SRMC-CWDA-2023-00074
Revision 0
September 18, 2023

Joel T. Maul
Senior Program Manager for Liquid Waste
U. S. Department of Energy
Savannah River Site

Dear Mr. Maul:

FOLLOW-UP TO SUMMARY OF APRIL 28, 2022, NRC/DOE TELECONFERENCE TO DISCUSS TECHNICAL REVIEW REPORT RELATED TO TANK 12H

Ref:

1. ML20296A550, *Technical Review of Documents Related to Tank 12H Grout Formulations, Grout Testing, Procedures, and Grouting Operations at the H-Area Tank Farm at Savannah River.*
2. Email, M. George to L. Romanowski, C. Comeau P. Suggs, and C. Barr, *Summary of April 28, 2022 NRC-DOE Teleconference*, dated May 10, 2022.
3. Email, G. Nelson to A. Staub and L. Romanowski, *DOE Follow-Up Action Items for the Tank Farm*, dated August 18, 2023.

The following information is being provided in response to U. S. Nuclear Regulatory Commission (NRC) questions posed in Appendix B of their Technical Review Report (TRR) *Technical Review of Documents Related to Tank 12H Grout Formulations, Grout Testing, Procedures, and Grouting Operations at the H-Area Tank Farm at Savannah River Site.* [Reference 1] Questions were discussed in the NRC-U.S. Department of Energy (DOE) teleconference held on April 28, 2022, however, due to time constraints not all questions were able to be reviewed. [Reference 2] DOE agreed to provide written responses to questions that were not discussed or required further clarification. Additionally, NRC pointed to 10 specific follow-up action items in an August 18, 2023 communication. [Reference 3] Responses to the follow-up action items are provided below following the numbering system used in Appendix B of the TRR, the teleconference summary, and Action Item numbering in the August 18, 2023 communication. Follow-up action items are highlighted in light blue.

Appendix B Question #4

Grout Specifications & Testing: NRC requested the final specification for clean cap grout as a follow-up action to the May 17, 2016, teleconference. Could DOE clarify how it achieves the minimum flowability given that SRNL-STI-2012-00558 indicates that flowability would be compromised at a water-to-cement ratio of 0.51, and that the one most-relevant sample tested in SRNL-STI-2012-00558 (sample WP023 with a water-to-cement ratio of 0.51) had a slump flow of only 18.6 cm (7.5 in) and no sample had greater slump flow than 29 cm? Could DOE clarify if any Daratard or any admixtures were used in the Tank 16H clean cap specification, or whether there is an option to use admixtures in the future?

Because this question was not discussed, this is Follow-Up Action Item No. 1: NRC staff recently reviewed the procurement specification for Vault 4 Clean Cap Grout (C-SPP-Z-00012). The specification presented three alternatives for clean cap grout but did not indicate which was selected for use in Vault 4. All three potential Vault 4 mix designs called for ASTM C1611 slump flow to be in the range of 66–97 cm (26–38 in), but an apparently relevant test sample of saltstone, WP023 having w:c = 0.51, had a slump flow of only 18.6 cm (7.5 in) and no sample had slump flow greater than 28.3 cm (11.1 in) (SRNL-STI-2012-00558). Which, if any, of the three alternatives presented in C-SPP-Z-00012 was placed into Tank 16H to complete its bulk fill? What was the w:c ratio of Tank 16H clean cap grout? Was the Tank 16H clean cap grout formula mixed with water or with a caustic aqueous solution of NaOH? Please provide the measured slump flow values for the batches of clean cap grout placed into Tank 16H. Please indicate if any admixtures were used in the production of Tank 16H clean cap grout to enhance flowability or prevent bleed-water segregation.

Response: Vault 4 Clean Cap 1 as defined in C-SPP-Z-00012 was used to complete Tank 16 bulk fill. The w:c ratio for this mix is 0.5. Water was used for the mixture, not a caustic aqueous solution of NaOH. Three slump flow values were obtained for the clean cap grout formula during bulk fill for Tank 16: 31.5″ at 85°F, 32.5″ at 88°F, and 36″ at 89°F, all within the acceptable range of 26-38″ as listed in C-SPP-Z-00012. No admixtures were used in the Tank 16 clean cap grout, and the specification does not explicitly list an option to do so.

As noted above, all clean cap grout batches passed the slump flow test in the field at the time of use. VSL-14R3330-1 (NRC Accession No. ML20279A790) looked at the effect of decreasing w/pm ratio on flowability in clean cap grout and showed that a w/pm ratio of 0.5 did not significantly reduce slump flow. It should also be noted when comparing these studies that differing test methods were used. SRNL-STI-2012-00558 uses ASTM D6103 which is the test method for Controlled Low Strength Materials (CLSM), while VSL-14R3330-1 uses ASTM C1611 and a mini slump flow method. ASTM D6103 uses a cylinder with a height of 6″ and a diameter of 3″, while

ASTM C1611 uses a cone with a top internal diameter of 4”, a bottom internal diameter of 8”, and a height of 12”. The mini slump test used a cone with a top internal diameter of 2”, a bottom internal diameter of 4”, and a height of 6”. The difference in size for these containers would change the volume of grout used for the test and therefore the spread. SRNL-STI-2012-010558 values would be lower than that listed in the specification since the specification relies on the larger cone volume used in ASTM C1611.

