SAVANNAH RIVER SITE CITIZENS ADVISORY BOARD

P.O. Box A ◇ Building 730-B, Room 1184 ◇ Aiken, SC 29802

A Department of Energy Environmental Management Site-Specific Advisory Board

January 28, 2015

Ms. Janet Griffin
Savannah River Nuclear Solutions, LLC
Savannah River Site
Building 730-1B
Aiken, SC 29808

Re: Comments on "Early Action Statement of Basis / Proposed Plan for the C-Area Operable Unit"

Dear Ms. Griffin:

The following comments are being submitted by the Savannah River Site Citizens Advisory Board on the "Early Action Statement Basis / Proposed Plan for the C-Area Operable Unit" that was made available for public comment on November 17, 2014, by the U.S. Department of Energy.

The following comments are based upon the assumptions that the human health risks presented in the Plan are scientifically valid, represent cancer risks based upon life-span exposure, and were developed using widely-accepted methods. In other words, validation and a discussion of how the human health risks were developed are beyond the scope of these comments. In addition, the following comments are restricted to the "Early Action Statement Basis / Proposed Plan for the C-Area Operable Unit" and as such do not address the draft Resource Conservation and Recovery Act permit modifications that were also made available for comment on November 17, 2014.

COMMENTS:

Background Information:

According to the Plan identified above:

1. The early remedial action is being taken in specific areas located in the C-Area Operable Unit, because there are refined constituents of concern in the soil, gravel and concrete that may pose a threat to human health.
2. The C-Area Operable Unit is an area of the Savannah River Site that is currently designated for industrial use and due to subsurface radiological contamination will not support unrestricted land use, such as residential.
3. The C-Area Operable Unit and associated subunits are located within the Fourmile Branch Watershed.
4. The refined constituents of concern include cesium-137, strontium-90, Aroclor 1254, and polycyclic aromatic hydrocarbons. Note: refined constituents of concern require remedial action.
5. The subunits located inside the C-Area perimeter fence that have refined constituents of concern are Building 717-C and C-Area Cask Car Railroad Tracks as Abandoned.
6. The subunits located outside the C-Area perimeter fence that have refined constituents of concern are the Early Construction and Operational Disposal Site, and Outfall C-03.
7. In the Early Action Record of Decision for the C-Reactor Complex, published in 2009, in-situ decommissioning was selected at the preferred end-state, so the future site worker was chosen as the baseline risk assessment scenario for human exposure at all of the C-Area Operable Unit subunits. However, a future resident scenario was also considered for subunits outside of the C-Area perimeter fence if a subunit qualified for unrestricted land use.
8. The exposure pathways for human to the refined constituents of concern were identified as exposure to surface media to a depth of one foot from incidental ingestion, dermal contact, inhalation of windblown dust, inhalation of volatile constituents, and external exposure from radionuclides. (P. 8 of 40, SRNS-RP-2014-00009, Revision I, September 2014.)

9. Based on the exposure pathways identified, the human health risk assessments for the four subunits are as follows: (Page 33 of 40, SRNS-RP-2014-00009, Revision I, September 2014.)
    a. Building 717-C: (contaminated media is concrete)
        i. For a worker exposed to cesium-137, the risk to get cancer over the span of a lifetime is 1 in 9,300,000 (written in the Plan as 9.3E-06);
        ii. For a worker exposed to strontium-90 the risk to get cancer over the span of a lifetime is 1 in 2,200,000 (written in Plan as 2.2E-06); and
        iii. For a worker the total accumulative risk of getting cancer over the span of a lifetime is 1 in 120,000 (written in plan as 1.2E-05).
    b. C-Area Cask Car Railroad Tracks as Abandoned: (contaminated media is soil and gravel)
        i. For a worker exposed to cesium-137, the risk to get cancer over the span of a lifetime is 1 in 2,800,000 (written in the Plan as 2.8E-06).
    c. Early Construction and Operational Disposal Site: (contaminated media is soil):
        i. For a future resident exposed to polychlorinated biphenyl-1254, the risk to get cancer over the span of a lifetime is 1 in 120,000 (written in the Plan as 1.2E-05).
        ii. For a resident exposed to benzo(a)pyrene, the risk to get cancer over the span of a lifetime is 1 in 8,500,000 (written in the Plan as 8.5E-06).
        iii. For a future resident exposed to benzo(b)fluoranthene, the risk to get cancer over the span of a lifetime is 1 in 1,500,000 (written in the Plan as 1.5E-06).
        iv. For a resident the total accumulative risk of getting cancer over the span of a lifetime is 1 in 220,000 (written in the Plan as 2.2E-05).
        v. For a worker exposed to polychlorinated biphenyl-1254, the risk to get cancer over the span of a lifetime is 1 in 3,600,000 (written in the Plan as 3.6E-06).
    d. Outfall C-03: (contaminated media is soil)
        i. For a resident exposed to cesium-137, the risk to get cancer over the span of a lifetime is 1 in 190,000. (written in the Plan as 1.9E-05).
        ii. For a worker exposed to cesium-137, the risk to get cancer over the span of a lifetime is 1 in 120,000. (written in the Plan as 1.2E-05).

