Department of Energy
Savannah River Operations Office
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SEP 30 2019

Ms. Susan B. Fulmer, P. G. Manager
Federal Remediation Section
Division of Site Assessment, Remediation and Revitalization
Bureau of Land and Waste Management
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201

Mr. Jon Richards
Acting Savanah River Site Remedial Project Manager
Superfund Division
U.S. Environmental Protection Agency, Region 4
61 Forsyth Street, SW
Atlanta, GA 30303

Dear Ms. Fulmer and Mr. Richards:

SUBJECT: Continued Usage of High-Level Waste Tank 4F, SEMS Number 23

In accordance with the Savannah River Site Federal Facility Agreement (FFA), this letter is to request your approval for continued use of Type I Tank 4F to store a specific batch of dissolved salt solution. The Complete Bulk Waste Removal Efforts milestone for Tank 4F was previously achieved in 2011. Enclosed is a technical justification that provides a summary of Tank 4F operational and waste removal history, current status, and planned usage to support Tank 37H saltcake dissolution. The saltcake dissolution campaign in Tank 37H is being accelerated approximately two years due to the formation of a large saltcake mound that significantly impacts the ability to efficiently operate the 242-25H (3H) Evaporator System. Tank 37H is the primary receipt tank for the 242-25H Evaporator System and the efficient operation of this evaporator system is essential to the preparation of sludge batches in a timely manner. Having sludge batches prepared and ready to feed the Defense Waste Processing Facility will support the optimal operation of the Salt Waste Processing Facility (SWPF). The dissolved salt solution from Tank 37 is expected to have a minimal amount of fine particles and the relatively short-term storage of this solution is not expected to result in the addition of appreciable solids in Tank 4F. This dissolved salt solution will be used as part of future salt batches that will be processed in SWPF.

The October 31, 2016, South Carolina Department of Health and Environmental Control (SCDHEC) and U.S. Department of Energy (DOE) signed *Dispute Resolution Agreement for Alleged Violations of Class 3 Industrial Solid Waste Landfill Permit Facility* Paragraph 17 provides SCDHEC approval for reuse of Tank 4F to facilitate the implementation of that Agreement which includes commitments for salt waste processing. However, the U.S. Environmental Protection Agency approval is also required by the FFA.

Therefore, DOE requests your approval for the reuse of Tank 4F to store dissolved salt solution originating from Tank 37H as soon as possible so that the necessary actions to prepare for the sequence of activities that must occur can be done in a timely manner.

We will continue to keep your agencies informed on the transfers and status of Tank 4F during our quarterly Liquid Waste regulatory meetings.

If you or your staff have questions, please direct them to me at (803) 952-8365 or Mr. Aaron White at (803) 208-7248.

Sincerely,

Brian T. Hennessey
SRS Remedial Project Manager
Infrastructure and Area Completion Project

WDPD-19-47

Enclosure:
Technical Justification for
Continued Use of Tank 4F

cc w/encl:
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Enclosure
Technical Justification for Continued Use of Tank 4F

Tank 4 Facts:

- Type I tank – nominal capacity 750,000 gallons
- Used exclusively as a F-Canyon Waste Receiver Tank from 1961 through 1980
- Historical high in this tank was approximately 267 inches (equates to 724,000 gallons)
- Following an extensive waste removal campaign, Bulk Waste Removal Efforts (BWRE) declared complete in 2011
- Sludge heel (insoluble solids) volume of approximately 8,000 gallons at time of BWRE Complete declaration
- Four primary tank leak sites were identified after BWRE completed
  - All leak sites located at the horizontal weld seam 234 inches above tank floor (equates to approximately 634,000 gallons of waste volume)
  - No waste has been detected on the annulus floor
  - No leakage, significant surface corrosion or other anomalies were noted during the 2018 tank integrity inspections
- High-Level Liquid Conductivity Probe (HLLCP) is located at 200 inches above the tank floor which equates to a maximum allowable fill volume of 542,000 gallons
- Current liquid level is 40 inches (approximately 108,000 gallons including an estimated 8,000 gallons of insoluble solids)

Operational and Waste Removal History:

The eight Type I tanks in F-Tank Farm (FTF) - Tanks 1F to 8F - were the first liquid waste storage tanks built and commissioned for use at Savannah River Site in support of F-Canyon Separations Facility operations. Tank 4F was commissioned for use and received F-Canyon Plutonium Recovery and Extraction (PUREX) high-heat waste from May 1961 until February 1980. The tank was inactive and only used for waste storage from 1980 through 2000.

