Fort Calhoun License Termination Plan Review

Request for Additional Information

Technical Evaluation

TE-1 Characterization and Application of Fill/Backfill Material

Comment: Clarification is needed to describe the characteristics of the proposed "clean" backfill material and that backfill material will only be applied following the remediation and Final Status Surveys (FSSs) of individual survey units.

Basis: Adequate surveys are needed if the fill materials may contain residual radioactivity, or may be covering residual radioactivity, and must be considered for the survey unit to be compliant with 10 CFR 20.1402 and 10 CFR 20.1501. In multiple places, the LTP states that "clean" backfill will be used to fill excavations, voids and basements (e.g., Sections 3.3 and 3.5.1.3 of the LTP) to grade level. However, Sections 5.4.1.5 and 6.19 discuss attributing a dose from the proposed backfill materials. Therefore, clarification is needed on what is meant by "clean" fill materials. Similarly, the LTP describes in multiple places that backfill and grading will be performed after FSSs.

Request: Define the characteristics of "clean" backfill material and describe how backfill material will be verified/characterized as "clean" prior to use. Details related to the selection process for any additional backfill material, beyond what is available from the excavation of the rail spur expansion project, should also be provided. In addition, please verify, and provide a description of the process, by which the final status survey and application of backfill (e.g., when fill/backfill materials are not added until the final status survey is complete) are performed at individual survey units as part of license termination and FSSs.

TE-2 Operational Contamination Control Program and Remedial Action Support Surveys

Comment: Additional information is needed regarding how Remedial Action Support Surveys (RASSs) support the operational contamination control program.

Basis: To ensure compliance with 10 CFR 20, Subpart F, "Surveys and Monitoring," additional information is needed on how RASSs support the operational contamination control program. Sections 4.2 and 4.3 of the LTP describe the remediation actions and their expected impact on the site's Radiation Protection Program (which includes the contamination control program). However, the information provided is not sufficient for the NRC to conclude that RASSs will be used to support the contamination control program and are adequate for mitigating any unexpected releases of material to the environment. For example, the LTP does not specify any criteria that would trigger the contamination control program if contamination were unintentionally created or spread by decommissioning or waste processing activities. Of particular interest to the NRC is how the contamination control program addresses the potential creation and spread of discrete radioactive particles (DRPs) or discrete radioactive objects. Additionally, the proposed methodologies for RASSs are not described in sufficient detail to

ensure that DRPs would be identified, remediated, and documented if their presence is suspected.

Request: Add additional information to the LTP with regards to how the contamination control program is supported by RASSs. Describe the survey frequencies (e.g., after each work shift in areas where operations are conducted) and methods that will be used for operational surveys for waste generation/processing activities. Information on the methods should include appropriate detectors and methods suitable for identifying the potential presence of contamination including DRPs or radioactive objects that may be generated during decommissioning. A summary of the remedial actions that will be taken in the event DRPs or objects are present outside of a controlled operational area should also be included.

TE- 3 Basement Survey Unit Size Limits

Comment: Section 5.2.2 of the LTP indicates that basement survey units have no size limit regardless of classification.

Basis: To do adequate surveys of structures with residual radioactivity in compliance with 10 CFR 20.1501, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) guidance (NUREG-1575, Revision 1) indicates that Class 1 structural survey units have a size limit of 100 m^2 and Class 2 structural survey units have a size limit of 1,000 m^2. Also, lower structure classification survey units include the floor and lower 2 meters of the structural walls which are most likely to have been impacted by facility operations.

Request: Provide justification for indicating that there are no survey unit size limits in basement survey units or revise Section 5.2.2 to be consistent with the structural survey unit size guidance in MARSSIM and NUREG-1757, Vol 2.

TE-4 Isolation and Control Measures

Comment: Additional information is needed on the isolation and control measures that have or will be established for survey units once decommissioning activities have been completed and a decision to perform FSSs has been made.

