[7590-01-P]

NUCLEAR REGULATORY COMMISSION

[Docket Nos. 72-1041, 50-498, and 50-499; NRC-2022-0099]

South Texas Project Nuclear Operating Company

South Texas Project Electric Generating Station Units 1 and 2

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 South Texas Project Nuclear Operating Company (STPNOC) on March 11, 2022, from meeting certain NRC regulatory requirements for one multipurpose canister (MPC), Serial Number 248 (MPC 248), in use at the South Texas Project Electric Generating Station, Units 1 and 2 (STPEGS). This exemption permits STPNOC to continue using MPC 248 to store spent fuel for the service life of the canister, including transferring the MPC to a HI-STORM FW overpack, without volumetric examination data from radiographic testing for a 1-inch section of the repaired weld seam joining the baseplate to the canister shell.

DATES: This exemption was issued on April 25, 2022.

ADDRESSES: Please refer to Docket ID **NRC-2022-0099** when contacting the NRC about the availability of information regarding this action. You may obtain publicly available information related to this action using any of the following methods:

- **Federal Rulemaking Website**: Go to https://www.regulations.gov and search for Docket ID **NRC-2022-0099**. Address questions about Docket IDs in Regulations.gov to Stacy Schumann; telephone: 301-415-0624; email:

Stacy.Schumann@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 https://www.nrc.gov/reading-rm/adams.html. To begin the search, 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 email to PDR.Resource@nrc.gov. For the convenience of the reader, instructions about obtaining materials referenced in this document are provided in the "Availability of Documents" section.

- **NRC's PDR:** You may examine and purchase copies of public documents, by appointment, at the NRC's PDR, Room P1 B35, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852. To make an appointment to visit the PDR, please send an email to PDR.Resource@nrc.gov or call 1-800-397-4209 or 301-415-4737, between 8:00 a.m. and 4:00 p.m. (ET), Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT: Donald Habib, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; telephone: 301-415-1035; email: Donald.Habib@nrc.gov.

SUPPLEMENTARY INFORMATION:

I. Background

South Texas Project Nuclear Operating Company (STPNOC or the licensee) is the holder of Facility Operating License Nos. NPF-76 and NPF-80, which authorize operation of the STPEGS, respectively, in Matagorda County, Texas, pursuant to part 50 of title 10 of the *Code of Federal Regulations* (10 CFR), "Domestic Licensing of

Production and Utilization Facilities." The license provides, among other things, that the facility is subject to all rules, regulations, and orders of the NRC now or hereafter in effect.

Under 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 independent spent fuel storage installation (ISFSI) at power reactor sites to persons authorized to possess or operate nuclear power reactors under 10 CFR part 50. The licensee is authorized to operate a nuclear power reactor under 10 CFR part 50 and, accordingly, holds a 10 CFR part 72 general license for storage of spent fuel at the STPEGS ISFSI. Under 10 CFR 72.212(a)(2), (b)(3), (b)(5)(i), (b)(11) and 72.214, a general licensee may store spent fuel in a cask, so long as it is one of the approved casks listed in 10 CFR 72.214 and the general licensee conforms to the terms, conditions, and specifications of the relevant certificate of compliance (CoC) or amended CoC. Accordingly, under the terms of the general license, the STPNOC stores spent fuel at its ISFSI using the HI-STORM FW MPC-37 Storage System in accordance with CoC No. 1032, Amendment No. 2. As part of the MPC storage system, the MPC (of which the weld seam joining the baseplate to the shell is an integral part) ensures the functions of criticality safety, confinement boundary, shielding, structural support, and heat transfer.

II. Request/Action

In a letter dated March 11, 2022, the licensee requested an exemption from the requirements of 10 CFR 72.154(b) as well as 10 CFR 72.212(a)(2), (b)(3), (b)(5)(i), and (b)(11). Paragraph 72.154(b) requires the licensee to have available documentary evidence that material and equipment conform to the procurement specifications prior to installation or use of the material and equipment and to retain or have available this

documentary evidence for the life of the ISFSI or spent fuel cask.

Paragraph 72.212(a)(2) limits a general license to storage of spent fuel in casks approved under the provisions of 10 CFR part 72. Paragraph 72.212(b)(3) requires the general licensee to ensure that each cask it uses conforms to the terms, conditions, and specifications of a CoC or an amended CoC listed in § 72.214.

Paragraph 72.212(b)(5)(i) requires the general licensee to perform written evaluations which establish that the relevant 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.

Paragraph 72.212(b)(11) requires, among other things, that the general licensee comply with the terms, conditions, and specifications of the CoC or the amended CoC, as appropriate. Section 72.214 lists the casks that are approved for storage of spent fuel under the conditions specified in their CoC.

