

**NUCLEAR REGULATORY COMMISSION**

**[Docket Nos.: 72-1004, 72-40, 50-269, 50-270, 50-287; and NRC-2015-0191]**

**Duke Energy Carolinas, LLC;  
Oconee Nuclear Station Units 1, 2, and 3;  
Independent Spent Fuel Storage Installation**

**AGENCY:** Nuclear Regulatory Commission.

**ACTION:** Exemption; issuance.

**SUMMARY:** The U.S. Nuclear Regulatory Commission (NRC) is issuing an exemption in response to a request submitted by Duke Energy Carolinas, LLC., on August 28, 2014, from meeting Technical Specification (TS) 1.2.4a of Attachment A of CoC No. 1004, which limits the leak rate of the inner seal weld to  $1.0 \times 10^{-7}$  reference cubic centimeters per second (ref cc/s) at the highest DSC limiting pressure, for five (5) dry shielded canisters (DSCs) at the Oconee Nuclear Station, Independent Spent Fuel Storage Installation (ISFSI).

**ADDRESSES:** Please refer to Docket ID **NRC-2015-0191** 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-2015-0191**. Address questions about NRC dockets to Carol Gallagher; telephone: 301-415-3463; 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). The ADAMS accession number for each document referenced (if it available in ADAMS) is provided the first time that a document is referenced.

- **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:** John Vera, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; telephone: 301-415-5790; e-mail: [John.Vera@nrc.gov](mailto:John.Vera@nrc.gov).

**SUPPLEMENTARY INFORMATION:**

1.0 BACKGROUND

Duke Energy Carolinas, LLC (the applicant) is the holder of Facility Operating License Nos. DPR-38, DPR-47, and DPR-55, which authorize operation of the Oconee Nuclear Station,

Units 1, 2, and 3 in Oconee County, South Carolina, pursuant to part 50 of Title 10 of the *Code of Federal Regulations* (10 CFR), “Domestic Licensing of Production and Utilization Facilities.” The licenses provide, among other things, that the facility is subject to all rules, regulations, and orders of the NRC now or hereafter in effect.

Consistent with 10 CFR part 72, subpart K, “General License for Storage of Spent Fuel at Power Reactor Sites,” 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. The applicant is authorized to operate a nuclear power reactor under 10 CFR part 50, and holds a 10 CFR part 72 general license for storage of spent fuel at the Oconee Nuclear Station ISFSI. Under the terms of the general license, the applicant stores spent fuel at its ISFSI using the Transnuclear, Inc. (TN) Standardized NUHOMS® dry cask storage system Certificate of Compliance (CoC) No. 1004, Amendment No. 9.

## 2.0 REQUEST/ACTION

The applicant has requested an exemption from the requirements of 10 CFR 72.212(b)(3), 10 CFR 72.212(b)(5)(i), and the portion of 10 CFR 72.212(b)(11) that requires compliance with the terms, conditions, and specifications of CoC No. 1004, Amendment No. 9, for the Standardized NUHOMS® Horizontal Modular Storage System, to the extent necessary for the applicant to maintain 5 DSCs in their current position at the ISFSI associated with the operation of Oconee, Units 1, 2, and 3. These regulations specifically require storage of spent nuclear fuel under a general license in dry storage casks approved under the provisions of 10 CFR part 72, and compliance with the terms and conditions set forth in the CoC for each dry storage spent fuel cask used by an ISFSI general licensee. Specifically, the exemption would relieve the applicant from meeting TS 1.2.4a of Attachment A of CoC No. 1004, which limits the leak rate of the inner seal weld to  $1.0 \times 10^{-7}$  reference cubic centimeters per second (ref cc/s) at

the highest DSC limiting pressure. As a result, granting this exemption will allow for continued storage of DSCs numbers 93, 94, 100, 105, and 106 at the Oconee Nuclear Station ISFSI.

In January 2014, the applicant identified a discrepancy on a test report processed from the helium leak rate instrument vendor. The discrepancy was that the temperature coefficient was stated as four (4) percent per degree Celsius (%/°C), when previously this value was three (3) %/°C. The applicant stated that the instrument vendor confirmed that the three (3) %/°C coefficient was incorrect for this instrument, and that canisters loaded at ambient temperatures greater than (>) 23°C would have had a non-conservative temperature coefficient applied to the helium leak rate measurement. The applicant stated that the incorrect value had been used to calculate the leak rates of forty-seven (47) DSCs.

