

Passport Information

Date Created	11/02/2012 REV. 1 DATE 7/26/13
Planner Name	Smith, Alicia Montney
Planner Telephone	2-3524
Equipment Name	Waste Storage Tank
Facility	FTF
CLI Number	241905
Functional Class	PS

**1.0 Scope of Work:**

Place grout in Waste Storage Tank 5 (241-905F) to support tank closure. This includes removal of riser cover port plugs, tremie installation into risers and pumping of grout through slick line piping. There are 9 grout 'Placements' to fill the Primary Tank, Annulus Tank and Annulus Inlet Piping and then a placement for each Riser and Annulus Exhaust Piping per '**Sketch 1- Grout Placement Plan**' in conjunction with:

- Grout Strategy For Tanks 5 & 6 Closure # SRR-LWE-2012-00087,
- Structural Integrity Requirements Calculation No. T-CLC-F-00496,
- Tank 5 and 6 Grout Activities RPD Survey Strategy/Plan: **SRR-ESH-2013-00065**
- Inspection Plan For Tanks 5 and 6 During Grouting Activities # SRR-LWE-2013-00008,
- Type I Tank Top Vertical Loading Evaluation Calculation No. T-CLC-F-00183, (Tank 5)
- Furnishing and Delivery of Tank Closure Grout C-SPP-F-00055 Rev 4

AHA Number: <b>TF-11696, R1</b>				Drawing: Sketch 1 – Grout Placement Plan,				
Pre Job Briefing Checklist: <b>OPS-SO-LWO.01</b>				Procedure:				
SRWP	<b>003</b>	Job Specific RWP	<b>13-FTF-170</b>	Calibration Datasheet				
Permits				ASME B31.3:		Yes	<b>X</b>	No
Fluid Service: Category: D				Normal		Category: M		
Additional Attachments: Attachment A- Tremie Installation Steps, Attachment B- Cleaning/Pigging of Slick Line, Sketch 1 – Grout Placement Plan, Attachment C- Flammability Control Evaluation, Riser Sign-off Sheet 1 - Port Plug Removal, Riser Sign-off Sheet 2 - Placements 1-3, Riser Sign-off Sheet 3 - Placements 4-9, Riser Sign-off Sheet 4 – Riser Placements, Daily Truck Log-TOP, Daily Truck Log-BOTTOM, Tank Grout Operations Daily Checklist, Excerpt from Flammability Control Program, <b>Mix/Pump Op Instructions</b>								

**NOTE: SHOULD SLICK LINE REQUIRE RE-ROUTING YOU MUST GET PERMISSION FROM DA PRIOR TO RE-ROUTING**

**2.0 Precautions and Limitations:**

- 2.1. Workers are required to review and sign in on appropriate RWP (identified by RPD).
- 2.2. Warning barricades are required for work areas to control unauthorized access to the work area, identify hazards associated with work, and prevent personnel contact with falling objects and moving parts of equipment.
- 2.3. Housekeeping should be performed before, during, and after work activities. Promptly remove debris, unnecessary tools, materials, and equipment, as the job progresses.
- 2.4. Personnel should not attempt to lift more than they are capable of lifting. If equipment is hard or awkward to handle, mechanical means (e.g., forklift, pallet jack) should be used and/or additional personnel should perform the task.
- 2.5. Any electric powered tool/equipment that will be used shall be connected to a Ground Fault Circuit Interrupter (GFCI) protected outlet.
- 2.6. If unexpected loss of ventilation or improper air flow occurs, place job in a safe condition, exit the area, and **NOTIFY** RCO FLM, PIC, and IH for path forward.
- 2.7. If problems or conditions are encountered that were not anticipated or covered under the AHA or associated permits, or the boundaries of the work need to be modified or changed as the job progresses, **SUSPEND WORK**, Notify supervision, and return the work package to the work coordinator or planner for required revisions.
- 2.8. Perform as much prep work in clean area as possible to help reduce potential for personnel exposure and contamination, and to help reduce the generation of contaminated waste (bring only necessary material into RBA/CA).
- 2.9. Portable eyewash units with rinse wands shall be positioned, readily available, in the immediate work area, with an unobstructed travel path, for each potentially exposed employee, where potential exposure to chemicals exists. Number of employees exposed at any given time should be limited. Readily available safety shower shall be positioned in close proximity to work area. In case of exposure to eyes, eyewash for required immediate 15 minute flush. In case of exposure to skin or body, rinse wand for immediate flush of affected area then safety shower as required for 15 minute flush. Contaminated clothing to be removed immediately and exposed person to seek immediate medical attention.

**Precautions and Limitations continued:**

- 2.10. In the event of a spill of grout material contact the Control Room, stabilize the work area, notify the LWGS of the event and that a time out has been taken.
- 2.11. Be aware of biting/stinging insects, rodents, spiders, snakes, bird droppings, etc. Stay alert to changing weather conditions.

<b><u>Personal Protective Equipment (PPE) – 8Q Procedure 61</u></b>	
Description	Used @ Section(s)/Step(s)
Safety glasses with side shields.	At all times except when wearing respirator or goggles.
Sturdy work shoes	At all times.
Toe protection	Steel toe caps must be worn over sturdy work shoes or safety shoes may be worn as an option when handling sections of slickline.
Hard hat.	At All Times. This may be waived by Construction Supt. & Safety Dept. Rep. for heat stress related purposes.
Leather gloves.	When handling material or materials with rough or sharp surfaces/edges, and may be used as outer pair within a radiological area with RPD approval.
Chemical resistant apron	Required for workers directly involved with grout pumping/pouring or slick line cleaning activities. May be waived by IH personnel for heat stress related purposes.
Foam inserts for noise.	Hearing protection is required when using or when near power tools or loud equipment, and as established by IH Noise Surveys & area postings.
Safety Harness w/Relief Step Device	When unprotected fall of 6' or more exists.
Face Shield w/Safety glasses.	UVEX Bionic face shield and safety glasses w/side shields when engaged in grout pumping/pouring, slick line cleaning, or pressure washing activities.
Face shield & chemical goggles.	May be utilized in lieu of UVEX Bionic face shield and safety glasses.
PVC / Nitrile gauntlet gloves.	Required by workers directly involved with grout pumping/pouring activities or handling of slickline.
Coveralls, disposable type	Required for clean out of slick line and pressure washing activities.
Long sleeve clothing.	Or disposable sleeves, required for workers directly involved with grout pumping/pouring or slick line cleaning activities.
Knee protection.	May be used as an option when working for extended periods in the kneeling position.
Reflective or high visibility blaze orange warning vest, shirt or jacket.	For personnel involved with flagging/spotting heavy equipment related activities (i.e. placing and replacing flush water totes/containers as required.)
List other hazards and the necessary controls.	Be aware of biting/stinging insects, rodents, spiders, snakes, bird droppings, etc. Stay alert to changing weather conditions. Also see 1199252-40 Work Instructions, Section 2.0. for other hazard controls.

**Chemicals (MSDS) – Per AHA**

WATERWORKS SP-400	26022-1
SLICK WILLIE 2 : NEW AND IMPROVED (identified as a carcinogen)	43554-1
CONCRETE PRODUCT FOR TANK GROUT FILL	45506-1
MERCURY VAPORS	N/A



**Section 3.0 Prerequisites: Cont.**

**Initial/Date/**

- 3.12. Construction: **ENSURE** grout pumps and slick line piping system is installed and ready for use per WO# 1199252-10.
- 3.13. Construction: **ENSURE PIC** completes Attachment "C" Flammability Control Evaluation daily.
- 3.14. Construction: **ENSURE** *Tank Grout Operations Daily Checklist* is performed daily.
- 3.15. Construction: **EVALUATE** the work site plans/layout and determine if installed eyewash/safety shower units are appropriately located to support the task(s).
- 3.16. Construction: **ENSURE** to stage additional eyewash with rinse wand as required.
- 3.17. Construction: **ENSURE** test areas, safety showers and hay bales at storm drains are installed, operable and ready for use per WO# 1199252-38.
- 3.18. Construction: **ENSURE** water supply is available to support work activities and clean-out grout trucks.
- 3.19. Construction: **ENSURE** tremie piping is available and ready for installation into tank risers.
- 3.20. Engineering: **PERFORM** engineering evaluation to determine minimum purge flow requirement to maintain flammable vapor concentration below 25% CLFL and required time for response to a loss of ventilation. Copy of the evaluation to be placed in package.

**Engineering Evaluation #:** \_\_\_\_\_

**Engineering:**

\_\_\_\_\_  
PRINT

\_\_\_\_\_  
SIGN

\_\_\_\_\_  
DATE

- 3.21. Construction: **VERIFY** I & M has staged camera equipment per "*Inspection Plan for Tanks 5 and 6 During Tank Grouting Activities*".
- 3.22. Construction WGS: **PERFORM** walk down with workers and planner to discuss work, beginning with the portion of task to be performed first.
- 3.23. Construction: **ENSURE** URS is notified to perform grout testing per C-SPP-F-00055 Rev 4 Attachment 5.3.
- 3.24. Construction: **ENSURE** IH has established Hearing boundaries for Grout Pump and Concrete Truck locations.

**4.0 Task Performance:**

Initial/Date

**REMOVAL OF RISER COVER PORT PLUGS and TREMIE INSTALL**

**NOTE: Steps 4.1 through 4.8 will be performed for each riser where grout is placed. Grout may only be placed through Risers 1, 3, 5, 8, North Annulus, South Annulus, Annulus Ventilation Inlet and Annulus Ventilation Exhaust. Placement through any other risers requires Engineering approval prior to placement.**

Individual Riser sign-offs done only on 'Riser Sign-off Sheet 1-Port Plug Removal' on a daily, as needed basis, per PIC. Any risers not used on 'Riser Sign-off Sheet 1 - Port Plug Removal' shall have an 'N/A' next the riser name. Package sign-off of these steps 4.1 thru 4.10 will be done when all initial tremies have been installed.