10. A contaminate migration analysis was performed; and it was concluded that there was no potential for groundwater contamination of the refined constituents of concern to exceed drinking water standards. (P. 9-10 of 40, SRNS-RP-2014-00009, Revision I, September 2014)

Remedial Action Goals

According to the Plan identified above: (P. 11 of 40, SRNS-RP-2014-00009, Revision I, September 2014)

1. The remedial action goals are:
    a. To prevent future resident exposure to contaminated media or structure within the C-Area perimeter fence.
    b. To prevent industrial worker exposure to the refined constituents of concern (cesium-137, strontium-90, Aroclor 1254, and polycyclic aromatic hydrocarbon) where the risk to get cancer from exposure exceeds 1 in 1,000,000 in Building 717-C, C-Area Cask Car Railroad Tracks as Abandoned, and the Early Construction and Operational Disposal Site.
    c. To prevent industrial worker and future resident exposure to cesium-137 at Outfall C-03.

2. When remedial alternatives are considered, there are three categories of requirements that clarify how remedial actions comply with requirements and standards set forth under Federal and State environmental laws as required by the Superfund Amendments Reauthorization Act. The requirements are referred to as "Applicable or Relevant and Appropriate Requirements", and the three categories are action-specific, location-specific, and chemical-specific.
    a. Action-specific requirements may control the design, performance and other aspects of implementation of specific remedial activities;
    b. Location-specific requirements reflect the physiographic and environmental characteristics of the unit or the immediate area, and may restrict or preclude remedial actions depending of the location or characteristics of the unit; and
    c. Chemical-specific requirements are media-specific concentration limits promulgated under Federal or State Law. (P. 12 of 40, SRNS-RP-2014-00009, Revision I, September 2014)

Remedial Alternatives

The selection of alternatives per the Comprehensive Environmental Response, Compensation and Liability Act is guided by a desire to develop a list of alternatives that can be compared in order to select the most effective cost-efficient remedial action. The alternatives include options that 1) immobilize chemicals, 2) reduce the contaminant volume, 3) or reduce the need for long-term, on site management. Other alternatives include little or no treatment to protect human health by controlling exposure through Land Use Controls. For the subunits in the C-Area Operable Unit, addressed in this Plan, a No Action and Land Use Controls remedial alternatives were determined to be adequate as agreed to in the RCRA Facility Investigation/Remedial Investigation/Baseline Risk Assessment/Corrective Measures Study/Feasibility Study completed in 2014. (P. 12 of 40, SRNS-RP-2014-00009, Revision I, September 2014)

Alternative 1 - No Action

If this alternative were selected, no action would be taken to address the refined constituents of concern in the subunits in the C-Area Operable Unit and the 5-year remedy review would not be conducted.

Alternative 2 - Land Use Controls (P. 13 of 40, SRNS-RP-2014-00009, Revision I, September 2014)

If this alternative were selected, Land Use Controls would limit only exposure of the industrial worker and future resident to the refined constituents of concern. Exposure for workers would be limited by the use of administrative and engineering controls, limiting work activities by the use of work clearance permits, and posting signs to inform personnel of the presence of hazardous materials. In addition, deed restrictions would prevent residential land use.

