



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

September 26, 2023

MEMORANDUM TO: Stephen S. Koenick, Branch Chief  
Low-Level Waste and Projects Branch  
Division of Decommissioning, Uranium Recovery,  
and Waste Programs  
Office of Nuclear Material Safety  
and Safeguards

THRU: Christopher A. McKenney, Branch Chief  
Risk and Technical Analysis Branch  
Division of Decommissioning, Uranium Recovery,  
and Waste Programs  
Office of Nuclear Material Safety  
and Safeguards

Handwritten signature of Christopher A. McKenney in black ink.

Signed by McKenney,  
on 09/26/23

FROM: Cynthia S. Barr, Senior Risk Analyst  
Risk and Technical Analysis Branch  
Division of Decommissioning, Uranium Recovery,  
and Waste Programs  
Office of Nuclear Material Safety  
and Safeguards

Handwritten signature of Cynthia S. Barr in black ink.

Signed by Barr, Cynthia  
on 09/26/23

SUBJECT: TECHNICAL REVIEW: U.S. DEPARTMENT OF ENERGY  
DOCUMENTATION RELATED TO ANCILLARY EQUIPMENT  
CLOSURE AT THE F-TANK FARM FACILITY AT THE  
SAVANNAH RIVER SITE (PROJ0734)

The U.S. Nuclear Regulatory Commission (NRC) has performed a technical review of a collection of documents prepared by the U.S. Department of Energy (DOE) that provide information about closure of ancillary equipment—two F-Area diversion boxes known as FDB-5 and FDB-6, at the F-Tank Farm facility at the Savannah River Site in Aiken, SC. This technical review report is the first report to review information on ancillary equipment closure and use of slag-free alternative grouts at the tank farm facilities at SRS.

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This technical review is associated with Monitoring Area (MA) 1, "Inventory" and 3, "Cementitious Material Performance". Specifically, this technical review supports Monitoring Factors (MFs) 1.1, "Final Inventory and Risk Estimates," 1.4, "Ancillary Equipment Inventory", and 1.5, "Waste Removal (As it Pertains to ALARA)"; and 3.4, "Grout Performance", and 3.6, "Waste Stabilization (As it Impacts ALARA)."

NRC findings related to *Inventory and Final Risk Estimates* include the following:

- Although no inventory was developed for diversion boxes, such as FDB-5 and FDB-6, in the FTF Performance Assessment (PA), DOE developed an inventory for these diversion boxes to perform a special analysis (SA) to estimate potential doses and support closure of the ancillary equipment. While there is significant uncertainty in the approach used to develop the inventory, NRC staff concludes that the approach used was reasonable given the expected low risk-significance of residual waste remaining in the diversion boxes compared to other sources at the FTF.
- NRC recommends that DOE look for opportunities to validate the methods used to develop the ancillary equipment inventory in the FTF PA, including the use of characterization and sampling to support the assumed low risk estimates of ancillary equipment. This will be especially important for potentially plugged transfer lines and jumpers.
- The results of the SA using the estimated inventories for FDB-5 and FDB-6 reveal negligible contributions to overall peak dose at FTF. The updated SA estimated the maximum potential dose to a future hypothetical MOP resulting from the waste in FDB-5 at  $6 \times 10^{-5}$  mSv/yr (0.006 mrem/yr) and from FDB-6 at  $1 \times 10^{-4}$  mSv/yr (0.01 mrem/yr).
- Given the apparent low risk associated with residual waste that may be present in the FDB-5 and FDB-6 diversion boxes, NRC staff concur that waste was removed to the maximum extent practical.
- In future documentation, DOE should clarify the reason for abandonment of jumpers in the diversion boxes and the expected radiological status of the abandoned jumpers (e.g., the jumpers were plugged and were abandoned prior to waste dissolution; or the jumpers were not plugged or were plugged and abandoned after attempted waste dissolution) to provide a stronger basis for the assumptions that went into estimating the residual volume and concentration of waste remaining in the diversion boxes, particularly since the interior of these jumpers cannot be easily characterized.

NRC findings related to *Grout Performance and Waste Stabilization* include the following:

- Bulk fill reducing tank grout (mix LP#8-16 of C-SPP-F-00055) and clean cap grout (C-SPP-Z-00012) were the only two tank fill grouts previously listed for use in the Consolidated General Closure Plan for F-Area and H-Area Waste Tank Systems (SRR-CWDA-2017-00015, Revision 0). Grout evaluations performed by SRR in support of closing FDB-5 and FDB-6 identified two other cementitious materials that DOE prefers to use to fill ancillary structures at the tank farms: low slump, non-structural concrete (mix A2000-6-0-2-A) and a zero-bleed, controlled low-strength material (ZB-CLSM, also known as ZB-FF-8-D; C-SPS-G-00096).

- Low-Slump Concrete (mix A2000-6-0-2-A) is not meant to be a structural concrete, but only needs to plug openings in the sump, so that when the more flowable ZB-CLSM/ZB-FF-8-D is placed into the diversion box, it does not uncontrollably flow out into other parts of the system. This mix appears appropriate to perform this task. Based upon the similarity between tank fill grout LP#8-16 and ZB-CLSM/ZB-FF-8-D, if ancillary structures, such as diversion boxes, contain insignificant quantities of waste such that chemically imparting reducing conditions on infiltrating water is unnecessary, then slag-free ZB-CLSM/ZB-FF-8-D will likely function in an equivalent physical manner to provide structural stability to ancillary structures.

Docket No. PROJ0734

Enclosure: Technical Review of Ancillary Equipment Closure

cc: D. Pickett, SWRI  
WIR Service List

Technical Review of Ancillary Equipment Inventory, Risk, Grout, F-Tank Savannah River Site DATE  
September 26, 2023

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