The licensee loaded spent fuel in the HI-STORM FW Storage System MPC-37, MPC 248, for storage in the ISFSI at STPEGS under CoC No. 1032, Amendment No. 2, under its general license. Condition 6 of the CoC states, "Features or characteristics for the site or system must be in accordance with Appendix B to this certificate." Appendix B, Section 3.3 of the CoC requires, with certain approved alternatives that are not relevant in this case, the HI-STORM FW MPC-37 to meet the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, 2007 Edition (ASME Code). Section III, Subsection NB, of the ASME Code requires that 100 percent of the weld seam joining the baseplate to the shell of the canister be examined by a radiography test (RT). Further, ASME Code Section III, Subsection NB requires, in part, that "examination of a weld repair shall be repeated as required for the original weld." Thus, in effect, the NRC staff is considering an exemption from the requirement to repeat

volumetric examination by RT as required for the original weld on a 1-inch portion of the repaired weld.

During a review of manufacturing documents, the manufacturer determined that a 1-inch section of the shell-to-baseplate weld on MPC 248 was not properly digitally radiographed after a weld repair. When notified of this issue, the licensee had already loaded MPC 248 with spent fuel assemblies and was in the process of preparing the MPC for long-term storage at the STPEGS ISFSI pad. The affected MPC is currently in a safe, analyzed condition in the STPEGS Unit 1 Fuel Handling Building cask decontamination area.

This exemption would, if granted, permit the licensee to continue using MPC 248 to store spent fuel for the service life of the canister, including transferring the MPC to a HI-STORM FW overpack, without volumetric examination data from radiographic testing for a 1-inch section of the repaired weld seam joining the baseplate to the canister shell. In order for this exemption to exempt the licensee from all relevant provisions, the licensee would also need an exemption from 10 CFR 72.214. As the licensee did not request an exemption from 10 CFR 72.214, as part of the NRC staff's consideration of the requested exemption, the NRC staff will also consider granting an exemption from 10 CFR 72.214 upon its own initiative, in accordance with 10 CFR 72.7. For brevity, whenever this analysis refers to the requested exemption it means both the exemption requested by the licensee and the exemption from 10 CFR 72.214.

III. 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

Section 72.7 allows the NRC to grant exemptions from the requirements of 10 CFR part 72. The NRC staff has determined that issuance of this exemption is consistent with the Atomic Energy Act of 1954, as amended, and not otherwise inconsistent with NRC's regulations or other applicable laws. Therefore, the requested exemption is authorized by law.

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

This exemption would, if granted, exempt the licensee from the requirement to repeat volumetric examination as required for the original weld on a 1-inch portion of the repaired weld in ASME Code Section III, Subsection NB, which the licensee is required to follow by the relevant technical specifications. If would also, if granted, exempt the licensee from the 10 CFR 72.154(b) requirement to have available documentary evidence that material and equipment conform to the procurement specifications prior to installation or use of the material and equipment and to retain or have available this documentary evidence for the life of the ISFSI or spent fuel cask.

The licensee supported this exemption request with a structural evaluation for the MPC and a separate structural analysis, both of which assumed a weld strength reduction factor of 0.8 to account for the missing RT examination. The structural evaluation showed that MPC 248 maintains structural and confinement functions and that, even with the 0.8 weld strength reduction factor, MPC 248 would still meet the ASME Code, Section III, Subsection NB structural analysis requirements. The NRC's review and evaluation of this 0.8 weld strength reduction factor and the licensee's structural analysis for MPC 248 are found in the *Materials Review for the Requested*

Exemption and the *Structural Review for the Requested Exemption* section of this notice, respectively.

Review of the Requested Exemption

The HI-STORM FW storage system consists of a sealed metallic multi-purpose canister (MPC) contained within an overpack constructed from a combination of steel and concrete. The HI-STORM FW overpack can be loaded with the MPC containing spent fuel using the HI-TRAC VW transfer cask and prepared for storage while inside the 10 CFR part 50 facility. The HI-TRAC VW transfer cask is required for shielding and protection of the spent fuel during loading and closure of the MPC and during movement of the loaded MPC from the cask loading area of a nuclear plant spent fuel pool to the storage overpack. The MPC enclosure vessels are cylindrical weldments with identical and fixed outside diameters. Each MPC is an assembly consisting of a honeycomb fuel basket, a baseplate, a canister shell, a lid, and a closure ring. The number of spent fuel storage locations in an MPC depends on the type of fuel assembly. The MPC-37 model in use at STPEGS is designed to hold 37 pressurized water reactor fuel assemblies.

The NRC has previously approved the HI-STORM FW storage system in CoC No. 1032, including Amendment No. 2 to the CoC, which is the version of the CoC in use at STPEGS. The requested exemption does not change the fundamental design, components, contents, or safety features of the storage system. The NRC staff has evaluated the applicable potential safety impacts of granting the requested exemption to assess the requested exemption's potential for danger to life or property or the common defense and security; the evaluation and resulting conclusions are presented in this notice. The potential impacts identified for this exemption request were in the areas of materials, structural integrity, and confinement capability. The staff did not identify any potential impacts in the areas of criticality, shielding, and thermal conditions.

