COMMENT RESPONSE MATRIX FOR UNITED STATES ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON:

DRAFT BASIS FOR SECTION 3116 DETERMINATION FOR CLOSURE OF F-TANK FARM AT THE SAVANNAH RIVER SITE DOE/SRS-WD-2010-001, REVISION 0 SEPTEMBER 30, 2010

SAVANNAH RIVER SITE
AIKEN, SOUTH CAROLINA

DOE-SR COMMENT RESOLUTION FORM

March 2012

UNITED STATES DEPARTMENT OF ENERGY SAVANNAH RIVER SITE	Document Review Record SRR-CWDA-2011-00118, Revision 0	
Document No./Title: DOE/SRS-WD-2010-001, Draft Basis for Section 3116 Determination for Closure of F-Tank Farm at the Savannah River Site	Rev.: Revision 0	Doc. Date: 9/30/2010
Commenter(s): United States Environmental Protection Agency		Contact: Sherri Ross

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	Comments from EPA Cover Letter	
1	The Draft Basis Document generally provides a sufficient level of explanation to substantiate the conclusion that the stabilized residuals in the F-Tank Farm (FTF) meet the requirements of the NDAA. However, one major potential deficiency remains in the information presented related to the Performance Assessment modeling and NDAA compliance which was discussed during a December 14, 2010 teleconference call that SRS hosted for the Nuclear Regulatory Commission (NRC). The NRC raised the concern that review of reference document WSRC-TR-2007-00283 revealed information pertaining to the presence of voids in the subsurface at the FTF, known as Calcareous Zones, which may exist in the lower zone of the Upper Three Runs (UTR) Aquifer. Presence of voids in the subsurface could lead to preferential flow pathways for movement of contaminants in the subsurface, which could potentially and significantly impact the conclusions of the current performance assessment (PA) modeling. It is unclear if the PA modeling considered the scenario of void volumes and preferential pathways in the subsurface…. The Draft Basis Document will need to be revised to state whether Calcareous Zones and the potential for preferential flow pathways was considered in the PA modeling before any conclusions can be drawn about the sufficiency of the information provided with respect to exhibiting compliance with NDAA requirements.	The Nuclear Regulatory Commission (NRC) asked multiple questions regarding how the potential presence of calcareous zones in the vicinity of the F-Tank Farm (FTF) might impact the FTF Performance Assessment (PA) modeling results and/or conclusions. [ML1032001240, ML103190402] Specifically, NRC staff comments RAI-PA-2, CC-PA-2, RAI-FF-1, RAI-FF-2, RAI-FF-3, RAI-FF-4, and RAI-SS-3 are all associated in some way with the potential impact of calcareous zones on the FTP PA. The Department of Energy (DOE) responses to the NRC staff comments (SRR-CWDA-2011-00054) provide the detailed information needed to conclude that the potential presence of calcareous zones in the vicinity of the FTF does not negatively impact the FTP PA modeling results and/or conclusions. These responses are available for public review at the following websites: http://sro.srs.gov/f_htankfarmsdocuments.htm and www.em.doe.gov The NRC indicated particular interest in the possibility of extreme heterogeneities in calcareous and surrounding sediments (in the form of sink holes, voids, and conduits) that may not be reflected in the GSA/PORFLOW model utilized in the FTF PA. Although various early documents describe voids, drilling fluid losses, and grout takes associated with the Santee Formation (e.g., Calcareous Zone, Lower Aquifer Zone), there is in fact no evidence of actual subsurface voids, karst, or caves that would act as open flow conduits. As discussed fully in the DOE response to NRC staff comment RAI-FF-1, the available geologic characterization data and associated interpretations do not support the existence of open

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		voids or conduits that would constitute extremely high conductivity pathways for groundwater flow and contaminant transport. The calcareous zones are not treated separately in the FTF PA flow models because the soft zones are isolated and discontinuous in the General Separations Area (GSA), representing only a small fraction of the Upper Three Runs (UTR)-Lower Zone (LZ) aquifer. These features occur near the base of the UTR-LZ in the GSA and do not extend through the entire thickness of the aquifer. Confirmatory borings and careful study of previously grouted zones revealed no significant thicknesses of grout. While Savannah River Site (SRS) soft zones have not been studied using tracer tests, and no unusual hydraulic gradients or unexpected flow conditions have been documented in the FTF or GSA, soft zones have been the subject of many general and facility-specific investigations, the conclusions of which are summarized in the DOE response to NRC staff comment RAI-FF-1. DOE believes the impacts associated with calcareous zones have been appropriately evaluated in the FTF PA modeling and therefore no impacts have been identified as a result of the subsurface calcareous zones The NRC has reviewed the information presented in the DOE responses to NRC staff comments and documented their consultative review, observations and recommendations in the NRC Technical Evaluation Report (TER). [ML112371715] The NRC states in the TER, "NRC staff is convinced that large voids do not currently exist in the subsurface along flow paths to the 100 m (330 ft) point of compliance." The NRC also recommends, "Additional information could be collected during the monitoring period to support DOE's modeling treatment of the calcareous zones in the lower portion of the UTR aquifer." Along these lines, the NRC provides several recommendations for DOE's consideration. DOE will evaluate the recommendations as part of PA maintenance under DOE Manual 435.1-1,

