UNREVIEWED WASTE MANAGEMENT QUESTION EVALUATION (UWMQE)

UWMQE Number: TRC-FTF-2013-00320

1. Unreviewed Waste Management Question Evaluation

NOTE: Each question below requires Comment / Justification.

a. Is the Proposed Activity or New Data outside the bounds of the critical inputs/assumptions of the analyses contained in the WD, PA, CA, approved SA(s), or approved UWMQE(s)? For example, does the proposed activity or new information involve a change to the assumed critical design features for a waste tank/disposal unit design as described in the WD, PA, CA, approved SA(s), or approved UWMQE(s) such as critical inputs/assumptions?

Yes ☐ **No** ☒

tested MHC 12/17/13

Comment / Justification:

The New Data being evaluated is the fact that some of the bulk fill grout in Tanks 5 and 6 was of indeterminate quality because it did not meet all of the grout fill formulation specifications (C-SPP-F-000055, Revision 4). Contrary to the bulk fill grout procurement specification, some concrete cylinders used to test the compressive strength of the Tanks 5 and 6 grout were not ~~cured~~ in accordance with ASTM C31 and ASTM C511 and were not strength tested per ASTM C39 (Reference 2013-NCR-15-WFC-0007). The specification deviations dealt with humidity monitoring during compressive strength testing and test timing. As explained in the attached pages, the new data does not impact the grout properties and is within the bounds of the critical inputs/assumptions

b. Does the New Data involve an increase in the radionuclide inventory or chemical constituents evaluated in the approved WD, PA, CA, approved SA(s), and approved UWMQE(s)?

Yes ☐ **No** ☒

Comment / Justification:

The new data relates to Tank 5 and Tank 6 grout and does not increase the tank radionuclide inventories or chemical constituents.

UNREVIEWED WASTE MANAGEMENT QUESTION EVALUATION (UWMQE)

1. **Unreviewed Waste Management Question Evaluation** - continued

c. Would the radionuclide disposal limits need to be changed to implement the proposed activity?

Yes ☐ **No** ☒

Comment / Justification:

The new data in no way relates to radionuclide inventory.

d. Is it possible that the Proposed Activity or New Data causes the WD, PA, CA, approved SA(s), or approved UWMQE(s) performance objectives to be exceeded?

Yes ☐ **No** ☒

Comment / Justification:

As explained in the attached pages, the new data does not impact the grout properties and is within the bounds of the critical inputs/assumptions. Compliance with performance objectives is not impacted since the assumed grout properties are unaffected.

UNREVIEWED WASTE MANAGEMENT QUESTION EVALUATION (UWMQE)

2. UWMQE Originator

IS the activity within the bounds of the existing WD, PA, CA or approved SA(s) and approved UWMQEs? **Yes** ☒ **No** ☐

IS a Special Analysis required? **Yes** ☐ **No** ☒

Comment / Justification:

See attached pages

Check one of the following boxes below and forward to peer reviewer.

☐ CANCEL the proposed activity. (Document canceled activities as applicable.)

☐ MODIFY the proposed activity.

☒ PROCEED to PARC approval (if no SA is required).

☐ PROCEED with proposed activity; categorical exclusion applies.

☐ PERFORM Special Analysis.

Originator: Mark Layton (Print) / [signature] (Signature)

Date: 12/10/13 Time: 12:27

UNREVIEWED WASTE MANAGEMENT QUESTION EVALUATION (UWMQE)

3. UWMQE Peer Reviewer

Concur with the UWMQEO's determination? Yes ☒ No ☐

Comment / Justification:

Reviewed the UWMQE and referenced NCR (2013-NCR-15-WFC-0007) and have no comments.

Peer Reviewer: Kent Rosenberger / Kent H. Rosenberger

Print / Signature

Date: 12/10/2013

UNREVIEWED WASTE MANAGEMENT QUESTION EVALUATION (UWMQE)

4. UWMQE AGCC Reviewer

Is there a legal objection to the UWMQEO's determination? **Yes** ☐ **No** ☑

Comment / Justification:
No legal objection.

AGCC ~~or Delegate AGCC~~ THOMAS FRANK ENGLAND / [signature]
Print / Signature

Date: 17 DEC 13

5. UWMQE VP/GC Reviewer

Concur with the UWMQEO's determination? **Yes** ☐ **No** ☐ **N/A** ☑

Comment / Justification:
VP/GC not present for duty.

VP/GC not available
~~VP/GC or Delegate VP/GC~~ Thomas Frank ENGLAND / [signature]
Print / Signature

Date: 17 Dec 13

UNREVIEWED WASTE MANAGEMENT QUESTION EVALUATION (UWMQE)

6. PARC Chairman

IS the activity consistent with the existing WD? **Yes** ☒ **No** ☐

IS a Special Analysis required? **Yes** ☐ **No** ☒

Comment / Justification:

IF a Special Analysis is required, **INDICATE** the follow-up action by checking one of the following boxes below and return to the UWMQE Originator

☐ CANCEL the proposed activity. (Document canceled activities as applicable.)

☐ MODIFY the proposed activity to attempt to eliminate the SA.

☐ PERFORM SA.