Basis: Additional clarifications are needed about the isolation and control program and the FSS data to ensure it will be adequate to demonstrate compliance with 10 CFR 20, Subparts E and F. Section 5.2.3 of the LTP describes the measures for isolation and control that the licensee will take prior to initiating FSS and will maintain during and after FSS. This section also describes the area surveillances that will be performed after FSS to provide assurance that these areas remain unchanged.

The NRC uses FSS data to reach reasonable assurance that a site has been adequately characterized and meets the unrestricted release criteria. It is important for this data to reflect the final site conditions. For example, if a survey unit were to become re-contaminated after the FSS was performed, the FSS data would no longer be applicable. It is important that the controls that have already been put in place, as well as those that will be in place, ensure that no activities will occur within a survey unit that could potentially cause the radiological conditions to change once a decision to transition to isolation has been made.

Additional clarification is needed on:

a) how isolation and control measures will be managed for open land areas that do not have a positive access control. It is not clear from the LTP whether the isolation and control program for these areas will be primarily through the surveillances or if the other isolation and control measures described in the LTP also apply to these areas. For example, it is not clear whether the measures such as instructing individuals to contact the LT/FSS group before performing work in the area and the tracking of entries into the area will apply to the open land areas.

b) when the licensee intends to stop using isolation and control measures relative to when the license for the FCS site (minus the ISFSI) is terminated. Section 5.2.3.2 indicates that the isolation and control measures will "remain in force until there is minimal risk of recontamination from decommissioning or the survey unit has been released from the license…". However, the next paragraph states that "To provide additional assurance that survey units that have successfully undergone FSS remain unchanged until final site release." It is not clear from the LTP whether any movement of materials across survey units (e.g., regrading of the site) would be allowed to occur prior to the release of the site or if the isolation and control measures would prevent this.

c) the method that will be used to determine the rigor needed for the surveillance surveys. It is unclear from the LTP how the surveillances will be documented and whether this information will be included in the FSS reports.

Request: Please provide additional information on the controls that are or will be in place to ensure that no activities that could potentially contaminate the survey unit will occur once a decision to transition to isolation has been made. If investigation surveys (e.g., Radiological Assessments (RAs)) may be used for justification that no reperformance of an FSS is necessary, clarify how documentation of such surveys will supplement previously performed FSSs.

TE-5 Surrogate and Insignificant Contributor Quality Control (QC) Checks

Comment: Clarification is needed regarding which surveys the licensee will perform to assess the insignificant contributors and surrogate ratios.

Basis: This information is needed to assure compliance with 10 CFR 20.1402 (i.e., that the total dose to potential future site occupants is less than the dose criteria) and 10 CFR 20.1501 (i.e., that the site has been adequately characterized). At minimum, the additional site characterization surveys and QC sampling during FSSs should include determinations that the surrogate ratios and insignificant contributor data in each survey unit are consistent with the data sets utilized to establish values in the LTP (see Table 5-16 and section 6.15 of the LTP). Clarification is also needed for the actions that will be taken if the data in any survey unit is not consistent with the established values. Section 5.2.6.2 of the LTP describes the development of surrogate radionuclide ratios (Table 5-16) while other sections (e.g., Sections 5.2.5 and 6.15) describe the mixture ratios, dose contribution, and selection of the insignificant contributors from the initial suite of site radionuclides. In Section 5.2.5 of the LTP, the licensee commits to analyzing 10 percent of the continuing characterization samples for all media samples collected

in a survey unit for the initial suite of radionuclides and provides a method to assure that the appropriate surrogate and insignificant contributors are considered. Section 5.2.6.2 also commits to directly measuring C-14 in all soil samples. However, the LTP provides insufficient details on whether FSS QC samples or other survey types (e.g., RA, RASS), or other media, will also address the surrogate/inferred radionuclides or the insignificant contributors and whether the established values are appropriate for the survey unit.

