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# HIGH-LEVEL WASTE TANK CLOSURE FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE SAVANNAH RIVER SITE

## SUPPLEMENT ANALYSIS

U.S DEPARTMENT OF ENERGY
SAVANNAH RIVER SITE OPERATIONS OFFICE
AIKEN, SOUTH CAROLINA
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## ACRONYMS and ABBREVIATIONS

| | |
|---|---|
| AEA | Atomic Energy Act of 1954 |
| ALARA | As Low As Reasonably Achievable |
| BOA | Bulk Oxalic Acid |
| CFR | Code of Federal Regulations |
| DOE | U.S. Department of Energy |
| ECC | Enhanced Chemical Cleaning |
| EIS | Environmental Impact Statement |
| EPA | U.S. Environmental Protection Agency |
| FMB | Fourmile Branch |
| FTF | F-Area Tank Farm |
| FTF PA | F-Tank Farm Performance Assessment |
| FR | Federal Register |
| HLW | High-Level Waste |
| LLW | Low-Level Waste |
| MCL | Maximum Contaminant Level |
| MEP | Maximum Extent Practical |
| MEPAS | Multimedia Environmental Pollutant Assessment System |
| NDAA | National Defense Authorization Act |
| NEPA | National Environmental Policy Act |
| NRC | U.S. Nuclear Regulatory Commission |
| OA | Oxalic Acid |
| ROD | Record of Decision |
| SA | Supplement Analysis |
| SCDHEC | South Carolina Department of Health and Environmental Control |
| SRIP | Savannah River Implementing Procedure |
| SRS | Savannah River Site |
| WD | Waste Determination |
| WIR | Waste Incidental to Reprocessing |

# 1 PURPOSE AND NEED FOR AGENCY ACTION

The Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508) for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA) (42 USC 4321 et seq.) require federal agencies to prepare a supplement to an Environmental Impact Statement (EIS) when there are substantial changes in the proposed action that are relevant to environmental concerns, or significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. Agencies also may prepare a supplement to further the purposes of NEPA (40 CFR 1502.9 (c)). The Department of Energy (DOE) NEPA regulations at 10 CFR Part 1021 likewise will provide that DOE shall prepare a supplemental EIS if there are substantial changes to the proposal or significant new information relevant to environmental concerns, and may do so at any time to further the purposes of NEPA. When it is unclear whether a supplemental EIS is required, DOE prepares a Supplement Analysis (SA) to evaluate information pertinent to determining whether the existing EIS remains adequate, or whether DOE needs to prepare a new EIS or supplement to the existing EIS, as appropriate (10 CFR 1021.314 and 1021.330). This SA was prepared by reviewing the analysis in *Savannah River Site High-Level Waste Tank Closure Final Environmental Impact Statement*, DOE/EIS 0303 (DOE 2002a) ("the EIS") and supporting documents and current information on F-Area Tank Farm (FTF) closure at the Savannah River Site (SRS).

The purpose of this SA is to provide a basis for determining whether there are substantial changes concerning the FTF as evaluated in the EIS or significant new information relevant to environmental concerns. This SA evaluates the continued adequacy of the EIS in light of those changes (i.e., whether there are substantial changes in the proposed action, or significant new circumstances- or significant new information relevant to environmental concerns); it does not re-evaluate the previous analysis or decisions based on that analysis. This SA contains information for DOE to determine whether (1) an existing EIS should be supplemented, (2) a new EIS should be prepared, or (3) no further NEPA documentation is required.

# 2 BACKGROUND

This section discusses the scope of the EIS as it relates to the closure activities for the FTF tanks and associated equipment, and the timeframe for these decisions supported by the EIS. Activities addressed in the EIS primarily include those that deal with removal of radioactive wastes and closure activities. The EIS provided the analyses required under NEPA for certain projects required to implement this tank closure program at SRS.