**\*\*\*RADCON ACTION STEP\*\*\***

**NOTE: RCO will perform step 4.1. concurrently with steps 4.2 thru 4.8.**

4.1. Construction: **ENSURE** RPD performs radiation and contamination surveys *during tremie installation activities, AND*

**IF** radiological conditions are greater than any of the following levels:

Contamination (dpm/100cm2)	Probe		Dose Rate (mrem/hr)		Airborne	
200	$\alpha$	NA	$\alpha$	NA	Extremity	N/A
1,000	$\beta\gamma$	NA	$\beta\gamma$	NA	Skin	
Riser area				100	WB Working Rate	

**THEN DECON/WRAP** to less than levels above. **IF** working dose rate exceeds levels above, obtain PIC and RCO FLM approval to continue.

Construction: **RECORD** Action Taken (Note: N/A if levels not exceeded):

Tank Riser: SEE 'Riser Sign-off Sheet 1-Port Plug Removal' for any actions taken.

Construction \_\_\_\_\_ RPD \_\_\_\_\_ / \_\_\_\_\_

4.2. Construction: **VERIFY** tank & annulus ventilation is operating prior to start of work process to remove riser cover port plugs during tank and annulus bulk fill. \_\_\_\_\_ / \_\_\_\_\_

4.3. Construction: **ENSURE HIGH RAD CONTROL PROCEDURE** for the removal of port plug is initiated. \_\_\_\_\_ / \_\_\_\_\_

**Section 4 continued:**

**Initial/Date**

4.4. Construction: **REMOVE** riser cover port plug with OPS REP. present, **AND ENSURE RCO** performs an air flow check to ensure airflow is **DOWN INTO** the Tank and **NOT OUT** to atmosphere and **IF** airflow check fails **THEN** place work in a safe condition, exit area and **NOTIFY** RPD FLM, IH, and LWGS of conditions.

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**\*IH ACTION STEP\***

4.5. Construction: **ENSURE** IH/IH qualified RCO **PERFORMS** a Mercury Vapor Survey of **Riser port plug cover removal for tremie installation activities**, IF mercury levels are greater than 0.008 mg/m<sup>3</sup> within the breathing zone **THEN** replace cover, **SUSPEND** work and **NOTIFY** LWGS and the Area Industrial Hygienist. **Work may proceed using supplied air respiratory protection once IH concurrence is obtained.**

Survey Results: \_\_\_\_\_ mg/m<sup>3</sup>Hg

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4.6. Construction: **INSTALL initial** tremie (pre-sleeved) into Primary Tank, Annulus, and Annulus Inlet risers with PIC/RPD/ DA direction into tank riser cover port.

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4.7. Construction: **ENSURE** tremie is mechanically secured at top of tank riser.

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4.8. Construction: **ATTACH** tremie onto 5” slick line per Manufacturer’s assembly instructions and have CDE validate installation.

CDE \_\_\_\_\_/\_\_\_\_\_  
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**\*\*\* HOLDPOINT\*\*\***

4.9. PIC: Prior to initiating grouting operations **ENSURE** IH / IH qualified RCO performs flammability monitoring of the tank and annulus vapor space to verify flammable vapor less than 25 % CLFL **IF** greater than 25% CLFL operate forced ventilation until flammable vapor is less than 25% CLFL

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\_\_\_\_\_ % CLFL Tank

\_\_\_\_\_ % CLFL Annulus

**Section 4 continued:**

**Initial/Date**

**\*\*\* HOLDPOINT\*\*\***

4.10. Construction CDE: **VERIFY** Tank 5 grout addition authorization for startup is approved by the Tank 5 Closure SRR Project Manager.

**Authorization is verified by Tank 5 Project Manager:**

			/
<i>Print</i>	<i>Signature</i>	<i>Date</i>	

**PLACEMENT OF GROUT**

**NOTE 1:** There are 9 grout ‘Placements’ to fill the Primary Tank, Annulus Tank and Annulus Inlet Piping per ‘**Sketch 1- Grout Placement Plan**’.

**NOTE 2:** RPD will perform radiological surveys per the ‘Tanks 5 & 6 Grout Activities RPD Survey Strategy/Plan’, during all grout placements and slickline clean outs.

**NOTE 3:** An ISLT is required to be performed whenever a leg of the slick line is used followed by periodic inspections for leaks.

**NOTE4:** IH will **verify noise barricade posting adequacy** during placement of grout.

**Placement 1 - Primary Tank, to 2 ft.**

**NOTE:** Steps 4.11 thru 4.14 will be performed for each riser where grout is placed.

Individual riser sign-offs done only on ‘**Riser Sign-off Sheet 2 - Placement 1-3**’ on a daily, as needed basis, per PIC.

Any risers not used ‘**Riser Sign-off Sheet 2 - Placement 1-3**’ shall have an ‘N/A’ next to the riser name.

(#)Package sign-off of these steps 4.10 thru 4.14 will be done when **Placement 1 is complete**.

4.11. Construction: **PERFORM** visual inspection of installed tremie. \_\_\_\_\_ / \_\_\_\_\_

4.12. Construction: **IF** tremie is not installed in desired grout location, **THEN INSTALL** tremie into riser with PIC/RPD/ DA direction, per **Attachment A – ‘Tremie Installation Steps’** AND **VERIFY** tremie is within 5ft of top of tank bottom or last grout lift. An ‘**Attachment A - Tremie Installation Steps**’ to be used for **each** riser and **each** length installed. \_\_\_\_\_ / \_\_\_\_\_

**DA to VERIFY:** \_\_\_\_\_ / \_\_\_\_\_

**Section 4 continued:**

**Initial/Date**

4.13. Construction: **PLACE/POUR** Grout (fill to 24 inches; NOT TO EXCEED 400 cu. yds.) **DIRECTING empty** trucks to the wash-out/clean-out location; west of 241-58F.

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4.14. Construction: **INITIATE 'Attachment B-Cleaning/Pigging of Slick Line'** as needed.

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4.15. Construction CDE: **VERIFY** the amount of grout placed for each riser and **RECORD** the total for Placement 1 **AND OBTAIN** concurrence from PIC and DA.

Placement 1 Total \_\_\_\_\_ yds<sup>3</sup> CDE \_\_\_\_\_ / \_\_\_\_\_ PIC \_\_\_\_\_ / \_\_\_\_\_ DA \_\_\_\_\_ / \_\_\_\_\_

**END OF Placement 1 - Primary Tank, to 2 feet.**

**Placement 2 - Annulus, to 1ft.**

**NOTE: Steps 4.16 thru 4.19 will be performed for each riser where grout is placed.**

Individual riser sign-offs done only on 'Riser Sign-off Sheet 2 - Placement 1-3' on a daily, as needed basis, per PIC.

Any risers not used 'Riser Sign-off Sheet 2 - Placement 1-3' shall have an 'N/A' next to the riser name.

(#)Package sign-off of these steps 4.15 thru 4.19 will be done when **Placement 2 is complete.**

4.16. Construction: **PERFORM** visual inspection of installed tremie.

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4.17. Construction: **IF** tremie is not installed in desired grout location, **THEN INSTALL** tremie into riser with PIC/RPD/ DA direction, per **Attachment A - 'Tremie Installation Steps'** **AND VERIFY** tremie is within 5ft of top of annulus bottom or last grout lift. An **'Attachment A'** to be used for **each** riser.

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**DA to VERIFY:**

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4.18. Construction: **PLACE/ POUR** Grout (fill to 12 inches; NOT TO EXCEED 32 cu. yds.) **DIRECTING empty** trucks to the wash-out/clean-out location; west of 241-58F.

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**Section 4 continued:**

**Initial/Date**

4.19. Construction: **INITIATE 'Attachment B - Cleaning/Pigging of Slick Line'** as needed. \_\_\_\_\_ / \_\_\_\_\_

4.20. Construction CDE: **VERIFY** the amount of grout placed for each riser and **RECORD** the total for Placement 2 **AND OBTAIN** concurrence from PIC and DA.

Placement 2 Total \_\_\_\_\_ yds<sup>3</sup> CDE \_\_\_\_\_ / \_\_\_\_\_ PIC \_\_\_\_\_ / \_\_\_\_\_ DA \_\_\_\_\_ / \_\_\_\_\_

**END OF Placement 2 - Annulus, to 1ft.**

**Placement 3 – Annulus Inlet Piping (Lower Horizontal)**

**NOTE:** Tremie installation in Annulus Inlet to fill the interior of **horizontal** Inlet Piping. Continue grout filling of both legs of the horizontal inlet piping “until grout is observed exiting the all horizontal ducting distribution holes”. The **vertical** section of the Annulus **Inlet** Piping will be filled during Placements 4-9. However, the Annulus **Exhaust** Piping will be filled in the riser fill work package. (Ref: 6.2.1 of SRR-LWE-2012-00087)

**NOTE: Steps 4.21 thru 4.24 will be performed for each riser where grout is placed.** Individual riser sign-offs done only on ‘Riser Sign-off Sheet 2 - Placement 1-3’ on a daily, as needed basis, per PIC. Any risers not used ‘Riser Sign-off Sheet 2 - Placement 1-3’ shall have an ‘N/A’ next to the riser name. (#)Package sign-off of these steps 4.20 thru 4.24 will be done when **Placement 3 is complete.**

4.21. Construction: **PERFORM** visual inspection of installed tremie. \_\_\_\_\_ / \_\_\_\_\_

4.22. Construction: **IF** tremie is not installed in desired grout location, **THEN INSTALL** tremie into riser with PIC/RPD/ DA direction, per **Attachment A – ‘Tremie Installation Steps’** **AND VERIFY** tremie is within 5ft of top of annulus bottom or last grout lift. An ‘Attachment A to be used for **each** riser. \_\_\_\_\_ / \_\_\_\_\_

**DA to VERIFY:** \_\_\_\_\_ / \_\_\_\_\_

4.23. Construction: **PLACE/POUR** Grout (**NOT TO EXCEED 32 cu. yds.**) **DIRECTING** empty trucks to the wash-out/clean-out location; west of 241-58F. \_\_\_\_\_ / \_\_\_\_\_

4.24. Construction: **INITIATE 'Attachment B - Cleaning/Pigging of Slick Line'** as needed. \_\_\_\_\_ / \_\_\_\_\_

**Section 4 continued:**

**Initial/Date**

4.25. Construction CDE: **VERIFY** the amount of grout placed for each riser and **RECORD** the total for Placement 3 **AND OBTAIN** concurrence from PIC and DA.