1. Perimeter Fencing would be used to surround the 82 acre area of contamination in the C-Area, which includes the two subunits, Building 717-C and C-Area Cask Car Railroad Tracks as Abandoned.
    a. This fencing would need to be in place for greater than 200 years as residual contamination will be long-lived.
2. Additional perimeter fencing would be used to surround the two subunits that are outside of the perimeter fencing, the Early Construction and Operational Disposal Site and Outfall C-03. For the Early Construction and Operational Disposal Site, fencing would surround an area of 38,751 square feet. For Outfall C-03, 1,115 linear feet of fencing would be necessary.
    a. The fencing around Outfall C-03 may be required for less than 200 years due to the radioactive decay of cesium-137, which has a half-life of about 30 years.
3. Annual inspections would be required and maintenance would be performed as needed to keep the Land Use Controls functioning as designed.
4. The 5-year remedy review would be conducted to determine if the Land Use Controls were still protective.

Evaluation of Alternatives

Potential remedial alternatives are analyzed using nine evaluation criteria to satisfy the requirements of the Comprehensive Environmental Response, Compensation and Liability Act. A comparison of these criteria across the alternatives is shown below. (P. 38 of 40, SRNS-RP-2014-00009, Revision I, September 2014)

Table 5. Comparison of Alternatives Against the CERCLA Evaluation Criteria

Criterion	Alternative 1: No Action	Alternative 2: Land Use Controls
Overall Protection of Human Health	Not protective of the Industrial worker or future resident because there are no controls or remediation	Protective of the Industrial worker because of access controls and the future resident because of deed restrictions
Overall Protection of the Environment	Protective of the environment because no ECO/CM/PTSM RCOCs	Protective of the environment because no ECO/CM/PTSM RCOCs
Compliance with ARARs	Doesn't meet the PCB ARAR	Meets the PCB ARAR
Long-Term Effectiveness and Permanence		
Magnitude of Residual Human Health Risk	Residual human health risk remains above $1x10^{-6}$	Residual human health risk remains above $1x10^{-6}$
Adequacy of Controls	Not adequately protective of human health receptors	Effective in preventing exposure to human receptors and breaking the exposure pathway. Leaves contaminants in place. LUCs required as long as contaminants are present
Permanence	Not permanent. Leaves contaminants in media	Not permanent. Leaves contaminants in media
Treatment		
Treatment type	No active treatment	No active treatment
Degree of Expected Reduction in Toxicity, Mobility, or Volume	No reduction	No reduction
Short-Term Effectiveness		
Amount of Hazardous Material Destroyed or Treated	None	None
Risk to Remedial Worker	None	None
Risk to Community	None	None
Risk to Environment	None	None
Time to Implement and achieve RAO	Never	6 months
Implementability		
Availability of Materials, Equipment, Contractors	Not Applicable	Readily available
Ability to Construct and Operate the Technology	Not applicable	Easy to construct
Ability to Obtain Permits/ Approvals from Other Agencies	Not Applicable	Easy to obtain approval
Estimated Cost		
Total Estimated Capital Cost	$0	$131,583
Total Estimated Present Worth O&M Cost	$0	$2,136,579
Total Estimated Cost	$0	$2,268,162
Overall Protection of Human Health and the Environment		
State Support/Agency Acceptance	Not acceptable	Both USEPA and SCDHEC support the preferred remedy.
Community Acceptance	This criterion will be completed following public review	This criterion will be completed following public review.

Acronyms used on this table:
ECO= not defined in acronym list
CM=contaminate migration
PTSM=principle threat source material
RCOCs=refined constituents of concern
PCB=polychlorinated bipheny
ARAR= Applicable or Relevant and Appropriate Requirements
RAO=remedial action objective

The estimated cost is based upon the assumption that the Land Use Controls would be maintained in place for 200 years.

Summary of Analysis:

Alternative 1 – No Action does not meet the threshold criteria for overall protection of human health and is not compliant with the chemical Applicable or Relevant and Appropriate Requirements.