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		which accompanies DOE Order 435.1, Change 1, pursuant to DOE's responsibilities under the Atomic Energy Act of 1954, as amended.
	I - General Comments from Enclosure	
1	The text in Section 2.4, Radionuclide Inventory in F-Tank Farm Facility Systems, Structures and Components, of the Draft Basis Document discusses the methodology for adjusting the radionuclide inventory for modeling purposes. However, the explanation of how radionuclides with inventories of less than one curie (Ci) are adjusted requires clarification. The text in the last paragraph on Page 2-68 states "For a majority of the radionuclides with an adjusted inventory less than one curie, the inventories were adjusted to either one curie or the analytical detection limit (1.0E-03 Ci). This allows more efficient and cost effective means of confirming concentrations within residual materials for radionuclides that have been observed (through previous analyses or scoping studies) to have greater potential impact on the overall dose, the inventory was adjusted to the analytical detection limit." It is unclear why radionuclides which have a greater potential impact on dose would be adjusted to the analytical detection limit of 0.001 Ci, rather than the higher concentration of one Ci. The text in Section 2.4 does not state why it was decided to adjust radionuclide concentrations for isotopes that have the greater impact to dose to the detection limit, while other radionuclide concentrations were adjusted to one Ci. Additionally, since current laboratory radioanalytical methods are capable of detecting individual radionuclides at much	The discussion contained within Section 2.4 of the *Draft Basis for Section 3116 Determination for Closure of F-Tank Farm at the Savannah River Site* (hereinafter referred to as: Draft FTF 3116 Basis Document) (DOE/SRS-WD-2010-001) is a summary of the methodology utilized to develop the FTF PA estimated residual radionuclide inventory. The underlying intent of the inventory methodology was to ensure that the inventory used in FTF modeling was reasonably conservative but at the same time did not artificially focus attention on constituents unreasonably and distract from constituents that would be legitimate concerns. The majority of the radionuclides with an originally adjusted inventory less than one curie did not pose a potential dose risk, so allowing them to be modeled with a more conservative inventory would not impact the dose results but would allow for comparison, at the time of final residual characterization, to the estimated residual inventory to be accomplished more easily, since the higher the inventory assumed, the less effort is required to confirm the existence or lack thereof for a constituent. Those radionuclides that did present a dose risk had their inventory projections artificially exaggerated (i.e., increased in value beyond DOE's best estimate), to a generalized analytical detection limit of 1.0E-03 Ci if their originally adjusted inventory was less than this value. Those radionuclides with an originally adjusted inventory of less than one curie that did not present a dose risk had their estimated residual inventory artificially exaggerated to 1.0 Ci. In either case, it was believed that the value assumed in the estimated residual inventory for such radionuclides would be found to be conservative once the individual waste tanks are cleaned and the remaining residuals are characterized, through sampling and analysis, prior to operational closure.

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	smaller quantities than 0.001 Ci, it is unclear what instrumentation was used to quantitate the radionuclide concentrations referenced in this section of the text, or how the 0.001 Ci analytical detection limit was derived. Provide a response, and as appropriate, revise the Draft Basis Document to provide additional explanation regarding how the referenced analytical detection limits were obtained and why the inventory adjustments were made as described in the text.	It should be noted that the values used (either one curie or analytical detection limit) are simply reasonably conservative inventory estimates used to inform the FTF PA. These values were not used to adjust estimated inventories downward nor are they meant to supersede actual sample results. At the completion of waste removal for each of the waste tanks (or groups of waste tanks) and ancillary structures as appropriate, the estimated residual inventory identified in the FTF PA will be compared and evaluated against the actual residual inventory determined during final residual characterization after the waste tank or ancillary structure has been cleaned. The actual residual inventory will be developed from a determination of the residual material volume combined with analytical data from a statistically based sampling program of the residual material. This process has been completed for Tanks 18 and 19, and actual residual information is reflected in the final *Basis for Section 3116 Determination for Closure of F-Tank Farm at the Savannah River Site* (hereinafter referred to as: FTF 3116 Basis Document) (DOE/SRS-WD-2012-001), the *Tank 18/Tank 19 Special Analysis for the Performance Assessment for the F-Tank Farm at the Savannah River Site* (SRR-CWDA-2010-00124) and associated references. The detection limit of 1.0E-03 Ci used to develop the estimated residual inventory is based on the estimated residual volume at closure and the analytical detection limit in terms of concentration. The analytical limit used in all cases, in terms of concentration, was 1.0E-04µCi/g. This analytical limit is a generality since actual detection limits are based on the specific radionuclide, the type of sample material, and many other factors. The limit of 1.0E-04µCi/g was chosen because of the confidence in the ability to measure below this level for all radionuclides. Use of this value limits the need to confirm estimates to unnecessarily low levels which would require additional cost and schedule for no additional benefit.

