

General Closure Plan for the F-Tank Farm at Savannah River Site - 10102

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ABSTRACT

The Savannah River Site (SRS) is in the process of completing several documents for the F-Tank Farm to support the closure process. The first step in the process is the completion of a performance assessment to evaluate whether performance objectives can be met at the time of closure. The F-Tank Farm is one of two liquid radioactive waste storage areas at the SRS and the location of the first two tanks closed in the Department of Energy (DOE) complex in the late 1990's. SRS plans to close the next two tanks in the F-Tank Farm prior to the Federal Facility Agreement deadline of 2012. In order to commence tank grouting for final closure, several closure documents are necessary including a Section 3116 Waste Determination and South Carolina General Closure Plan.

INTRODUCTION

The SRS is a DOE facility located in south-central South Carolina, approximately 161 kilometers (100 miles) from the Atlantic Coast. The major physical feature at SRS is the Savannah River, approximately 32 kilometers (20 miles) of which serves as the southwestern boundary of the site and the South Carolina-Georgia border. The SRS includes portions of Aiken, Barnwell, and Allendale Counties in South Carolina. The SRS occupies an almost circular area of approximately 803 square kilometers (310 square miles) and contains production, service, and research and development areas.

The F-Area is in the north-central portion of the SRS and occupies approximately 1.5 square kilometers (364 acres). The F-Tank Farm is an active liquid waste storage facility consisting of 22 underground carbon steel waste tanks that store, or once stored liquid radioactive waste generated primarily from chemical separations processes. There are four tank designs in the F-Tank Farm (Types I, III, IIIA and IV) which have unique design features that impact the Performance Assessment results. Tank 17 and Tank 20 have already been filled with grout and closed via a South Carolina and Environmental Protection Agency (EPA) reviewed and approved Closure Plan and Closure Modules. The F-Tank Farm also includes various equipment used to facilitate liquid transfers and evaporation operations. Figure 1 presents the general layout of the F-Tank Farm including the storage tanks and principal ancillary equipment.

The F-Tank Farm is subject to a state industrial waste water permit and Federal Facility Agreement [2]. After wastes are removed from individual waste tank systems and the systems are stabilized, the waste tank systems will be operationally closed under, and then removed from, the industrial wastewater permits that regulate their operation. DOE has committed to remove from service as soon as practical, those liquid radioactive waste tank systems that do not meet the state and federal standards set forth in the Federal Facility Agreement. To accomplish this goal, DOE must obtain approval of a General Closure Plan for the F-Tank Farm. To develop a

more efficient approach to approval of a Closure Plan for the F-Tank Farm, DOE and Savannah River Remediation, LLC conducted scoping meetings with South Carolina Department of Health and Environmental Control (SCDHEC). The outcome of these scoping meetings is a General Closure Plan that sets forth the general protocol by which DOE intends to close the F-Tank Farm to protect human health and the environment in accordance with applicable regulations and agreements. The General Closure Plan describes the approach to waste tank system-specific waste removal, characterization and stabilization that will be submitted in tank system-specific closure modules as each tank or group of tanks and associated ancillary equipment is ready for closure.

As waste removal activities in tank systems are completed and these systems are prepared for closure activities, waste tank system-specific closure modules are prepared to document the unique aspects associated with the closure of that individual system of tank(s) and associated ancillary equipment. Because it is anticipated that the waste tank systems in the F-Tank Farm will be closed over several years, the system-specific modules provide the opportunity to address and evaluate evolving technologies for waste removal and tank stabilization, and potential changes to regulations. The closure modules also provide a mechanism for SCDHEC to review and approve each individual closure activity.