Alternative 2 – Land Use Controls is protective of the industrial worker and the future resident, and can meet the Remedial Action Objectives. The refined constituents of concern are left in place and human health is protected by restricting exposure by fencing off the subunits where the refined constituents of concern are. The residual risk is low with a cancer risk of 1 in 10,000. This risk will continue to be reduced overtime as cesium-137, which is the primary risk driver, will decay naturally. The hazardous materials are left in place and the residual risk that remains is greater than 1 in 1,000,000. (P. 16 of 40, SRNS-RP-2014-00009, Revision I, September 2014)

Preferred Alternative

The preferred alternative is Alternative 2 – Land Use Controls. The preferred remedy for the C-Area Operable Unit "leaves hazardous substances in place that pose a potential future risk and require land use restrictions for an indefinite period of time." (P. 17 of 40, SRNS-RP-2014-00009, Revision I, September 2014) To ensure that land use restrictions are maintained and periodically verified, the Savannah River Site has a "Land Use Control Assurance Plan" that was written in response to the US Environmental Protection Agency's policy, *Assuring Land Use Controls at Federal Facilities.*

The cost for implementation of Alternative 2 – Land Use Controls is shown below. The initial capital cost for the project is $59,400, and the total cost for the 200-year project is estimated to be $2,268,162. (P. 39 of 40, SRNS-RP-2014-00009, Revision I, September 2014)

Table 6. Summary of the Present Value Costs

Alternative 2:
Land Use Controls
Subunits at CAOU – SRS

Item	Quantity	Units	Unit Cost	Total Cost	
Direct Capital Costs					
Institutional Controls					
Posting of Warning Signs	90	ea	$100	$9,000	
Land Use Control Implementation Plan	1	ea	$20,000	$20,000	
Deed Restrictions	3	ea	$5,000	$15,000	
Subtotal - Direct Capital Cost				$44,000	*
Mobilization/Demobilization	20%	of subtotal direct capital		$8,800	*
Site Preparation/Site Restoration	15%	of subtotal direct capital		$6,600	*
Total Direct Capital Cost		(sum of * items)		**$59,400**	
Indirect Capital Costs					
Engineering & Design	14%	of direct capital		$8,316	
Project/Construction Management	25%	of direct capital		$14,850	
Health & Safety	3%	of direct capital		$1,782	
Overhead	30%	of direct capital + indirect capital		$25,304	
Contingency	20%	of direct capital + indirect capital		$21,930	
Total Indirect Capital Cost				**$72,183**	
Total Estimated Capital Cost				**$131,583**	
Direct O&M Costs	1.1%	discount rate for costs >30 years duration[1]			
Annual Costs (Existing System during Post-ROD Design & Const)	2	years O&M		*Years 2015 - 2016*	
Access Controls	1	ea	$750	$750	
Subtotal - Annual Costs				$750	
Present Worth Annual Costs (-1.4% Discount Rate)				$1,525	
Annual Costs (Institutional Controls)	200	years O&M		*Years 2017 - 2217*	
Access Controls	1	ea	$750	$750	
Annual Inspections / Maintenance	1	ea	$5,000	$5,000	
Subtotal - Annual Costs				$5,750	
Present Worth Annual Costs (1.1% Discount Rate)				$206,358	
Five Year Costs	41				
Remedy Review	1	ea	$15,000	$15,000	
Subtotal - Five Year O&M Costs				$15,000	
Present Worth Five Year Costs				$238,467	
Total Present Worth Direct O&M Cost				**$446,350**	
Indirect O&M Costs					
Project/Admin Management	217%	of direct O&M[2]		$967,200	
Health & Safety	5%	of direct O&M		$15,600	
Overhead	30%	of direct O&M + indirect O&M		$428,745	
Contingency	15%	of direct O&M + indirect O&M		$278,684	
Total Present Worth Indirect O&M Cost				**$1,690,229**	
Total Estimated Present Worth O&M Cost				**$2,136,579**	
TOTAL ESTIMATED COST				**$2,268,162**	