According to the applicant, forty-two (42) of the forty-seven (47) DSCs affected were verified to meet the TS. The applicant's re-evaluation involved verifying the ambient temperature when the DSCs were loaded and applying the appropriate temperature coefficient. However, the applicant stated that the actual temperature correction value datasheets could not be found for DSCs 93, 94, 100, 105, and 106, and that these canisters were loaded in the summer months when ambient conditions during helium leak testing would likely have exceeded 23°C, so the revised temperature correction factor would have been applicable. The applicant stated that for these DSCs, without evidence of the actual ambient temperature or test value, confirmation that the TS was met with the revised temperature coefficient was not possible.

In a letter dated August 28, 2014, (ADAMS Accession No. ML14255A005), as supplemented December 8, 2014 (ADAMS Accession No. ML14346A008), and June 12, 2015 (ADAMS Accession No. ML15169B103), the applicant requested an exemption from certain parts of the following requirements to allow storage of the 5 DSCs at the Oconee Nuclear Station ISFSI:

- 10 CFR 72.212(b)(3), which states that “[t]he 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.”
- 10 CFR 72.212(b)(5)(i), which requires that, “The general licensee perform written evaluations, before use and before applying the changes authorized by an amended CoC to a cask loaded under the initial CoC or an earlier amended CoC, which establish that [t]he cask, once loaded with spent fuel or once the changes authorized by an amended CoC have been applied, will conform to the terms, conditions, and specifications of a CoC or an amended CoC listed in § 72.214.”
- 10 CFR 72.212(b)(11), which states in part that “[t]he licensee shall comply with the terms, conditions, and specifications of the CoC and, for those casks to which the licensee has applied the changes of an amended CoC, the terms, conditions, and specifications of the amended CoC....”

Upon review, in addition to the requirements from which the applicant requested exemption, the NRC staff determined exemptions from the following requirements are also necessary in order to authorize the applicant’s request and added the following requirements to the exemption for the proposed action pursuant to its authority under 10 CFR 72.7, “Specific exemptions”:

- 10 CFR 72.212(a)(2), which states that “[t]his general license is limited to storage of spent fuel in casks approved under the provisions of this part.”
- 10 CFR 72.214, which lists the approved spent fuel storage casks.

### 3.0 DISCUSSION

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

#### Authorized by Law

This exemption would allow the applicant to continue storage of DSCs numbers 93, 94, 100, 105, and 106 in their as-loaded configurations at the Oconee ISFSI by relieving the applicant of the requirement to meet the inner seal weld leak rate limit as required by TS 1.2.4a of Attachment A of CoC No. 1004. The provisions in 10 CFR part 72 from which the applicant is requesting exemption, as well as provisions determined to be applicable by the NRC staff, require the licensee to comply with the terms, conditions, and specifications of the CoC for the approved cask model it uses. Section 72.7 allows the NRC to grant exemptions from the requirements of 10 CFR part 72. Granting the licensee's proposed exemption is not otherwise inconsistent with NRC regulations or other applicable laws. 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. Therefore, the exemption is authorized by law.

#### Will Not Endanger Life or Property or the Common Defense and Security

This exemption would relieve the applicant from meeting TS 1.2.4a of Attachment A of CoC No. 1004, which limits the leak rate of the inner seal weld to less than or equal to  $1.0 \times 10^{-7}$  ref cc/s at the highest DSC limiting pressure, allowing for continued storage of DSCs numbers 93, 94, 100, 105, and 106 in their as loaded conditions at the Oconee Nuclear Station ISFSI. This exemption only addresses the 5 DSCs for which the ambient temperature at time of loading could not be confirmed by the applicant. Because the temperature at the time of loading cannot

be confirmed, the applicant cannot demonstrate that the leak rate of the inner seal weld would be less than or equal to  $1.0 \times 10^{-7}$  ref cc/s at the highest DSC limiting pressure. As detailed below, NRC staff reviewed the exemption request to determine whether granting of the exemption would cause potential for danger to life, property, or common defense and security.

#### Review of the Requested Exemption

Background: The NUHOMS<sup>®</sup> system provides for the horizontal dry storage of canisterized spent fuel assemblies in a concrete horizontal storage module (HSM). The cask storage system components for NUHOMS<sup>®</sup> consist of a reinforced concrete HSM and a DSC vessel with an internal basket assembly that holds the spent fuel assemblies. The HSM is a low-profile, reinforced concrete structure designed to withstand all normal condition loads, as well as abnormal condition loads created by natural phenomena such as earthquakes and tornados. It is also designed to withstand design basis accident conditions. The Standardized NUHOMS<sup>®</sup> Horizontal Modular Storage System has been approved for storage of spent fuel under the conditions of Certificate of Compliance No. 1004. The DSCs under consideration for exemption were loaded under Certificate of Compliance No. 1004, Amendment No. 9.