In 2000, the design and installation of waste removal equipment in Tank 4F was initiated. Burkeite and saltcake removal campaigns from Tank 4F began in May 2007. During this removal process, an estimated 16,300 gallons of burkeite and 17,900 gallons of saltcake were removed. Sludge removal started in April 2009 and an estimated 83,000 gallons of insoluble solids were removed. After BWRE was declared complete, approximately 465,000 gallons remained in Tank 4F - an estimated 8,000 gallons of insoluble solids and an estimated 457,000 gallons of supernate. In 2012, 71,800 gallons of supernate was transferred out of Tank 4F to Tank 21H to support the preparation of Actinide Removal Process (ARP) / Modular Caustic Side Solvent Extraction Unit (MCU) Salt Batch 6. In 2016, 250,100 gallons were transferred from Tank 4F to Tank 22H for eventual volume reduction in the 242-16H (2H) Evaporator System. In addition, evaporation of the water in the supernate occurs naturally over time, further reducing the volume remaining in Tank 4F. As of August 13, 2019, Tank 4F contained 40 inches of waste (approximately 108,000 gallons including the estimated 8,000 gallons of insoluble solids).

In October 2011, a leak site was discovered 234 inches above the tank floor in proximity to the south annulus riser. This location's marking had been seen prior to concluding the area contained a crack; however, the area at that time was believed to be a construction marking or calcite stains. In September 2013, three additional leak sites were discovered at 234 inches above the tank floor in proximity to the north annulus riser. White artifacts appeared parallel with the weld seam and in the weld's heat affected

zone. Two of the cracks appear to be through wall penetrations; however, the third crack is not confirmed. A minimal amount of waste material is present on the external primary tank wall because the cracks are well above current waste levels. No appreciable waste is present in the annular pan. The HLLCP is currently set at 200 inches above the tank floor, 34 inches below these crack site.

In a letter dated July 12, 2013, the Department of Energy (DOE) formally requested continued use of Tanks 4F and 7F to temporarily store specific supernate waste. The request stated that the use of these tanks was necessary

> "...to facilitate heel cleaning and waste removal by enabling the operation of the 3H evaporator to support the following risk reduction activities:
>
> 1. Sludge batch preparation to maintain DWPF operations,
> 2. Heel removal efforts with oxalic acid in Tank 12 by decanting the neutralized cleaning solution to the 3H evaporator, and
> 3. Bulk waste removal efforts in Tank 13 by decanting supernate to the 3H evaporator.
>
> In addition, DOE intends to continue planned receipt of H Canyon waste (see also Enclosure 4) with this action also having a risk reduction outcome."

In a letter dated October 2, 2013, the South Carolina Department of Health and Environmental Control (SCDHEC) disapproved the July 12, 2013 request citing the fact that DOE had identified "other options for waste management." In a letter dated November 19, 2013, the U.S. Environmental Protection Agency (EPA) similarly did not consent to the July 12, 2013 request, also citing DOE's alternative plans.

In a letter dated February 18, 2016, DOE requested the reuse of Tanks 4F, 7F and 8F, all of which had completed BWRE. The letter and associated supporting presentations requested, as a first step, the storage of Tank 41H dissolved salt solution in Tank 4F. The second step of the proposed actions was to have Tank 4F store Tank 51H leachate solution from low-temperature aluminum dissolution associated with the preparation of Sludge Batch 10 following transfer of the Tank 41H dissolved salt solution from Tank 4F to Tank 21H to support ARP/MCU salt batch preparation. In the requesting letter, DOE specifically requested response on the "Tank 41H (dissolved salt solution) into Tank 4F - First Step" initiative "as soon as possible" and stated "DOE will continue to engage with you and provide additional information for continued usage of the tanks as described above [i.e., the remaining requested steps involving the reuse of Tanks 4F, 7F and 8F]." On February 25, 2016, EPA responded by letter concurring with the requested reuse of Tank 4F for the "First Step" (i.e., receipt and storage of Tank 41H dissolved salt solution). SCDHEC did not directly respond to the February 18, 2016 DOE request by letter but in paragraph 17 of the *Dispute Resolution Agreement for Alleged Violations of Class 3 Industrial Solid Waste Landfill Permit Facility – Facility ID #025500-1603 – United States Department of Energy Savannah River Site*, an Agreement signed by DOE and SCDHEC on October 31, 2016, it states "Tanks 4, 7, and 11 will be used to facilitate this Agreement." Due to challenges in dissolving the Tank 41H saltcake, these transfers into Tank 4F did not occur.