Appendix B Question #5

Grout Specifications & Testing: With respect to SDDR No. 13307, the document has two attachments documenting the two highest bleed results, which were 8.9 percent (June 18, 2015) and 3.3 percent (June 19, 2015), but the deviation description states that none of the bleed tests resulted in zero bleed. Please indicate if this statement was true over a limited time-range, or for every batch placed into Tank 16H. On page 4 of the SDDR, DOE states that bleed test results varied from 0.0 to 8.9%, which isn’t consistent with page 1, that states none of the bleed tests resulted in 0.0 bleed. DOE also stated that the initial grout mix qualification test results for these two batch tickets show that these batches met the zero bleed requirement (initially, but not after 24 hours). Please clarify.

Because this question was not discussed, it is Follow-Up Action Item No. 2.

Response: The statement in the deviation description on page 1 of the SDDR is not correct for all samples taken during grouting operations. The statement that bleed test results varied from 0.0 to 8.9% on page 4 of the SDDR is correct. For all the Tank 16 field tests performed during grouting operations, 37 of 54 samples showed zero bleed at 24 hours and the average was 0.7%. The zero bleed requirement made in the specification (C-SPP-F-00055, Section 3.2.1.2.A.6) is for trial batching to be performed before grouting begins to show the mix is capable of achieving zero bleed after 24 hours. This requirement was met as documented in the trial batch report contained on page 19 of the SDDR.

Appendix B Question #6

Grout Placement: NRC recently reviewed DOE’s Tank 16H grouting operations lessons learned document, which included the recommendation to devise grout placement sequence/lift height plans on real grout data for set-up time, specific gravity, etc., instead of on bounding values, to potentially provide more placement flexibility. Please indicate whether the Tank 12H lift height analysis was based on bounding values or realistic values, and if based on bounding values, will realistic values be utilized for Tank 15.

Because this question was not discussed, it is Follow-Up Action Item No. 3.

Response: After establishing the preferred lift heights for Tank 12 grout placement, the Tank 12 Project Team determined the planned Tank 12 lift heights were within the bounding limits calculated to support Tank 16 grouting operations, and therefore did not rework calculations to utilize actual values. There have been no decisions made for lift height analysis in Tank 15, therefore, whether bounding or actual values will be used has not been determined.

Appendix B Question 8

Grout Transferability, Flowability & Mounding: Please provide information about the volumetric capacity of the grout trucks and about the limitations on the amount they can reasonably discharge. Does the batch plant measure "exactly" 6.1 cubic meters (8 cubic yards) (and with what uncertainty) into each truck? When a truck has fully discharged its load of grout into a tank, is there a certain amount of grout residue remaining on the interior of the truck, such that only approximately 6.04 cubic meters (7.9 cubic yards) are actually discharged per truck? Is it feasible for each grout truck to actually deliver its 6.1 cubic meters (8 cubic yards) of grout?

Because this question was not discussed, it is Follow-Up Action Item No. 4.

Response: The batch plant does not measure the exact volume of grout in a truck. The grout specification provides the weight or volume of individual components that make up the grout, on a cubic yard basis, and the batch plant adds the quantity necessary for eight cubic yards. When placing the grout into a waste tank, flow meters are not utilized to determine the volume placed, volumes are estimated based on the assumption that on average each truck contains eight cubic yards of grout. When providing the estimated total volume of grout added to a tank, it is assumed that each truck contains eight cubic yards of grout upon arrival, however, to determine the volume added to the waste tank, any grout discharged to support required receipt testing is subtracted from the eight cubic yards. For example, the information provided which led to the 7.9 cubic yards per truck value calculated by the NRC above, was based on 27 trucks arriving and 213 cubic yards being placed into the tank. However, the 213 cubic yards being placed into the tank accounted for three receipt tests performed during delivery of the 27 trucks. As required in Note 1 of Attachment 5.3 of C-SPP-F-00055, at least 0.8 cubic yards must be dispatched before testing. For the trucks requiring testing, this material was dispatched to a skid pan and not placed in the waste tank and then material was discharged for testing. For estimating purposes, it is assumed that one cubic yard is dispatched for testing purposes, and not placed in the waste tank, each time a test is performed. Therefore, the 213 cubic yards placed into the waste tank accounted for three cubic yards being diverted for testing purposes. While the number of grout trucks emptied, accounting for grout dispatched for testing, is used to estimate the volume of grout placed in a tank, tanks are not grouted until a volume estimate is met. Tanks are grouted under continuous visual inspection until full, with monitoring for potential void spaces occurring throughout the process. The calculated tank volumes and estimated grout placement volumes are used to support the visual verification that no appreciable void volumes remain within a grouted waste tank.