The NRC has previously approved the Standardized NUHOMS<sup>®</sup> Horizontal Modular Storage System storage system. The requested exemption does not change the fundamental design, components, contents, or safety features of the storage system. The NRC staff evaluated the applicable potential safety impacts of granting the exemption to assess the potential for danger to life or property or the common defense and security. The potential impacts identified for this exemption request were in the areas of structural integrity and confinement capability.

*Structural Review for the Requested Exemption:* The two objectives of TS 1.2.4a are to (1) demonstrate that the top cover is “leak tight” as defined in ANSI N14.5 – 1997, “American National Standard for Leakage Tests on Packages for Shipment of Radioactive Materials,” and (2) to retain helium cover gases within the DSC to provide heat dissipation and minimize oxidation of the fuel cladding. There are two tests used to verify the “leak tight” condition of the inner top cover seal weld. The first is a dye penetrant test (PT) and the second is a helium leak test (LT).

The applicant stated that the dye penetrant tests conducted met the limits of TS 1.2.5 for the population of forty-seven (47) canisters for which the helium leak rates were calculated with the incorrect temperature coefficient.

The structural acceptance criteria for both the inner top cover weld and the outer top cover weld is predicated on the successful results of the dye penetrant test in accordance with Interim Staff Guidance (ISG) – 15 “Materials Evaluation” (ADAMS Accession No. ML010100170). The NRC staff finds that because the dye penetrant tests were acceptable, the staff finds that welds are structurally acceptable. There are no structural implications with the inner top cover seal weld as a result of the helium leak test having been conducted with an incorrect temperature correction coefficient. The NRC staff finds that the structural properties of the five (5) CoC No. 1004, Amendment No. 9 DSCs addressed in the exemption request remain in compliance with 10 CFR part 72 and the applicable design and acceptance criteria have been satisfied.

*Confinement Review for the Requested Exemption:* For canisters affected by use of an incorrect temperature coefficient for leakage rate, the licensee was unable to verify compliance with the technical specifications and thus performed a bounding leak rate calculation based on

the maximum bounding temperature (40.6°C) expected during the loading of the DSCs. The NRC staff finds that this temperature is bounding based on publicly published values for the maximum temperature for the area surrounding Oconee (ADAMS Accession No. ML15218A297). This calculation resulted in a calculated leak rate limit of  $1.02 \times 10^{-7}$  ref cc/s (air), or a 2% increase. This does not mean that an actual leakage rate of  $1.02 \times 10^{-7}$  ref cc/s (air) is expected but that the licensee asserts it is a reasonable estimate of the worst case leakage rate that can be derived in the absence of an actual recorded temperature data at the time of leak testing.

The NRC staff finds that the assumption of a maximum bounding temperature, as described above, is appropriate, because the actual ambient temperature is unknown. Use of this assumption demonstrated that the calculated revised leakage rate limit cannot be greater than reported ( $1.02 \times 10^{-7}$  ref cc/s (air)). The ambient temperature in part determines the maximum size of the equivalent hole for leak rate calculations, and since the maximum likely temperature value was used, the NRC staff determined that it is reasonable for the licensee to conclude that a bounding leak rate would be achieved with a maximum equivalent hole size.

The NRC staff reviewed the applicant's calculation method for determining the equivalent leak rate hole size and the estimated leakage rate corrected for assumed gas mixtures (i.e., air: helium). The NRC staff determined that, based on this calculation, even if significant uncertainty in the physical parameters used in the calculation were considered, the maximum equivalent hole size was the main driver that would account for any large change in a calculated leak rate criteria. Accordingly, the NRC staff determined that the revised calculated leakage rate with a bounding maximum temperature could not also result in large changes in the calculated leakage rate depending on the geometric or other physical parameters, such as pressure, which are used in the calculation. Therefore, the NRC staff concludes that

consideration of the maximum expected temperature provides a reasonable best estimate of the maximum leakage rate that could be expected for the subject DSCs. Inspection of the revised bounding leak rate calculation demonstrates that even if the package was leaking at the revised leakage rate, there would still be no significant release of radioactive material to the environment nor would this leakage rate result in a depletion of the inert helium environment necessary to ensure spent fuel cladding integrity.