Materials Review for the Requested Exemption: The licensee asserted that although MPC 248 does not meet the ASME Code requirements specified in Appendix B, Section 3.3 of the CoC, MPC 248 continues to meet its safety functions. The licensee stated that after the completion of spent fuel loading, drying, and closure welding of MPC 248, Holtec International, the CoC holder, informed the licensee that MPC 248 does not fully meet the requirements in CoC Appendix B. More specifically, the Holtec HI-STORM FW MPC design and certification is based on compliance with ASME Code Section III, with certain approved alternatives. Portions of ASME Code Section III, Subsection NB-5000, require that weld repairs in the MPC confinement boundary be examined to the same criteria as the initial welds. Section III, Subsection NB also requires that 100 percent of the MPC shell-to-baseplate welds be volumetrically examined using RT, in accordance with Section III, NB-5230.

During fabrication, Holtec performed a typical weld repair of the MPC 248 shell-to-baseplate weld after the initial digital RT examination showed a section of the weld had lack of fusion. The weld was excavated to remove the lack-of-fusion defect and a successful liquid penetrant test (PT) examination of the entire excavated area was performed. The dimensions of the excavated area are approximately 9 inches in length by 0.5 inches in width and 0.5 inches in depth (through wall at the defect location). The licensee stated that detailed profile dimensions of the repaired area are not available but referred to Holtec procedures that require a 3-to-1 taper for weld repair excavations. The weld repair was performed using an ASME Code Section IX qualified gas tungsten arc weld procedure and successfully passed a final PT exam. After the PT exam was completed, the unit was reinspected using the same digital RT process used on the original weld, but only 8 inches of the 9-inch length were examined. The missing 1-inch section is located at the end of one side of the excavated area. The licensee stated that

the RT on the original weld did not identify weld defects on the end of the excavated area containing this 1-inch portion, but a portion of the weld in this 1-inch section had to be removed to access the defects in the adjacent portion of the shell-to-baseplate weld and allow repair welding to be performed. Following completion of the weld repair, MPC 248 successfully passed a helium leakage test during factory acceptance testing as well as a hydrostatic test performed at STPEGS during loading operations.

According to the licensee, the repairs along the MPC shell-to-base plate weld were completed per Holtec's written procedures. After completing the repairs, Holtec examined the repaired area by PT and determined that the PT examination results met the acceptance criteria of ASME Code Section III, NB-5350. Holtec performed the post-repair RT examination and later determined that the RT examination which met the acceptance criteria of ASME Code Section III, NB-5320 included only 8 of the 9 inches.

The licensee's assertion that MPC 248 continues to meet all its safety functions is based on the following:

- The weld repair was performed in accordance with all Holtec quality procedures.

- MPC 248 has 653 inches of welds in total. Holtec performed an RT examination on all those welds except for the approximately 1-inch section of repaired weld. This 1-inch section is approximately 0.15 percent of the MPC 248 welds. The remaining 99.85 percent of MPC 248's welds were fully inspected.

To support its weld strength reduction factor, the licensee referenced the weld strength reduction factor of 0.8 from NRC Interim Staff Guidance (ISG) – 15, "Materials Evaluation," for welded austenitic stainless steel spent fuel storage canisters that are examined using progressive, multiple-layer PT examinations in lieu of a volumetric

examination nondestructive examination (NDE) method that is required by ASME Code Section III, Subsection NB.

The licensee also reviewed the requirements in several sections of the ASME code to support its selection of the weld strength reduction factor value from ISG-15. Specifically, the licensee reviewed the joint efficiency values included in ASME Code Section VIII, Division 1 and Section III, Subsection ND. The licensee also reviewed the quality factor for welded joints in ASME Code Section III, Subsection NG. The licensee also noted that the SA-240 Type 304 stainless steel design stress values applicable to ASME Code Section VIII, Division 1 and Section III, Subsection ND are generally equal to the design stress intensity values applicable to Section III, Subsection NB—which apply to the weld in question—except for minor variances at 300 and 400 degrees Fahrenheit.

The licensee noted that ASME Code Section VIII, Division 1, which governs the design and construction of non-nuclear pressure vessels, specifies that Category C butt joints have a weld efficiency of 0.85 when subject to spot radiography, as specified in ASME Code, Section VIII, Division 1, UW-52. The licensee noted that spot radiography requires a minimum of one 6-inch spot to be RT examined for every 50-foot increment of the weld. The licensee stated that the Category C butt joints are more critical than Category C corner joints, which is the type of joint for the weld in question. The licensee also stated that by comparison, more than 99 percent of the MPC shell-to-baseplate weld was examined by RT, far exceeding the requirement for spot radiography per ASME Code Section VIII, Division 1, UW-52. Therefore, the licensee concluded that a 0.85 value for joint efficiency is conservative for evaluation of MPC 248, making the selected 0.8 value even more conservative.