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	II – Specific Comments from Enclosure	
1	Table 2:1-5, Summary of Maximum Groundwater Monitoring Results for Major Areas that Outcrop to Fourmile Branch, 2007-2007, Page 2-28: As gross alpha and beta should only to be used for screening, the specific alpha and beta radionuclides need to be provided. Once either individual radionuclide are known to exist or the Safe Drinking Water Standards are exceeded (15 pCi/L, gross alpha, & 50 pCi/L) then specific radionuclides are to be analyzed for, and compared against, either individual Maximum Contaminant Levels (MCLs), or, if no MCLs exist, risk-based levels.	DOE acknowledges and performs radionuclide speciation for gross alpha and beta results above site screening values. Table 2.1-5 on page 2-28 of the Draft FTF 3116 Basis Document is an excerpt from Table 7-1 on page 7-9 of the *Savannah River Site 2007 Environmental Report.* [WSRC-STI-2008-00057] The table was presented to provide the reader with an understanding of the current conditions associated with SRS groundwater for areas that outcrop to Fourmile Branch. This report and associated data files, which provide the specific groundwater monitoring results including radionuclide speciation results, can also be found on the web at: http://www.srs.gov/general/pubs/ERSum/index.html The FTF General Closure Plan and subsequent Closure Modules for specific waste tanks or tank systems, which are described in Section 8 of the Draft FTF 3116 Basis Document, address compliance with the Safe Drinking Water Standards and comparison to individual Maximum Contaminant Levels (MCLs) and risk-based levels. No change to the FTF 3116 Basis Document has been made in this regard.
2	**S**ection 2.1.8, Natural and Background Radiation, Page 2-28: The overall chemical background exposure (e.g. from Table 2.1.3) should be provided if the overall radiation background is given. Just showing how SRS radiation releases compare to the overall radiation background doses is not sufficient (although common and convenient due to known general background sources of radiation). To give perspective, this should also be done for metals and chemicals.	The purpose of the Draft FTF 3116 Basis Document was to facilitate consultation with the NRC under Section 3116(a) of the Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005 (NDAA), and the final FTF 3116 Basis Document provides a basis for the determination by the Secretary of Energy, in consultation with the NRC, that the criteria in Section 3116(a) are met and that the waste is not high-level waste. [DOE-WD-2012-001] The metals and chemical hazards associated with closure of the FTF are not part of the criteria set forth in Section 3116(a) of the NDAA. However, the metals and chemicals associated with FTF closure are addressed in the FTF General Closure Plan and subsequent Closure Modules for specific waste tank or tank systems, which is described in

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		Section 8 of the Draft FTF 3116 Basis Document. No change to the FTF 3116 Basis Document has been made in this regard.
3	Section 2.4, Radionuclide Inventory in F-Tank Farm Facility Systems, Structures, and Components, Page 2-65: Can analysis from previous leaks be used to help provide source types, or % or types of particular radionuclides in a given tank?	The inventory used in FTF modeling represents the residual material anticipated to be remaining in the waste tanks and ancillary structures at the time of operational closure. As such, the material remaining in the waste tank is expected to be the dense insoluble material left in the waste tanks after waste tank cleaning. The single instance where material has leaked from a waste tank into the surrounding soils (i.e., overflow of waste tank riser) involved supernate, which would typically contain much more soluble material than would be present in a waste tank after cleaning. Given the differences between the two types of material (i.e., insoluble solids versus supernate), the leaked material would not be representative of the residuals that would remain in the waste tanks or ancillary structures at the time of closure. This same discussion is applicable to those waste tanks that have had leaks from the primary waste tank into the tank annulus. The waste in the tank annuli is representative of supernate that was contained in the waste tanks at the time leakage from the primary tank occurred and would not be representative of insoluble solids that may remain at the conclusion of waste tank cleaning.
4	Section 2.4.1, Residual Inventory for Tank Annuli, Inside Failed Cooling Coils and Internal Tank Surfaces, Page 2-69: The text in Section 2.4.1 states that cooling coils with the potential for residual waste holdup will be evaluated and flushed appropriately. However, the text does not state how cooling coils that are not well positioned for access or flushing, or that have been bent or broken due to cleaning activities, have been evaluated to determine if these coils still contain residual waste. Additionally, the text does not discuss whether the cooling coils may contain void volume	Similar to other equipment that will be entombed inside of waste tanks at closure, cooling coils will be evaluated on a tank-by-tank basis to determine the best approach to flushing, grouting, and determination of potential waste hold up. In their intact design configuration, all cooling coils have a supply pipe and a return pipe that provide access at the waste tank top for flushing and grouting from either end. Failed cooling coils include those that are broken, cut, or breached, and these coils are typically identified visually or by performing pressure tests on the cooling coils. Failed cooling coils that remain connected to the supply piping or return piping can be flushed and grouted from the waste tank top utilizing the supply piping,

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	that cannot be eliminated with grouting. Provide a response, and as appropriate, revise the Draft Basis Document to state how or whether cooling coils that are bent or broken were evaluated to determine whether they contain waste or void volume.	return piping, or both. Sections of cooling coils that are disconnected from both the supply and return piping will be evaluated for potential waste hold up, and impact on closure. Failed cooling coils inside the waste tank that cannot be assuredly filled with grout are not expected to provide a vertical fast flow path from the waste tank top to the contamination zone at the bottom of the waste tank for the following reasons. Vertical cooling coils do not extend all the way to the waste tank roof and are configured so that a minimum of 18 to 25 inches of grout can be placed above the top of the coils, in addition to the 30 inches (or more) of cover provided by the waste tank roof. As described above, any failed cooling coils that could not be accessed either by the supply piping or return piping would not extend to the top of the waste tank and therefore would not provide a fast flow path to the residual. No change to the FTF 3116 Basis Document is planned.
5	Section 2.5, Residual Waste Stabilization, Page 2-71: Section 2.5 states that cooling coils will be grouted to minimize void spaces, to minimize fast flow pathways, and to provide stability. However, this section does not state how cooling coils that were bent or broken due to cleaning activities can be assured to be filled with grout in order to eliminate void volumes that may serve to function as fast flow pathways for water movement or contaminate migration. Revise Section 2.5 to state how damaged cooling coil voids will be minimized or eliminated and/or if void volumes in cooling coils were modeled in the F-Tank Farm Performance Assessment (PA).	See DOE response to Specific Comment #4 above.
6	Section 5.1.3, Highly Radioactive Radionuclides Based on 100-Meter Groundwater Analysis (For Member of the Public Following Closure), Page 5-4: The third paragraph in Section 5.1.3 states that those radionuclides with an	During the course of NRC's consultative review, NRC questioned the potential for calcareous zones at SRS. DOE has evaluated the modeling performed in the FTF PA considering the potential effects of the presence of calcareous zones. As described further in the response to Environmental