Appendix B Question #9

Grout Transferability, Flowability & Mounding: The Tank 16H lessons learned document (SRR-TCR-2015-00024) addressed needs to (i) remove diversion valves from the grout slickline, because such use resulted in grout plugging and ineffective cleaning of the slickline, and (ii) develop a better method to ensure that the grout slickline is fully wetted/lubricated prior to grout introduction to minimize grout plugging (SRR-TCR-2015-00024). *Please provide insight into whether this lesson learned represents a long-term issue that DOE has been tracking through multiple tank grouting operations.*

NRC Summary of DOE Verbal Response: DOE will not use the diversion valves for grout slick lines in the future.

Unanswered Question per August 18, 2023 Communication: Please provide insight into whether this lesson learned represents *a long-term issue that DOE has been tracking through multiple tank grouting operations.*

This unanswered question is Follow-Up Action Item No. 5.

DOE Response: Diversion valves were not used for other tank grouting operations prior to Tank 16 grouting. Tanks 18 and 19 used a slick line that went directly to a single-entry point in the tank. Tanks 5 and 6 used line segments with spool pieces to divert to different fill locations. The grout plugging due to diversion valve use was therefore not observed in any previous grouting operations prior to Tank 16 grouting and was not a long-term issue. Based on lessons learned from Tank 16, Tank 12 grouting did not utilize diversion valves.

Appendix B Question 12

Bleed Water Segregation: Residual pools of flush water present on the floor of Tank 12H before grouting began were mapped by DOE contractors so that those areas could be purposefully avoided during initial grouting of Tank 12H (ADAMS Accession No. ML16111B174). Does DOE have such maps or further information available about where residual water remained in the tank for NRC review? DOE should provide additional information regarding the quantity and performance impact of the standing water that was present in Tank 12H during grouting. DOE to follow-up.

NRC Summary of DOE Verbal Response: The standing water in Tank 12H at the start of grouting was left over from waste retrieval operations. DOE will check and see if they have maps of standing water at the start of grouting. Also, NRC requested that DOE indicate how did went about grouting around the pools of water and indicate any potential negative impacts associated with grouting into standing water. DOE will follow-up with additional information on this question.

NRC Summary of DOE Response in August 18, 2023 Communication: The standing water in Tank 12H at the start of grouting was left over from waste retrieval operations. DOE will check if they can provide maps of standing water at the start of grouting to NRC.

Additional NRC request during teleconference per August 18, 2023 Communication: Please indicate how DOE contractors grouted around the pools of water. Please indicate any potential impacts associated with grouting adjacent standing water. DOE will follow-up with additional information on this question.

These unanswered requests/questions are Follow-Up Action Item No. 6.

Response: Attachment 2 provides a map of the standing water about one week prior to the initiation of grouting. The depth of any standing water was not provided. A map made in October 2014, prior to sampling (U-ESR-H-00125, Attachment O), noted 1.5" of water below Riser 1 and 2.0" to 2.5" below Riser 5. The map provided as Attachment 1 of this document shows the area under Riser 1 was dry when grouting of Tank 12 was initiated in Riser 1 on 1/19/2016. On 1/19/2016, a total of 20 trucks were discharged into Riser 1. The plan for the second day of grouting was to discharge into Riser 5. A visual inspection of the tank on the morning of 1/20/2016 showed the grout from the first day had made its way under Riser 5 and there was no standing water directly under Riser 5. Testing of the effect of adding grout into standing water has been performed in the past with 4" of standing water, significantly higher than what was seen in Tank 12H. While grouting directly into 4" of standing water caused segregation to occur and increased likelihood that the grout would not meet requirements for compressive strength, "standing water (in the tank primary or annulus) does not necessarily result in unsatisfactory grout, provided grout placement is controlled in such a manner as to ensure that the excess water does not hamper grout curing or cause excessive segregation." (SRR-CWDA-2012-00051, NRC ADAMS Accession #ML13078A206) Visualization throughout the grouting process by camera inspection allows for placement of grout in locations with the lowest amount of standing water possible.

Appendix B Question 19

Cooling Coil Flushing & Grouting: The 8 intact cooling coils of Tank 12H were grouted only from the coil inlet (SRR-LWE-2016-00036). When a solid stream of grout was visually detected at the coil outlet, a minimum surplus of 38 L (10 gal) of grout was introduced to the coil to ensure complete filling (ADAMS Accession No. ML15239A612; SRR-CWDA-2015-00159; SRR-LWE-2016-00036; WO 01337683-31-F). Does DOE measure the discharged grout volume to determine if more than 37.9 L (10 gal) to determine the volume of grout to be injected into the coil?

NRC Summary of DOE Verbal Response: DOE will provide at a later time.

This unanswered question is Follow-Up Action Item No. 7.