The licensee noted that ASME Code Section III, Subsection ND, which applies to Class 3 nuclear components, also specifies a joint efficiency of 0.85 for Category C butt welds subject to spot radiography. The licensee stated that the inspection performed on the shell-to-base plate weld for MPC 248 exceeds these minimum ASME Code requirements for spot radiography in ASME Code Section III, Subsection ND because more than 99 percent of the weld was examined by RT.

The licensee also compared the value of the weld strength reduction factor from ISG-15 to the requirements of ASME Code Section III, Subsection NG, which is applicable to core support structures of nuclear facility components. The licensee pointed to Table NG-3352-1, which specifies a quality factor for a welded joint of 0.75 for a full penetration weld subjected to PT for both the root pass and the final pass. The licensee stated that the quality factor for welded joints in Table NG-3352-1 would be overly conservative because more than 99 percent of the shell-to-baseplate weld for MPC 248 was volumetrically examined using RT, 100 percent of the weld received surface examination using PT, and the weld excavation cavity at 3-to-1 taper at the 1-inch weld location received PT. This is discussed in detail in the staff's independent analysis in this notice.

The NRC staff reviewed the information provided by the licensee including: (1) the licensee's comparisons of the weld strength reduction factor to the joint efficiency values based on requirements contained in ASME Code Section VIII, Division 1, and ASME Code Section III, Subsection ND; and to the quality factor for welded joints in ASME Code Section III, Subsection NG; (2) the specific requirements in those ASME Code sections; (3) the guidance in, and applicability of ISG-15; and (4) the information provided by the licensee regarding the weld repair procedures and post-weld repair NDE results.

The staff determined that although the weld strength reduction factors specified in the ASME Code sections cited by the licensee are not applicable to the Holtec HI-STORM FW MPC-37—which was approved using the design and construction requirements in ASME Code, Section III, Subsection NB—the values are conservative with respect to a possible weld strength reduction factor for MPC 248 because more than 99 percent of the shell-to-baseplate weld was examined using RT and 100 percent was examined using PT. As discussed in this notice, the staff calculated two potential weld strength reduction factors, both are which are conservative. Both calculated values are greater than the licensee's 0.8 value, making the licensee's value more conservative. In addition, the staff notes that: (1) only the fraction of the 1-inch-long three-to-one tapered section of the weld that was removed was not examined by RT after the repair; (2) the portion of the 1-inch weld that remained after excavation at the three-to-one tapered section was volumetrically examined by RT prior to excavation and met the acceptance criteria of ASME Code Section III, NB-5320; (3) 100 percent of the repair weld section was successfully examined by PT both after excavation and after repair; and (4) more than 88 percent of the approximately 9-inch repair weld section was examined using RT. Therefore, the staff concluded that the values of the weld strength reduction factors derived from the ASME Code sections cited by the licensee conservatively bound the reduction in the weld strength of the shell-to-baseplate weld of MPC 248 as a result of possible weld defects in the 1-inch portion of the repair weld that was not examined by RT.

The staff also reviewed the guidance in ISG-15 which states that, if progressive surface examinations (i.e., sequential examinations conducted as a multi-pass weld is deposited) such as multiple layer PT or magnetic particle testing are used for a spent fuel storage canister closure lid weld in lieu of a volumetric examination, a weld strength

reduction factor of 0.8 is to be imposed on the weld design to account for imperfections or flaws that may have been missed by the progressive surface examinations. The staff determined that, although the guidance for the use of the weld strength reduction factor in ISG-15 was not intended to be applied for an MPC shell-to-baseplate weld, the value of the weld strength reduction factor from ISG-15 would be conservative for the MPC 248 shell-to-baseplate weld for the same reasons provided for the comparisons of the weld strength reduction factors from the ASME Code sections cited by the licensee and discussed in the previous paragraph. Therefore, the staff concluded that the values of the weld strength reduction factor from ISG-15 conservatively bound the reduction in the weld strength of the shell-to-baseplate weld of MPC 248 as a result of possible buried weld defects in the 1-inch portion of the repair weld that was not examined by RT.

The NRC staff conducted an independent analysis of MPC 248 considering the MPC materials and the design of the shell-to-baseplate weld. The staff's analysis postulated that the portion of the repaired area of the weld that was not subjected to the post-weld repair RT examination includes a buried weld flaw.