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	aggregate contribution to dose of less than or equal to 1.25 millirems per year (mrem/year) were eliminated from the Highly Radioactive Radionuclide (HRR) list. This screening for a member of the public assumes peak doses were appropriately modeled. In light of concerns raised regarding the presence of Calcareous Zones in the lower zone of the Upper Three Runs aquifer (UTR) as discussed during the December 14, 2010 teleconference hosted by the Savannah River Site (SRS) with the Nuclear Regulatory Commission (NRC) regarding the Draft Basis Document, uncertainty exists as to the robustness of the modeling for contaminant migration in the PA modeling because it is unclear whether these calcareous zones were appropriately accounted for in the model(s). Therefore, it is unclear if open conduits may exist or may develop along the projected contaminant migration pathways which would alter the migration rate of radionuclides and would alter the human health risk assessment conclusions regarding public exposure at the 100 meter compliance point. Provide a response to address the concern that calcareous Zones may not have been accounted for in the PA Modeling which may affect the results of the contaminant migration modeling and projected dose to a member of the public at the 100 meter compliance point. Additional information is requested in order to demonstrate that current PA modeling and risk assessment conclusions are sufficiently justified as support for the Draft basis Document conclusion. Additional text is needed discussing that the screening of radionuclides for designation as HRRs is adequate for the purposes of showing compliance with the NDAA	Protection Agency (EPA) cover letter Comment #1 above, the potential presence of calcareous zones in the vicinity of the FTF does not impact the conclusions of the current FTF PA modeling or the Draft FTF 3116 Basis Document. The NRC has reviewed the calcareous zones information presented in the DOE responses to NRC staff comments (SRR-CWDA-2011-00054) and documented their consultative review, observations and recommendations in the NRC TER (ML112371715). The NRC states in the TER, "NRC staff is convinced that large voids do not currently exist in the subsurface along flow paths to the 100 m (330 ft) point of compliance." The NRC also recommends, "Additional information could be collected during the monitoring period to support DOE's modeling treatment of the calcareous zones in the lower portion of the UTR aquifer." Along these lines, the NRC provides several recommendations for DOE's consideration. DOE will evaluate the recommendations as part of PA maintenance under DOE Manual 435.1-1, which accompanies DOE Order 435.1, Change 1, pursuant to DOE's responsibilities under the Atomic Energy Act of 1954, as amended. Regarding Highly Radioactive Radionuclides (HRRs), the NRC concluded in the TER that, "DOE's process for identification of HRRs is reasonable." The NRC also recommended that DOE continue to evaluate its HRR list as additional information becomes available, to the extent that the list is used to inform decisions relative to characterization, selection of treatment technologies, and radionuclide screening for PA calculations. DOE agrees with this recommendation, and will continue to evaluate these areas as part of PA maintenance, and will continue to emphasize HRRs in the selection of cleaning technologies and the characterization of residuals.

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	requirement that HRRs have been removed to the maximum extent possible.	
7	Section 5.1.3, Highly Radioactive Radionulcides Based on 100-Meter Groundwater Analysis (for Member of the Public Following Closure), Page 5-4, [& also Section 5.2, Page 5-9]: Instead of using 1.25 mrem/yr as the lower limit, should MCLs be considered (i.e. the equivalent pCi/L to the "old" 4 mrem/yr dose nomenclature – may in many cases be now equivalent to approximately 1 mrem/yr or so [e.g. Tc99: 900 pCi/L MCL is ~ 1 mrem/yr using today's conversion factors])? Additionally, EPA considers the 25 mrem/yr "all pathways dose limit" as being above the CERCLA risk range, 10-6 to 10-4, and thus not protective under CERCLA (obviously, if the risk range is achieved, then DOE's dose will be met as well).	The referenced MCLs pertain to the EPA dose limit of 4 mrem/yr applicable to public drinking water systems. DOE's evaluation and requirements associated with the drinking water standard is addressed in the FTF General Closure Plan discussed in Section 8 of the Draft FTF 3116 Basis Document. The relevant criteria in Sections 3116(a)(3)(A)(i) and (a)(3)(B)(i) of the NDAA however call for disposal in compliance with the NRC performance objectives at 10 Code of Federal Regulations (CFR) 61, Subpart C, which in turn specify a 25 mrem/year all pathways dose limit (10 CFR 61.41). Compliance with the drinking water standards or the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) risk range is therefore outside the scope of the 3116(a)(3)(A)(i) and (a)(3)(B)(i) criteria and the discussion in the FTF 3116 Basis Document concerning those criteria. Furthermore, DOE believes it is inappropriate to use alternate standards (EPA drinking water standards or CERCLA risk range) not specified in Section 3116(a) in establishing screening criteria for compliance with the Section 3116(a) criteria especially considering 1) the differences in dose conversion factors between DOE's FTF PA analysis and development of the MCLs and 2) the fact that water consumption is only one of many pathways associated with the "all pathways dose limit" specified in the NRC performance objective, as cross-referenced in the 3116 criteria. No change to the FTF 3116 Basis Document has been made in this regard.
8	Section 5.1.4, Highly Radioactive Radionuclides Based on Air Pathway Analysis (For Member of the Public Following Closure), Page 5-5: The air pathway evaluation for HRRs is based on information obtained from the F-Tank Farm PA modeling for radionuclide release and	DOE has evaluated the modeling performed in the FTF PA considering the potential effects of the presence of calcareous zones. As described further in the response to EPA cover letter Comment #1 above, the potential presence of calcareous zones in the vicinity of the FTF does not impact the current FTF PA modeling or the Draft FTF 3116 Basis Document. The

