WM2008 Conference, February 23 – 28, 2008, Phoenix, AZ
Abstract #8073

Savannah River Site Public and Regulatory Involvement in the Cercla Low-Level Waste (LLW) Program and Their Effect on Decisions to Dispose of LLW Generated by Cercla

Helen Belencan
U. S. Department of Energy
W. T. (Sonny) Goldston
Washington Savannah River Company

Comment [HB1]:

ABSTRACT

The key to successful public involvement at the Savannah River Site (SRS) has been and continues to be vigorous, up-front involvement of the public, federal and state regulators with technical experts. The SRS Waste Management Program includes all forms of radioactive waste. All of the decisions associated with the management of these wastes are of interest to the public and successful program implementation would be impossible without including the public up-front in the program formulation. Serious problems can result if program decisions are made without public involvement, and if the public is informed after key decisions are made.

This paper will describe the regulatory and public involvement program and their effects on the decisions concerning the disposal at the Savannah River Site (SRS) of LLW generated from CERCLA Removal and Remedial Actions. At SRS the Deactivation and Decommissioning (D&D) project has generated large amounts of LLW from the removal of buildings and processing facilities. The D&D project is expected to generate even larger amounts of LLW in the future. The most cost effective disposal alternated is to use the onsite LLW disposal facility in E-Area. The E-Area LLW Facility is owned and operated by the Department of Energy (DOE) under its authority granted by the Atomic Energy Act of 1954, as amended. Since the disposal of CERCLA generated waste is also governed by the Environmental Protection Agency (EPA) CERCLA regulations, it is important that EPA, DOE, and the South Carolina Department of Health and Environmental Control (SCDHEC) work together to resolve any conflicts in implementation of the D&D project so that all regulations are followed and the project can be continued successfully.

An issue of particular significance will be described in this paper that, were it not resolved successfully, would have jeopardized the completion of one project and resulted in higher overall project costs. The EPA determined in review of the E-Area LLW Facility groundwater monitoring that a “release” under CERCLA had occurred. As a result, EPA determined that it was necessary to issue a “Notice of Unacceptability” to SRS revoking the CERCLA Off-Site Rule approval for the E-Area LLW Facility, thus, no longer allowing the E-Area LLW Facility Slit trenches to receive CERCLA waste for disposal. It became critical to the success of the D&D project to reestablish CERCLA Off-Site Rule approval. The discussions and negotiations

with the South Carolina regulators and EPA were conducted in full view of the public and as such, an informed decision as to resolution included the public interactions.

This paper will describe the successful results of this technical, regulatory, and public involvement program, explore the challenges, how the accomplishments occurred, and describe the future challenges along with the road map for the future. In doing this, the SRS D&D project must be described to give the readers an understanding of the technical complexities that must be communicated successfully to achieve constructive stakeholder participation and regulatory approval.

INTRODUCTION

The Savannah River Site (SRS), located near Aiken, South Carolina, is managed by the United States Department of Energy (DOE) and Operated by Washington Savannah River Company (WSRC). The SRS has been operated since the 1950's to produce radioactive materials for defense and other purposes since that time. In the 1990's the SRS was designated a Superfund site under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) regulations to allow DOE to perform waste management activities to cleanup the legacy waste sites that were created during the cold war operation of the SRS. As a part of the CERCLA program soil and groundwater cleanup activates are being conducted to ensure items such as seepage basins and groundwater contaminations were properly treated and disposed. Also, the Deactivation and Decommissioning (D&D) project was begun and has generated large amounts of LLW from the removal of buildings and processing facilities. The D&D project is expected to generate even larger amounts of LLW in the future. Much of the radioactive waste generated from these types of cleanup and D&D projects are determined to be managed under the regulations that are prescribed by CERCLA.

DISCUSSION

SRS operates a Low-Level Radioactive Waste disposal facility under the DOE's authority granted by the Atomic Energy Act of 1954, as amended. The LLW disposal facility at SRS is called the E-Area LLW Facility and consists of several disposal units including concrete vaults and trenches. DOE has disposed of its operational LLW in this Facility since the 1990's, but was not allowed to dispose of CERCLA waste until certain approvals were obtained from EPA. To properly manage the radioactive waste from the soil and groundwater cleanups and the D&D projects, SRS applied for and received CERCLA Off-Site Rule Acceptability for the E-Area LLW Facility Trenches and Vaults from the Environmental Protection Agency (EPA) Region IV in 1996. Of course, SRS continued to use the EPA Superfund project to determine though evaluations of various options, what the appropriate disposition of CERCLA generated wastes might be. Included in these evaluations were in-situ disposal of waste on the CERCLA site where the waste was generated, shipment of the wastes to a location away from the SRS (for example to the Nevada Test Site), or disposal at SRS in the E-Area LLW Facility.