The NRC staff used this initial postulate because: (1) the portion of the original weld in the 1-inch section was examined by PT after the weld excavation's completion; and (2) the completed repair weld was also PT-examined. Both of these examinations reveal no surface-breaking flaws, indicating that if a flaw was to exist in that 1-inch section, it would be a buried weld flaw. The staff determined that for the entire shell-to-baseplate weld, the weld strength reduction factor that would be applied to the structural analysis of such a joint to account for a buried weld flaw per the ASME Code would be at least 0.99 because: (1) the entire section of the shell-to-base plate weld and the section of the repair weld that was RT-examined were verified to be free of any relevant flaws; (2) the design of the MPC shell and MPC baseplate are sufficiently thick

and provide sufficient stiffness to the MPC shell to prevent significant stress concentrations for relatively small buried weld flaws; (3) the MPC shell, baseplate, and the shell-to-baseplate weld are all high toughness materials that are not susceptible to brittle fracture; and (4) MPC 248 successfully passed a helium leakage test during factory acceptance testing and a hydrostatic pressure test during the loading operations. This number does not credit the 1-inch section without RT. The NRC staff calculated this number dividing the length of the section that that did not receive RT by the total length of the shell-to-baseplate weld and then subtracting that result from 1. This method produces a weld strength reduction factor that is greater than .99. Given that the licensee's selected weld strength reduction factor of 0.8 is less than this staff-calculated value, the licensee's factor accounts for a greater reduction in weld strength due to a buried flaw.

In addition to the above analysis, the staff conducted a weld strength reduction factor analysis using greater conservatisms. Specifically, the staff assumed a worst-case flaw size that considered information provided by the licensee on the results of the initial RT of the shell-to-baseplate weld; the profile of the weld excavation and the weld repair process; and the NDE conducted after excavation and again after the weld repair was completed. This calculation based the weld strength reduction factor on only the repaired weld rather than the entire shell-to-baseplate weld. In this evaluation, the staff also did not credit the presence of the entire 1-inch repair weld which was not RT-examined post repair. This calculation would be conservative relative to the actual reduction in weld strength because the 1-inch portion of the weld that did not receive post-repair RT was initially examined by RT per ASME Code Section III, NB-5230 and shown to meet the ASME Code Section III, NB-5320 acceptance criteria prior to weld excavation (as previously discussed, this section of the weld is located within the 3-to-1

taper area). Additionally, the weld excavation cavity and post-repair weld were both PT examined per ASME Code Section III, NB-5230 and met the acceptance criteria of ASME Code Section III, NB-5350. In this case, the 1-inch section is 11 percent of the 9-inch repair section. Thus, the same calculation discussed above produces a weld strength reduction factor of 0.89.

Given that the licensee's selected weld strength reduction factor of 0.8 is less than both of the staff-calculated values, it would account for a greater reduction in weld strength due to a buried flaw than either of those values. Therefore, the 0.80 weld strength reduction factor is conservative.

The staff's independent analyses of the weld strength reduction factor for MPC 248 are conservative because: (1) the weld repair procedure with the multi-pass manual gas tungsten arc weld was developed to facilitate a weld repair, provide more control over weld deposition, and minimize the introduction of weld flaws; (2) the 1-inch weld is within the three-to-one taper section of the repair excavation with sound weld metal backing based on the initial RT results and the weld excavation cavity PT results prior to the weld repair; (3) the post-repair weld examinations using PT and RT met the acceptance criteria in ASME Code Section III, NB-5300; (4) any weld repair flaw present in the non-examined RT weld repair section would be limited to the dimensions of the weld repair in the tapered area of the excavation; (5) based on the post-repair PT results, any flaw introduced during repair welding would be embedded in the weld with low stress concentration of little to no significance to structural performance or the confinement function of the MPC; and (6) the staff's analysis was based on a maximum of 1-inch missing weld in the MPC shell-to-baseplate weld.

Based on the points above, any weld flaw present in the 1-inch section that was not examined by RT after the weld repair would be a small relative to the length of that

section of the weld. The staff's analysis is conservative because, as stated above, the analysis assumed no credit for the entire portion of the weld that was not examined by RT after the repair. Because the licensee's 0.8 weld strength reduction factor is more conservative than the values of the weld strength reduction factor the staff calculated, the staff's independent analysis shows that the weld strength reduction factor of 0.8 used by the licensee is sufficient to account for the possible presence of non-surface breaking flaws in the portion of the repair weld that was not subjected to post-repair volumetric examination. Therefore, the staff finds the 0.8 weld strength reduction factor acceptable. The licensee's structural analysis using this weld strength reduction factor is analyzed in this notice.

Evaluation Findings of Materials Review: As a result of the analyses discussed above, the NRC staff finds that the weld strength reduction factor provided by the licensee is sufficient to account for the presence of undetected flaws that may be present in the shell-to-baseplate weld of MPC 248, loaded under CoC No. 1032, Amendment No. 2. Therefore, the use of a 0.8 weld strength reduction factor in the structural evaluation would not endanger life or property or the common defense and security if the requested exemption were granted.