Response: Coil capacity is estimated ahead of time. Grout is added by the full hopper volume, which are increments of 0.75 cubic yards (CY). For example, Coil #30 was estimated to require 109 gallons (0.54CY) of grout. One full hopper was added to the coil, meaning 150 gallons (0.75CY) was pumped into the coil, well above the estimated volume and additional 10-gallon value.

Appendix B Question 20

Cooling Coil Flushing & Grouting: With regard to work order WO 01337683-31-A (Tank 12H coil flushing spreadsheet), please explain the term "water buffalo level" and the disconnect between the water levels recorded before, after, and the volumes required (which do not appear to add up, even with adding a minimum of 37.9 L (10 gal) extra).

NRC Summary of DOE Verbal Response: DOE will advise what a water buffalo is.

Unanswered Questions per August 18, 2023 Communication: Please explain the disconnect between the water levels recorded before, after, and the volumes required (which do not appear to add up, even with adding a minimum of 37.9 L (10 gal) extra). Please explain the term "water buffalo level."

These unanswered requests/questions are Follow-Up Action Item No. 8.

Response: The water buffalo is a 1000-gallon water tank mounted on a trailer that supplies the flush water. Water levels within the water buffalo are measured to the 25-gallon mark. The difference between final and initial water buffalo levels is used to estimate the volume of water passed through the cooling coil with the closest possible 25-gallon increment to the required volume being used. When the volume of water passed through each coil is calculated the only discrepancy with the required volume is Coil #18, which was documented as having 150 gallons flushed through it but the difference in water buffalo level indicates 200 gallons of water were spent. For the first coil of the day an additional 40 gallons of water were used to fill the supply hose, which was Coil #18. This accounts for the inconsistency between the flush volume and the water buffalo difference value.

Appendix B Question 21

Cooling Coil Flushing & Grouting: With regard to WO 01337683-31-F (Coil Grout Spreadsheet), please explain why this spreadsheet addresses only 5 of 8 intact coils, and why the coil capacity noted here differs from the required flush volumes per coil (WO 01337683-31-A).

NRC Summary of DOE Verbal Response: There was a missing second page that DOE will send to NRC.

Provision of the missing second page is Follow-Up Action Item No. 9.

Response: WO 1337683-31, Attachment F, Pages 1 and 2 are included as Attachment 2 to this letter.

Appendix B Question 23

Riser Grouting: During the final stages of riser grouting in the Tank 12H primary, a liquid spill onto the tank top occurred when liquid that had accumulated in the tank primary overtopped a riser. DOE thinks the liquid spill was from a riser that was not being monitored by a camera, but the specific riser that was overtopped was not identified in the lessons learned document (SRR-TCR-2016-00007). Please identify the specific riser involved in this liquid spill, and additional reports or documentation of the incident, as well as any video footage.

NRC Summary of DOE Verbal Response: The spill occurred on 3/7/2016. The spray chambers 6-8 ft in height were left in place during Tank 12H grouting making it more difficult to observe rising grout levels in Tank 12H risers. While filling in Riser 3, the grout backed-up into the Riser 3 spray chamber above the tank level. This was realized when a pipe cleaning "pig" had floated up into the riser and was seen moving around at the elevation of the spray chamber flush ring. Riser 7 was not as sealed as other risers. The grout exited from Riser 7 through the path of least resistance onto the tank top. NRC staff inquired about the volume of grout that spilled on to the tank top. When recalling the incident during the meeting DOE estimated that it was approximately 200 sq ft. DOE contained the over-flow grout with spill kits and cleaned up the area. DOE capped the area with grout.

Subsequent NRC inquiry at the teleconference: What was volume of grout that spilled onto the top of Tank 12H?

Response at the teleconference: The area covered by the spilled grout was approximately 20 sq meters (200 sq ft).