Because the insignificant contributors and inferred radionuclides are not directly measured, it is necessary to verify that assumptions made based on initial characterization data hold true throughout the site during and after decommissioning and that the dose considerations for these components of potential dose are appropriately addressed.

In addition, the technical evaluation performed in RSCS TSD 21-043, Rev 1, should be updated after all relevant site characterization data and final status survey QC data are available and included with the data set in the TSD and the impact to all FSSs determined.

Request: Update the LTP sections dealing with future site characterization (e.g., Sections 1.5.2, 2.2.2, 2.2.6, 5.2.5), QC during FSSs (e.g., Sections 5.2.6.2, 5.6.3, 5.7.1.), as well as other sections pertaining to other survey types, as appropriate, to explicitly include data evaluations to validate that the insignificant contributors and surrogate ratios are correct and what actions the licensee will take if the data indicate inconsistency with the previously established values. Clarify for which surveys and for which media verification of the surrogate ratios and insignificant contributors will occur. Please confirm that the evaluation performed in RSCS TSD 21-043 will be updated after all applicable future characterization and FSS QC data is included in the data set and that the impact of the newly updated radionuclide mixture fractions, insignificant contributors, and surrogate ratios will be assessed for all FSSs.

TE-6 Data Quality Objectives for Groundwater Monitoring

Comment: More information is needed on the Data Quality Objectives (DQOs) for groundwater monitoring during decommissioning.

Basis: The LTP does not provide information on the DQOs for the groundwater monitoring and whether they are sufficient to provide reasonable assurance that the final conditions of the site are consistent with the dose criteria in 10 CFR 20.1402 and that the site has been adequately characterized per 10 CFR 20.1501. Section 2.4 of the LTP describes surface and groundwater characterization that has previously been performed and Section 5.4.1.10 describes the survey methodology that will be used for groundwater. Section 5.4.1.10 states that the assessments of residual radioactivity in groundwater at the site will be via groundwater monitoring wells installed at FCS and that the ongoing monitoring includes the Radiological Environmental Monitoring Program (REMP), Radiological Groundwater Protection Program, and National Pollutant Discharge Elimination System monitoring. In some cases, the information needed to demonstrate compliance with the decommissioning regulations is different than the information needed during operations, and the groundwater program may need to be adjusted accordingly. Groundwater monitoring during and following decommissioning activities should include residual radioactivity identified in the groundwater during decommissioning, if any, and investigations of subsurface residual radioactivity identified prior to or during decommissioning that could be associated with groundwater contamination. These investigations generally consider the

conceptual site model, and transport time and spatial length scales for relevant radionuclides. The NRC provides guidance on Surface Water and Groundwater Characterization as part of decommissioning in NUREG-1757, Vol 2, Rev 2.

Sections 5.2.6.6 and 6.18 of the LTP describe the methodology that the licensee will use to determine the dose from groundwater contamination, if any, that exists at the time of license termination. However, neither of these sections describes how the radionuclides of concern (ROCs) for groundwater will be determined and whether they are expected to differ from the ROCs identified for other media. Additionally, it is not clear if the concentrations of all the ROCs will be evaluated as part of the groundwater monitoring program. As part of developing DQOs for groundwater monitoring, the licensee should describe how they will determine the ROCs for the groundwater pathway. The DQOs should be sufficient to determine the concentration of the ROCs in the groundwater and their associated dose.

Additionally, the DQOs for the groundwater monitoring are expected to be sufficient to allow comparison to the U.S. Environmental Protection Agency (EPA) Maximum Contaminant Levels, and monitoring should be sufficient to statistically demonstrate that residual radioactivity concentrations in water are stable or decreasing (e.g., use of the Mann-Kendall test). For reference, see the Memorandum of Understanding (MOU) between EPA and NRC for Consultation and Finality on Decommissioning and Decontamination of Contaminated Sites (Agencywide Documents Access and Management System [ADAMS] Accession No. ML073090532) and the paper written on implementing the MOU (ADAMS Accession No. ML051380168).