## 2.1 Existing Analysis

Tank closure at SRS involves two tank farm facilities – F – and H – Area Tank Farms – which contain 51 radioactive waste tanks[1] and associated equipment (such as evaporators, transfer piping, sumps, pump pits, diversion boxes, filtrations systems, sludge washing equipment, valve boxes, and the condensate transfer system). Two of the 51 radioactive waste tanks have been closed (Tanks 17 and 20 in the FTF), and 49 radioactive waste tanks are left to be closed. The FTF facility is described (including the surrounding environment as well as site location and history) in the EIS. DOE evaluated the environmental impacts of three alternatives for closure of the tanks: (1) Stabilize Tanks; (2) Clean and Remove Tanks; and (3) No Action. Under the Stabilize Tanks alternative, DOE considered three options for Tank Stabilization: Fill with Grout (the preferred alternative); Fill with Sand; or Fill with Saltstone. DOE explained that each alternative would begin after bulk waste removal[2] from the 49 tanks and associated equipment.

In the EIS, DOE evaluated human health and environmental impacts associated with closing tanks and associated equipment and used deterministic modeling in the analysis. The radiation dose to a future human receptor was calculated by fate and transport modeling using the computer code called Multimedia Environmental Pollutant Assessment System (MEPAS[3]). Radionuclide activity levels (i.e. concentrations) at various locations were estimated and compared to potential water quality criteria (e.g. drinking water MCL of 4 millirem-per-year) established for the protection of human health and aquatic life. The option under the alternative to stabilize tanks that showed the lowest long-term radiological impact at all exposure points and met the drinking water MCL for groundwater was the Fill with Grout option (EIS, page 4-40). Likewise, none of the chemical contaminants exceeded MCLs at any point of exposure, for either the Fill with Grout or Fill with Sand options (DOE 2002a, page 4-40).

On August 19, 2002, DOE published a Record of Decision (DOE 2002b) (ROD) to select the preferred alternative identified in the Final EIS, Stabilize Tanks – Fill with Grout. The ROD discussed DOE's confidence in the tank stabilization method due to the expected performance of the reducing grout and the successful waste removal and operational closure process employed for Tanks 17 and 20.The EIS described the characteristics of reducing grout as a pumpable, self-leveling backfill material, composed primarily of cement, fly ash, and blast furnace slag (DOE 2002a, page 2-4). Reducing grout would immobilize waste residuals in the tanks following tank cleaning and reduce leaching of contaminants out of the tanks once stabilized because the grout would be formulated to retard the movement of radionuclides and chemical constituents from the closed tank. This grout material would have a high pH to be compatible with the carbon steel of the tank.

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[1] THE DOE 2002 Final EIS and ROD use the term "high-level waste tanks" when referring to the F- and H- Area Tank Farms. This document generally uses the term "radioactive waste tanks" rather than the term "high-level waste tanks".

[2] Bulk waste removal in the EIS is defined as a process where DOE must remove the waste stored in the tanks by pumping out all of the waste that is possible with existing equipment, leaving behind residual contamination on the tank walls and internal hardware such as cooling coils. A heel of liquid, salt, sludge or other material remains in the bottom of the tank and cannot be removed without special means. Removal of this residual material is part of the cleaning stage of the proposed action (i.e. Chemical cleaning methods) (DOE 2002a, Page 1-13).

[3] MEPAS is software that integrates a suite of environmental parameters assessing transport and exposure pathways for chemical and radioactive releases to determine their potential impact on the surrounding environment, individuals and populations.

## 2.2 Timeframe

The ROD described how DOE would manage its radioactive waste and tank closure activities at SRS during a 30-year period (1998-2028). The EIS evaluated impacts of the tank waste removal and stabilization of residual wastes in the tank with grout, and assumed that during this timeframe, advances in the mechanical and chemical technologies would enhance the waste removal processes. DOE further explained that it would evaluate the technical, regulatory and performance implications of any technology in a tank-specific Closure Module (DOE 2002a, page 1-13).

# 3 PROPOSED ACTIONS

Since the publication of the EIS and issuance of the ROD, there have been new activities and new documents pertaining to the FTF. This SA reviews the new information and discusses whether the information is significant to environmental concerns or affects the analysis in the EIS.

DOE stated in the ROD that waste removal and tank cleaning would be performed by spray water washing, and if necessary other cleaning techniques would be employed. These techniques include mechanical methods, oxalic acid (OA) cleaning, or other chemical cleaning methods (DOE 2002b). While spray water washing and oxalic acid are still used in the waste removal process, DOE is also using new enhanced mechanical and chemical cleaning technologies to remove as much waste as is practical while reducing risk to workers.