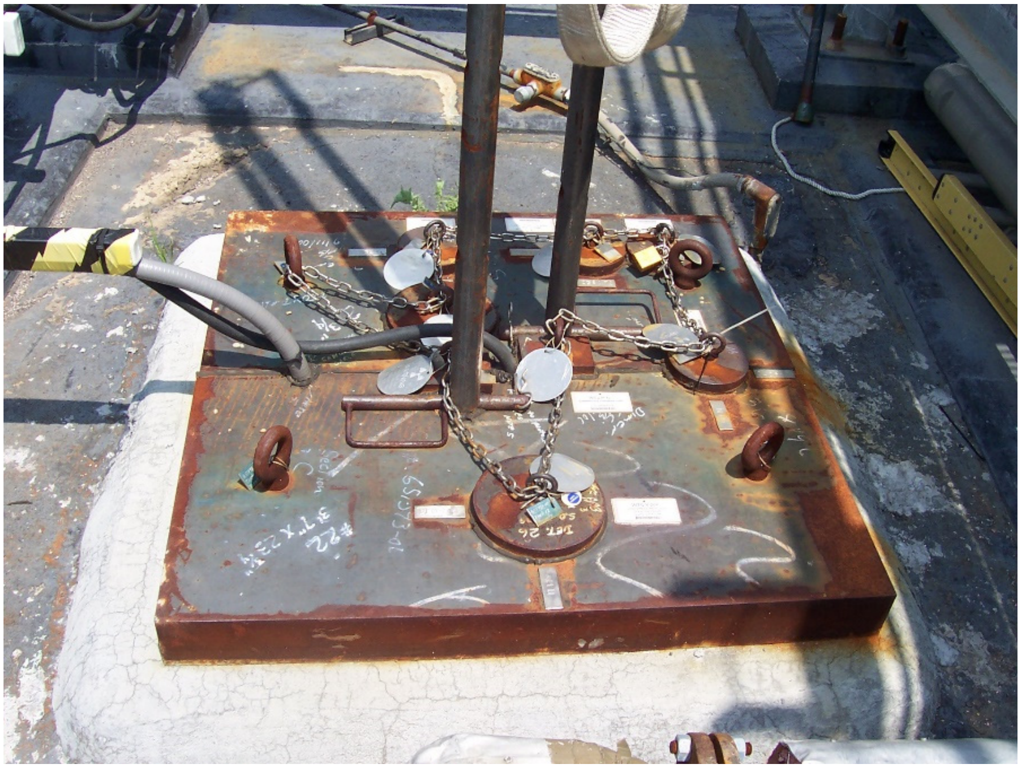
Follow-Up Action Item No. 10:

NRC requests DOE confirm that grout was being placed into Riser 3 when grout leaked around a riser cover port plug at Riser 7. NRC also requests DOE provide illustrations or photographs of typical spray chambers associated with tank risers to better understand how the spray chambers interfere with riser grouting observations. Finally, NRC requests that DOE provide illustrations or photographs of typical riser cover port plugs.

Response: Grout was being placed into Riser 3 when liquid was reported exiting Riser 7. Spray chamber information provided in Attachments 3 and 4 of this letter (Drawings D180209 and W727076). Figure 1 provides an external photo of Riser 3 with the grouted in place spray chamber. A photo of Riser 7 during the closure process is provided in Figure 2 to show the associated riser cover port plugs.

Figure 1: Tank 12 Riser 3 Spray Chamber

Figure 2: Tank 12 Riser 7 Before Final Grouting



If you have any questions, please feel free to contact me at 803-557-9900.

Sincerely,

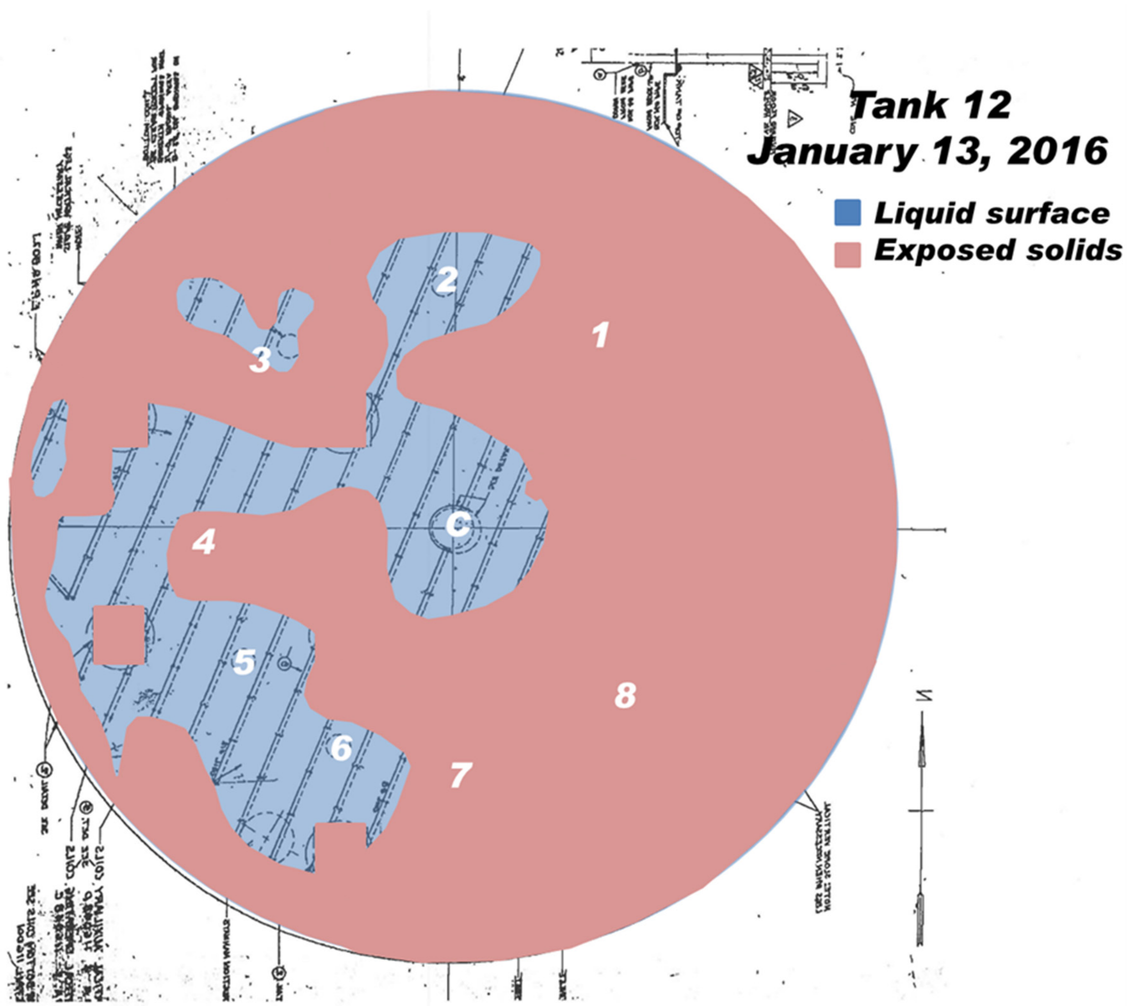
LARRY ROMANOWSKI (Affiliate)