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	migration, which concludes the aggregate concentration of radionuclides in air media at the 100-meter compliance point, will not result in a dose greater than 0.2 mrem/yr. As such, the text in Section 5.1.4 states that this pathway was eliminated from consideration as one which includes HRRs. In light of concerns raised in the December 14, 2010 SRS/NRC teleconference regarding the presence of Calcareous Zones in the UTR aquifer, additional information which supports that current PA modeling adequately accounts for the potential voids created by Calcareous Zones should be provided. This information is required to provide adequate support or statements that HRR screening for the air pathway is sufficiently justifiable, in accordance with the NDAA Section 3116 requirements.	NRC has reviewed the calcareous zones information presented in the DOE responses to NRC staff comments (SRR-CWDA-2011-00054) and concurs with the conclusions presented therein, as documented in the NRC TER (ML112371715). No change to the FTF PA modeling or the FTF 3116 Basis Document has been made in this regard.
9	Section 5.1.5, Highly Radioactive Radionuclides Based on Intruder Pathway Analysis, Page 5-5: Section 5.1.5 states that radionuclides shown to result in a dose contribution to the inadvertent intruder which in aggregate, contributed a dose of less than or equal to 25 mrem/yr, were screened from the HRR list. In light of concerns regarding the presence of Calcareous Zones in the UTR aquifer, additional information supporting that current PA modeling adequately accounts for the potential voids created by Calcareous Zones should be provided. This information is required to provide additional support to statements that HRR screening for the Intruder pathway is sufficiently accurate, in accordance with the NDAA Section 3116 requirements.	DOE has evaluated the modeling performed in the FTF PA considering the potential effects of the presence of calcareous zones. As described further in the response to EPA cover letter Comment #1 above, the potential presence of calcareous zones in the vicinity of the FTF does not impact the conclusions of the current FTF PA modeling or the Draft FTF 3116 Basis Document. The NRC has reviewed the calcareous zones information presented in the DOE responses to NRC staff comments (SRR-CWDA-2011-00054) and documented their consultative review, observations and recommendations in the NRC TER (ML112371715). The NRC states in the TER, "NRC staff is convinced that large voids do not currently exist in the subsurface along flow paths to the 100 m (330 ft) point of compliance." The NRC also recommends, "Additional information could be collected during the monitoring period to support DOE's modeling treatment of the calcareous zones in the lower portion of the UTR aquifer." Along these lines, the NRC provides several recommendations for DOE's consideration.

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		DOE will evaluate the recommendations as part of PA maintenance under DOE Manual 435.1-1, which accompanies DOE Order 435.1, Change 1, pursuant to DOE's responsibilities under the Atomic Energy Act of 1954, as amended. (See additional discussion in the FTF 3116 Basis Document.) Regarding HRRs, the NRC concluded in the TER that, "DOE's process for identification of HRRs is reasonable." The NRC also recommended that DOE continue to evaluate its HRR list as additional information becomes available, to the extent that the list is used to inform decisions relative to characterization, selection of treatment technologies, and radionuclide screening for PA calculations. DOE agrees with this recommendation and will continue to evaluate these areas as part of PA maintenance and the selection of cleaning technologies which may become available in the future.
10	Section 5.1.5, Highly Radioactive Radionuclides Based on Intruder Pathway Analysis, Page 5-5: The text in Section 5.1.5 does not describe the exposure scenario assumed for the intruder Pathway analysis. Therefore, the conclusions are not well supported by statements provided regarding the screening of HRRs. For clarity in understanding the process that supports conclusions regarding HRRs for the intruder scenario, revise this section of the Draft Basis Document to qualitatively describe what intruder exposure assumptions were considered in determining which radionuclides were determined to not contribute to dose greater than 25 mrem/yr (i.e., ingestion, direct exposure). Alternatively, include text that refers the reader to Section 7, The Waste will be Disposed of in Accordance with the Performance Objectives Set Out in 10 CFR 61, Subpart C, which describes the exposure scenarios.	DOE agrees with the comment and has added text to Sections 5.1.3, 5.1.4, and 5.1.5 in the final FTF 3116 Basis Document to refer the reader to specific sections of the FTF 3116 Basis Document that provide descriptions of the scenarios and exposure pathways considered in the analyses.