Request: Update the LTP to include DQOs for groundwater monitoring similar to the DQOs established for FSS sampling. The DQOs should address the initial suite of radionuclides established in the LTP (Table 5-2) and should provide sufficient information to provide reasonable assurance that the groundwater conditions remaining at the site at the time of license termination are consistent with the NRC regulations.

TE-7 Surveys of Excavations

Comment: Surveys (including FSSs and RASSs) of excavations should include the sidewalls as well as the footprint of the excavation (see NUREG-1757, Vol 2, Section G.3.2.1).

Basis: The FSS should incorporate all exposed surfaces in an excavation to be compliant with 10 CFR 20.1501. In Section 5.4.1.4 of the LTP (as well as other sections), the licensee states that an FSS) designed as an open land survey will be performed of excavations. Clarify that this means both the excavation footprint as well as any sidewalls of the excavation will be subject to the FSS and RASS, as appropriate.

Request: Clarify in Section 5.4.1.4 (and others as appropriate) that exposed sidewalls of excavations will be incorporated into any RASS or FSS.

TE-8 Discrete Radioactive Particle Definition and Surveys

Comment: Justify the definition of DRPs of concern and actions to be taken in event of DRP release.

Basis: A dose basis and activity level for DRPs of concern that are anticipated to remain on site at the conclusion of decommissioning are needed for the NRC staff to assess the potential dose impact of any DRPs to future site occupants and compliance with decommissioning regulations in 10 CFR 20.1402. In addition, justification that the survey methodology is sufficient to detect DRPs that have an activity level of concern and the additional information on survey techniques is needed to ensure surveys would be compliant with 10 CFR 20.1501.

Section 5.4.1.11 of the LTP provides a description of survey considerations for areas that are suspected to have DRP contamination. In this section, DRPs are defined as "specks of radioactive material identified usually as either activated corrosion product such as cobalt-60, or an irradiated fuel fragment exhibiting greater than 10,000 corrected counts per minute (100,000 dpm)." Due to issues such as what instruments are being utilized, how instruments are set up, detector/source geometry, shielding materials that may be present, etc. basing a definition on instrument response is inadequate.

Section 5.4.1.11 of the LTP provides information on the survey methods that the license will use in suspected DRP areas. However, this survey information does not include a justification that the methodology is sufficient to detect DRPs that have an activity level of concern. Also, the description of the survey methodology does not specify if alarms are going to be used to identify DRPs during scanning and, if so, what the instrument set points will be.

Also, the LTP does not appear to address radioactive objects which are larger in volume than the typical DRP but of a lesser volume than would typically be considered for "materials and equipment". Information is needed on whether the same approach will be used for these discrete radioactive objects as will be used for DRPs. The LTP does not clarify if the DRPs or radioactive objects will be considered and evaluated even if composed of materials not directly related to plant operations and not specifically excluded from 10 CFR 20.1402 (e.g., TENORM).

Finally, Section 5.4.1.11 states that a condition report will be generated for each DRP encountered. However, the LTP does not appear to commit to performing contamination control surveys to identify and disposition DRPs in a timely manner to avoid potential secondary transport and if DRP remediation efforts will be complete prior to any additional soil disturbing activities in the affected area.

Request:

a) Please propose a dose basis and activity level for DRPs of concern if such are anticipated to be part of the residual radiation present at the conclusion of decommissioning.
b) Describe the method for surveying for DRPs that demonstrate that it will be sufficient to identify DRPs of concern.
c) If using alarms to identify DRPs during scanning, justify the proposed alarm set point for the surveys and what instruments the set points will apply to.

d) Describe the procedures, if any, that will apply to surveys for radioactive objects which are larger in volume than the typical DRP but of a lesser volume than would typically be considered for “materials and equipment” (e.g., activated concrete pebble/rock).
e) Describe how DRPs or radioactive objects will be considered and evaluated including if they are composed of materials not directly related to plant operations and not specifically excluded from 10 CFR 20.1402 (e.g., TENORM).
f) If a release of DRPs does occur, describe the contamination control surveys to be used to identify and disposition DRPs, and how they will be done to avoid potential secondary transport. Also describe how DRP remediation efforts will be done in relation to any soil disturbing activities in the affected area. Describe how the activities will be documented.