Digitally signed by LARRY ROMANOWSKI (Affiliate)
Date: 2023.09.18 11:11:36 -04'00'

Larry B. Romanowski

Manager, Closure and Disposal Determinations
Waste Disposal Authority
Savannah River Mission Completion, LLC

Attachment 1



Attachment 2

W.O. 1337683-31 Tank 12

ATTACHMENT F - COIL GROUT SPREADSHEET

TK.12 COIL #	COIL ISOLATION VALVES SUPPLY / RETURN	(1.) Step (4.72.) VERIFY tank ventila-tion is operating.	(2.) Step (4.73.) ENSURE RCO performs contam. & dose rate survey. DOCUMENT on ATTACH. "G"	(3.) Step (4.74.) INITIATE Grout Mixture: 1 Supersack of Grout to 75 gal. water for 6 minutes.	(4.) Step (4.75). (substeps 4.75.1., 4.75.2, 4.75.3) ALIGN Valves CRW-(X)S, CRW-(X)R, & V-1, V-2 CLOSED	(5.) Step (4.76. substeps 4.76.1 & 4.76.2) CONNECT grout hose #1 (V-1) @coil supply	(6.) Step (4.77.) ENSURE V-6 is CLOSED	(7.) Step (4.78.) CONNECT flush water to Supply Side @V-6 & ENSURE hose restraints installed.	(8.) Step (4.79.) ENSURE Totalizer T-1 set to ZERO	(9.) Step (4.80.) ENSURE V-9 & V-15 CLOSED	(10.) Step 4.81. (substeps 4.81.1., 4.81.2 4.81.3 & 4.81.4) ALIGN Valves CRW-(X)S, CRW-(X)R, V-1, V-2 & V-9 OPEN	(11.) Step (4.82.) START grout pump	Step (4.83.) If 1st Coil of Day or after pigging, PUMP 100% coil volume + 10 gal. + Hose #1 vol. thru coil & PERFORM ISLT	(15.) Step (4.84.) If NOT 1st Coil of Day or after pigging, PUMP 100% volume +10 gal. thru coil & PERFORM ISLT	REF: 100% of coil cap.	(16.) Step (4.85. substeps 4.85.1 & 4.85.2) SHUT DOWN grout pump & CLOSE TEMP-V-9	(17.) Step (4.86. substeps 4.86.1., 4.86.2) RECORD T-1 reading & ZERO T-1	(18.) Step (4.87). (substeps 4.87.1., 4.87.2) ALIGN Valves CRW-(X)S, CRW-(X)R, CLOSED	(19.) Step (4.88. substeps 4.88.1 & 4.88.2.) ALIGN valves V-12 & V-14 OPEN	(20.) Step (4.89. substeps 4.89.1 & 4.89.2.) ALIGN valves V-15 & V-9 OPEN	(21.) Step (4.90.) START flush water pump	(22.) Step (4.91.) When flush water runs clear, SHUT down pump.	(23.) Step (4.92. substeps 4.92.1 & 4.92.2.) ALIGN valves V-9 & V-15 CLOSED	(24.) Step (4.93. substeps 4.93.1 & 4.93.2.) ALIGN valves V-12 & V-14 CLOSED	(25.) Step (4.94. substeps 4.94.1 & 4.94.2.) ALIGN valves V-1 & V-2 CLOSED	(26.) Step (4.95. substep 4.95.1, 4.95.2 & 4.95.3) RE-LOCATE Hose: Supply & Return and evaluate tote liquid level.
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CRW-CCL-4	CRW-V-4S	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	102 gal	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16
	CRW-V-4R				GWP 3/21/16					GWP 3/21/16	GWP 3/21/16		GWP 3/21/16	GWP 3/21/16		GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16			GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16
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CRW-CCL-17	CRW-V-17S	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	124 gal	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16
	CRW-V-17R				GWP 3/4/16					GWP 3/4/16	GWP 3/4/16		GWP 3/4/16	GWP 3/4/16		GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16			GWP 3/4/16	GWP 3/4/16	GWP 3/4/16	GWP 3/4/16
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CRW-CCL-18	CRW-V-18S	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	154 gal	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16
	CRW-V-18R				GWP 3/21/16	GWP 3/21/16				GWP 3/21/16	GWP 3/21/16		GWP 3/21/16	GWP 3/21/16		GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16			GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16
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CRW-CCL-22	CRW-V-22S	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	102 gal	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16
	CRW-V-22R				GWP 3/21/16	GWP 3/21/16				GWP 3/21/16	GWP 3/21/16		GWP 3/21/16	GWP 3/21/16		GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16			GWP 3/21/16	GWP 3/21/16	GWP 3/21/16	GWP 3/21/16
					GWP 3/21/16						GWP 3/21/16															
											GWP 3/21/16															
CRW-CCL-23	CRW-V-23S	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	109 gal	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16
	CRW-V-23R				GWP 3/17/16	GWP 3/17/16				GWP 3/17/16	GWP 3/17/16		GWP 3/17/16	GWP 3/17/16		GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16			GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16
					GWP 3/17/16						GWP 3/17/16															
											GWP 3/17/16															