Additionally, DOE specified in the ROD that it would proceed with a Waste Incidental to Reprocessing (WIR) evaluation process as specified in DOE Manual 435.1-1, *Radioactive Waste Management* (DOE, 1999b) to determine whether the residual waste that will remain in the FTF at the time of closure can be managed as low-level waste (LLW). However, DOE now plans to use the criteria specified in section 3116(a) of the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005 (NDAA) (Public Law 108-375), which was enacted after the EIS and ROD.

After the EIS and ROD were issued, DOE published a *Performance Assessment for the F-Tank Farm at the Savannah River Site* (SRR 2010a) (FTF PA). The FTF PA consists of analyses, based on a collection of models used to estimate maximum potential future dose to hypothetical human receptors and to evaluate the potential human health impacts associated with planned closure of the FTF. The FTF PA is used to demonstrate whether the planned closure of the FTF will meet DOE requirements, the State of South Carolina's requirements and certain Nuclear Regulatory Commission (NRC) LLW performance objectives referenced in Section 3116(a). The FTF PA provides part of the technical justification for a determination the Secretary of Energy may make under Section 3116(a).

This SA evaluates (both qualitatively and quantitatively) whether there would be significant environmental impacts resulting from implementation of these actions. Specifically, this SA examines the potential impacts of additional cleaning methods, compares the DOE Manual

435.1-1 WIR process to the Section 3116(a) process, and uses an impact indicator to compare the human health impacts described in the EIS to the FTF PA.

# 4 NEW INFORMATION

The following subsections summarize the new information or new circumstances in the current tank closure process.

## 4.1 Cleaning Technologies

In the EIS, DOE evaluated both mechanical cleaning and oxalic acid cleaning of tanks after bulk waste removal. Mechanical methods include technology and equipment that are typically remotely operated, including mixer pumps, transfer pumps and agitators. The ROD did not specify types of mechanical cleaning methods or devices to be used, and indicated that over the 30-year period of tank closure activities, DOE expected to use newly developed technologies for tank cleaning.

One such new technology, the Mantis[4], is a mechanical vacuum technology suitable for tanks without obstructive cooling coils that would interfere with the tethered hose on the Mantis. Further, experience showed that the tank residuals in Tanks 18 and 19 could not be effectively dissolved with OA (DOE, 2011c). DOE successfully deployed the Mantis for residual waste cleaning in SRS Tanks 18 and 19, which do not have obstructive cooling coils. These tanks contained fast-settling waste particles, for which mixer and transfer pumps are ineffective. The Mantis technology will be considered for use on other tanks without obstructive cooling coils.

In the EIS, DOE indicated that OA cleaning would be employed when bulk waste removal and water washing would not satisfy the closure criteria (DOE 2002a, page 2-1). The EIS indicated that some tanks would be cleaned with OA because these tanks have obstructing cooling coils or support columns, which make mechanical cleaning less effective. Currently, Bulk Oxalic Acid (BOA) is a mature chemical cleaning technique that has been successfully used to chemically remove residual waste in Tanks 5 and 6 (SRR 2011b and SRR 2011a, respectively). However, BOA creates large amounts of oxalate solids and introduces significant volumes of neutralized waste and wash water from sludge washing. Using an alternative technique currently in the design phase, Enhanced Chemical Cleaning[5] (ECC), oxalate solids would be decomposed and the acid would be recycled to minimize downstream impacts and also minimize the volume of liquid added into the cleaning process.

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[4] The Mantis is a commercial (TMR Associates, Denver CO) remotely operated tethered crawler outfitted with a high pressure/low flow eductor for lifting (vacuuming) solids. The crawler uses highly pressurized water nozzle(s) to create an adequate vacuum to remove material from a tank and propel the material to a receipt tank through a waste discharge line and transfer hoses.

[5] ECC (chemical cleaning technique) is planned to be used on tanks that have extensive carbon steel cooling coil interference in the bottom of the tank. This process uses diluted OA as the cleaning agent, and destroys the oxalate by using ozone. The dissolved metals and associated radionuclides are precipitated and transferred out of the tank. ECC facilitates additional cleaning opportunities.

