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Savannah River Site, Aiken, SC 29808

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**TANK 16 GROUTING LESSONS LEARNED**

The purpose of this Tank 16 Grouting Lessons Learned is to document the lessons learned from Tank 16 grout preparation and grouting scope. Recommendations will be provided to Tank Farms and Waste Removal and Tank Closure to incorporate these lessons in execution of future tank grouting activities.

The baseline Tank 16 Grouting scope includes activities required to prepare the tank for grouting and complete the filling of the tank primary, annulus, cooling coils, equipment, and risers with grout.

The Tank 16 Grouting lessons learned are listed in the appendix.

GRD

c: Tank 16 Project Team (electronic distribution)
Tank 12 Project Team (electronic distribution)

**APPENDIX: TANK 16 GROUTING LESSONS LEARNED TABLE**

| Item # | Area | Lesson Learned Description | Recommendation |
|---|---|---|---|
| 1 | Work Planning | Use of diversion valves in the grout slick line resulted in grout plugging of the slickline and limiting of the ability to adequately and effectively “pig” the line clean. | Remove the diversion valves and utilize removable spool pieces to route grout to tank fill points. |
| 2 | Work Planning | Use of decant totes for the cooling coil grouting process, specifically for the intact cooling coils resulted in a high hazard, difficult to manage effort. The decant pump failed multiple times, creating work stoppages, plugged grout hoses, worker exposure, equipment change outs and work package revisions. | Eliminate the decant tote and grout intact coils directly to a waste tote, particularly when a relatively small number of intact coils are being grouted. |

| Item # | Area | Lesson Learned Description | Recommendation |
|---|---|---|---|
| 3 | Engineering | The specified bulk fill grout, when used in the combination of a Type II tank, hot weather conditions, and low water-cement ratio grout created a mounding condition in the tank. The Tank 16 team had to cease bulk grouting operations and re-arrange work schedules to keep overall tank grouting activities progressing while developing a solution on how to complete tank grouting. The ultimate solution was the limited volume use of a "Vault 4 Clean Cap Grout" that was already procured but had to be reviewed to determine if it met the PA requirements. The lessons learned was to have the review completed to allow the use of this highly flowable grout available for all or some portion of future tanks. | Conduct an evaluation and appropriate testing, along with any resulting procurements, to allow the use of this highly flowable grout for all or some portion of future tanks. |
| 4 | Engineering | IBC calculations/determinations associated with the slick line and ventilation system stacks were cumbersome and time consuming to develop requiring multiple walk downs and revisions. | Utilize allowances with in the International Building Code (IBC), such as restricting access to areas around the slick or elevated equipment, in order to lower the PC (tornado and seismic) levels. |
| 5 | Engineering | Alter grout placement sequence/lift heights. Structural calculations for grout placement height are based on assumed, bounding values for set time, specific gravity, etc. for the grout when actual values are available. Actual values may provide less restrictive grout pour heights. | Provide actual grout data to the structural department to evaluate any potential changes to the grout height limitations. |

| Item # | Area | Lesson Learned Description | Recommendation |
|---|---|---|---|
| 6 | Work Planning | Grouting of cooling coils is the most complicated, highest hazard operation during the overall grouting process. Can grouting of the cooling coils be eliminated? | Evaluate the potential to eliminate or modify the cooling coil grouting process. |
| 7 | Management | There is inefficiency in work package development/approval prioritization in the team schedules. | Evaluate methods to show work package priorities in the team execution schedules and communicate these priorities. |
| 8 | Construction | Dedicated CDEs running work packages, particularly the cooling coil grouting. | Assign construction CDEs to the project to execute grouting work packages. |
| 9 | Management | Conduct a cooling coil (both failed and intact) grouting practice/dry run once all the equipment and hoses are in place. | Add pre-requisite management control plan actions to conduct the practice or dry run activities. |
| 10 | Work Planning | Provide a better method to fully “wet” the slickline prior to grout introduction. | Evaluate use of additional “pigs” to maintain a full slick line to assure the interior perimeter of the slick line is lubricated. |
| 11 | Engineering | Evaluate allowing an acceptable range of bleed water in the bulk fill grout rather than limiting to zero bleed water. | Analyze data from Tank 16 grout testing to determine a reasonable range for bleed water. |
| 12 | Work Planning | Provide weather related contingency for slick lines (hot vs. cold) | Evaluate the time of the year and anticipated weather and prepare grouting activities accordingly. |

| Item # | Area | Lesson Learned Description | Recommendation |
|---|---|---|---|
| 13 | Engineering | As a result of discussions with SCDHEC on December 9th, placement of clean cap grout in Tank 12 is not allowed without approval from SCDHEC. SCDHEC must be notified as soon as we encounter an issue (mounding, pluggage, etc.) that may warrant use of the clean cap grout. After an approved UWMQE, SCDHEC must again be notified and documents submitted for their review. SCDHEC will provide approval prior to addition of the clean cap grout. All communications with SCDHEC will be through DOE. Methods of communication between DOE and SCDHEC will be phone calls and emails. | RM&A should be notified as soon as an issue (mounding, pluggage, etc.) that may warrant use of the clean cap grout is recognized. Recommend inclusion of this requirement in the grout strategy document, Communication Plan, grouting work packages, and job briefings. |
| 14 | Engineering | Flushing and subsequent grouting of cooling coils is currently two different processes. Each process takes a large number of resources and time for set up and execution. | In order to reduce set up costs time and risks, develop a method to flush cooling coils immediately followed by the grouting of the same coil. |