Clarification RAIs

CL-1 Criteria for Determining when Changes to the LTP Require NRC Approval

Comment: The LTP change criteria listed in the proposed license amendment do not include all the criteria listed in NUREG-1700, Revision. 2.

Basis: To evaluate that the LTP demonstrates meeting the requirements of 10 CFR Part 20, Subpart E, “Radiological Criteria for License Termination,” NRC uses NUREG-1700, “Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans.” NUREG-1700 recognizes that the licensee may make changes to the LTP following its approval by the NRC. However, NUREG-1700 identifies that there are areas of the LTP that cannot be changed without prior NRC approval because it would represent a change to the approved license termination methodology. To control this change process, NUREG-1700 contains a list of LTP areas that cannot be changed without prior NRC approval and states that the LTP should include a provision that addresses how changes are made to the LTP after approval.

The license amendment request (LAR) proposes to add license condition (LC) 3.D to the FCS license. The LC would approve the LTP and identify areas of the LTP that cannot be changed without NRC approval. The LAR states that the proposed LC is in accordance with NUREG-1700, Revision 1, Appendix 2, which is a list of NRC identified areas of the LTP that would require prior NRC approval to be changed. The proposed LC essentially captures the list in NUREG-1700, Revision 1, Appendix 2. However, NUREG-1700 has been updated (Revision 2) and contains a list, in Appendix B, that is more comprehensive than that in Revision 1. The list from Revision 2 contains two additional areas of evaluation that, if changed in the LTP, would need approval by NRC. These areas are: 1) a change to the approach used to demonstrate compliance with dose criteria, and 2) a change to the dose assessment parameter values or pathway dose conversion factors that would lead to a lower calculated dose than what was approved in the LTP.

Request: For proposed LC 3.D, please clarify that the proposed list of LTP areas that cannot be changed without NRC approval does not include the two additional areas described in NUREG-1700, Revision 2, Appendix B or, revise the proposed LC to reflect those two additional areas. If those two additional evaluation areas are not to be included in proposed condition 3.D, please describe how any changes to those two areas would be controlled in the LTP.

CL-2 Clarification of Figures Showing Random Sample and Scan Locations

Comment: The information shown on the figures need to be clarified.

Basis: The Survey Unit Random Sample and Scan Locations figures referenced in Sections 2.3.2.1.1-2.3.2.1.3, are inconsistent in the information conveyed. Survey Unit 8100 Figure 2-26 has a legend that includes locations for walkover grids, Figure 2-28 (SU 8200) has no legend, and Figure 2-30 (SU 8300) and others show a legend with only sample locations. The dot within a circle indicates a soil sample location per the legend in the lower right corner of Figure 2-30 but does not state if the circle represents the scan area like the legend for Figure 2-26. The title of Figure 2-26 indicates that it includes "Scan Locations." Figure 2-30 is believed to convey the same information but has a legend in the lower left showing the circled dot as a sample location rather than as a random sample location. Consistent survey data presentation in figures is required under 10 CFR 20.1501(a)(2) and is needed by NRC staff to better understand the information in the figures.

Request: The licensee should provide updated figures with consistent legends and data consistent with the legend and titles for those figures that indicates the meaning of each mark on the figure and that corresponds to the text describing the figure.

CL-3 Scan Alarms

Comment: Provide a description for the “Scan Alarms” indicated in Table 2-83.

Basis: Table 2-83, “Turbine Building Scan Results,” indicates that at four locations there were “Scan Alarms.” Clarification is needed to demonstrate compliance with 10 CFR 20.1501(a)(2) on the adequacy of surveys for residual radioactivity.