## 4.2 Legislation

In the ROD, DOE indicated that it would use the criteria for the WIR evaluation process as described in DOE Manual 435.1-1(DOE 1999b), accompanying DOE Order 435.1 (DOE 1999a) to determine whether residual waste, after bulk waste removal and cleaning, is not high-level radioactive waste and can be managed as LLW or transuranic waste. In 2005, Section 3116 of the NDAA was enacted which provides that the Secretary of Energy, in consultation with the Nuclear Regulatory Commission (NRC), may determine that certain waste from reprocessing of spent nuclear fuel is not high-level waste if the criteria in Section 3116(a) are met. In accordance with that law, the Secretary may determine that the criteria in Section 3116(a) have been met, instead of the similar WIR criteria in DOE Manual 435.1-1, and that the residuals in the tanks and ancillary structures in the FTF at closure are not HLW and may be managed as LLW.

Section 3116 and DOE Manual 435.1-1 both allow DOE to determine if residual waste at the time of closure can be managed as LLW. Both Section 3116 and DOE Manual 435.1-1 specify similar criteria for removal of radionuclides and both reference the same NRC LLW performance objectives. DOE consults with the NRC and affords the public the opportunity to comment under both processes[6]. Thus, there are no significant changes to the process, criteria or performance objectives used to determine whether the residual waste is not HLW and may be managed as LLW. Section 3116 does not affect DOE's selection of the Stabilize and Fill with Grout alternative for tank closure. As explained in the ROD, because DOE must meet overall performance standards in any case, the regulatory status of the residual waste does not affect the assessment of environmental impacts (DOE 2002b)

## 4.3 FTF Performance Assessment

As explained above, DOE developed an FTF PA after the EIS and ROD were issued. The FTF PA is a key risk assessment tool used to inform closure and disposal decisions. The PA models the fate and transport of contaminants over long periods of time utilizing informed assumptions to determine potential consequences. The FTF PA provides most likely consequences of planned actions. The FTF PA includes sensitivity and uncertainty analyses based on the probability of these potential consequences. Uncertainty analyses provide information regarding the range of possible results under varying scenarios while the sensitivity analysis provides information about the aspects of the system most critical to the decision to be made, such as the importance of engineered barriers, e.g., grout and a closure cap. PAs are required under DOE Manual 435.1-1, and meet the requirements of applicable State of South Carolina requirements for risk assessment (SCDHEC R.61-58, SCDHEC's "State Primary Drinking Water Regulation" (SCDHEC 2009)). The FTF PA has been reviewed by the NRC, the Environmental Protection Agency (EPA), the South Carolina Department of Health and Environmental Control (SCDHEC), and the public, and has undergone revision in response to those comments. DOE is using the FTF PA to provide

[6] Section 3116(a) provides for consultation with the NRC, whereas DOE consults with NRC as a matter of policy and consistent with DOE guidance for WIR evaluations under DOE Manual 435.1-1. Although not required by either Section 3116(a) or DOE Manual 435.1-1, DOE affords the public the opportunity for review and comment under both processes.

reasonable expectation that dose limits will not be exceeded within 10,000 years after FTF closure[7].

The FTF PA evaluates the potential human health impacts associated with closure of the FTF tanks and associated equipment[8]. The FTF PA includes both deterministic and probabilistic modeling – a hybrid approach to evaluate performance variability due to uncertainty and system sensitivities. The base case analysis (PORFLOW[9] model) reflects the best estimate of future closure system behavior, while the probabilistic analysis (GoldSim[10] model) considers a variety of possible scenarios.

The FTF PA analyzes the characteristics of reducing grout, which would be composed of cement, slag, fly ash, and sand. The PA is used to provide DOE with a reasonable expectation that FTF closure will meet performance objectives and dose limits for the protection of the public and the hypothetical human intruder during the period of 10,000 years after closure. The FTF PA was completed to support the SCDHEC- approved FTF Industrial Wastewater Closure Plan for F-Area Waste Tank Systems, as well as a potential determination by the Secretary, in consultation with the NRC, that the criteria in Section 3116(a) will be met at closure. (DOE 2011, Section 5.2)

# 5 IS A SUPPLEMENTAL EIS NEEDED?

This section evaluates the new information for potential relevance to environmental impacts associated with the proposed action and preferred alternative in the EIS.