Placement 3 Total \_\_\_\_\_ yds<sup>3</sup> CDE \_\_\_\_\_ / \_\_\_\_\_ PIC \_\_\_\_\_ / \_\_\_\_\_ DA \_\_\_\_\_ / \_\_\_\_\_

**END OF Placement 3 – Annulus Inlet Piping (Lower Horizontal)**

**Placements 4 thru 9 – Primary Tank, Annulus, and Annulus Inlet Piping (Vertical)**

**NOTE:** The **vertical** section of the Annulus **Inlet** Piping will be filled during Placements 4-9. However, the Annulus **Exhaust** Piping will be filled in the ‘Riser Placement’ section of the work package per *SRR-LWE-2012-0087*.

**NOTE:** Steps 4.26. thru 4.29. will be performed for each riser where grout is placed.

Individual riser sign-offs done only on ‘Riser Sign-off Sheet 3 - Placement 4-9’ on a daily, as needed basis, per PIC.

Any risers not used ‘Riser Sign-off Sheet 3 - Placement 4-9’ shall have an ‘N/A’ next to the riser name.

(#)Package sign-off of these steps 4.25 thru 4.30 will be done when all ‘Placements 4-9’ are complete.

4.26. Construction: **PERFORM** visual inspection of installed tremie. \_\_\_\_\_ / \_\_\_\_\_

4.27. Construction: **IF** tremie is not installed in desired grout location, **THEN INSTALL** tremie into riser with PIC/RPD/ DA direction, per **Attachment A – ‘Tremie Installation Steps’** **AND VERIFY** tremie is within 5ft of top of last grout lift. **An ‘Attachment A - Tremie Installation Steps’** to be used for **each** riser and **each** length installed. \_\_\_\_\_ / \_\_\_\_\_

**DA to VERIFY:** \_\_\_\_\_ / \_\_\_\_\_

**Section 4 continued:**

**Initial/Date**

4.28. Construction: Complete Grout placement 4 through 9 as follows.

4.28.1 Construction: **PLACEMENT 4: PLACE/POUR** Grout (Fill to 5 ft.-NOT TO EXCEED 550 cu.yds.) **DIRECTING empty** trucks to the wash-out/clean-out location; west of 241-58F.

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4.28.2 Construction: **PLACEMENT 5: PLACE/POUR** Grout in the Annulus tank (Fill to 10 ft.-NOT TO EXCEED 200 cu.yds.) **DIRECTING empty** trucks to the wash-out/clean-out location; west of 241-58F.

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4.28.3 Construction: **PLACEMENT 5: PLACE/POUR** Grout in the Annulus Intlet (Fill to 10 ft.-NOT TO EXCEED 200 cu.yds.) **DIRECTING empty** trucks to the wash-out/clean-out location; west of 241-58F.

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4.28.4 Construction: **PLACEMENT 6: PLACE/POUR** Grout (Fill to 15 ft.-NOT TO EXCEED 1900 cu.yds.) **DIRECTING empty** trucks to the wash-out/clean-out location; west of 241-58F.

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4.28.5 Construction: **PLACEMENT 7: PLACE/POUR** Grout in the Annulus Tank (Fill to 20 ft.-NOT TO EXCEED 250 cu.yds.) **DIRECTING empty** trucks to the wash-out/clean-out location; west of 241-58F.

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4.28.6 Construction: **PLACEMENT 7: PLACE/POUR** Grout in the Annulus Inlet(Fill to 20 ft.-NOT TO EXCEED 250 cu.yds.) **DIRECTING empty** trucks to the wash-out/clean-out location; west of 241-58F.

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4.28.7 Construction: **PLACEMENT 8: PLACE/POUR** Grout (Fill to Tank Full-NOT TO EXCEED 1800 cu.yds.) **DIRECTING empty** trucks to the wash-out/clean-out location; west of 241-58F.

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4.28.8 Construction: **PLACEMENT 9: PLACE/POUR** Grout in the Annulus Tank (Fill to 24'-6"-NOT TO EXCEED 120 cu.yds.) **DIRECTING empty** trucks to the wash-out/clean-out location; west of 241-58F.

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4.28.9 Construction: **PLACEMENT 9: PLACE/POUR** Grout in the Annulus Inlet (Fill to 24'-6"-NOT TO EXCEED 120 cu.yds.) **DIRECTING empty** trucks to the wash-out/clean-out location; west of 241-58F.

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4.29. Construction: **INITIATE 'Attachment B - Cleaning/Pigging of Slick Line'** as needed.

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**Section 4 continued:**

**Initial/Date**

4.30. Construction CDE: **RECORD** the amount of grout placed **AND OBTAIN** concurrence from PIC and DA.

Placement 4 – Primary Tank \_\_\_\_\_ yds<sup>3</sup> CDE \_\_\_\_\_ / \_\_\_\_\_ PIC \_\_\_\_\_ / \_\_\_\_\_ DA \_\_\_\_\_ / \_\_\_\_\_

Placement 5 – Annulus Tank \_\_\_\_\_ yds<sup>3</sup> CDE \_\_\_\_\_ / \_\_\_\_\_ PIC \_\_\_\_\_ / \_\_\_\_\_ DA \_\_\_\_\_ / \_\_\_\_\_

Placement 5 – Annulus Inlet \_\_\_\_\_ yds<sup>3</sup> CDE \_\_\_\_\_ / \_\_\_\_\_ PIC \_\_\_\_\_ / \_\_\_\_\_ DA \_\_\_\_\_ / \_\_\_\_\_

Placement 6 – Primary Tank \_\_\_\_\_ yds<sup>3</sup> CDE \_\_\_\_\_ / \_\_\_\_\_ PIC \_\_\_\_\_ / \_\_\_\_\_ DA \_\_\_\_\_ / \_\_\_\_\_

Placement 7 – Annulus Tank \_\_\_\_\_ yds<sup>3</sup> CDE \_\_\_\_\_ / \_\_\_\_\_ PIC \_\_\_\_\_ / \_\_\_\_\_ DA \_\_\_\_\_ / \_\_\_\_\_

Placement 7 – Annulus Inlet \_\_\_\_\_ yds<sup>3</sup> CDE \_\_\_\_\_ / \_\_\_\_\_ PIC \_\_\_\_\_ / \_\_\_\_\_ DA \_\_\_\_\_ / \_\_\_\_\_

Placement 8 – Primary Tank \_\_\_\_\_ yds<sup>3</sup> CDE \_\_\_\_\_ / \_\_\_\_\_ PIC \_\_\_\_\_ / \_\_\_\_\_ DA \_\_\_\_\_ / \_\_\_\_\_

Placement 9 – Annulus Tank \_\_\_\_\_ yds<sup>3</sup> CDE \_\_\_\_\_ / \_\_\_\_\_ PIC \_\_\_\_\_ / \_\_\_\_\_ DA \_\_\_\_\_ / \_\_\_\_\_

Placement 9 – Annulus Inlet \_\_\_\_\_ yds<sup>3</sup> CDE \_\_\_\_\_ / \_\_\_\_\_ PIC \_\_\_\_\_ / \_\_\_\_\_ DA \_\_\_\_\_ / \_\_\_\_\_

4.31. PIC: **ENSURE** Tank Farm Operations personnel **EVALUATES** the operability of tank and annulus ventilation **AND**

**SECURES** ventilation per **SW11.1-CLOSURE-VENT.**

\_\_\_\_\_ / \_\_\_\_\_

4.32. PIC: **INITIATE** weekly flammable vapor concentration monitoring of risers per WSRC-TR-2003-00087 REV.20 section 6.8.1.7 (See Attachment C)

\_\_\_\_\_ / \_\_\_\_\_

**END OF Placements 4-9 – Primary Tank, Annulus, and Annulus Inlet Piping (Vertical)**

**Riser Placements**

**NOTE: Steps 4.33 thru 4.39 will be performed for each riser where grout is placed.**

Individual riser sign-offs done only on 'Riser Sign-off Sheet 4 – Riser Placements' on a daily, as needed basis, per PIC. Any risers not used 'Riser Sign-off Sheet 4 – Riser Placements' shall have an 'N/A' next to the riser name.

(#)Package sign-off of these steps 4.31 thru 4.37 will be done when **All Risers, including Annulus Exhaust Piping, are complete.**

4.33. PIC: **ENSURE** portable ventilation is available **AND**

**PLACED** per Rad Con direction within one duct diameter of riser opening.

\_\_\_\_\_ / \_\_\_\_\_

4.34. Construction: **VERIFY** that flammable vapor concentrations have been sampled and meet acceptable levels prior to grouting each riser, per Attachment C - Excerpt from WSRC-TR-2003-00087 Rev.20. Section 6.8.1.8

\_\_\_\_\_ / \_\_\_\_\_

**NOTE:** Estimated riser fill volumes  
Center 7 cu yds  
1-8 2 cu yds  
Annulus 3.2 cu yds

4.35. Construction: **PERFORM** visual inspection of installed tremie/slickline/hose.

\_\_\_\_\_ / \_\_\_\_\_

4.36. Construction: **IF** tremie/slickline/hose is not installed in desired grout location, **THEN INSTALL** tremie/slickline/hose into riser with PIC/RPD/ DA direction, per **Attachment A – 'Tremie Installation Steps'** **AND VERIFY** tremie/slickline/hose is within 5ft of top of last grout lift. An '**Attachment A - Tremie Installation Steps**' to be used for **each** riser and **each** length installed.