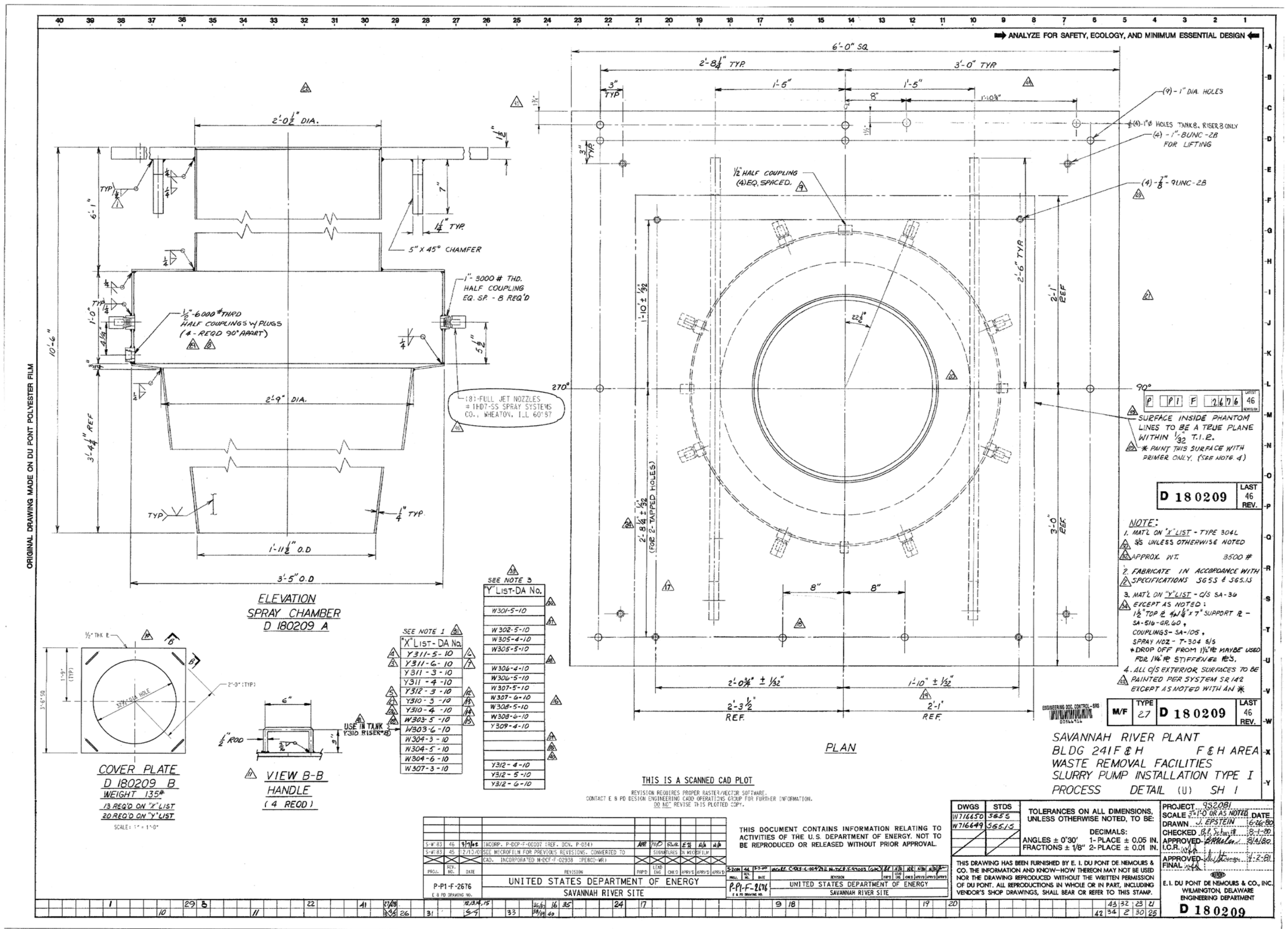
Attachment 2

W.O. 1337683-31 Tank 12

ATTACHMENT F - COIL GROUT SPREADSHEET

TK.12 COIL #	COIL ISOLATION VALVES SUPPLY / RETURN	(1.) Step (4.72.) VERIFY tank ventila-tion is operating.	(2.) Step (4.73.) ENSURE RCO performs contam. & dose rate survey. DOCUMENT on ATTACH. "G"	(3.) Step (4.74.) INITIATE Grout Mixture: 1 Supersack of Grout to 75 gal. water for 6 minutes.	(4.) Step (4.75). (substeps 4.75.1., 4.75.2, 4.75.3) ALIGN Valves CRW-(X)S, CRW-(X)R, & V-1, V-2 CLOSED	(5.) Step (4.76. substeps 4.76.1 & 4.76.2) CONNECT grout hose #1 (V-1) @coil supply	(6.) Step (4.77.) ENSURE V-6 is CLOSED	(7.) Step (4.78.) CONNECT flush water to Supply Side @V-6 & ENSURE hose restraints installed.	(8.) Step (4.79.) ENSURE Totalizer T-1 set to ZERO	(9.) Step (4.80.) ENSURE V-9 & V-15 CLOSED	(10.) Step 4.81. (substeps 4.81.1., 4.81.2 4.81.3 & 4.81.4) ALIGN Valves CRW-(X)S, CRW-(X)R, V-1, V-2 & V-9 OPEN	(11.) Step (4.82.) START grout pump	Step (4.83.) If 1st Coil of Day or after pigging, PUMP 100% coil volume + 10 gal. + Hose #1 vol. thru coil & PERFORM ISLT	(15.) Step (4.84.) If NOT 1st Coil of Day or after pigging, PUMP 100% volume +10 gal. thru coil & PERFORM ISLT	100% of coil cap.	(16.) Step (4.85. substeps 4.85.1 & 4.85.2) SHUT DOWN grout pump & CLOSE TEMP-V-9	(17.) Step (4.86. substeps 4.86.1., 4.86.2) RECORD T- 1 reading & ZERO T-1	(18.) Step (4.87). (substeps 4.87.1., 4.87.2) ALIGN Valves CRW-(X)S, CRW-(X)R, CLOSED	(19.) Step (4.88. substeps 4.88.1 & 4.88.2.) ALIGN valves V-12 & V-14 OPEN	(20.) Step (4.89. substeps 4.89.1 & 4.89.2.) ALIGN valves V-15 & V-9 OPEN	(21.) Step (4.90.) START flush water pump	(22.) Step (4.91.) When flush water runs clear, SHUT down pump.	