## 5.1 Drinking Water Impacts

DOE guidance for preparing a supplement analysis (DOE 2005) discusses the impact indicator approach to comparing results in SA analysis. Impact indicators are the most important parameters used to estimate impacts for an environmental resource. After all media and pathways have been evaluated in the PA, the groundwater concentrations of contaminants were found to be by far the most limiting exposure pathway, contributing approximately 92% of the

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[7] The FTF PA evaluates a period of 10,000 years and provides additional data beyond this period of time for the purpose of making risk-informed decisions related to closure of the FTF. As required by DOE Manual 435.1-1, maintenance of the FTF PA will include future updates to incorporate new information, updated model codes, analysis of actual residual inventories, etc., as appropriate.

[8] This associated equipment (such as evaporator systems, transfer pipelines, sumps, pump pits, diversion boxes, valve boxes and condensate transfer system) is referred to as "ancillary structures" in the Draft Basis for Section 3116 Determination for Closure of the FTF at SRS (DOE 2010b)

[9] PORFLOW is a comprehensive computer program for simulation of transient or steady state flow, heat salinity and mass transport in multiphase, variably saturated, porous or fractured media with dynamic phase change. The main features of PORFLOW that are relevant to the FTF PA include variably saturated flow and transport of parent and progeny radionuclides. The PORFLOW model simulates groundwater flow and contaminant transport in the vadose zone and underlying aquifers.

[10] GoldSim is dynamic, probabilistic simulation software developed by GoldSim Technology Group. It is a hybrid of several simulation approaches, combining systems dynamics with some aspects of discrete event simulations, and embedding this framework into a Monte Carlo simulation framework. This software compares and evaluates alternative designs, plans and policies in order to minimize risks and make decisions in uncertainty.

all-pathways dose to a hypothetical member of the public (DOE 2011, Section 5.0). The all-pathways dose includes impacts associated with using contaminated water sources (groundwater or stream) for drinking, showering, gardening, watering livestock, and recreational activities (fishing, boating, and swimming) as further described within the EIS (DOE 2002a Section C.2.1.2) and FTF PA (DOE 2010a Section 4.2.4). As described in the EIS, the regulations governing closure of the tanks specify that the average concentration of manmade radionuclides in drinking waters shall not produce a dose equivalent to the total body or an internal organ dose above 4 millirem-per-year (beta-gamma activity), i.e. the combined contribution from contaminants from all tanks and associated equipment will not exceed the 4 millirem-per-year limit. Additionally, the concentrations of alpha radionuclides in drinking water shall not exceed a concentration of 15 picocuries per liter (not including uranium isotopes), i.e. the combined contribution from all tanks and associated equipment will not exceed the 15 picocuries per liter limit[11]. The drinking water beta-gamma dose and water alpha concentration are used as the impact indicators for this analysis since these limits are the primary performance objective for the SRS radioactive waste tank system closures in the EIS, ROD and Closure Plan per SCDHEC Drinking Water Regulation 61-58 (SCDHEC 2009).

Table 1 below is a comparison of drinking water doses associated with beta-gamma radionuclides and concentrations for alpha radionuclides from the EIS and the FTF PA at various locations around the FTF.

Table 1: Modeled FTF Drinking Water Results for EIS and the FTF PA

| Drinking Water Points of Assessment[1] | EIS | PA Base Case[2] |
|---|---|---|
| Beta-gamma dose limit (millirem-per-year) | 4 | 4 |
| 1 meter from FTF (millirem-per-year)[3] | 130 | 17.1 |
| 100 meters from FTF (millirem-per-year)[3] | 51 | 3.4 |
| Seepline (millirem-per-year)[4] | 1.9 | 0.08 |
| Alpha concentration limit (15 picocuries-per liter) | 15 | 15 |
| 1 meter from FTF (picocuries-per-liter)[3] | 13 | 32.4[5] |
| 100 meters from FTF (picocuries-per-liter)[3] | 4.8 | 3.8[5] |
| Seepline (picocuries-per-liter)[4] | 0.04 | 0.06[5] |