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11	Section 5.1.5, Highly Radioactive Radionuclides Based on Intruder Pathway Analysis, Page 5-6, last paragraph: Has the 500 mrem/yr peak intruder dose been approved by SC and EPA? Is 100 yrs after closure long enough to exclude CERCLA's risk range?	The Draft FTF 3116 Basis Document demonstrates that the criteria in Section 3116(a) of the NDAA will be met at closure of FTF, and the final FTF 3116 Basis Document provides a basis for the determination by the Secretary of Energy, in consultation with the NRC, that the criteria in Section 3116(a) are met and that the waste is not high-level waste. [DOE-WD-2012-001] The relevant criteria in Sections 3116(a)(3)(A)(i) and (a)(3)(B)(i) of the NDAA call for disposal in compliance with the NRC performance objectives at 10 CFR 61, Subpart C, which include a performance objective for protection of individuals from inadvertent intrusion (10 CFR 61.42). Although that performance objective does not specify a dose limit, the 500 mrem/yr peak intruder dose "limit" is based on the NRC's 10 CFR 61 Final Environmental Impact Statement and NRC guidance documents, NUREG-0945 and NUREG-1854, as explained in Section 5.1.5 (Page 5-6) and 7.1.5.1 (Page 7-7) of the Draft FTF 3116 Basis Document. Approval by the State of South Carolina or EPA of that 500 mrem/yr peak intruder dose limit is not called for, authorized by or required by Section 3116 or NRC guidance. The 100-year institutional control period DOE uses to exclude members of the public from intruding onto the disposal facility (within the 100-meter buffer zone) is only for modeling purposes in determining potential doses. As described in Section 2.1.1.4 (Page 2-6) of the Draft FTF 3116 Basis Document, DOE assumes the Federal Government continues to own and control SRS in perpetuity which would minimize the potential for intruder doses. The 100-year institutional control period used for purposes of modeling should not be confused with DOE's responsibility and commitments toward risk management. CERCLA risk will be addressed following closure of the FTF in accordance with the Federal Facility Agreement. Additional, Interim Resource Conservation and Recovery Act (RCRA)/CERCLA controls will be established in accordance with Section

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		3.3 of the FTF General Closure Plan (LWO-RIP-2009-00009) which is discussed in Section 8 of the Draft FTF 3116 Basis Document.
12	Section 5.2.2, Waste Removal Technologies, Page 5-10: Section 5.2.2 references use of a systematic process to identify, evaluate, and select equipment for waste removal for previously cleaned tanks and that the process is documented in a "Systems Engineering Evaluation." While it appears that a formal process was used to implement the best available technology during previous waste removal activities, it is not clearly stated what specific processes will be implemented to address alternative waste removal techniques in future actions. For example, what selection process will be used for Type I tanks where it has been determined that existing technologies used in Type IV tanks will not be deployable? Additional information should be provided in the Draft Basis Document addressing the process that will be used for technology screening and selection.	Additional information on the process for evaluating and selecting available waste removal technologies for each waste tank in the closure process is provided in *Waste Removal Technology Baseline: Technology Development Description,* V-ESR-G-00003. The referenced document provides a more thorough description of the waste removal technology selection process, the current baseline technologies, and consideration of future technologies. A recent example of how DOE evaluates potential technologies is documented in *Cost-Benefit Analysis for Removal of Additional Highly Radioactive Radionuclides From Tank 18,* SRR-CWDA-2012-00026. DOE has added a reference to both of these documents in the FTF 3116 Basis Document. The above referenced documents, V-ESR-G-00003 and SRR-CWDA-2012-00026, are available for public review at the following websites: http://sro.srs.gov/f_htankfarmsdocuments.htm and www.em.doe.gov
13	Section 5.2, Removal of Highly Radioactive Radionuclides to the Maximum Extent Practical (MEP), Page 5-9: Section 5.2 and its subsections discuss the removal of highly radioactive radionuclides (HRRs) and Section 5.3 discusses removal of HRR to the maximum extent practical (MEP). These sections discuss selection, deployment, and evaluation of existing technologies to remove HRR to the MEP, with a particular focus on previous removal actions in Type IV tanks. It is noted on page 5-12 that Type I tanks represent: "…the most challenging tank for waste removal activities due, in part, to a limited number of	Additional information on the process for evaluating and selecting available waste removal technologies for each waste tank in the closure process is provided in *Waste Removal Technology Baseline: Technology Development Description,* V-ESR-G-00003. The referenced document provides a more thorough description of the waste removal technology selection process, the current baseline technologies, and consideration of future technologies. A recent example of how DOE evaluates potential technologies is documented in *Cost-Benefit Analysis for Removal of Additional Highly Radioactive Radionuclides From Tank 18,* SRR-CWDA-2012-00026. DOE has added a reference to both of these documents in the FTF 3116 Basis Document. The