[1] Interest rate for costs with duration <30 years (i.e., before 2043) based on OMB Circular A-94 (Dec 2012).
[2] Percentage rate based on Full-Time Employee (FTE) involvement until 2217

Post-ROD Schedule

The remedial action plan is scheduled to start in January 2016. (P. 18 of 40, SRNS-RP-2014-00009, Revision I, September 2014)

CONCLUSIONS

In conclusion, we agree that Alternative 2 – Land Use Controls is preferred over No Action, but are concerned with the indefinite period of time that the Land Use Controls must be in place to protect the future workers and residents. It is hard to imagine that these controls could be kept in place for 200 years or more. Two hundred years represents eight generations and 50 US Presidential Terms! The United States of America is only 238 years old. The Department of Energy is just 39 years old, and the Office of Environmental Management was established a mere 26 years ago.

It is difficult to believe that the Department of Energy will have control of this land 200 years from now on. In addition, to estimate the cost to maintain the Land Use Controls for 200 years is not a meaningful exercise as it is largely a guess. In addition, the use of deed restrictions to prevent future residents from being exposed to the refined constituents of concern is also flawed, because it again assumes that there is permanency in local government structure to control land use. Even if a deed restriction is in place, it is very difficult for the government to control what happens on private property so far into the future.

As stated at the beginning of this letter, it is beyond the scope of these comments to debate the risk assessments presented in this Plan. Rather, we are basing our opinions on the fact that the US Environmental Protection Agency, the SC Department of Health and Environmental Control, and the Department of Energy believe that four subunits in the C-Area Operable Unit (Building 717-C, C-Area Cask Car Railroad Tracks as Abandoned, Early Construction and Operational Disposal Site, and Outfall C-03) have refined constituents of concern that pose a cancer risk to workers and future residents, if they are exposed to surface media to a depth of one foot from incidental ingestion, dermal contact, inhalation of windblown dust, inhalation of volatile constituents, and external exposure from radionuclides. Not only are these risks present now, but these risks would be present for at least 200 years into the future.

The Savannah River Site should be cleaned up to protect future generations of workers and residents, if it is possible to do so. As a result, installing Land Use Controls that must be in place for 200 years is not an acceptable approach. Unfortunately, there is nothing in the Plan that addresses how difficult or expensive it would be to remove and treat the contaminated soil, gravel and concrete where the contamination resides. However, it is hard to imagine that this is not possible as similar soil excavation projects have been completed at the Savannah River Site in recent years. One project that comes to mind is the cleaning up of contamination in Lower Three Runs where about three acres of contaminated soil was removed and disposed of. The cost of this excavation and treatment was over 17 million dollars, so we recognize that removal and treatment of soil, gravel and concrete is an expensive endeavor.

Another project that demonstrates the feasibility of removing surface media is the cleanup of ash in the wetlands area at Dunbarton Bay. In this project about 13 acres will be excavated to remove ash. The cost of this cleanup project is over four million dollars. Again, it is recognized that the removal and treatment of soil, gravel and concrete is an expensive endeavor. However, in the long run it is worth the cost if future generations are protected. From the information presented, it appears that it would be feasible to cleanup of the subunits in the C-Area Operable Unit rather than just preventing access to the areas where refined constituents of concern reside.

It is recognized that these subunits in Area-C Operable Unit do not come close to the risks of the High Level Waste Tanks and strongly agree that the cleanup of these subunits should not take funds away from the High Level Waste Tank cleanup project at this time. Further, the timely completion of the clean out and closure of the High Level Waste Underground storage tanks should continue to be of the highest priority.