\_\_\_\_\_ / \_\_\_\_\_

**DA to VERIFY:**

\_\_\_\_\_ / \_\_\_\_\_

**Section 4 continued:**

**Initial/Date**

**CAUTION**

**If an interruption in grouting riser has a duration greater than 8 hours, monitoring of vapor space concentration shall be completed and <25% CLFL before grout can continue.**

4.37. PIC: **IF** a delay of > 8 hours has occurred during riser pour, **OR**  
**IF** > 8 hours has elapsed since riser flammability sampling was completed, **THEN**  
**HAVE** riser being grouted resampled for flammable vapors and document in PIC log. \_\_\_\_\_ / \_\_\_\_\_

4.38. PIC: **IF** riser required resampling for flammability, **THEN**  
**VERIFY** vapor concentration is <25% CLFL prior to continuing. \_\_\_\_\_ / \_\_\_\_\_

4.39. Construction: **PLACE/POUR GROUT AND DIRECT** all trucks to the wash-out/clean-out location; west of 241-58F. \_\_\_\_\_ / \_\_\_\_\_

4.40. Construction: **INITIATE 'Attachment B - Cleaning/Pigging of Slick Line'** as needed. \_\_\_\_\_ / \_\_\_\_\_

4.41. Construction: **DISCONNECT** tremie/slickline/hose from each riser with PIC/RPD/DA direction. \_\_\_\_\_ / \_\_\_\_\_

**Section 4 continued:**

**Initial/Date**

4.42. Construction CDE: **RECORD** the amount of grout placed **AND OBTAIN** concurrence from PIC and DA.

<b>Riser 1</b> _____ yds <sup>3</sup>	CDE _____ / _____	PIC _____ / _____	DA _____ / _____
<b>Riser 2</b> _____ yds <sup>3</sup>	CDE _____ / _____	PIC _____ / _____	DA _____ / _____
<b>Riser 3</b> _____ yds <sup>3</sup>	CDE _____ / _____	PIC _____ / _____	DA _____ / _____
<b>Riser 4</b> _____ yds <sup>3</sup>	CDE _____ / _____	PIC _____ / _____	DA _____ / _____
<b>Riser 5</b> _____ yds <sup>3</sup>	CDE _____ / _____	PIC _____ / _____	DA _____ / _____
<b>Riser 6</b> _____ yds <sup>3</sup>	CDE _____ / _____	PIC _____ / _____	DA _____ / _____
<b>Riser 7</b> _____ yds <sup>3</sup>	CDE _____ / _____	PIC _____ / _____	DA _____ / _____
<b>Riser 8</b> _____ yds <sup>3</sup>	CDE _____ / _____	PIC _____ / _____	DA _____ / _____
<b>Riser N</b> _____ yds <sup>3</sup>	CDE _____ / _____	PIC _____ / _____	DA _____ / _____
<b>Riser E</b> _____ yds <sup>3</sup>	CDE _____ / _____	PIC _____ / _____	DA _____ / _____
<b>Riser S</b> _____ yds <sup>3</sup>	CDE _____ / _____	PIC _____ / _____	DA _____ / _____
<b>Riser W</b> _____ yds <sup>3</sup>	CDE _____ / _____	PIC _____ / _____	DA _____ / _____
<b>Riser C</b> _____ yds <sup>3</sup>	CDE _____ / _____	PIC _____ / _____	DA _____ / _____
<b>Annulus Inlet</b> _____ yds <sup>3</sup>	CDE _____ / _____	PIC _____ / _____	DA _____ / _____
<b>Annulus Exhaust</b> _____ yds <sup>3</sup>	CDE _____ / _____	PIC _____ / _____	DA _____ / _____

4.43. Construction CDE: **VERIFY** the amount of grout placed and **RECORD** the total below:

**Tank 5 Total** \_\_\_\_\_ yds<sup>3</sup> CDE \_\_\_\_\_ / \_\_\_\_\_ PIC \_\_\_\_\_ / \_\_\_\_\_ DA \_\_\_\_\_ / \_\_\_\_\_

**Section 4 continued:**

**Initial/Date**

4.44. Construction: **CONTACT** RPD to perform surveys prior to removing tools/materials from radiological work area.

\_\_\_\_\_ / \_\_\_\_\_

**NOTE:** All low-level waste should be packaged for disposal by Waste Generator and verified by Waste Verifier prior to disposal.

4.45. Construction: **PERFORM** housekeeping activities as follows:

\_\_\_\_\_ / \_\_\_\_\_

- **CLEAN** tools used.
- **REMOVE** waste and/or excess material generated from work activities.
- **DISPOSE** of waste per GCO/Waste Verifier directions.

**5.0 Post Maintenance Testing & Return to Service:**

N/A

**6.0 Post Work & Feedback:**

6.1. Construction LWGS/PIC: **PERFORM** a post job walk-down to verify all work is completed for this task.

\_\_\_\_\_ / \_\_\_\_\_

6.2. Construction CDE: **CHECK** the work package for completeness and ensure all documents used during the job are identified on the P211 Work Package Print Report in section Print Report - Work Order Record Documents (M102 / M104) or, if added during work execution, identified in Documents added to work package in field.

\_\_\_\_\_ / \_\_\_\_\_

6.3. Construction: **ENTER** any feedback including field revisions and recommendations for improvements for future work in Passport OR NA if no feedback applies (CO Comments - Mechanic Feedback to be addressed by Work Control).

\_\_\_\_\_ / \_\_\_\_\_

6.4. Construction CDE: **ENSURE** all MT&E has been documented in the work package and the MT&E Log has been properly completed CDE and/or QCE may initial/date. This step may be marked N/A with justification statement and initialed/dated by the CDE if no MT&E was used.

\_\_\_\_\_ / \_\_\_\_\_

# Work package 1199252-30 REV1 Attachment A - Tremie Installation Steps

**Task Performance:**

**Initial/Date**

**NOTE:** Step to be performed for all tremie installations with an 'Attachment A - Tremie Installation Steps' for each riser and length installed.

**\*\*\*RADCON ACTION STEP\*\*\***

**NOTE: Step 4.1 will be performed concurrently with steps 4.2. thru 4.8.**

4.1. Construction: **ENSURE** RPD performs radiation and contamination surveys *Prior to and during tremie installation activities, AND*

**IF** radiological conditions are greater than any of the following levels and below RWP suspension guides:

Contamination (dpm/100cm2)	Probe		Dose Rate (mrem/hr)		Airborne	
200	$\alpha$	NA	$\alpha$	NA	Extremity	N/A
1,000	$\beta\gamma$	NA	$\beta\gamma$	NA	Skin	
Riser area				10	WB Working Rate	

- **THEN (Contamination): DECON/WRAP** to less than levels above. **IF** working dose rate exceeds levels above, obtain PIC and RCO FLM approval to continue.

Construction: **RECORD** Action Taken (Note: N/A if levels not exceeded):

Tank Riser: \_\_\_\_\_

Construction \_\_\_\_\_ RPD \_\_\_\_\_ /

4.2. Construction: **VERIFY** tank & annulus ventilation is operating prior to start of work process to remove riser cover port plugs. \_\_\_\_\_ /

4.3. Construction: **ENSURE HIGH RAD CONTROL PROCEDURE** for the removal of port plug is initiated. \_\_\_\_\_ /

Work package 1199252-30 REV1 **Attachment A - Tremie Installation Steps**

4.4. Construction: **REMOVE** riser cover port plug. **ENSURE** RPD performs and airflow test at each riser location to verify that the air does not flow out of the opening, **IF** air flow fails, **THEN**

**RE-INSTALL** riser cover port plug and place work area in a safe condition **AND NOTIFY** RPD FLM, FTF IH and PIC of condition so appropriate controls are established before continuing work.

\_\_\_\_\_/

4.5. Construction: **DISCONNECT** and **RELEASE** tremie into the tank with PIC/RPD/ DA direction, **N/A** if step is not needed.

\_\_\_\_\_/

4.6. Construction: **INSTALL** tremie into Primary Tank, Annulus, and Annulus Inlet risers with PIC/RPD/ DA direction into tank riser cover port.

\_\_\_\_\_/

4.7. Construction: **ENSURE** tremie is mechanically secured at top of tank riser.

\_\_\_\_\_/

4.8. Construction: **ATTACH** tremie onto 5" slick line per Manufacturer's assembly instructions and have CDE validate installation.

CDE \_\_\_\_\_/

4.9. Construction: **PERFORM** housekeeping activities as follows:

- **REMOVE** any waste and/or excess material generated from the work activities.
- **CLEAN** any tools used **AND**
- **PLACE** the tools into their proper storage area.

**NOTE:** All *Low Level Waste* should be packaged for disposal by Waste Generator and verified by Waste Verifier prior to disposal.

\_\_\_\_\_/

Work package 1199252-30 REV1 **Attachment A - Tremie Installation**  
**Steps**

- 4.10. Construction: **NOTIFY** the GCO to determine waste disposal from waste generated during the work operations.

\_\_\_\_\_ /

WORK PACKAGE 1199252-30 REV 1

Task Performance: \_\_\_\_\_ Initial/Date \_\_\_\_\_

**NOTE:** This Attachment is to be implemented at any time during the grout operation where the LWGS sees it necessary to clean out the slick line.

'Attachment B – Cleaning/Pigging of Slick Line' for each pigging activity.