Notes:

1. The drinking water doses and concentrations compared between the EIS and FTF PA are based on the 10,000 year performance period.
2. The PA Base Case (Case A) results are from the FTF PA deterministic modeling, which represents the expected (most likely) peak dose consequences during the 10,000 year compliance period after FTF Closure.
3. The 1 meter and 100 meter points of assessments in the EIS are from the edge of the FTF (DOE 2002a, Section C.2.1.4, C-10). The 1 meter and 100 meter points of assessment in the FTF PA are from the edge of a tank (DOE 2010a, Section 5.2.1).

[11] It should also be noted that a total radium concentration limit of 5 picocuries-per-liter is also required. However, the EIS did not report the radium concentrations so a comparison of these results between the EIS and FTF PA was not performed.

4. The FTF PA and the EIS calculated the seepline radionuclide concentration in the water as it seeps from the ground prior to mixing in the stream. For simplicity, all contaminants from FTF were modeled as flowing toward Fourmile Branch in the EIS. The FTF PA modeled groundwater flow to two streams, Upper Three Runs and Fourmile Branch based on the existing groundwater divide at the FTF. The Upper Three Runs seepline results are reported in the above table for the FTF PA since these results are higher than those calculated for Fourmile Branch.
5. The reported FTF PA peak concentrations were determined by summing the maximum concentration of each isotope during the 10,000 year performance period; regardless of timing (i.e. this artificially increases the concentration since the peaks for each isotope do not occur in the same year).

## 5.2 Other Resource Impacts

The environmental media evaluated in the EIS for impacts from the proposed action and alternatives are the following: land use, geological, hydrological, biological, air quality, socioeconomic, noise, cultural resources, and environmental justice impacts. No additional potential effects on these environmental resources would result from the FTF PA, Section 3116 process or from enhanced tank cleaning technologies. The proposed action would require neither the use of any additional land nor the construction of new facilities. DOE does not expect any land use, geological, hydrological, biological, air quality, socioeconomic, noise, cultural resources, or environmental justice impacts beyond those previously identified in the EIS. Therefore, no further analysis is necessary.

The projected human health (worker and public) impacts during FTF cleaning and closure operations from the proposed action and alternatives identified in the EIS would not change. The EIS states that DOE would exercise "as low as reasonably achievable" (ALARA) principles to minimize individual worker doses. The ALARA principles ensure that radiation exposures to workers and releases of radioactivity to the environment are maintained below regulatory limits, and deliberate efforts are taken to further reduce exposures and releases. DOE implements a Radiation Protection Program at SRS (SRS Radiation Protection Program), which would continue to apply such ALARA principles during FTF closure activities so as to minimize the potential impacts to workers and members of the public during cleaning and closure operations.

# 6 BENEFITS FROM NEW INFORMATION

The objective of this section is to evaluate the benefits of the new information to the FTF closure program.

## 6.1 New Cleaning Technology

The ROD placed emphasis on safely removing waste while protecting workers, the public, and the environment. Consistent with the ROD, worker hazards would continue to be addressed under normal DOE worker standards and procedures[12], including the ALARA program discussed above.

Impacts of the mechanical and chemical cleaning technologies used and planned as part of the tank closure process were evaluated in the EIS. Accordingly, there are various mechanical technologies being used in the FTF to remove additional waste from the tanks, including types of mixer pumps, robotic crawlers with high-pressure spray nozzles and suction capabilities, and wall crawlers with spray nozzles to remove waste from tank wall surfaces. None of these mechanical devices affects environmental resources or adds an impact to human health already analyzed in the EIS.

As analyzed in the EIS, OA would be used to clean some of the tanks that contain cooling coils. The current strategy is to chemically clean all tanks with cooling coils using either BOA or ECC. Additionally, chemical cleaning would effectively reduce residual radioactivity at the time of closure, therefore reducing public and environmental impacts. Liquid waste volumes that would result from the use of BOA and ECC would still be within the estimated volumes of waste generated for the preferred alternative as analyzed in the EIS. ECC is an enhancement to the chemical cleaning process because it would reduce the volume of radioactive liquid waste produces during chemical cleaning of the tanks and reduces the SRS tank closure lifecycle schedule.