However, there is a 3rd Alternative that is appropriate. Thus, Alternative 3 – Temporary Land Use Controls and Final Removal of Refined Constituents of Concern is being proposed. In this scenario, the Land Use Controls as described in Alternative 2 would be put into place per the proposed Plan, but in 2040, when the major work is projected to be completed on the High Level Waste Tanks, excavation and treatment or disposal of the contaminated soil, gravel, and concrete from Building 717-C, C-Area Cask Car Railroad Tracks as Abandoned, Early Construction and Operational Disposal Site, and Outfall C-03 would be evaluated, and if the cancer risk is confirmed, would be initiated. This timeline would delay cleanup of these subunits for one generation, but it is more reasonable to expect that the Land Use Controls would still be in place to protect workers and residents until the excavation could be completed. Importantly, this Alternative is perfectly in line with two of the three options that are used to guide the process to select alternatives under the Comprehensive Environmental Response, Compensation and Liability Act, the desire to reduce contaminant volume and to reduce the need for long-term on site management. (P. 18 of 40, SRNS-RP-2014-00009, Revision I, September 2014)

The cost for this first phase of this alternative would be the same as Alternative 2 – Land Use Controls, with Direct Capital Costs of $59,400 and Indirect Capital Costs of $131,583. Instead of 200 years of Direct Operating and Maintenance costs, there would be 25 years, which would add approximately $56,000 for the first 14 years of the project, until 2040.

We strongly urge you to consider Alternative 3 – Temporary Land Use Controls and Final Removal of Refined Constituents of Concern as proposed here. This alternative would allow protection for another generation of future workers and residents at a modest cost and cleanup of the subunits so that all future generations are protected without question. The cost of cleanup in 25 years will probably escalate from current costs, but there is also a possibility that new methods and equipment could make the project easier.

CLOSING

A few comments on the public participation process for this comment period are warranted. First, the extension of the comment period for an additional 30 days is appreciated. Second, the online availability of the two documents that were prepared for public review, the "Early Action Statement of Basis / Proposed Plan, Fact Sheet for the C-Operable Unit" and the full document "Early Action Statement of Basis / Proposed Plan for the C-Area Operable Unit, made the review process easier. Third, two sections in the proposed Plan give the impression that the decision to go with Alternative 2 – Land Use Control is a "done deal" and that the input at this time from the public is an exercise without meaning.

1) In the "Summary of Analysis" section on the third from the last page of the Plan narrative, there is a paragraph about Alternative 2 that includes the following sentence: "Alternative 2 is also the only Likely Response Action agreed to during scoping of the project," (P. 16 of 40, SRNS-RP-2014-00009, Revision I, September 2014). This makes it seem unlikely that new input from the public will make a difference. If this was agreed upon, is there really an opportunity for the public to suggest a new Alternative? 2) In section "VII. Summary of Remedial Alternatives" in the Plan the following is stated: "Thus, for subunits requiring further action in the CAOU, a No Action and LUC remedial alternative were determined to be adequate as agreed to in the RFI/RI/BRA/CMS/FS document (SRNS 2014)." (P. 12 of 40, SRNS-RP-2014-00009, Revision I, September 2014) Again, this makes it seem unlikely that new input from the public will make a difference. If this was agreed upon, is there really an opportunity for the public to suggest a new Alternative?

In addition, there are two issues that should be addressed by the Department of Energy in the future. First and foremost, when documents are prepared for public review and comment, they should be written without the use of acronyms, except those that are understood by the public at large, as described in the "Federal Plain Language Guidelines" revised in May 2011. In the current situation, the Plan contains 65 acronyms, which hinders comprehension and greatly extends reading time.

Second, any fact sheet that is prepared to accompany another document should contain all pertinent information. For example, in the Plan that is being discussed here, a fact sheet was also provided. It was fairly easy to read, even with the abundance of acronyms, but there are two omissions that are pertinent to the decision-making process involving the alternatives. 1) Risks are presented without stating what the risks are, and the risks are stated in an unfamiliar form. If these are cancer risks over the span of a lifetime, then that should be stated. Also, stating risks in scientific notation, such as 2.8E-06, is not readily understood by the public. 2) The explanation of the Alternative 2 does not include the timeframe involved for Land Use Controls. It is very important for the public to understand that the Land Use Controls that are the favored remedy in this Plan are going to have to be in place and maintained for 200 years or more.

In closing, the Citizens Advisory Board appreciates the opportunity to provide input on this proposed Plan and looks forward to working closely with the Department of Energy as cleanup decisions at the Savannah River Site are made in the future.

Sincerely,

Marolyn J. Parson, Ph. D.

Dr. Marolyn Parson, Chairperson
SRS Citizens Advisory Board