PARC Chairman or Designee: Brenda C Green / [signature]
Print / Signature

Date: 12/17/2013

New Data

The New Data is information regarding the bulk fill grout that was used in Tanks 5 and 6. Some of the bulk fill grout in Tanks 5 and 6 did not meet all of the grout ~~fill formulation~~ testing specifications (C-SPP-F-000055, Revision 4). While tank grout meeting the grout testing ~~fill~~ formulation specifications will inherently meet the FTF PA (SRS-REG-2007-00002) assumptions, the fact that grout did not meet the testing specifications does not necessarily lead to the grout not meeting the FTF PA assumptions, since the PA assumptions revolve around the final cured grout properties.

With respect to the grout in Tanks 5 and 6, there is one area in which the grout specifications were not met, requiring further examination of the grout properties to ensure the FTF PA assumptions are met by the grout placed in Tanks 5 and 6. C-SPP-F-00055 Rev 4 requires that compressive strength testing is performed within specified time periods using grout cylinders kept in an environment the humidity monitoring. These testing specifications were not met for some cylinders (Reference 2013-NCR-15-WFC-0007).

Assumed Grout Properties in the FTF PA and Impact of New Data

Filling a cleaned tank with grout prevents the walls and ceiling from possibly collapsing. The grout fill also helps to reduce water intrusion into the tank over time. Reducing the amount of water allowed to enter a closed tank retards the migration of residual radioactivity from the tank to the environment. Testing has demonstrated the chemical and physical characteristics of the grout formula used at SRS. FTF closure activities will use reducing grout, with low reduction potential (Eh), thus minimizing the mobility of the radionuclides after closure. All grout formulas are alkaline because grout is a cement-based material that naturally has a high pH which is compatible with the carbon steel waste tank liner. The tank fill grout will have high compressive strength and low permeability, enhancing its ability to limit the migration of contaminants after closure. (Reference SRS- REG-2007-00002)

The FTF closure documents contain assumptions regarding both mechanical and chemical properties of the tank fill grout. These assumptions pertain to the waste tank grout's performance with respect to 1) grout chemical properties, 2) waste tank stability, and 3) tank flow modeling. These grout performance areas and their implications with respect to assumed performance are addressed in additional detail below.

Grout Chemical Properties

The FTF PA models assume that the chemical properties (e.g., reducing capacity) of the fill grout changes as a function of pore volume flushing. Once enough water flows through the pore volumes of the grouted waste tank, these models assume that the fill grout chemical properties transition from reducing to oxidizing. Because the timing of these transitions is determined based on grout formulation, the grout components (e.g., slag quantity) were developed with specific chemistry impacts (e.g., extended reducing capacity) in mind. Deviation from the compressive strength testing method outlined in the grout fill formulation specifications (C-SPP-F-000055, Revision 4) does not impact the grout components that impact the chemical properties (e.g., slag quantity) and therefore would not affect the PA assumptions regarding grout chemical properties. As documented in 2013-NCR-15-WFC-0007, the grout compressive strength requirements have been shown to be met in a manner equivalent to the specification's required method.

Waste Tank Stability

Section 3.2.1.5 of the FTF PA states that "the entire tank is assumed to be filled with grout, therefore structural failure (i.e., collapse) is not considered." The PA assumes the grout has adequate compressive strength (i.e., 500 psi per PA Table 3.2-4) to withstand the overburden load on the tank at closure. Not meeting the compressive strength testing method did not impact the grout material overall functionality with regards to tank stability. The compressive strength testing was performed on the 28 grout cylinders affected with none of the test results below 2000 psi (Reference Page 52 of 2013-NCR-15-WFC-0007).

Tank Flow Modeling

The tank grout minimizes the flow of water from the tank top to the contamination zone at the bottom of the tank. The FTF PA describes the assumed grout material properties in PA Section 4.2.3.2.3. The properties assumed in the modeling were selected from the testing described in WSRC-STI-2007-00369 and SRNL-STI-2011-00551, and are shown in PA Table 4.2-31 and PA Figure 4.2-25. The grout formula was developed to meet the assumed material properties (SRNL-STI-2011-00551), with conformance to the grout formulation validated through adherence to the grout specification requirements.

The compressive strength testing in specification C-SPP-F-00055 is not related to the properties impacting tank flow modeling, and the deviation from the compressive strength testing method outlined in the grout fill formulation specifications (C-SPP-F-000055, Revision 4) does not affect the tank flow modeling assumptions.

References

C-SPP-F-000055, Langton, C. A., *Furnishing and Delivery of Tank Closure Grout*, Savannah River Site, Aiken, SC, Rev. 4, December 19, 2012.

NCR 2013-NCR-15-WFC-0007, Redwood, A., Savannah River Site, Aiken, SC, Rev. 0, October 23, 2013.

SRNL-STI-2011-00551, Langton, C. A. and Stefanko. D. B., *Tanks 18 and 19-F Structural Flowable Grout Fill Material Evaluation and Recommendations*, Savannah River Site, Aiken, SC, Rev. 1, April, 2013.

WSRC-STI-2007-00369, Dixon, K. L., et al., *Hydraulic and Physical Properties of Tank Grouts and Base Mat Surrogate Concrete for FTF Closure*, Savannah River Site, Aiken, SC, Rev. 0, October 2007.