In summary, ECC provides a beneficial enhancement to the FTF Closure program. There is no additional impact to the environment or to human health from the use of remotely operated mechanical devices or the use of the chemical cleaning process, including ECC in, in the tanks. There also are no changes to the decision to stabilize and fill the tanks with grout (after removal of waste to the extent practical), and no substantial changes to impacts analyzed in the EIS.

## 6.2 Legislation

As noted above, Section 3116 of the NDAA was enacted after the EIS and ROD. Both Section 3116(a) and DOE Manual 435.1-1 specify similar criteria for determining that certain waste from reprocessing is not HLW and may be managed as LLW. Furthermore, the process and criteria used to determine whether the waste is HLW or LLW does not have any bearing on environmental impacts described in the EIS because the residual waste in the tanks and the consequences of stabilizing and filling the tanks with grout are the same regardless of the determination under either Section 3116 or DOE Manual 435.1-1. Therefore, there Section 3116(a) criteria does not alter the impact of the proposed action or alternatives. Under both the Section 3116(a) legislation and DOE Manual 435.1-1 WIR evaluation process, DOE consults with the NRC and affords the public the opportunity for review and comment. Section 3116 however may provide an additional monitoring benefit. While monitoring by DOE is required

[12] These requirements and procedures include the following: 10CFR Part 835, "Occupational Radiation Protection", DOE Order 440.1B, "Worker Protection Management for DOE Federal and Contractor Employees", DOE Order 5458.1, Change 2, "Radiation Protection of the Public and the Environment", DOE Order 422.1, "Conduct of Operations Requirements for DOE Facilities", SRIP 440.3, "DOE-SRS Federal Employee Occupational Safety and Health (FEOSH) Program" and SRIP 441.1, "Radiation Protection".

under DOE Orders and policy, Section 3116(b), unlike DOE Manual 435.1-1, requires monitoring by the NRC, in coordination with the State of South Carolina, of DOE's disposal actions under Section 3116(a) for the purpose of assessing continued compliance with the NRC LLW performance objectives.

## 6.3 FTF Performance Assessment

The FTF PA shows lower drinking water doses associated with beta-gamma radionuclides at all three points of assessment in comparison to the EIS. During the 10,000 year compliance period, the FTF PA deterministic (base case) model indicates that the drinking water dose at 100 meters peaks at 3.4 millirem-per-year, which is significantly lower than the drinking water peak dose modeled in the EIS for the FTF (51 millirem-per-year). The analysis in this SA shows that the drinking water peak dose modeled in the FTF PA is below the regulatory standard (4 millirem-per-year) at 100 meters and at the seepline versus only at the seepline in the EIS. Even though the 1 meter and 100 meter points of assessment are closer to the contamination sources in the FTF PA (from the edge of a tank) versus the EIS (from the edge of the FTF), the higher EIS doses are expected for the beta-gamma radionuclides because these radionuclides are generally shorter lived and more mobile; and the evaluation of additional barriers (e.g., closure cap and carbon steel liners) in the FTF PA reflects consideration of the additional protection provided by those barriers and the associated reduction in dose attributable to such radionuclides.

A comparison of the EIS and FTF PA alpha radionuclide concentration results for the three points of assessment identify very little difference between the 100 meter and seepline concentrations, but a noticeable increase in concentration at the 1 meter location for the FTF PA results. The variance is based on two differences between the EIS and FTF PA analysis. First, the FTF PA peak concentrations (shown in Table 2) were determined by summing the maximum concentration of each isotope during the 10,000 year performance period; regardless of timing which artificially increases the total concentration used for comparison since the peaks for each isotope do not occur simultaneously. To demonstrate, the FTF PA 1 meter point of assessment 32.4 picocuries-per liter peak concentration consists of 19.6 picocuries-per-liter from radionuclides peaking at year 10,000 and 13.3 picocuries-per-liter from radionuclides peaking around year 6,000. Second, the 1 meter and 100 meter points of assessment were closer to the inventory source in the FTF PA (from the edge of the tank) versus the EIS (from the edge of the FTF). Since 100 meters from the edge of a tank is roughly the edge of the FTF, the EIS 1 meter results could be considered more comparable to the FTF PA 100 meter results. Taking these two factors into consideration, there is no EIS estimated result that is reasonably comparable to the FTF PA estimated 1 meter concentration. Alternatively, the EIS reported 1 meter concentration (13 picocuries-per-liter) is higher than the comparable FTF PA 100 meter result (3.8 picocuries-per liter).

