STP Nuclear Operating Company
South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

April 1, 2022
NOC-AE-22003883
10 CFR 72.7
STI: 35302169

ATTN: Document Control Desk
Director, Division of Fuel Management
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

South Texas Project
Units 1 and 2
Docket Nos. 50-498; 50-499; 72-1041
Supplement to Request for Exemption from Certificate of Compliance (CoC)
Inspection Requirement for One Multipurpose Canister

References:

1. Letter; from C. H. Georgeson to NRC Document Control Desk; "Request for Exemption from Certificate of Compliance (CoC) Inspection Requirement for One Multipurpose Canister;" dated March 11, 2022; NOC-AE-22003877; ML22070B140.

2. Letter; from NRC D. Habib to C. H. Georgeson; "Request for Additional Information for Review of the South Texas Project Electric Generating Station Independent Spent Fuel Storage Installation, License No. SNM-2514 – Cost Activity Code/Enterprise Project Identification Number 001028/07201041/L-2022-LLE-0009;" dated March 31, 2022; ML22087A147; EPID L-2022-LLE-0009.

By Reference 1, STP Nuclear Operating Company (STPNOC) requested exemption from 10 CFR 72.154(b), 10 CFR 72.212(a)(2), 10 CFR 72.212(b)(3), 10 CFR 72.212(b)(5)(i), and a portion of 10 CFR 72.212(b)(11) for a multipurpose canister (MPC) found to have an incomplete radiography test. By Reference 2, the NRC requested additional information necessary to evaluate STP's exemption request. STPNOC is providing the requested additional information as Attachments 1 and 2.

There are no commitments in this letter.

If you have any questions, please contact Zachary Dibbern at 361-972-4336 or me at 361-972-7806.

C. H. Georgeson

C. H. Georgeson
General Manager, Engineering

Attachments:

1. STP Response to NRC RAI C-1
2. STP Response to NRC RAI M-1

cc:
Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
1600 E. Lamar Boulevard
Arlington, TX 76011-4511

Donald Habib
Office of Nuclear Material Safety and Safeguards

Attachment 1

STP Response to NRC RAI C-1

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NRC Request for Additional Information RAI C-1

Discuss how the results of the helium leakage testing completed after the weld repair on MPC 248 demonstrate that the MPC meets the required leakage acceptance criteria.

Enclosure 1 of the letter from South Texas Project Nuclear Operating Company, dated March 11, 2022, (NOC-AE-22003877) states the following (on page 1):

> 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.

The statement above suggests that the containment boundary for the MPC in question was demonstrated as “leaktight” for purposes of the confinement review (assuming that fabrication leakage test was conducted in accordance with the SAR for this system); additionally, the applicant asserted that confinement has been maintained for this MPC following the weld repair. Staff review of the results of the leak testing of MPC 248 may provide reasonable assurance that confinement has been maintained for this MPC.

STPNOC Response

The helium leakage test and hydrostatic test were performed in accordance with approved STPNOC and Holtec procedures, which comply with the Certificate of Compliance and Final Safety Analysis Report.

Holtec performed baseplate and shell helium leak tests on the multipurpose canister (MPC) following weld repair activities and prior to shipment to STP. The acceptance criterion for leaktight, per ANSI N14.5, leakage is equal to or less than 2.0×10^{-7} std-cm^3/sec. The measured leakage value was 1.121×10^{-8} std-cm^3/sec, which meets the ANSI N14.5 leaktight criterion.

STP performed a hydrostatic pressure test per ASME Section III, Subsection NB, Article NB-6000 following the closure activities of welding the MPC lid to the shell. The acceptance criteria used for the hydrostatic test were: (1) no observable leakage at the lid-to-shell weld, and (2) no relevant indication from the dye penetrant test (PT). During the test, the MPC internal pressure is to be maintained between the range of 125.5 PSIG and 129.5 PSIG, this pressure requirement was met with a pressure of approximately 127 PSIG for greater than 10 minutes. The lid-to-shell weld was checked for leakage and no observable leakage was found after the minimum 10-minute hold. No relevant indication was identified when performing the PT inspection.

Attachment 2

STP Response to NRC RAI M-1

STP Response to NRC RAI M-1

NRC Request for Additional Information RAI M-1

Provide additional information to demonstrate that the stress reduction factor used in the stress analysis for HI-STORM FW multipurpose canister (MPC) adequately bounds the possible weld flaws in the unexamined section of MPC shell to baseplate weld.

The applicant proposed to use a joint efficiency factor from the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 1. However, the joint efficiency factor from ASME Section VIII, Division 1, is not applicable to the HI-STORM FW MPC, which is designed and constructed using ASME Section III, Division I, Subsection NB, with NRC approved ASME B&PV code alternatives.