Structural Review for the Requested Exemption: The staff's structural review focused on the re-analysis of the shell-to-baseplate weld, as provided in Enclosure 2 (proprietary), "HI-STORM FW MPC Stress Analysis," of the exemption request, to verify that the safety function of the MPC is maintained after considering a weld strength reduction factor to the allowable stress values used as design criteria. As discussed above, the licensee applied a weld strength reduction factor in its analysis to account for imperfections or flaws that may be missed for the 1-inch weld portion without post-repair RT.

Re-Analysis of the Shell-to-Baseplate Weld: The HI-STORM FW Final Safety Analysis Report (FSAR), HOLTEC Report No. HI-2114830, Table 10.1.4, “HI-STORM FW MPC NDE Requirements,” establishes the weld acceptance criteria that provide reasonable assurance that the weld will perform its design function under all loading conditions as defined in ASME Code, Section III, Subsection NB. In accordance with Appendix B, Section 3.3, "Codes and Standards," of CoC No. 1032, the HI-STORM FW MPC-37 must meet the 2007 Edition of the ASME Code. The ASME Code Section III, Subsection NB, states, in part, that “examination of a weld repair shall be repeated as required for the original weld.” For original welds, it is required that 100 percent of the weld seam joining the baseplate to the shell of the canister be examined by RT. Since the unexamined portion of the repair weld is not in conformance with the ASME Code requirements described in the CoC, the licensee’s structural evaluation seeks to demonstrate that the use of the affected MPC 248 will not adversely impact its structural safety function after considering a weld strength reduction factor used to account for the non-conformance condition.

As discussed above in the materials review of the requested exemption, the staff concluded that the licensee’s weld strength reduction factor of 0.8 (i.e., an overall 20 percent reduction in the allowable stress) is sufficient to account for potential imperfections or flaws that may have been missed by an incomplete RT when considering the size of the unexamined portion of the repair weld. The licensee applied this weld strength reduction factor to the allowable stress intensity used in the five load cases identified as the governing load combinations for the MPC 248 shell-to-baseplate weld per the HI-STORM FW FSAR (HOLTEC Report No. HI-2114830, Revision 5) to re-evaluate the safety factors that are available and demonstrate that the design function will be maintained. The five load cases are as follows: the design condition with a

120 pounds per square inch gauge (psig) normal internal pressure only to bound short-term normal operations (Case 1), an accident condition with a 200 psig accident internal pressure (Case 2), a short-term MPC lifting operation with a 120 psig operating internal pressure plus weight of the contents (Case 3), an off-normal condition with a 120 psig off-normal internal pressure plus bounding off-normal temperature contours (Case 4), and a design basis short-term operation with a 120 psig internal pressure plus bounding short-term operation temperature contours (Case 5). By comparing the reduced allowable stress of each loading condition to the resultant stress obtained from the finite element analysis performed by the licensee in the structural analysis of the HI-STORM FW system (Holtec Report HI-2094418, Revision 20), the licensee calculated a new safety factor for each loading condition. The analysis demonstrated that the shell-to-baseplate weld maintains a safety factor above 1.0 for all loading conditions and that sufficient design margin remains to accommodate the resultant stress from each loading condition even with the reduced stress allowable used to account for potential imperfections or flaws in the repaired weld. The licensee further stated that, in addition to the weld strength reduction factor, the analysis also retains several conservatisms from the existing FSAR design basis analysis, such as using bounding pressures, temperatures, and temperature contours.

While the NRC staff is not basing its conclusions on these conservatisms, the NRC staff notes that the use of these conservative values in the analysis demonstrate that additional design margin remains available to accommodate resultant stress.

Evaluation Findings of Structural Review: The NRC staff reviewed the analysis performed in Enclosure 2 (proprietary) of the exemption request for the MPC shell-to-baseplate weld and finds that the licensee evaluation demonstrates that a safety factor greater than 1.0 is maintained (i.e., calculated stresses remain below the allowable

stress intensities with the reduction factor) for all normal, off-normal, and accident conditions after the stress allowable for each load case is reduced by 20 percent to account for imperfections or flaws that may be missed due to the non-conforming weld inspection. The staff notes that the use of a weld strength reduction factor to the allowable stress values is similar to other approved alternatives to the ASME code examination requirements as described in NUREG-2215, "Standard Review Plan for Spent Fuel Dry Storage Systems and Facilities," to account for imperfections or flaws that may be missed by other examinations. While the alternatives described in NUREG-2215 are not applicable to this weld, as discussed above in the materials section, the NRC finds their use acceptable in this instance. During its review, the staff also verified that the licensee has properly applied the weld strength reduction factor of 0.8 to applicable allowable stress values for the design criteria. The staff also notes that no potential for stress cycling is expected at the unexamined portion of the repair. As discussed in Section 3.1.2.5 of CoC No. 1032 FSAR, fatigue failure is not a credible concern for the MPC since it is not an active system (i.e., no moving parts) and is not subject to significant stress cycling due to rapid temperature changes or significant pressure changes. Therefore, there is no credible concern of fatigue failure if any flaw introduced during the weld repair is considered.