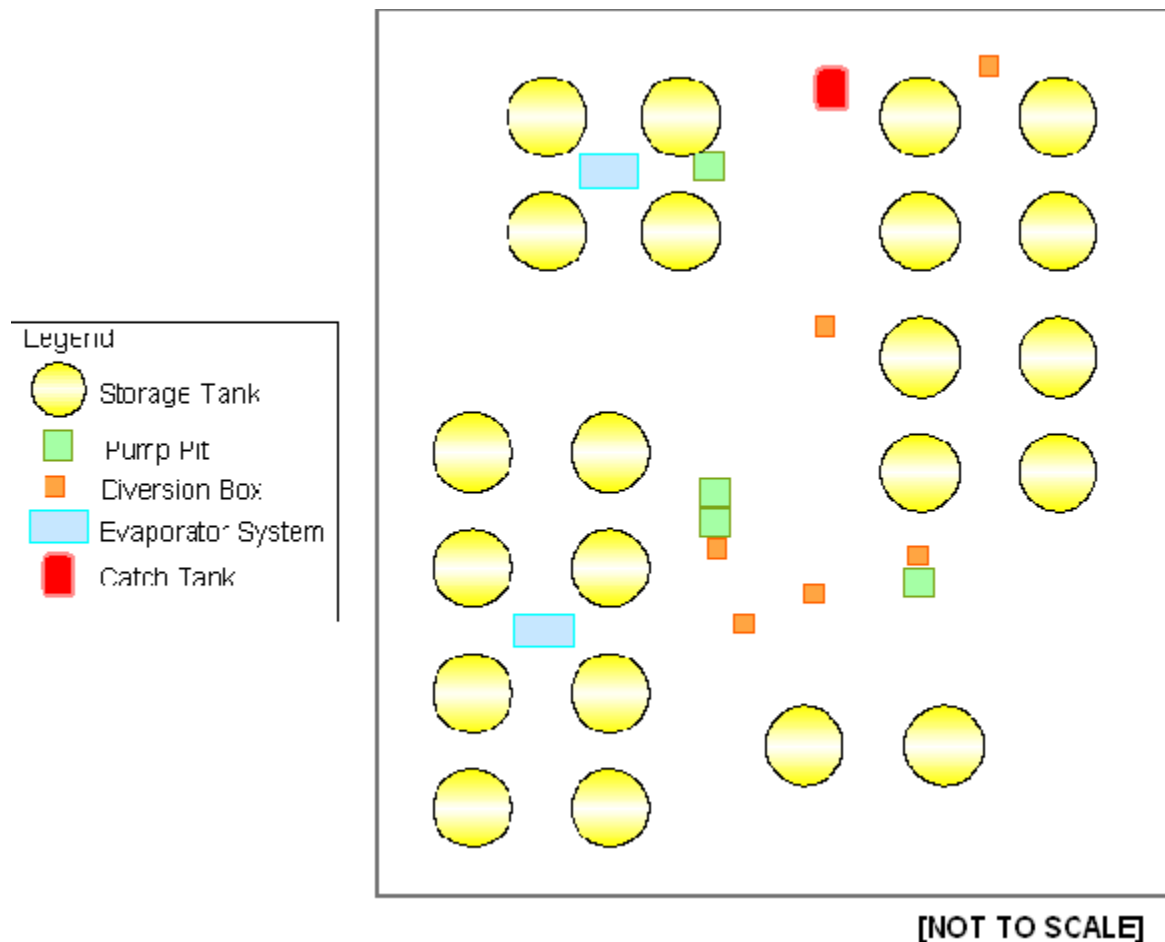


Fig. 1. General Layout of F-Tank Farm.

REGULATORY DOCUMENTATION PATH TO TANK CLOSURE

As depicted in Figure 2 the documentation path to the closure of the individual waste tank systems in the F-Tank Farm involves multiple agencies, each with specified criteria required to be demonstrated prior to taking operational closure actions. The analytical results documented in the F-Tank Farm Performance Assessment [1] provide the foundation for future decision-making actions by all affected regulatory agencies. The F-Tank Farm Performance Assessment was developed to generate results needed to demonstrate that applicable performance objectives will be met after closure. Some of the documents will provide closure information that is applicable to the entire F-Tank Farm, i.e., area-specific documentation, and some will apply to individual waste tank-specific closure activities.

National Environmental Policy Act (NEPA)

In May of 2002, DOE issued the *Savannah River Site High-Level Waste Tank Closure Environmental Impact Statement* to assess the potential environmental impacts associated with alternatives for closing the liquid waste tanks, as well as the potential environmental impacts of the residual material remaining in the closed waste tank systems, as required by NEPA. [3] The closure configuration selection process is documented in the record of decision for this EIS and the “Fill with Grout Option” was selected as the preferred option. A supplemental analysis to the EIS, based on the recent revision to the F-Tank Farm Performance Assessment, which confirms the existing record of decision, will be part of the Tier 1 documentation and authorization to proceed to closure.

Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005, Section 3116

The Performance Assessment provides information that will also be used to support demonstration that the performance objectives, as identified in Title 10 Code of Federal Regulations (CFR) Part 61 (*Licensing Requirements for Land Disposal of Radioactive Waste*) and referenced by the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005, Section 3116 (hereafter referred to as: NDAA Section 3116), are met. [4] The NDAA Section 3116 (a) legislation specifies the criteria for DOE to use to determine whether residuals remaining in the waste tanks systems can be managed as non-high level waste at a DOE site in a “covered state” [e.g., South Carolina] where activities are regulated by the state’s approved closure plan or permit. A Waste Determination Basis Document will be prepared for the F-Tank Farm, based in part on the environmental protection information provided in the F-Tank Farm Performance Assessment. Upon review of the information in the Basis Document, the Secretary of Energy, in consultation with the Nuclear Regulatory Commission, will determine whether the residual material in the waste tank systems can be managed as non-high level waste. The Waste Determination Basis Document will describe both specific information on how the NDAA Section 3116 (a) criteria are met for the F-Tank Farm closure activities in aggregate and the process that will be used to demonstrate that individual waste tank system operational closure actions will support the waste determination conclusions.

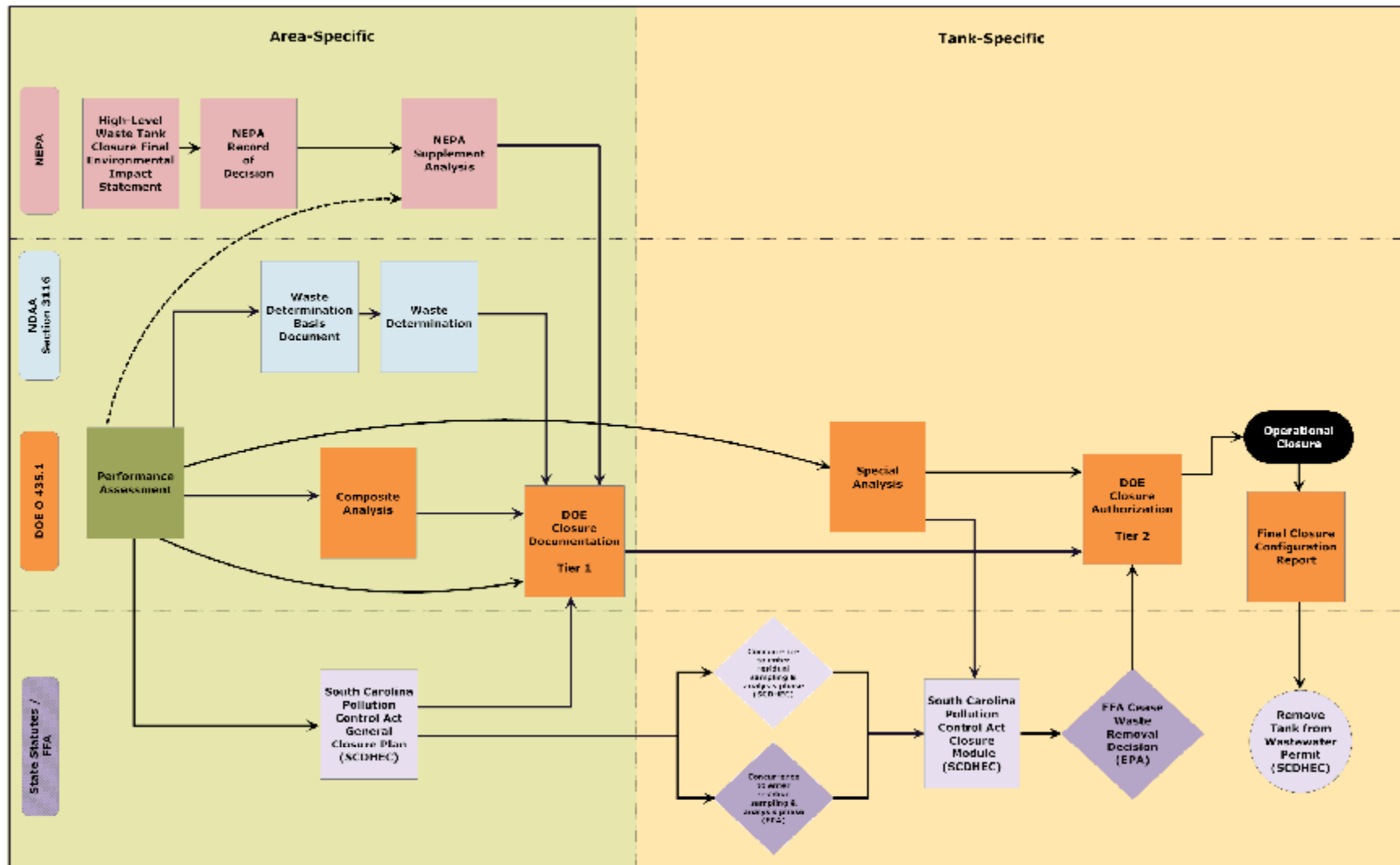


Fig. 2. Regulatory Documentation Path to Tank Closure.