The NRC staff finds that the confinement functions of the five (5) CoC No. 1004, Amendment No. 9 DSCs addressed in the exemption request remain in compliance with 10 CFR part 72.

The NRC staff considered the potential impacts of granting the exemption on the common defense and security. The requested exemption is not related to any security or common defense aspect of the Oconee Nuclear Station ISFSI, therefore granting the exemption would not result in any potential impacts to common defense and security.

Based on its review, the NRC staff has reasonable assurance that in granting the exemption, the storage system will continue meet the thermal, structural, criticality, retrievability and radiation protection requirements of 10 CFR part 72 and the offsite dose limits of 10 CFR part 20 and, therefore, will not endanger life or property. The NRC staff also finds that there is no threat to the common defense and security.

Therefore, the NRC staff concludes that the exemption to relieve the applicant from meeting TS 1.2.4a of Attachment A of CoC No. 1004, which limits the leak rate of the inner seal weld to less than or equal to  $1.0 \times 10^{-7}$  ref cc/s at the highest DSC limiting pressure, allowing for continued

storage of DSCs numbers 93, 94, 100, 105, and 106 at the Oconee Nuclear Station ISFSI, will not endanger life or property or the common defense and security.

#### Otherwise in the Public Interest

In considering whether granting the exemption is in the public interest, the NRC staff considered the alternative of not granting the exemption. If the exemption were not granted, in order to comply with the CoC, the five DSCs which are subject to the exemption request would have to be unloaded from the storage module, transported back to the cask handling area, opened, rewelded, retested, transported back to the HSM, and reloaded. This would entail a higher risk of a cask handling accident and additional personnel exposure. This alternative would also generate additional radioactive contaminated material and waste from operations.

The proposed exemption to permit the continued storage of DSCs numbers 93, 94, 100, 105, and 106 at the Oconee Nuclear Station ISFSI is consistent with NRC's mission to protect public health and safety. Approving the requested exemption produces less of an opportunity for a release of radioactive material than the alternative to the proposed action because there will be no operations involving opening the DSCs which confine the spent nuclear fuel. Therefore, the exemption is in the public interest.

#### Environmental Consideration

The NRC staff also considered in the review of this exemption request 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, "Environmental assessment." The proposed action is the approval of an exemption from the requirements of 10 CFR 72.212(a)(2), 72.212(b)(3), 72.212(b)(5)(i), 72.214, and the portion of 72.212(b)(11) that states the licensee shall comply with the terms, conditions, and specifications of the CoC. This exemption would relieve the applicant from meeting Technical

Specification (TS) 1.2.4a of Attachment A of CoC No. 1004, allowing for continued storage of DSCs numbers 93, 94, 100, 105, and 106 at the Oconee Nuclear Station ISFSI.

The environmental assessment concluded that the proposed action would not significantly impact the quality of the human environment. The NRC staff concludes that the proposed action will not result in any changes in the types or amounts of any 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 proposed action only affects the requirements associated with Technical Specification (TS) 1.2.4a of Attachment A of CoC No. 1004, which limits the leak rate of the inner seal weld to  $1.0 \times 10^{-7}$  ref cc/s at the highest DSC limiting pressure, and does not affect plant effluents, or any other aspects of the environment, for DSCs numbers 93, 94, 100, 105, and 106 at the Oconee Nuclear Station ISFSI.

The Environmental Assessment and the Finding of No Significant Impact was published on September 3, 2015; 80 FR 53350.

#### 4.0 CONCLUSION

Based on the foregoing considerations, the NRC staff has determined that, pursuant to 10 CFR 72.7, 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. Therefore, the NRC grants the applicant an exemption from the requirements of 10 CFR 72.212(a)(2), 72.212(b)(3), 72.212(b)(5)(i), 72.214, and the portion of 72.212(b)(11) that states the licensee shall comply with the terms, conditions, and specifications of the CoC, only with regard to meeting Technical Specification (TS) 1.2.4a of Attachment A of CoC No. 1004. This exemption approval is limited to authorizing continued storage of DSCs numbers 93, 94, 100, 105, and 106 in the TN Standardized NUHOMS® dry cask storage system at the Oconee Nuclear Station ISFSI.

This exemption is effective upon issuance.

Dated at Rockville, Maryland, this 17 day September, 2015.

For the Nuclear Regulatory Commission.

**/RA/**

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