4.1. Construction: **ENSURE** grout pump is in a safe state. \_\_\_\_\_ / \_\_\_\_\_

4.2. Construction: **ENSURE** hammer valve on pump is in a closed position. \_\_\_\_\_ / \_\_\_\_\_

4.3. Construction: **ENSURE** a catch basin is available for pump cleanout. \_\_\_\_\_ / \_\_\_\_\_

**Note: Step 4.4 will be performed concurrently with steps 4.5 thru 4.13**

**\*\*\*RADCON ACTION STEP\*\*\***

4.4. Construction: **ENSURE** RPD performs radiation and contamination surveys *of slick line and grout pump, AND*

**IF** radiological conditions are greater than any of the following levels and below RWP suspension guides:

Contamination (dpm/100cm <sup>2</sup> )	Probe	Dose Rate (mrem/hr)		Airborne			
200	$\alpha$	NA	$\alpha$	NA	Extremity	N/A	
1,000	$\beta\gamma$	NA	$\beta\gamma$	NA	Skin		
Slick Line				10	WB Working Rate		

- **THEN (Contamination): DECON/WRAP** to less than levels above. **IF** working dose rate exceeds levels above, obtain PIC and RCO FLM approval to continue.

Construction: **RECORD** Action Taken (Note: N/A if levels not exceeded):

Construction \_\_\_\_\_ RPD \_\_\_\_\_ / \_\_\_\_\_

4.5. Construction: **REMOVE** section of slick line from grout pump. \_\_\_\_\_ / \_\_\_\_\_

**Section continued:****Initial/Date**

- 4.6. Construction: **INSERT** sponge clean out ball (pig) into slick line. \_\_\_\_\_ / \_\_\_\_\_
- 4.7. Construction: **INSTALL** Blowout Cap (air type) fitting onto slick line. \_\_\_\_\_ / \_\_\_\_\_
- 4.8. Construction: **OPEN** hammer valve on the slick line. \_\_\_\_\_ / \_\_\_\_\_
- 4.9. Construction: **CONNECT** air compressor hose to Blowout Cap fitting. (Ensure whip protection is installed). \_\_\_\_\_ / \_\_\_\_\_
- 4.10. Construction: **VERIFY** I&M Camera is in place, **THEN** **OPEN** valve on pig fitting to clean slick line. \_\_\_\_\_ / \_\_\_\_\_
- 4.11. Construction: With I&M support **VERIFY** clean out ball clears slick line, **THEN** **CLOSE** valve on blowout fitting. \_\_\_\_\_ / \_\_\_\_\_
- 4.12. Construction: **ENSURE** hammer valve on pump is in a closed position. \_\_\_\_\_ / \_\_\_\_\_
- 4.13. Construction: **CLEAN OUT** grout pump and ready for next pour. \_\_\_\_\_ / \_\_\_\_\_
- 4.14. Construction: **ENSURE** air compressor is shut down (not operating). \_\_\_\_\_ / \_\_\_\_\_
- 4.15. Construction: **REMOVE** air compressor hose from pig fitting. \_\_\_\_\_ / \_\_\_\_\_
- 4.16. Construction: **REMOVE** blowout fitting from slick line. \_\_\_\_\_ / \_\_\_\_\_
- 4.17. Construction: **INSTALL** section of slick line where section was previously removed for cleaning unless section does not require re-installation (e.g. final cleanout before dismantling). N/A this step if section is not to be re-installed. \_\_\_\_\_ / \_\_\_\_\_

**Task Performance:**

**Initial/Date**

**'Attachment C – Flammability Control Implementation Actions.'**

**Bulk Grout Operations**

**NOTE:** Steps 1 thru 3 may be N/A'd if performing riser grout operations.

1. PIC: **VERIFY** tank & annulus ventilation is operating.

**IF** tank or annulus ventilation is not operating. **THEN**

**REQUEST** operations to start ventilation per SW11.1-CLOSURE-VENT. \_\_\_\_\_ / \_\_\_\_\_

2. PIC: **ENSURE** IH / IH qualified RCO performs flammable vapor sampling of tank and annulus regions **AND** record results below.

\_\_\_\_\_ % CLFL Tank

\_\_\_\_\_ % CLFL Annulus \_\_\_\_\_ / \_\_\_\_\_

3. PIC: **IF** any location is  $\geq 25\%$  CLFL, **THEN**

**PERFORM** the following:

- a. **HAVE** IH / IH qualified RCO continue flammable vapor sampling of elevated regions until concentration is  $< 25\%$ . \_\_\_\_\_ / \_\_\_\_\_

- b. **RECORD** CLFL concentration, date and time when applicable area(s) has reached  $< 25\%$  CLFL.

Tank % CLFL \_\_\_\_\_ Date / Time \_\_\_\_\_

Annulus % CLFL \_\_\_\_\_ Date / Time \_\_\_\_\_ \_\_\_\_\_ / \_\_\_\_\_

Attachment C Continued:

Initial/Date

Riser Grout Operations

NOTE: Steps 4 thru 8 may be N/A'd if performing bulk grout operations.

4. PIC: **RECORD** date of last tank and annulus flammability concentration sample performance **AND RECORD** where information was obtained from.

Tank Sample Date: \_\_\_\_\_ Documentation: \_\_\_\_\_

Annulus Sample Date: \_\_\_\_\_ Documentation: \_\_\_\_\_ / \_\_\_\_\_

5. PIC: **IF** last sample date is greater than or equal to 6 days from current date, **THEN PERFORM** the following:

- a. **ENSURE** IH / IH qualified RCO performs flammable vapor sampling of at least one tank and/or one annulus riser.

\_\_\_\_\_ % CLFL Tank Riser \_\_\_\_\_ Date Performed \_\_\_\_\_

\_\_\_\_\_ % CLFL Annulus \_\_\_\_\_ Date Performed \_\_\_\_\_ / \_\_\_\_\_

- b. **IF** riser sampled in Step 5.a is greater than 25% CLFL, **THEN**

**PERFORM** the following:

- 1) **ENSURE** IH / IH qualified RCO performs flammable vapor sampling of all other risers in that location. (tank or annulus)

Riser # \_\_\_\_\_ % CLFL \_\_\_\_\_ Date / Time \_\_\_\_\_

Riser # \_\_\_\_\_ % CLFL \_\_\_\_\_ Date / Time \_\_\_\_\_

Riser # \_\_\_\_\_ % CLFL \_\_\_\_\_ Date / Time \_\_\_\_\_

Riser # \_\_\_\_\_ % CLFL \_\_\_\_\_ Date / Time \_\_\_\_\_

Riser # \_\_\_\_\_ % CLFL \_\_\_\_\_ Date / Time \_\_\_\_\_

Riser # \_\_\_\_\_ % CLFL \_\_\_\_\_ Date / Time \_\_\_\_\_

Riser # \_\_\_\_\_ % CLFL \_\_\_\_\_ Date / Time \_\_\_\_\_

Riser # \_\_\_\_\_ % CLFL \_\_\_\_\_ Date / Time \_\_\_\_\_ / \_\_\_\_\_

- 2) **IF** flammable vapor sample is greater than 25% CLFL, **THEN**

**VENTILATE** the riser(s) utilizing localized ventilation until flammable vapor sample of all elevated concentration risers is less than 25% CLFL.

\_\_\_\_\_ / \_\_\_\_\_

Attachment C Continued:

Initial/Date

- 6. PIC: ENSURE IH / IH qualified RCO performs sampling of the riser(s) to be grouted today for flammable vapor concentration.

Riser # _____	% CLFL _____	Date / Time _____
Riser # _____	% CLFL _____	Date / Time _____
Riser # _____	% CLFL _____	Date / Time _____
Riser # _____	% CLFL _____	Date / Time _____
Riser # _____	% CLFL _____	Date / Time _____
Riser # _____	% CLFL _____	Date / Time _____

\_\_\_\_\_ / \_\_\_\_\_

**Note:** Steps 7 and 8 may be worked concurrently.

- 7. PIC: IF any riser sampled in Step 6 is greater than or equal to 60% CLFL, THEN OPERATE localized ventilation at the riser(s) for at least one hour AND HAVE IH / IH qualified RCO perform follow-up Flammable vapor sampling of the riser(s) until CLFL is less than 25%.

\_\_\_\_\_ / \_\_\_\_\_

- 8. PIC: IF any riser sampled in Step 6 is greater than or equal to 60 % CLFL, THEN PERFORM the following:

- a. ENSURE IH / IH qualified RCO performs flammable vapor sampling of all other risers in that location. (tank or annulus)

Riser # _____	% CLFL _____	Date / Time _____
Riser # _____	% CLFL _____	Date / Time _____
Riser # _____	% CLFL _____	Date / Time _____
Riser # _____	% CLFL _____	Date / Time _____
Riser # _____	% CLFL _____	Date / Time _____
Riser # _____	% CLFL _____	Date / Time _____
Riser # _____	% CLFL _____	Date / Time _____
Riser # _____	% CLFL _____	Date / Time _____
Riser # _____	% CLFL _____	Date / Time _____
Riser # _____	% CLFL _____	Date / Time _____
Riser # _____	% CLFL _____	Date / Time _____
Riser # _____	% CLFL _____	Date / Time _____
Riser # _____	% CLFL _____	Date / Time _____
Riser # _____	% CLFL _____	Date / Time _____
Riser # _____	% CLFL _____	Date / Time _____

\_\_\_\_\_ / \_\_\_\_\_

- b. IF flammable vapor sample is greater than 25% CLFL, THEN VENTILATE the riser(s) utilizing localized ventilation until flammable vapor sample of all elevated concentration risers is less than 25% CLFL.