DOE Order 435.1 Tier 1 Closure Authorization

The Tier 1 Closure Documentation is required to demonstrate compliance with DOE requirements, as defined in DOE Order 435.1. [5] The primary purpose the F-Tank Farm Tier 1 Closure Documentation is to define and bound the parameters for the F-Tank Farm closure activities, and to define the approach and plans by which closure of the F-Tank Farm will be accomplished. Upon approval of the Tier 1 Closure Documentation by the DOE Environmental Management Deputy Assistant Secretary for Regulatory Compliance, an Authorization to Proceed is issued.

South Carolina Pollution Control Act General Closure Plan

SCDHEC has the authority to approve the South Carolina Pollution Control Act General Closure Plan. This General Closure Plan documents the process that will be employed for evaluating each waste tank system or group of waste tank systems within the F-Tank Farm to determine if the cleaning and stabilization is protective of human health and the environment. It also describes the process by which waste removal technologies are chosen, the process to determine when all practical waste removal is complete, and the process to determine that the closure activities are consistent with the performance objectives

Concurrence to Enter Residual Sampling and Analysis Phase

When DOE considers that it is appropriate to cease waste removal operations in specific tanks, preliminary data and other information is presented in a briefing to EPA and SCDHEC to obtain concurrence that there is reasonable assurance that further waste removal efforts are not technically practicable from an engineering perspective and it is appropriate to transition to the sampling and analysis phase of the waste tank system operational closure process. If EPA and SCDHEC agree, they concur by letter to DOE. This agreement to proceed to the sample and analysis phase is a non-binding preliminary decision and does not satisfy the requirements of Federal Facility Agreement, Appendix L.1 or 9b. The Federal Facility Agreement, Appendix L, Requirement 9.b states:

9.b “The parties agree to the following process concerning waste removal. For each tank, DOE shall involve SCDHEC and EPA throughout each stage in the bulk waste and heel removal processes to explain the activities undertaken, results of removal operations, challenges, and DOE’s next steps. DOE shall consider and openly discuss any feedback from participants prior to proceeding to the next stage. These interactions are anticipated to be frequent and informal meetings or conference calls, as agreed to by the participating parties, but shall occur no less than quarterly. When DOE considers waste removal to be complete, DOE shall notify EPA and SCDHEC and provide supporting documentation to SCDHEC and EPA for review. DOE, SCDHEC, and EPA shall mutually agree that waste removal activities may cease.” [1]

Special Analysis

Once the final characterization of the residuals remaining in each waste tank system is complete, a Special Analysis is performed to verify that the waste tank system closure activities continue to satisfy the performance objectives for DOE Order 435.1, the NDAA Section 3116 (a) Waste Determination and the South Carolina Pollution Control Act. The Special Analysis process is consistent with DOE M 435.1-1 and DOE G 435.1-1 and is a systematic process for determining the impact on the results and conclusions of a Performance Assessment when parameter values, such as inventory, change. Since waste removal activities have not been completed on these systems, the final inventory parameters for many of the F-Tank Farm waste systems inventory are estimates based on process knowledge and projected waste removal capabilities. As waste tank system waste removal activities are completed, the final characterization results are available and the Performance Assessment conclusions can be validated.

Closure Module

A waste tank system-specific closure module detailing the inventory and closure configuration of an individual waste tank system is submitted to SCDHEC for review and approval. This closure module demonstrates that further waste removal efforts are not technically practicable from an engineering perspective and considers such things as technology capabilities, schedule impacts and a quantified cost, risks and benefit analysis. In addition, the closure module is provided to EPA Region 4 project managers for review to ensure consistency with the Federal Facility Agreement requirements for overall remediation of the F-Tank Farm. The closure module may also be provided to members of the public by SCDHEC for their review and comment prior to SCDHEC approval.

Following waste tank system cleaning, the actual inventory information replaces the initial estimated inventory that was used in the F-Tank Farm Performance Assessment and a Special Analysis will be developed to validate that the performance objectives will continue to be met for the overall F-Tank Farm closure. The closure module documents the revised estimates for the peak groundwater concentrations and peak dose using actual data from all tank systems that have been closed and the estimated closure inventory of those tank systems that have not yet been closed. Knowledge gained as systems are closed are factored into the inventory estimates for those systems pending cleaning.