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	access points compared to a Type III/IIIA tank, the presence of roof support columns in the Type I tanks, and horizontal [coiling] coil runs at the bottom of the waste tank including stacked horizontal runs (often referred to as "fences")…" While the information provided in the Draft Basis Document is quite detailed on the selection and deployment of heel removal technologies for Type IV tanks, there is relatively little information regarding planned or contemplated technologies for removal of HRRs in the more challenging Type I and III/IIIA tanks. Additional information on anticipated methods for HRR removal to the MEP in Type I and III/IIIA tanks should be provided.	above referenced documents, V-ESR-G-00003 and SRR-CWDA-2012-00026, are available for public review at the following websites: http://sro.srs.gov/f_htankfarmsdocuments.htm and www.em.doe.gov
14	Section 5.3, Removal of Highly Radioactive Radionuclides to the Maximum Extent Practical, Pages 5-17 and 5-18: Neither the text in Section 5.3, nor the graphs in Figure 5.3-1, Tank 18 Waste Removal and Figure 5.3-2, Tank 19 Waste Removal, state what the specific volume of waste remaining in the tanks is estimated at the completion of the Phase Four heel removal. In order to better understand the amount of material left in the tanks in relation to the estimated inventories of radionuclides, it is recommended the volume of material to be left in each of the waste tanks 18 and 19 be provided in the text in Section 5.3. Additionally, consider revising the figures for tanks 18 and 19 to include volume amounts of material on the graph.	DOE agrees with this comment and has added the final volumes to the final FTF 3116 Basis Document. The final residual volumes for Tanks 18 and 19 were provided in Section 2.3.4 (page 2-62) of the Draft FTF 3116 Basis Document, however, DOE has also provided this information in Section 5.3 of the FTF 3116 Basis Document.
15	Section 5.4, Conclusion, Page 5-19: The Conclusion, states: "Removal of HRRs to the MEP in FTF waste tanks and ancillary structures occurs through a systematic	Additional information regarding the phases of DOE's waste retrieval activities and the decision processes for each of the phases is provided in the reference document *Approach to Documenting Removal of Radionuclides to*

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	progression of waste removal and cleaning activities using proven technologies to a point where further removal of HRRs is not sensible or useful in light of the overall benefit to human health, safety and the environment." It is not clear what specific decision processes will be used to establish when HRRs have been removed to the MEP. The Draft Basis Document should provide more specific information on how this determination will be made. It would seem appropriate to include more specific descriptions, or acceptance criteria, regarding how DOE will establish that "further removal of HRRs is not sensible or useful."	*Support DOE Closure Authorizations*, DOE/SRS-WD-2011-001. The referenced document outlines and describes the approach used by DOE for each of the SRS waste tanks and ancillary structures. DOE has added the information contained in the cited reference, DOE/SRS-WD-2011-001, as an appendix to the FTF 3116 Basis Document. The above referenced document, DOE/SRS-WD-2011-001 is available for public review at the following websites: http://sro.srs.gov/f_htankfarmsdocuments.htm and www.em.doe.gov
16	Section 6.3.2, Site Specific FTF Waste Concentration calculation Averaging Expressions, Page 6-5: Section 6.3.2 states: "The impact of drilling into a waste tank was also considered in the FTF PA with respect to the acute intruder, the well driller. Since the likelihood of a well driller penetrating a waste tank is very remote based on local drilling practices that would terminate the drilling once significant resistance is encountered, a chronic intruder was not assessed." Section 6.3.2.3 states: "The FTF PA probabilistic model was utilized to determine the dose to the chronic intruder assuming the 1-meter well contaminated source and one of the three drill cutting sources including a 3-inch diameter transfer line, a 4-inch diameter transfer line or waste tank." The reviewer could not identify probabilistic dose assessment results for the chronic tank intruder in the FTF PA. It is possible that such an analysis could predict significant dose to the chronic tank intruder, potentially in excess of the scenarios	Please note that the reference to the FTF PA probabilistic model in Section 6.3.2 (page 6-8) of the Draft FTF 3116 Basis Document was inadvertent. Development of the site-specific factors utilized the FTF PA deterministic model and its associated dose calculation methodology to determine the dose to the chronic intruder from the one-meter well contaminated source and one of three drill cutting sources: 3-inch transfer line, a 4-inch transfer line, or a waste tank. The FTF PA probabilistic analysis does not consider, as a credible source, the drill cuttings from a waste tank. Although the FTF PA does not consider the waste tank drilling scenario as a credible scenario, the FTF PA does present the dose consequences from drilling into a waste tank to the acute intruder, the actual driller, as a sensitivity analysis (FTF PA Section 6.5.2.2). However, for the purposes of calculating site-specific factors for determining whether 10 CFR 61.55 Class C concentration limits are met for a closed waste tank, the tank drilling scenario is considered as a source of contaminants to the chronic intruder. Discussion of results of this analysis are presented in the response to NRC staff comment CC-WC-1. [SRR-CWDA-2011-00054] DOE has revised the wording in Section 6.3.2

