliance (CoC) provide the design bases and design criteria for SSCs that are ITS. Also, 10 CFR 72.236(l) requires that applicants for a CoC evaluate ITS SSCs to demonstrate that they will maintain confinement of radioactive material under normal, off-normal, and accident conditions. If the storage building is an ITS SSC, the applicant is required to provide the design bases and design criteria of the building by 10 CFR 72.236(b) as well as a structural evaluation of the building by 10 CFR 72.236(l).

The applicant stated in the response to RAI 4-2 that the building's design will depend on site-specific conditions, and the applicant described how the requirements of 10 CFR 72.212 and 10 CFR 72.48 would require a general licensee using the MSO cask to perform an evaluation of the building's influence on the cask. As the applicant noted in the RAI response, 10 CFR 72.212 and 10 CFR 72.48 evaluations consider the design bases, methods of evaluation, and other aspects of the evaluations from the CoC holder's final safety analysis report (FSAR) for the storage system's design. However, the applicant has not provided any design bases or performed any evaluation for the proposed storage building in the SAR or any referenced document associated with this amendment. The design bases and evaluations are required to be provided by the applicant for a CoC in the FSAR per 10 CFR 72.236 and are needed to conduct the evaluations described in §§ 72.48 and 72.212.

The staff recognizes there are site-specific aspects to the design and evaluation of the proposed storage building. However, §72.236 does not allow for any exemptions for site-specific ITS SSCs and requires the CoC holder to provide the design bases, the design criteria, and an evaluation of the ITS SSCs. The evaluation and design information required of the CoC holder and documented in the FSAR may then serve to establish the methods of evaluation and the bounding parameters of the SSCs.

The staff requests an evaluation of the storage building including the building's safety significance, design bases, and design criteria. The staff also requests a structural analysis or a description of a structural analysis assessing the structural performance of the building and any effect it may have on the MSO cask under normal, off-normal, and accident conditions, including natural phenomena. This information should include the codes and standards, the input parameters, and the specific methods of evaluation that will be used to design and analyze the building. Finally, the staff requests that the SAR be updated to include the information requested.

This information is needed to determine compliance with the regulatory requirements in 10 CFR 72.236(b) and 10 CFR 72.236(l).

## Thermal Evaluation

- 4-1 Provide adequate technical basis or thermal analysis that justify safe storage of the MSO inside a building.

In its responses to questions 4-1 and 4-2 in the NRC RAI dated February 25, 2021 (ADAMS accession number ML21067A043), NAC stated that the use of the MSO is limited to storage inside a building assuring protection from low speed wind in its proposed technical specifications. However, the applicant did not provide a thermal analysis that demonstrates that the predicted temperatures would be below allowable limits for a configuration inside a building or technical justification that demonstrates an outside configuration would be bounding. Justify why the outside configuration (that has not considered the effect of low speed wind) would be applicable to or bound a configuration inside a building to ensure that an appropriate method is used for future site-specific evaluations or provide an analysis of an array of casks stored inside a building which considers the proposed conditions on the building environment (i.e., building air temperatures, effects of vents near walls, etc.). Additionally, the available margin for a cask located outside (quiescent conditions) is small. Therefore, it is necessary for the applicant to evaluate phenomena and boundary conditions for the inside configuration that are not captured in the cask analyzed located outside. The staff identified the following deficiencies for an MSO analyzed outside that could prevent the application of the thermal analysis results from bounding an inside configuration:

- The free stream temperature of 76°F for convective heat transfer (for all external surfaces and inlet vents) and the external radiation temperature of 76°F could be different due to the building structure, unless ambient temperature refers to the temperature inside the building and the user established adequate control such that the ambient temperature is not exceeded during the entire licensed period. These controls can't rely on any active cooling system. Either provide a definition of ambient temperature stating it is both the indoor and outdoor air temperature for casks stored indoors or outside on a pad or provide additional temperature controls for casks stored inside a building.
- A realistic or conservative approach to specify the boundary conditions on all external surfaces of the building that could affect the heat transfer. Building structural walls could add additional resistance to heat transfer because the walls would be blocking radiation heat transfer to the environment and radiating heat back to the casks. Also, a bounding or realistic configuration needs to be considered if the external walls of the building would be exposed to the ambient or will share walls with other buildings.
- The MSO analyzed outside is based on a two-dimensional (2-D) axisymmetric model that cannot capture the three-dimensional effects of a cask array situated inside a building. It is not clear that evaluating the enclosure walls of a building and any building ventilation that provide passive cooling would be adequately captured using 2-D analysis.

RAI Response 4-2 (ADAMS accession number ML21067A043) states:

“10 CFR 72.212 (6) requires an evaluation of site parameters to see if they are bounded. In this case the buildings influence on cask performance must be evaluated. Per 10 CFR 72.212 (7) a 72.48(c) based evaluation for any changes must be performed which limits the evaluation to FSAR MOE or equivalent methods.”

However, because of the deficiencies identified above for an MSO evaluated outside, the staff does not believe the current FSAR method of evaluation (MOE) can be used to perform the thermal evaluation of a cask array situated inside a building. The staff needs the thermal evaluation of a cask array inside a building to determine the adequacy of the thermal design in meeting any applicable material temperature limits.

This information is needed to determine compliance with the regulatory requirements in 10 CFR 72.236(b) and 10 CFR 72.236(f).

### **Shielding Evaluation**

- 5-1 Justify the NS-3 shielding material loss {proprietary information removed} due to exposure to radiation and show that the loss of material due to radiation dose is consistent with the dose the NS-3 is expected to receive during storage.

In its supplemental response dated April 20, 2021, to the NRC RAI dated October 8, 2020 (ADAMS Accession No. ML20258A160), see item 5-1 in the proprietary enclosure on the same issue, the applicant states that NS-3 material loss {proprietary information removed} due to radiation. However, the staff could not determine how the value was determined.

The staff needs this information to determine if the request meets the regulatory requirements of 10 CFR 72.236(d).