Need for Continued Usage of Tank 4F Post-BWRE:

Tank 37H is the primary receipt tank for the 242-25H (3H) Evaporator System. On July 9, 2019, during a routine recycle transfer of concentrated supernate from Tank 37H back to Tank 32H, the 242-25H Evaporator Feed Tank, it was discovered that a large mound of saltcake had unexpectedly formed below

the drop point in Tank 37H. It is estimated that the top of this mound is at 337 inches from the tank floor. The Documented Safety Analysis (DSA) does not allow a significant volume of saltcake to be exposed above the supernate level due to the potential build up and release of hydrogen gas associated with breakdown of water molecules in the presence of high radiation fields (i.e., radiolysis). To put this height in perspective, the HLLCP in Tank 37H is positioned at 365 inches above the tank floor and a margin of at least five inches is employed to ensure this level is not reached, leaving, at best case, only about 55,000 gallons of usable operable volume at this time. When you couple this small operating region in the tank with the fact that the mound will continue to increase in height as saltcake continues to form from evaporator operations, it is apparent that continued, efficient operation of the 242-25H Evaporator System is not possible without creating additional space in Tank 37H. With the height of the mound and overall amount of saltcake that has formed since the last saltcake dissolution campaign in Tank 37H in 2016, it is necessary to immediately begin activities to design and execute the next saltcake dissolution campaign in this tank.

Revision 21 of the Liquid Waste System Plan predicted the need for, and scheduled the execution of, the next saltcake dissolution campaign in Tank 37H in about two years. Due to current conditions, though, it is now required that Tank 37H undergo a saltcake dissolution campaign during the first quarter of Fiscal Year 2020 to restore the 242-25H Evaporator System operating capacity and maintain the sludge batch preparation schedule necessary to support full operations of the Salt Waste Processing Facility (SWPF). To support this plan, it will be necessary to temporarily store no more than 500,000 gallons of the dissolved salt solution originating from Tank 37H in Tank 4F and a similar volume in Tank 39H, the H-Canyon waste receipt tank. This dissolved salt solution will have similar characteristics as the Tank 3F dissolved salt solution that is currently being stored in Tank 7F. The transfer and storage of this solution in Tank 4F is not expected to add appreciable solids to the tank so the temporary storage of this salt solution will not impact future heel removal activities needed to clean and operationally close this tank. The dissolved salt solution, like the material currently stored in Tank 7F, will be used to compile future salt batches.

The dissolved salt solution that will be stored in Tank 4F will be transferred into future salt batches and processed in SWPF well before Tank 4F is needed to the support the FTF Tank Closure Cesium Removal (TCCR) Unit 2 operations if such a unit operation is determined to be technically feasible and economically efficient.

Status of Tank 4F:

Tank 4F currently contains approximately 108,000 gallons of waste including the estimated 8,000 gallons of insoluble solids.

Request for Reuse:

Although the Salt Waste Dispute Resolution Agreement provided DOE with SCDHEC's approval to reuse Tank 4F to facilitate implementation of that agreement to achieve the waste processing amounts, DOE is submitting this request for reuse of Tank 4F consistent with Appendix L of the Savannah River Site Federal Facility Agreement (FFA) and seeks written concurrence from SCDHEC and EPA based on the technical justifications provided herein. DOE will continue to provide the status of these operational activities during the Liquid Waste Program Quarterly Regulatory Conference Calls.