Approval of the closure module by SCDHEC constitutes authorization to initiate final, irreversible operational closure activities, e.g., grouting of tank structures. Approval of the closure module by SCDHEC also constitutes approval that Federal Facility Agreement, Appendix L, Requirement 9b has been satisfied for the specified waste tank systems addressed in the closure module.

DOE Order 435.1 Tier 2 Closure Authorization

Tier 2 Closure Authorization is developed for the closure of each waste tank system or group of waste tank systems. The Tier 2 Closure Authorization provides the waste tank system-specific

information to demonstrate that the process described in the Tier 1 Closure Documentation has been implemented and the criteria required in the Tier 1 Closure Documentation have been met. The Tier 2 Closure Authorization takes into account detailed closure information from the Special Analysis, the composite analysis, and the State-approved waste tank system-specific closure module. DOE approval of the Tier 2 Closure Authorization represents DOE's final authorization to proceed with permanent stabilization of the waste tank system.

Final Closure Configuration Report

Satisfaction of Federal Facility Agreement, Appendix L Requirements 10 – 15 will be considered complete when the waste storage tanks are stabilized, e.g., grouting activities for the primary and secondary tanks and risers are complete including isolation activities for associated transfer piping.

Following completion of operational closure activities for the individual waste tank system, DOE provides a Final Closure Configuration Report to SCDHEC describing the final configuration of that system.

Tank Removal from Wastewater Permit

Following the stabilization of the waste tank system(s), notification that this work scope, as described in the tanks system-specific closure module is complete is provided to SCDHEC. Following successful inspection by SCDHEC that the waste tank system closure actions have been satisfactorily completed, SCDHEC provides written verification that the waste tank systems have been removed from the conditions of the Industrial Wastewater Permit.

GENERAL CLOSURE PLAN

SCDHEC Regulation 61-82, Proper Closeout of Wastewater Treatment Facilities, does not provide specific guidelines for facilities that are not lagoons or package plants. This regulation states:

“Waste treatment facilities not defined as lagoons or package plants shall be closed out in accordance with guidelines issue by DHEC on an individual basis. These guidelines shall be designed to prevent health hazards and to promote safety in and around the abandoned site.”

To develop a more efficient approach to compliance with this regulation, DOE and Savannah River Remediation, LLC conducted scoping meetings with SCDHEC to reach agreement on content, format and approval requirements for State-approved tank closure documents. The outcome of these scoping meetings is a General Closure Plan that sets forth the general protocol by which DOE intends to close the F-Tank Farm to protect human health and the environment in accordance with applicable regulations and agreements. The General Closure Plan describes the approach to waste tank system-specific waste removal, characterization and stabilization that will be submitted in system-specific closure modules as each tank or group of tanks and associated ancillary equipment is ready for closure.

CONCLUSION

Because of the numerous documents needed to satisfy the requirements of all stakeholders, it is important to work with the regulators to establish a streamlined approach to documentation that provides all of the information needed but minimizes repetition. Repetition of information in various documents allows opportunity for error and potential for misinformation to the regulators and the public. This approach provides several advantages.

- The General Closure Plan is anticipated to be a one-time document that does not need to be modified as technology is improved. Closure modules describe the process for technology selection and implementation.
- The inventory of residue is documented in the closure modules so that the most recent closure module provides the most up-to-date inventory knowledge.
- Referencing versus repeating other higher-level documents (i.e., the Performance Assessment) reduces potential for inconsistencies and reduces effort for future changes.
- Agreeing up-front on what is to be included in the closure module, shortens the review and approval time and reduces impact on closure schedules.

REFERENCES

1. "Performance Assessment for the F-Tank Farm at the Savannah River Site", SRS-REG-2007-00002, Revision 0, Washington Savannah River Company (2008).
2. "Federal Facility Agreement for the Savannah River Site", WSRC-OS-94-42, Savannah River Site, Aiken, SC (1993).
3. "High-Level Waste Tank Closure Final Environmental Impact Statement", DOE-EIS-0303, Savannah River Site, Aiken, SC, Rev. 0, (2002).
4. "Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005", Public Law 108-375, "Defense Site Acceleration Completion", Section 3116, (2004).
5. "Radioactive Waste Management", DOE O 435.1, Chg. 1, U.S. Department of Energy, (2001).