As set forth above, the licensee has demonstrated that the shell-to-baseplate weld for MPC 248, loaded under CoC No. 1032, Amendment No. 2, is capable of maintaining its structural integrity and performing its safety function under normal, off-normal, and accident conditions. Therefore, the staff concludes that the structural properties of MPC 248, as addressed in the exemption request, remain in compliance with 10 CFR part 72, and therefore, from a structural perspective, this exemption, if granted, would not endanger life or property or the common defense and security.

Confinement Review for the Requested Exemption: The licensee stated on page 1 of Enclosure 1 of its exemption request that MPC 248 successfully passed a helium leakage test during factory acceptance testing following completion of the weld repair, as well as a hydrostatic test which was performed at STPEGS during loading operations. According to the licensee, the helium leakage test performed on MPC 248 was in conformance with the FSAR and the applicable Technical Specifications for the HI-STORM FW storage system and satisfied the "leaktight" criteria in ANSI N14.5-1997.

Evaluation Findings of Confinement Review: The staff found that, because MPC 248 successfully passed a helium leakage test during a fabrication acceptance test following completion of the weld repair, the MPC meets the leaktight criteria of ANSI N14.5-1997. Further, MPC 248 passed a hydrostatic test performed at STPEGS during loading operations, which provides further evidence of no discernable leakage from this MPC at the time of loading. The staff therefore concludes that MPC 248 meets the regulatory requirements for confinement in 10 CFR part 72 and, therefore, the weld repair completed on MPC 248 has had no effect on the confinement performance of the MPC in question. Consequently, from a confinement perspective, this exemption, if granted, would not endanger life or property or the common defense and security.

Conclusion Regarding Deviation from Weld Inspection Requirement: As noted above, the NRC staff did not identify any potential effects on criticality, shielding, and thermal conditions. Therefore, based on that fact and the above discussions, the NRC staff concludes that an exemption exempting the licensee from the requirement to repeat volumetric examination for the 1-inch portion of the repaired weld, if granted, would not endanger life or property or the common defense and security.

Record Keeping Provision Evaluation: As noted above, the licensee also requested an exemption from the 10 CFR 72.154(b) requirement to have available

documentary evidence that material and equipment conform to the procurement specifications prior to installation or use of the material and equipment and to retain or have available this documentary evidence for the life of the ISFSI or spent fuel cask. The records covered by the requested exemption are the records detailing the results for the RT discussed above. As previously detailed, the NRC staff has concluded that exempting the licensee from the requirement to repeat volumetric examination as required for the original weld on a 1-inch portion of the repaired weld would not endanger life or property or the common defense and security. If not performing the RT does not endanger life or property or the common defense and security, it follows that not retaining records of those test results would also not endanger life or property or the common defense and security. Therefore, the NRC staff finds that the requested exemption from 10 CFR 72.154(b), if granted, would not endanger life or property or the common defense and security

Otherwise in the Public Interest

In considering whether granting the requested exemption is in the public interest, the NRC staff considered the alternative of not granting the requested exemption. If the requested exemption were not granted, in order to comply with the CoC, MPC 248 would need to be opened and unloaded, the contents loaded in new MPC, and the new MPC welded and tested. This option would entail a higher risk of canister handling accidents, additional personnel exposure, and greater cost to the licensee. This option would also generate additional radioactive contaminated material and waste from operations. For example, the lid would have to be removed, which would generate cuttings from removing the weld material that could require disposal as contaminated material. This radioactive waste would be transported and ultimately disposed of at a qualified low-level radioactive waste disposal facility, potentially exposing it to the environment.

Further, data subject to the requested exemption from 10 CFR 72.154(b) is the data that comes from the test from which the licensee is being exempted. Without the data from the test, the licensee cannot satisfy 10 CFR 72.154(b). Thus, granting an exemption from the test requirements but not from the record-keeping requirement would still force the license to open and unload MPC 248, load the contents in new MPC, and weld and test the new MPC, meaning all the potential negative effects would still occur.

Based on the above, approving the requested exemption reduces the opportunity for a release of radioactive material compared to the alternative to the proposed action because there will be no operations involving the opening of the MPC that confines the spent nuclear fuel, potentially exposing radioactive waste to the environment. It will also generate less radioactive waste for disposal. Thus, the proposed exemption is consistent with NRC's mission to protect public health and safety. Therefore, the requested exemption is otherwise 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. The NRC staff determined that this proposed action fits a category of actions that do not require an environmental assessment or environmental impact statement. Specifically, the requested exemption meets the categorical exclusion in 10 CFR 51.22(c)(25).