Subsequently, the applicant re-evaluated calculations of bounding load cases for the MPC using a stress reduction factor described in NRC's interim staff guidance (ISG)-15, Materials Evaluation (NRC ADAMS Accession Number ML010100170). However, the stress reduction factor of 0.8 from ISG-15 is applicable for a lid to shell weld with multiple penetrant testing (PT) in lieu of a volumetric examination. Therefore, the applicant's proposed use of the stress reduction factor of 0.8 as a design criterion was not supported by a justification that demonstrates it was appropriate for the analyses of the possible weld flaws in the unexamined section of the repaired MPC shell to baseplate weld. While the stress reduction factor of 0.8 may be adequate to bound possible weld flaws as a result of the unexamined section of the repaired MPC to shell baseplate weld, the applicant did not provide an analysis or supporting information to justify the value of the stress reduction factor used in the re-evaluated calculations of the bounding load cases.

STPNOC Response

STP's basis for using a stress reduction factor (SRF) of 0.8 is based on the known condition of the MPC shell-to-base plate weld and consideration of ISG-15; NUREG-2215; ASME Section VIII, Div. 1; and ASME Section III, Subsections ND and NG. The full justification is presented below.

First, it is important to take note of the condition of the MPC shell-to-base plate weld for MPC 248, including its weld type, the nature of the repair, and inspections. The MPC shell-to-base plate weld is a full penetration corner joint, which is classified as a Category C joint (flat head to main shell) per NB-3351. After initial formation of the weld, the entire circumference of the MPC shell-to-base plate weld was volumetrically examined using radiography (RT). This original inspection revealed some indications that required local repairs. All weld repairs were performed using the same process, which consisted of excavating the weld to remove the indication, performing a dye penetrant test (PT) examination to confirm removal of the indication, filling the excavated area with new weld material, and finally performing surface PT and RT examinations of the completed weld repair.

At one specific location, an approximate 9-inch length of weld was excavated for repair. The center depth of this excavation was roughly the full thickness (0.5 inches), and the depth tapered to zero at both ends of the 9-inch-long excavation. Root and final PT examinations were performed on this weld repair, and the results were acceptable with no further indications. The final RT examination, however, did not envelope the entire length of the weld repair. The digital images that were captured only cover 8 inches of the 9-inch-long repair. In other words, an approximate 1-inch length of weld at one end of the repair did not undergo volumetric examination, which violates the requirements of ASME Section III, Subsection NB and the HI-STORM FW FSAR. All other repairs along the MPC shell-to-base plate weld were successfully completed per procedures, including all PT and RT examinations, with no post-repair indications. In summary, the vast majority of the shell-to-base plate weld (i.e., more than 99% of its total length) for MPC 248 was volumetrically examined using RT; only a 1-inch length of weld did not undergo RT examination through its full thickness. The volume of weld that was excavated and replaced during the repair process was only subject to root and final PT, with acceptable results.

Full penetration welds that are 100% examined using volumetric methods are considered fully effective under Subsection NB of the ASME Code, meaning the SRF is equal to 1.0. For MPC 248, a reduced SRF is used to analyze the shell-to-base plate weld owing to the fact that a small volume of weld was not examined by RT. The SRF for this analysis is set at 0.8, which is based on a review of ISG-15; NUREG-2215; ASME Section VIII, Div. 1; and ASME Section III, Subsections ND and NG.

ISG-15 and NUREG-2215 both endorse a SRF of 0.8 for austenitic canisters with lid-to-shell (LTS) weld subject to progressive PT examination. Although the weld in question is not a LTS weld, LTS and MPC shell-to-base plate welds are both Category C joints per ASME Code definitions. From the above description, the overall level of inspection performed on the shell-to-base plate weld for MPC 248 is more thorough and statistically more significant than that of a progressive PT examination over the full 360-degree length of weld.

ASME Section VIII, Div. 1 and ASME Section III, Subsection ND both specify a SRF of 0.85 for Category C butt welds subject to spot radiography. The level of inspection performed on the shell-to-base plate weld for MPC 248 exceeds the minimum Code requirements for spot radiography. It is also noted that, for SA-240 304 stainless steel, the design stress values applicable to Section VIII, Div. 1 and Section III, Subsection ND are generally equal to the design stress intensity values applicable to Section III, Subsection NB, except for minor variances at 300 and 400 degrees Fahrenheit.

ASME Section III, Subsection NG, which applies to core support structures and has the same design stress intensity values as Subsection NB, specifies a joint efficiency (i.e., SRF) of 0.75 for a Category C full penetration weld subjected to root and final PT only (i.e., no RT) per Table NG-3352-1. However, this is an overly conservative lower bound for the SRF associated with the shell-to-base plate weld for MPC 248 since more than 99% of the weld has been examined by RT.

Based on the above, STP has concluded that a SRF of 0.8 is an appropriate and justifiable value for the re-evaluation of the MPC shell-to-base plate weld for MPC 248. Per the re-evaluation (found in Reference 1 as Attachment 2), all calculated safety factors remain above

1.0, for all design basis load conditions. This indicates that the shell-to-base plate weld has sufficient strength even in the presence of possible, albeit unlikely, flaws in the small volume of weld that was not volumetrically examined after repair.