(23.) Step (4.92. substeps 4.92.1 & 4.92.2.) ALIGN valves V-9 & V-15 CLOSED	(24.) Step (4.93. substeps 4.93.1 & 4.93.2.) ALIGN valves V-12 & V-14 CLOSED	(25.) Step (4.94. substeps 4.94.1 & 4.94.2.) ALIGN valves V-1 & V-2 CLOSED	(26.) Step (4.95. substep 4.95.1, 4.95.2 & 4.95.3) RE-LOCATE Hose: Supply & Return and evaluate tote liquid level.
CRW-CCL-30	CRW-V-30S	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	109 gal	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16
	CRW-V-30R				GWP 3/17/16	GWP 3/17/16				GWP 3/17/16	GWP 3/17/16		GWP 3/17/16	GWP 3/17/16		GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16			GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16
					GWP 3/17/16						GWP 3/17/16															
											GWP 3/17/16															
CRW-CCL-31	CRW-V-31S	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	120 gal	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16
	CRW-V-31R				GWP 3/17/16	GWP 3/17/16				GWP 3/17/16	GWP 3/17/16		GWP 3/17/16	GWP 3/17/16		GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16			GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16
					GWP 3/17/16						GWP 3/17/16															
											GWP 3/17/16															
CRW-CCL-32	CRW-V-32S	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	112 gal	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16
	CRW-V-32R				GWP 3/17/16	GWP 3/17/16				GWP 3/17/16	GWP 3/17/16		GWP 3/17/16	GWP 3/17/16		GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16			GWP 3/17/16	GWP 3/17/16	GWP 3/17/16	GWP 3/17/16
					GWP 3/17/16						GWP 3/17/16															
											GWP 3/17/16															

Attachment 3



Attachment 4