Request: Please provide a description on what the “Scan Alarms” are.

CL-4 Inconsistent Low-Level Waste Volumes

Comment: The low-level radioactive waste volumes given in two places in the LTP are different from each other and both are different than the volume given in the Site-Specific Decommissioning Cost Estimate (DCE).

Basis: The requirement in 10 CFR 50.82(a)(9)(ii)(F), for an updated site-specific estimate of remaining decommissioning costs in the LTP, requires an estimate of low-level radioactive waste volumes from decommissioning so that waste disposal costs can be estimated as part of the site-specific DCE.

Page 3-21 of the LTP states “…the total volume of radioactive waste for disposal has been estimated at 3,222,861 cubic feet.” The sum of the volumes of waste in Class A, Class B/C and Greater than Class C in Table 3-4 is 3,334,679 cubic feet. Table 6-5 of the DCE, that was provided in the June 15, 2022, LTP RAI response, contains a breakdown of Class A, B/C and Greater than Class C waste. The total volume of those wastes is 2,499,928 cubic feet.

Request: Clarify the difference between these estimates of the total quantity of radioactive waste and/or provide a consistent projected volume for each class of radioactive waste.

CL-5 Methods Anticipated to be Used to Determine Ambient Background

Comment: Clarify the methods anticipated to be used to determine ambient background as discussed in section 5.2.4 of the LTP.

Basis: Section 5.2.4, “Reference Areas and Materials,” does not specifically state what methods would be used to determine ambient background when performing surveys. This information is necessary to demonstrate compliance with 10 CFR 20.1501(a)(2) on the adequacy of surveys for residual radioactivity.

Request: The licensee should describe the process for obtaining ambient background levels during surveys. A specific consideration for staff would be a discussion on how ambient background might change in a survey unit and how a revised ambient background would be determined.

CL-6 Verification of As Low As is Reasonably Achievable (ALARA) Parameters

Comment: The ALARA evaluation are using parameters inconsistent with the values present in the references/citations.

Basis: In Section 4.4.1.2 of the LTP, the licensee references a transportation fatal accident rate that appears inconsistent with the value in the cited document. The licensee should verify it is using the correct values in the reference document, or more recent document if available, to perform its evaluations.

Request: Revise the ALARA evaluations, as appropriate, to be consistent with the cited values/parameters after verifying the values being cited.

CL-7 In Situ Object Counting System (ISOCS) Use

Comment: Clarification is needed on how the licensee will address ISOCS field of view (FOV) uncertainties as discussed in sections 5.3 through 5.5 of the LTP. Verify that the RASS performed prior to ISOCS measurements will ensure a relatively homogenous radiation fluence is present in the ISOCS FOV (i.e., no DRPs or hot spots will be present).

Basis: Section 5.3, “Final Status Survey Design,” Section 5.4, “Final Status Survey Implementation,” and Section 5.5, “Final Status Survey Data Assessment” of the LTP address the use of ISOCS measurements for RASS and FSS. NUREG-1700, Section 5, “Final Radiation Survey Plan,” calls for a demonstration that the in-situ sample measurements with field instruments, and the associated survey methods, have adequate sensitivity as part of the FSS design. Accordingly, the LTP should address survey areas where inconsistent geometry is present (e.g., corners, junctions of walls, etc.) relative to ISOCS measurements and what determines when an ISOCS measurement location is “unsuitable.” This is needed to ensure an adequate survey is conducted consistent with the requirements of 10 CFR 20.1501.

Request: Update the appropriate discussions in the LTP regarding use of ISOCS and how prior to the use of ISOCS it is ensured that no DRPs or elevated areas are present in the ISOCS

FOV. Describe how if an elevated area is present, the ISOCS may still be used to investigate the area relative to its FOV of the elevated area. Also discuss the possibility of utilizing combinations of in situ and conventional measurements as part of the overall FSS design and how ISOCS measurements will be conservatively performed when uncertain geometries are being measured.