\_\_\_\_\_ / \_\_\_\_\_

1199252-30

**Attachment C Continued:**

**Initial/Date**

9. PIC: **DIRECT** Construction to perform one of the following:

Construction to **PROCEED** with Grout Operations

\_\_\_\_\_/\_\_\_\_\_  
/

Construction to **SECURE** Grout Operations

\_\_\_\_\_/\_\_\_\_\_  
/

Completed By: \_\_\_\_\_ / \_\_\_\_\_  
Signature Print Name

Date: \_\_\_\_\_

Time: \_\_\_\_\_

## 6.8 CLOSURE MODE

A requirement for tanks in the Closure Mode (only applies to Type I, II, and IV waste tanks) is that the radiolytic hydrogen generation rate shall be less than or equal to  $0.5 \text{ ft}^3/\text{hr}$  evaluated at  $25^\circ\text{C}$  with an  $\text{NO}_{\text{eff}}$  equal to zero<sup>1</sup>. Using the Radiolytic Hydrogen Generation Model outlined in Section 3.4.1.1.2 of the DSA<sup>1</sup>, the radiolytic hydrogen generation rate can be calculated.

An evaluation was performed on the flammability of Type I, II and IV waste storage tanks during grouting operations<sup>58</sup>. The evaluation used a maximum vapor space temperature of  $100^\circ\text{C}$ . The maximum vapor space temperature in an inactive dry tank is  $75^\circ\text{C}$  so using a higher vapor space temperature provides conservatism in the results. A radiolytic hydrogen generation rate of  $0.63 \text{ ft}^3/\text{hr}$  was determined to be the maximum rate at which a Type I, II, or IV waste storage tank can remain at or above 10 days time to LFL at the primary waste tank historical maximum waste level with a vapor space temperature of  $100^\circ\text{C}$ . This corresponds to a radiolytic hydrogen generation rate of  $0.5 \text{ ft}^3/\text{hr}$  evaluated at  $25^\circ\text{C}$  which is consistent with the temperature used to evaluate the LFL of hydrogen (See Section 6.1.1). Setting the radiolytic hydrogen generation rate limit to the value at  $25^\circ\text{C}$  provides additional conservatism.

During waste tank grouting, the organic content of the components that will comprise the grout will contribute insignificant quantities to the flammable vapor space concentration. As such, the contribution from trace organics assumed in waste tanks undergoing grouting will bound any volatile releases from the grout<sup>59</sup>.

Once the flammability-related Closure Mode entry prerequisites have been met for a waste storage tank, the HLLCP is not required for flammability controls in a tank that has been declared a Closure Waste Tank.<sup>1</sup>

Even though Closure Mode contains no other DSA requirements for flammable vapors, compliance with codes and standards (i.e., National Fire Protection Association (NFPA) Standard 69) continues to apply until grouting is complete. As such, flammable vapor control will be maintained by: a) operating forced ventilation, or b) sampling the vapor space to determine flammable vapor concentrations, or c) a combination of a and b. A methodology for compliance is contained in the FTF and HTF Fire Hazard Analyses<sup>60,61</sup> and is defined in the following paragraphs along with the implementation items of section 6.8.1.

From S-CLC-H-01248, a waste tank with a radiolytic hydrogen generate rate meeting the Closure Mode pre-requisite cannot reach an equilibrium condition of 100% of the CLFL so long as the tank level is less than 60 inches for a Type I tank, less than 140 inches for a Type II tank or less than 230 inches for a Type IV tank. Until grout is added to the tank, reducing the available vapor space volume, a Closure Mode tank will contain a small waste volume which will yield a much lower tank level than the values above. Since, by definition, a Very Slow Generation waste tank must also not reach equilibrium at 100% of the CLFL, it is reasonable to use the methodology described in section 8.2 for Closure Mode waste tanks until grout fill is initiated.

While adding grout to the primary tank and annulus, it is expected that forced ventilation will be operated in order to provide radiological contamination control for the displaced vapor space. This will simultaneously provide flammable vapor control. When grout addition is not actively in progress, the ventilation system can continue to be operated or periodic flammable vapor sampling can be performed.

Once the primary tank (or annulus) is filled to the base of the risers, an alternate strategy is required. At this point in the process, each riser (primary or annulus) can be considered a stand-alone location for flammable vapor accumulation. However, the hydrogen being generated by the waste will have to diffuse through 20+ vertical feet of grout to reach the riser openings. It is reasonably conservative to assume that the diffused hydrogen will be distributed equally among the available risers, i.e., the flammable vapor concentration in any one riser will be comparable to all risers of that location (primary or annulus). Based on this approach, at least one unfilled riser for each applicable location (primary and/or annulus) shall be sampled periodically to monitor for flammable vapor concentrations. Additionally, any riser that is about to be grouted shall also be monitored prior to grout pouring; the riser sampled for grouting can be used to satisfy the requirement for that location/period. Measured flammable vapor concentrations < 25% CLFL require no action. If the measured value is >25% CLFL but less than 60% CLFL, compensatory measures determined by an engineering evaluation shall be carried out to reduce the flammable vapor concentration prior to grouting. If ventilation is utilized as the compensatory measure, successful removal shall be confirmed via follow-up sampling. Risers with a measured flammable vapor concentration > 60% CLFL shall be ventilated to remove flammable vapors. Successful removal shall be confirmed via follow-up sampling prior to further activity. If any riser is found to be >60% CLFL, other unfilled risers for that location (primary or annulus) shall be sampled and action taken based on the values above.

During riser grout pouring, continuous vapor space monitoring is not required; however if grout pouring is interrupted prior to filling the riser, vapor space monitoring is required if the duration of the interruption is greater than 8 hours. If the riser is found to be greater than 25% CLFL, action should be taken based on the values above.

### 6.8.1 IMPLEMENTATION ACTIONS

1. Prior to placing a waste storage tank in Closure Mode, an engineering evaluation shall be performed to ensure the flammability-related Mode entry prerequisites for Closure Mode are met.
2. The flammability status of the waste tank shall be classified as Closure in the ERD. Conductivity Probe Height/Fill Limit, Hydrogen Analyzer Limit and Number of Required Turnovers are not applicable to a tank in Closure Mode.

3. From the time when a waste tank is declared in Closure Mode until grout pouring is initiated, the waste tank shall be treated as a Very Slow Generation waste tank and shall be ventilated/monitored as described in section 8.2.
4. Prior to initiating grouting operations, perform an engineering evaluation to determine the following (not applicable to riser grouting):
  - a. minimum purge flow required to maintain a flammable vapor concentration below 25% CLFL during grouting
  - b. required time for response to a loss of ventilation (e.g. restoration of ventilation or periodic flammable vapor sampling)
5. Prior to initiating grouting, monitor the vapor space to ensure that the flammable vapor concentration is less than 25% CLFL. If the result is equal to or greater than 25% CLFL, operate forced ventilation until the flammable vapor concentration is less than 25% CLFL (not applicable to riser grouting).
6. When grouting of a Closure Waste Tank is initiated, the following shall be performed for the primary tank and its annulus until each of these locations is completely filled to ensure that flammable vapor concentration remains below 25% CLFL:
  - a. Ventilate the location with forced ventilation

**OR**

  - b. Perform periodic flammable vapor sampling

If ventilation is being used to satisfy this attribute and ventilation flow is lost, initiate periodic flammable vapor sampling until forced ventilation is restored (not applicable to riser grouting).

7. Upon completion of bulk (non-riser) grouting perform the following for unfilled risers:
  - a. Sample one primary and one annulus riser for flammable vapor concentration weekly. If riser grouting is to be performed, the riser to be grouted may count as one of the risers sampled (annulus or primary)
    - If measured vapor concentration is less than 25% of the CLFL, no action is required.
    - If vapor concentration is greater than 25% of the CLFL, a compensatory measure, as defined in an engineering evaluation, shall be performed to bring the concentration below 25%.



# Tank 5 and 6 - Tank Grout Operations Daily Checklist Rev 1

**Work Package No.** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Pre-Start Up Checks:**

SAT

- |   |                          |
|---|--------------------------|
| 1. Grout line and equipment are clean                                 | <input type="checkbox"/> |
| 2. Equipment and grout line clamps and hose connections are secure    | <input type="checkbox"/> |
| 3. Area is properly posted and barricaded                             | <input type="checkbox"/> |
| 4. Discharge and disposal areas are prepared                          | <input type="checkbox"/> |
| 5. Radio checks performed   | <input type="checkbox"/> |
| 6. Flaggers are staged on truck route                                 | <input type="checkbox"/> |
| 7. Spill controls are in place  | <input type="checkbox"/> |
| 8. Verify URS/receipt inspector are at testing location               | <input type="checkbox"/> |
| 9. Truck washout area is prepared and ready                           | <input type="checkbox"/> |
| 10. Verify camera operability   | <input type="checkbox"/> |
| 11. Verify safety showers/eye wash stations are operable              | <input type="checkbox"/> |
| 12. Verify operability of ventilation system                          | <input type="checkbox"/> |
| 13. Verify PIC Completes Attachment C Flammability Control Evaluation | <input type="checkbox"/> |

PIC Approval to Proceed \_\_\_\_\_ Date \_\_\_\_\_

DA Approval to Proceed \_\_\_\_\_ Date \_\_\_\_\_

(Concurrence of camera inspections looking for voids or anomalies from the previous day)

**Operating Checks:**

Use equipment operating instructions

- |   |                          |
|---|--------------------------|
| 1. Locate emergency stop button                           | <input type="checkbox"/> |
| 2. Prime grout line (water/Slick Willie)                  | <input type="checkbox"/> |
| 3. Ensure hammer valve at pump is open                    | <input type="checkbox"/> |
| 4. Verify gauges operate                                  | <input type="checkbox"/> |
| 5. Place equipment in safe state for re-fueling as needed | <input type="checkbox"/> |

**Shut Down Checks:**

- |  |                          |
|--|--------------------------|
| 1. Close shut off valve  | <input type="checkbox"/> |
| 2. Discharge area is clear and posted                            | <input type="checkbox"/> |
| 3. Run pig thru line   | <input type="checkbox"/> |
| 4. Clean line, equipment and tools                               | <input type="checkbox"/> |
| 5. Pipe clamps and hose connections are secure                   | <input type="checkbox"/> |
| 6. Ensure hammer valve at pump is closed                         | <input type="checkbox"/> |
| 7. Area is properly posted and barricaded                        | <input type="checkbox"/> |
| 8. Disposals and housekeeping is complete including washout area | <input type="checkbox"/> |
| 9. Pump is fueled and ready for next day                         | <input type="checkbox"/> |
| 10. All radios on charge for next day                            | <input type="checkbox"/> |





Individual riser steps shall be performed in order.  
 Only Initial steps performed on the date written above.  
 Any risers not used shall have an 'N/A' next to the riser name.