Granting an exemption from 10 CFR 72.212(a)(2), 10 CFR 72.212(b)(3), 10 CFR 72.212(b)(5)(i), 10 CFR 72.212(b)(11), and 10 CFR 72.214 would only relieve the licensee from the inspection requirement found in TS 3.3 of Attachment B of CoC No. 1032. With this requested exemption, the licensee would be exempt from the requirement to repeat volumetric examination as required for the original weld on a 1-

inch portion of the repaired weld joining the canister baseplate to the canister shell of the HI-STORM FW MPC 248. Granting an exemption from 10 CFR 72.154(b) only relieves the licensee from the recordkeeping requirement associated with retaining and having available documentary evidence of a complete volumetric examination of the subject weld. A categorical exclusion for inspection requirements is provided under 10 CFR 51.22(c)(25)(vi)(C), and a categorical exclusion for recordkeeping requirements is provided under 10 CFR 51.22(c)(25)(A). In both cases, the criteria in 10 CFR 51.22(c)(25)(i)-(v) must also be satisfied.

In its review of the exemption request, the NRC staff determined, that, in accordance with 10 CFR 51.22(c)(25): (i) granting the exemption does not involve a significant hazards considerations because granting the exemption neither reduces a margin of safety, creates a new or different kind of accident from any accident previously evaluated, nor significantly increases either the probability or consequences of an accident previously evaluated; (ii) granting the exemption would not produce a significant change in either the types or amounts of any effluents that may be released offsite because the requested exemption neither changes the effluents nor produces additional avenues of effluent release; (iii) granting the exemption would not result in a significant increase in either occupational radiation exposure or public radiation exposure, because the requested exemption neither introduces new radiological hazards nor increases existing radiological hazards; (iv) granting the exemption would not result in a significant construction impact, because there are no construction activities associated with the requested exemption; and (v) granting the exemption would not increase either the potential for or consequences from radiological accidents because, even with the exemption, the canister will still be bounded by the FSAR analysis and will remain leaktight, and the exemption creates no new accident precursors at the STP ISFSI.

Finally, as previously noted this exemption request involves recordkeeping requirements and inspection requirements under 10 CFR 51.22(c)(25)(A) and (C), respectively. Accordingly, the requested exemption meets the criteria for a categorical exclusion in 10 CFR 51.22(c)(25)(vi)(C).

IV. Availability of Documents

The documents identified in the following table are available to interested persons through one or more of the previously described methods.

DOCUMENT	ADAMS ACCESSION NO.
South Texas Project, Units 1 and 2, Docket Nos. 50-498; 50-499; 72-1041, Independent Spent Fuel Storage Installation, Request for Exemption from Certificate of Compliance, Inspection Requirement for One Multipurpose Canister, dated March 11, 2022.	ML22070B140
Request for Additional Information for Review of the South Texas Project Electric Generating Station Independent Spent Fuel Storage Installation, License No. SNM-2514, dated March 31, 2022,	ML22089A085
South Texas Project, Units 1 and 2, Docket Nos. 50-498; 50-499; 72-1041, Independent Spent Fuel Storage Installation, Supplement to Request for Exemption from Certificate of Compliance (CoC) Inspection Requirement for One Multipurpose Canister, dated April 1, 2022.	ML22091A308
Spent Fuel Project Office Interim Staff Guidance -15, Materials Evaluation, Revision 0, January 10, 2001.	ML010100170
Issuance of Certificate of Compliance No. 1032, Amendment No. 2 for the HI-STORM Flood/Wind Multipurpose Canister Storage System.	ML16280A008 (Package)
CoC No. 1032, Amendment No. 2 [Letter to K. Manzione re: Issuance of Certificate of Compliance No. 1032, Amendment No. 2 for the HI-STORM Flood/Wind Multipurpose Canister Storage System].	ML16280A017
Certificate of Compliance No. 1032, Appendix B [Letter to K. Manzione re: Issuance of Certificate of Compliance No. 1032, Amendment No. 2 for the HI-STORM Flood/Wind Multipurpose Canister Storage System].	ML16280A019
HI-2114830, Rev. 5, "Final Safety Analysis Report on the HI-STORM FW FSAR MPC Storage System."	ML17179A444
NUREG-2215, “Standard Review Plan for Spent Fuel Dry Storage Systems and Facilities,”	ML20121A190

V. 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 licensee an exemption from the requirements of 10 CFR 72.212(a)(2), 10 CFR 72.212(b)(3), 10 CFR 72.212(b)(5)(i), 10 CFR 72.212(b)(11), and 10 CFR 72.214 only with regard to meeting the requirement to repeat volumetric examination as required for the original weld on a 1-inch portion of the repaired weld in conformance with Section III, Subsection NB, of the ASME Code, 2007 Edition, and 10 CFR 72.154(b) only with regard to maintaining and having available documentary evidence of the test for the service life of the canister.

This exemption is effective upon issuance.

Dated: April 25, 2022.

For the Nuclear Regulatory Commission.

/RA/

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