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	involving breach of a transfer line. If DOE performed this assessment, the results should be provided and discussed. If this assessment was not performed, it would seem appropriate to consider this potential future scenario.	of the final FTF 3116 Basis Document to clarify use of the deterministic model.
17	Section 6.4, Waste Concentration Calculation, page 6-10: Section 6.4 and its subsections provide calculations of radionuclides concentrations and compare the concentrations to the Class C concentration limits in 10 CFR 61.55. Section 6.4.1 states that "…the best estimate residual radionuclide inventory and residual volume for Tank 18 based on actual final characterization results is used…" to represent radionuclide concentrations in FTF tanks because "…Tank 18 is the primary contributor to the peak dose in the FTF." Additional information should be provided to justify the applicability of Tank 18 residual concentrations as a representative or conservative waste classification basis for all tanks in FTF. For example, it is possible that Type I tank residuals will be greater than Tank 18 due to the challenges associated with heel removal in Type I tanks. Alternatively, it may be appropriate to classify tanks individually or by type based on anticipated post-cleaning residual radionuclide inventories.	The Draft FTF 3116 Basis Document provides the methodology that DOE is utilizing for making comparisons to the concentration limits for Class C low-level waste (LLW) as set out in 10 CFR 61.55. At the time the Draft FTF 3116 Basis Document was prepared, only Tanks 18 and 19 final residual characterizations had been completed. This is still the case. The statement noted in this comment concerning Tank 18 was referring to Tank 18 being the primary contributor to the all-pathways peak dose in the performance period based on the FTF PA. Calculations for each of the FTF waste tanks and ancillary structures will be performed based on final residual characterization, when available, as part of the DOE Tier 2 closure authorization for that specific waste tank or ancillary structure. In addition, although DOE believes that the residual waste will meet Class C LLW concentration limits for all waste tanks, DOE has consulted with the NRC under both Sections 3116(a)(3)(A) and (a)(3)(B) -- concerning waste that meets or exceeds Class C concentration limits in 10 CFR 61.55, respectively -- to take full advantage of the consultation afforded under Section 3116 as explained in the Draft FTF 3116 Basis Document. In their TER, the NRC states, "NRC has reviewed DOE's disposal plans for the FTF waste as part of the extensive consultation process that is documented in this TER, thereby satisfying the requirements of Section 3116(a)(3)(B)(iii). Consequently, no additional DOE consultation with the NRC is required for tanks containing residual waste that might exceed Class C concentrations following final sampling and inventory development." [ML112371715]

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18	Section 6.4, Waste Concentration Calculation, Page 6-10: Section 6.4 and its subsections provide calculations of radionuclide concentrations and compare the concentrations to the Class C concentration limits in 10 CFR 61.55. Waste classification calculations are provided in for waste tanks and transfer lines in Sections 6.4.1 and 6.4.2, respectively. Waste classification calculations are not provided for ancillary structures. The reviewer did not identify an appropriate justification for exclusion of these structures or an appropriate justification for exclusion of these structures. Waste classification calculations should be performed to address ancillary structures or an appropriate justification for their exclusion should be provided.	The Draft FTF 3116 Basis Document provides the methodology that DOE is utilizing for making comparisons to the concentration limits for Class C LLW as set out in 10 CFR 61.55. At the time the Draft FTF 3116 Basis Document was prepared, only Tanks 18 and 19 final residual characterizations had been completed. This is still the case. Calculations for each of the FTF waste tanks and ancillary structures will be performed based on final residual characterization, when available, as part of the DOE Tier 2 closure authorization for that specific waste tank or ancillary structure. While DOE believes that the residual waste in the ancillary structures will meet Class C concentration limits, DOE has consulted with the NRC under both Sections 3116(a)(3)(A) and (a)(3)(B) -- concerning waste that meets or exceeds Class C LLW concentration limits in 10 CFR 61.55, respectively -- to take full advantage of the consultation afforded under Section 3116. In their TER, the NRC states, "NRC has reviewed DOE's disposal plans for the FTF waste as part of the extensive consultation process that is documented in this TER, thereby satisfying the requirements of Section 3116(a)(3)(B)(iii). Consequently, no additional DOE consultation with the NRC is required for tanks containing residual waste that might exceed Class C concentrations following final sampling and inventory development." [ML112371715]
19	Section 6.0 and Section 7.0 (complete): Section 6.0 and its subsections establish that FTF stabilized residuals at closure will meet the concentration limits for Class C low-level waste. Section 7.0 and its subsections establish that the stabilized residuals at closure will be disposed of in compliance with the performance objectives for land disposal of low-level waste (10 CFR 61, Subpart C). Determinations in each of these sections are, in part, based on results of past waste removal actions and anticipated	The Draft FTF 3116 Basis Document provides the methodology that DOE is utilizing for making comparisons to the concentration limits for Class C LLW as set out in 10 CFR 61.55. Calculations for each of the FTF waste tanks and ancillary structures will be performed based on final residual characterization, when available, as part of the DOE Tier 2 closure authorization for that specific tank or ancillary structure. In addition, as part of DOE's Tier 2 closure authorization, DOE will also document an evaluation of the impact of the final residual characterization against the conclusions reached in the FTF PA in a "Special Analysis" for the FTF PA.

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	results of future removal actions. It is possible that future waste removal actions may not be as effective as anticipated. The reviewer could not identify how, or if, the actual results of future waste removal actions will be evaluated against assessments in the Draft Basis Document. Will final post-removal characterizations data be used to confirm that the stabilized residuals meet the Class C waste concentration limits and that they are suitable for shallow land disposal? If so, the Document should specifically state this.	DOE has added a brief description of this process as an Appendix to the final FTF 3116 Basis Document as described in the response to EPA Specific Comment #15 above.

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NUREG-1854, *NRC Staff Guidance for Activities Related to U.S. Department of Energy Waste Determinations, Draft Final Report for Interim Use*, U.S. Nuclear Regulatory Commission, Washington DC, August 2007.

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SRR-CWDA-2012-00026, *Cost-Benefit Analysis for Removal of Additional Highly Radioactive Radionuclides From Tank, Savannah River Site*, Aiken, SC, Rev. 1, March 7, 2012.

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