	ENSURE RPD performs survey AND RECORD Action taken, below	VERIFY tank & annulus ventilation is operating	ENSURE High RAD CONTROL PROCEDURE is initiated.	REMOVE cover port plugs and ENSURE RPD performs airflow test	ENSURE IH/IH qualified RCO PERFORMS a Mercury Vapor Survey	INSTALL initial tremies with PIC/RPD/ DA direction	ENSURE tremie is mechanically secured	ATTACH tremie onto 5" slick line	ATTACH tremie... CDE sign-off
<b>Work Steps:</b>	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.8 CDE
Riser 1									
Riser 3									
Riser 5									
Riser 8									
Riser N									
Riser S									
Riser									
Riser									
Annulus Inlet									
Annulus Exhaust									

4.1 RECORD Action Taken:

Construction:

RDP:

**Riser Sign-off Sheet 2**

Date \_\_\_\_\_

Placement # \_\_\_\_\_

page \_\_\_\_\_ of \_\_\_\_\_

**Placements 1-3**

Individual riser steps shall be performed in order.

Only initial steps performed on the date written above.

Any risers not used shall have an 'N/A' next to the riser name.

<b>PLACEMENT OF GROUT</b>					
	PERFORM visual inspection	IF tremie not installed, INSTALL Tremie and VERIFY within 5ft of of last lift, DA to verify	PLACE/POUR GROUT	INITIATE Attachment B 'Cleaning/Pigging of Slick Line"	
<b>Placement 1 Work Steps:</b>	4.11	4.12	4.13	4.14	
Riser 1					
Riser 3					
Riser 5					
Riser 8					
Riser _____					
Riser _____					
<b>Placement 2 Work Steps:</b>	4.16	4.17	4.18	4.19	
Riser N					
Riser S					
Annulus Riser _____					
<b>Placement 3 Work Steps:</b>	4.21	4.22	4.23	4.24	
Annulus Inlet					

**Riser Sign-off Sheet 3**

Date \_\_\_\_\_

Placement # \_\_\_\_\_

**Placements 4-9**

page \_\_\_\_\_ of \_\_\_\_\_

Individual riser steps shall be performed in order.

Only initial steps performed on the date written above.

Any risers not used shall have an 'N/A' next to the riser name.

PLACEMENT OF GROUT		PERFORM visual inspection	IF tremie not installed, INSTALL Tremie and VERIFY within 5ft of of last lift, DA to verify	PLACE/POUR GROUT	INITIATE Attachment B 'Cleaning/Pigging of Slick Line"
<b>Placements 4-9 Work Steps</b>		4.26	4.27	4.28	4.29
Riser 1					
Riser 3					
Riser 5					
Riser 8					
Riser N					
Riser S					
Riser					
Riser					
Annulus Inlet					

## Riser Sign-off Sheet 4

Date \_\_\_\_\_

Placement # \_\_\_\_\_

page \_\_\_\_\_ of \_\_\_\_\_

### Riser Placements

Individual riser steps shall be performed in order.

Only Initial steps performed on the date written above.

Any risers not used shall have an 'N/A' next to the riser name.

	PIC: ENSURE portable ventilation... AND PLACED per Rad Con...	VERIFY Vapor concentrations have been sampled prior to grout.	PERFORM visual inspection	IF tremie not installed, INSTALL Tremie and VERIFY within 5ft of of last lift, DA to verify	PIC: IF a delay of > 8 hours has occurred during riser pour resample for flammability	PIC: IF riser required resampling for flammability, THEN VERIFY vapor concentration is <25% CLFL prior to continuing.	PLACE/POUR GROUT	INITIATE Attachment B 'Cleaning/Pigging of Slick Line'	DISCONNECT tremie
<b>Riser Placement Work</b>	4.33	4.34	4.35	4.36	4.37	4.38	4.39	4.40	4.41
Riser 1									
Riser 2									
Riser 3									
Riser 4									
Riser 5									
Riser 6									
Riser 7									
Riser 8									
Riser N									
Riser E									
Riser S									
Riser W									
Riser C									
Annulus Exhaust									
Annulus Inlet									

**PLACEMENT OF GROUT**

## Calculation Continuation Sheet

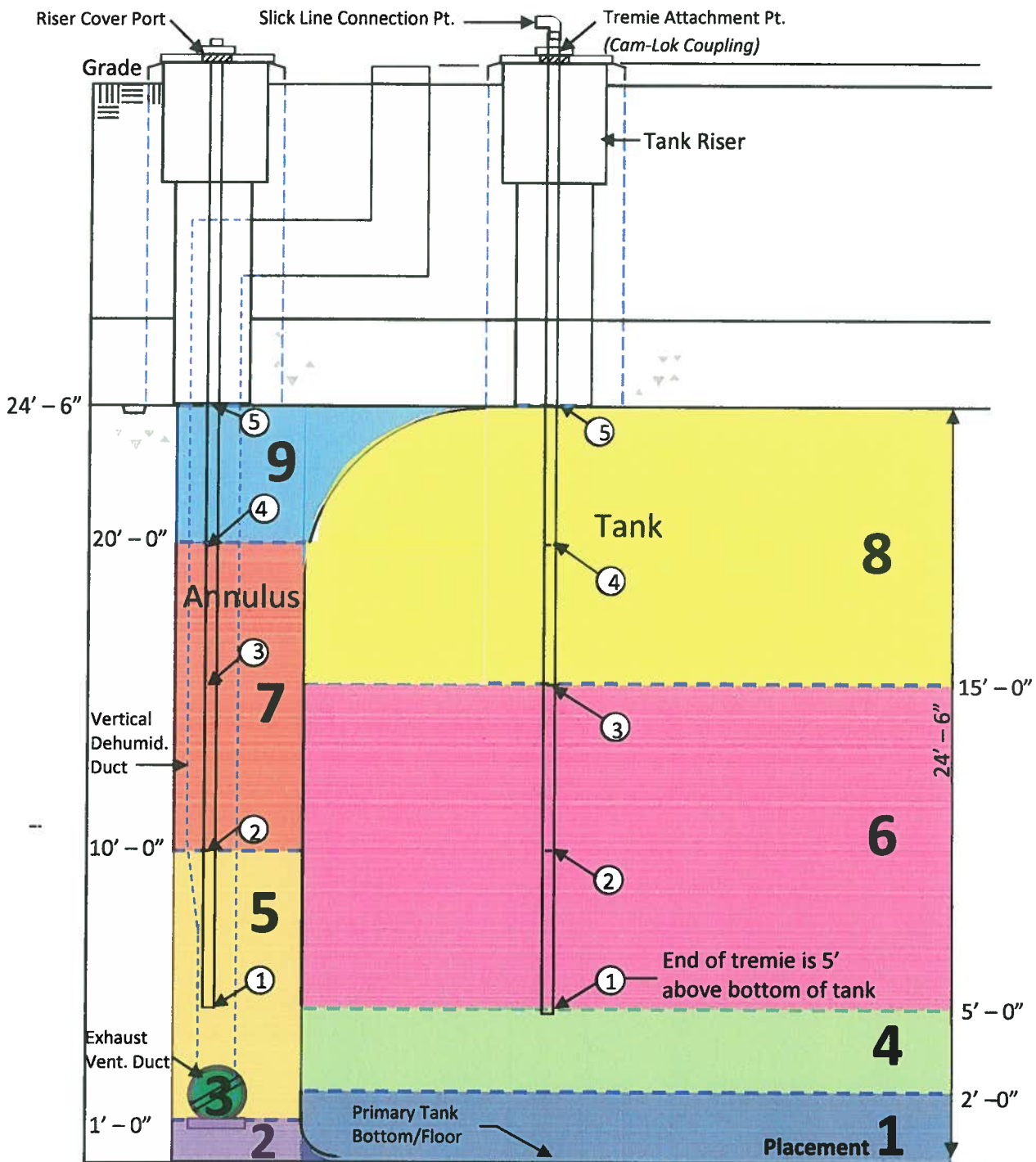
Calculation No.	T-CLC-F-00490	Sheet No.	26	Rev.	0
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2. RESULTS AND CONCLUSIONS

1. LIMIT THE HEIGHT OF GROUT FILL IN THE TANK ANNULUS RELATIVE TO THE GROUT LEVEL IN THE STEEL TANK TO 72 IN. MAX. TO PRECLUDE THE POTENTIAL FOR SHELL BUCKLING.
2. GROUT FILL HEIGHT INSIDE THE STEEL TANK RELATIVE TO THE GROUT LEVEL IN THE ANNULUS COULD BE AS HIGH AS 12 F. (144 IN.) WITH STEEL FERRITIC TONGUES  $K_{IC} = 144,000 \text{ PSI} \sqrt{\text{IN.}}$  AND THE PRESENCE OF THIN THICKNESS CRACKS UP TO 12 IN. IN LENGTH. BECAUSE OF THE LACK OF TEMPERATURE CONTROL, THE HEIGHT SHOULD BE LIMITED TO 8 FT.
3. THE COILING LOOPS WOULD NOT BE AFFECTED BY THE SPLICING PROCESS.
4. THE 6"  $\phi$  CW PIPES FROM THE VALVE HOUSE WOULD REMAIN WITHIN ALLOWABLE STRESSES FOR SETTLEMENTS UP TO 3.88 IN. REVIEW OF SETTLEMENT RECORDS GIVEN IN REF. 8 INDICATE TOTAL HISTORICAL SETTLEMENT LESS THAN 1 IN.
5. 3.25 IN. SETTLEMENT CAN BE SUSTAINED ON THE 3 1/2" STAINLESS STEEL PROCESS PIPES IN THE TRENCH WITHOUT EXCEEDING PIPE YIELD STRESSES.