A supplement to the EIS is not needed because the impacts of closure of the FTF tanks and associated equipment are bounded by the potential impacts identified in the EIS based on a comparison using the drinking water standards for beta gamma dose and alpha concentrations as an impact indicator.

# 7 CONCLUSION

A review of the cleaning methods for FTF, the criteria under the Section 3116 legislation and the FTF PA shows that while there is new information- relevant to the environmental concerns, it is not significant and does not bear on the impacts analyzed in the EIS. The Section 3116(a) criteria are similar to the WIR criteria and process under DOE Manual 435.1-1 described in the ROD. Further, the FTF PA shows lower doses and demonstrates compliance with applicable performance objectives, and DOE has improved its cleaning techniques to continue safe removal of residual waste. There is no change in the decision to stabilize by filling the tanks and associated equipment with grout. The new information does not change the proposed action analyzed in the EIS or the alternative selected in the ROD.

This review concludes that the impacts from closure of the FTF are within the scope of potential impacts evaluated in the EIS. The FTF closure program still follows the process laid out in the ROD to: (1) address the performance objectives for each tank that allows the cumulative closure of each tank to meet the overall performance standards, (2) address the regulatory status of the residual waste in the tanks through a determination, and (3) use cleaning methods (such as spray water washing or oxalic acid cleaning), if needed to meet tank-specific performance objectives.

DOE still plans to grout the tanks as it was considered the appropriate option to stabilize the tanks and certain associated equipment, and minimize human health and environmental risks. DOE stated in the ROD that it "will evaluate and consult with SCDHEC on closure methods and regulatory compliance revisions that will allow accelerated closure and reduction of risk associated with the HLW tanks" (DOE 2002b). According to the ROD, the decision to close a tank and proceed through the closure process is initiated through regulatory requirements and approved Closure Plans under the South Carolina Regulation 61-82, *Proper Closeout of Wastewater Treatment Facilities* (SCDHEC, 1980) of the South Carolina Pollution Control Act. DOE is required to close tanks and associated equipment in accordance with a SCDHEC – approved Closure Plan, thus meeting a Section 3116(a) criterion. On January 24 2011, SCDHEC approved the *Industrial Wastewater General Closure Plan for the F-Area Waste Tank Systems* (DOE 2011), typically called the FTF General Closure Plan. Therefore, DOE is still proceeding with its decisions and plans for closure of the waste tanks at SRS.DOE has not identified any significant new information that would affect the basis for its original decision as documented in the ROD. DOE will publish a notice, as appropriate, based on the final determination, to inform stakeholders of this analysis.

# 8 DETERMINATION

DOE has prepared a Supplement Analysis to determine whether the *Savannah River Site High-Level Waste Tank Closure Final Environmental Impact Statement* (DOE/EIS-0303) adequately addresses the current programmatic operations or whether additional documentation is necessary under NEPA. The Supplement Analysis compares key impact resources analyzed in the EIS with the current regulatory environment and the proposed actions for tank closure.

Based on this Supplement Analysis, DOE has determined that the proposed actions in the FTF closure program do not constitute substantial changes from those evaluated in the original EIS that are relevant to environmental concerns; or significant new circumstances or information relevant to environmental concerns and bearing on the proposed action, within the meaning of 40 CFR 1502.9 (c). Therefore, pursuant to 10 CFR 1021.314(c)(2), no further NEPA documentation is necessary.

Issued at Aiken South Carolina, on this 5th day of March, 2012

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SCDHEC (South Carolina Department of Health and Environmental Control), 2009, R.61-58, *State Primary Drinking Water Regulation*, Bureau of Water, Columbia SC, State Register (August 28, 2009)