# Tank 5&6 Grout Placement Plan - Sketch 1

Rev 1



## Notes:

1. Nine (9) placements are required to complete tank fill.
2. Tremie is shown numbered at bottom of each section. Each tremie will be released into tank or annulus.
3. This sequence of placements is based on Structural Integrity Requirements in T-CLC-F-00496 and Grout Strategy For Tanks 5 & 6 Closure # SRR-LWE-2012-00087.



# Tank 5 and Tank 6 Grout RCO Survey Strategy

**Document Control Number:**

**SRR-ESH-2013-00065**

Developed by: Thomas C. Chaff / 6-13-13  
FTF LWO S&H RPD First Line Manager Date

Reviewed by: William J. Tugay / 6-13-13  
RE&HP Date

Approved by: Cindy H. Head / 6-13-13  
FTF LWO S&H Facility Manger Date

**Savannah River Remediation  
P.O. Box 616  
Aiken, SC 29808**

## 1.0 RCO Survey Strategy

### 1.1 Pre-Grout Activities

All tank and annulus risers have been modified with grout addition plates with 3 access ports on each plate. This will provide grout delivery points into the tank, camera and lighting access into the tank, and access for portable tank/riser ventilation. Tank 5 purge ventilation system has been isolated and cannot be used. The Tank 6 Purge ventilation system will not be used due to its condition. Portable ventilation will be installed on risers 2 and 7 of both tanks. Each portable ventilation system will be equipped with an installed Demister and HEPA filter. The Demister will be installed into a port opening and be recessed one foot below riser opening. Three video cameras will be used to see the majority of the tank at the same time during grouting.

The annulus will be filled using two of the four annulus risers 180 degrees apart. All four annulus risers will be configured to support simultaneous camera operation. One annulus riser will be configured to support a portable (negative) ventilation system.

One SMP at Tank 6 riser 3 will be removed, placed into a container, and stored South West of Tank 7 (near FBD-4) until an engineering evaluation can be completed for disposition. An evaluation of the SMP storage was performed and concluded that due to the short duration of this storage, it will not change the radiological profile of the grout addition area. A further evaluation was made not to add more FARMS Area TLD's.

## 2.0 Grout Sequencing and RCO Survey Strategy

### 2.1 Annulus Bulk Filling

**2.1.1 RWP:** Due to each riser being configured with a plate and separate access ports, all risers will be sealed during grouting activities and ventilation (negative) will be required prior to starting grouting. Grout placement activities will be performed under SRWP 13-FTF-003. Activities requiring removal of ventilation systems from risers and camera installation/removal activities will be performed under JSRW 13-FTF-170.

**2.1.2 Posting:** Each riser will be posted based on general area posting; currently RA/CA. Any changes in radiological conditions, to include posting changes, shall be reported to RCO FLM.

**2.1.3 Dose rate survey:** RCO will monitor dose rates via remote EPD readout on the exhaust HEPA filter every 4 hours during grouting activities and document results on VSDS. **If EPD readings reach 50 mrem/hr @ contact, then notify RCO FLM and perform a contact and 30 cm dose rate with portable survey instrument (R0-2, R0-20) and document on VSDS. If a dose rate of 80mrem/hr@30 cm is obtained, then contact PIC, RCO FLM and SOM and implement HRA controls and post per RCO procedures.**

**NOTE:** If the remote EPD readout system becomes inoperable, RCO Inspectors shall perform HEPA filter monitoring per portable survey instruments. Survey frequency shall be established per RCO FLM.

- 2.1.4 Contamination survey:** RCO will perform contamination surveys on all annulus risers prior to grouting activities each day, and any time the slick line has been cleaned out, usually at the end of each day. All results shall be document on VSIDS. Notification of RPD FLM is required if any increase in contamination above baseline is detected.
- 2.1.5 Air sampling:** The ventilation exhaust will be monitored with a MAP air sampler and will be probed every 4 hours during grouting activities. Action limits will be anything above 3,000 d/m  $\alpha$  and 30,000d/m  $\beta\gamma$ . Notification of RCO FLM is required if above action limits are exceeded.

## **2.2 Primary Bulk Filling**

- 2.2.1 RWP:** Due to each riser being configured with a plate and separate access ports, all risers will be sealed during grouting activities and ventilation will be required prior to starting grouting. Work will be performed using JSRWP 13-FTF-170 during initial riser access work due to High Radiation dose rates. RPD will perform an evaluation of HRA controls for open riser work once grouting activities have been initiated. Activities such as camera install/remove, ventilation (Demister) install/remove and tremie change out will be performed under JSRWP.
- 2.2.2 Posting:** Each primary tank riser will be posted based on general area posting; currently RA/CA. Any changes in radiological conditions, to include posting changes, shall be reported to RCO FLM.
- 2.2.3 Dose rate survey:** RCO will monitor dose rates via remote EPD readout on the exhaust HEPA filter every 4 hours during grouting activities. **If EPD readings reach 50 mrem/hr @ contact, then notify RCO FLM and perform a contact and 30cm dose rate with portable survey instrument (R0-2, R0-20) and document on VSIDS. If a dose rate of 80mrem/hr@30cm is obtained, then contact PIC, RCO FLM and SOM and implement HRA controls and post per RCO procedures.**

**NOTE:** If the remote EPD readout system becomes inoperable, RCO Inspectors shall perform HEPA filter monitoring per portable survey instruments. Survey frequency shall be established per RCO FLM.

- 2.2.4 Contamination survey:** RCO will perform contamination surveys on all primary tank risers prior to grouting activities each day and any time the slick line has been cleaned out, usually at the end of each day. All results shall be document on VSDS. Notification of RPD FLM is required if any increase in contamination above baseline is detected.
- 2.2.5 Air sampling:** The ventilation exhaust will be monitored with a MAP air sampler and will be probed every 4 hours during grouting activities. Action limits will be anything above 3,000 d/m  $\alpha$  and 30,000d/m  $\beta\gamma$ . Notification of RCO FLM is required if above action limits are exceeded.

### **2.3 Cooling Coil Filling**

- 2.3.1 RWP:** Pre Grout activities performed the following; drained the chromate system, isolated Tank 5 and Tank 6 from the chromate system. Spool pieces will be installed in the Valve House at each cooling coil for grout introduction and work will be performed using SRWP 13-FTF-003. Activities requiring removal of ventilation systems from risers and camera installation/removal activities will be performed under JSRW 13-FTF-170.
- 2.3.2 Posting:** Valve house will be posted based on general area posting; currently RA/CA. Any changes in radiological conditions, to include posting changes, shall be reported to RCO FLM.
- 2.3.3 Dose rate survey:** Each chromate line will have been flushed with water prior to introduction of grout. Dose rates will be verified once water flushing has been performed. RCO will monitor dose rates on each line break prior to performing line breaks.
- 2.3.4 Contamination survey:** RCO will perform contamination surveys on all line break locations and at each location where “connections” are made. All grout line connections will be bagged in clear plastic with absorbent pads. All results shall be document on VSDS. Notification of RCO FLM is required if any increase in contamination above baseline is detected.
- 2.3.5 Air sampling:** No air sampling will be required to perform cooling coil grouting due to it being a closed system.

## 2.4 Tank Riser Filling

- 2.4.1 RWP:** Due to each riser being configured with a plate and separate access ports, all risers will be sealed during grouting activities and portable tank ventilation will be installed on each riser prior to grouting to be utilized as passive ventilation prior to starting riser grouting. Work will be performed using JSRWP 13-FTF-170. Activities requiring removal of ventilation systems from risers and camera installation/removal activities will be performed under JSRW 13-FTF-170.
- 2.4.2 Posting:** Each riser will be posted based on general area posting; currently RA/CA. Any changes in radiological conditions, to include posting changes, shall be reported to RCO FLM.
- 2.4.3 Dose rate survey:** RCO will monitor dose rates via remote EPD readout on the exhaust HEPA filter every 4 hours during grouting activities. **If EPD readings reach 50 mrem/hr @ contact, then notify RCO FLM and perform a contact and 30cm dose rate with portable survey instrument (R0-2, R0-20) and document on VSDS. If a dose rate of 80mrem/hr@30cm is obtained, then contact PIC, RCO FLM and SOM and implement HRA controls and post per RCO procedures.**

**NOTE:** If the remote EPD readout system becomes inoperable, RCO Inspectors shall perform HEPA filter monitoring per portable survey instruments. Survey frequency shall be established per RCO FLM.

- 2.4.4 Contamination survey:** RCO will perform contamination surveys on affected tank risers prior to grouting activities each day and any time the slick line has been cleaned out, usually at the end of each day. All results shall be document on VSDS. Notification of RCO FLM is required if any increase in contamination above baseline is detected.
- 2.4.5 Air sampling:** The ventilation exhaust will be monitored with a MAP air sampler and will be probed every 4 hours during riser grouting activities. Action limits will be anything above 3,000 d/m  $\alpha$  and 30,000d/m  $\beta\gamma$ . Notification of RCO FLM is required if above action limits are exceeded.

If you have any questions, please contact Tommy Chalker @ 507-8439, Kirby Coggin @ 646-1800, Cindy Head at 507-2783 or 2-3586, or Mike Croft @ 507-2363.

**Attachment A**

**FARMS location for Tank 5 and Tank 6 Grouting Activities**

One additional FARMS Motor Air Pump (location #38) will be installed on the west side of Tank 5 and 7. All FARM air samples will be probed daily and changed out weekly to be sent to CCF for analysis.