WHAT IS THE CERCLA OFF-SITE RULE?

Basically EPA wants to ensure that waste generated during a CERCLA cleanup activity is disposed properly and that the disposal activity will not in itself create another cleanup site. So if a CERCLA cleanup is taking place at location A, and the waste cleanup organization plans to move the waste away from location A for disposal at location B, the waste is considered to be moved "Off-Site", that is off of the location A site. EPA, therefore, must approve of facilities that receive waste generated from CERCLA cleanup activities. In the example, then, location B must be approved by EPA to receive the CERCLA waste from location A. Under the Off-Site Rule, "off'site" means off of the site undergoing CERCLA cleanup to some other site. At SRS,

the CERCLA cleanup site might be called T-Area. If the LLW was to be moved from T-Area to the E-Area LLW Facility for disposal, then the E-Area LLW Facility must be approved by EPA to receive that CERCLA waste by having Off-Site Rule Acceptability. As stated above, SRS applied for and received CERCLA Off-Site Rule Acceptability for the E-Area LLW Facility Trenches and Vaults from the Environmental Protection Agency (EPA) Region IV in 1996.

DISPOSAL OF LLW FROM THE D&D PROJECT IN THE E-AREA TRENCHES

Beginning around 2002, SRS began disposal of LLW in the E-Area LLW Facility Trenches from the D&D project. The D&D Project is conducted in such a way that the CERCLA requirements are applied only to those facilities which represent the potential for a release to the environment during decommissioning. CERCLA requirements will also be applied to the large harded facilities at the SRS, such as the canyons and reactors. EPA and SCDHEC expressed a desire to better understand the operation of the E-Area LLW Facility Trenches in 2005 since DOE proposed to used the Facility for disposal of waste generated from facilities decommissioned under CERCLA. DOE and its contractor, WSRC, shared a considerable amount of information concerning the regulations and requirements that govern the operation of the E-Area LLW Facility Trenches in a series of meetings and by providing copies of reports that were prepared to meet DOE requirements, This information provided to EPA and SCDHEC included information concerning the monitoring of the vadose zone and groundwater around and inside of the E-Area LLW Facility as discussed in the following section.

SRS E-AREA LLW FACILITY REGULATORY AUTHORITY

The regulations followed by DOE to dispose of radioactive LLW are contained in DOE Order and Manual 435.1, *Radioactive Waste Management*. As such the DOE is authorized to dispose of LLW as a result of the issuance of a Disposal Authorization Statement issued by DOE-Headquarters (HQ) in Washington, DC.

DOE authority is derived from the Atomic Energy Act (AEA) as transferred from the Atomic Energy Commission (AEC) to DOE through the Energy Reorganization Act of 1974, the Department of Energy Organization Act of 1977, and the Low-Level Radioactive Waste Policy Amendments Act of 1985. Section 161 of the AEA provides authority to establish "by rule, regulation, or order such standards and instructions to govern the possession and use of special nuclear material, source material, and byproduct materials…to promote the common defense and security or to protect health or to minimize danger to life or property." And also, to "prescribe such regulations or orders as it may deem necessary ….(3) to govern any activity authorized pursuant to this Act, including standards and restrictions governing the design, location, and operation of facilities used in the conduct of such activities, in order to protect health and minimize danger to life or property." And to "make such disposition as it may deem desirable of (1) radioactive materials ….the special disposition of which is, in the opinion of the Commission, in the interest of the national security….." This section plus sections 2, 3 and 41 give DOE the responsibility and authority to establish radiation protection standards for itself and its contractors. Section 11 of the Atomic Energy Act of 1954 defines byproduct material as any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear

material. SRS operated five heavy water moderated nuclear reactors. The reactors were fueled with enriched uranium (i.e., U-235, SNM) to produce neutrons to irradiate depleted uranium (i.e., U-238, a source material) to produce plutonium (i.e., SNM) and tritium (i.e., byproduct material) for nuclear weapons. As a consequence of the reactor operations, radioactive fission products (e.g., Sr-90, I-129, Tc-99) and activation products (e.g., C-14, Co-60, Ni-59, and Ni-63), all of which are byproduct material, were also produced. Waste disposed of in the E-Area LLWDF is contaminated with SNM, source or by-product material from SRS operations and therefore DOE is authorized to disposition this material as provided by the AEA.

Due to authority provided to USDOE by the AEA to regulate such material E-Area LLWDF is considered federally permitted under a federal program by the DOE under DOE Order 435.1, *Radioactive Waste Management*, and operates within the conditions established in the "Disposal Authorization Statement (DAS)" dated September 28, 1999. "Federally permitted releases" are allowed by Section 101 of CERCLA. This definition is captured in Section VI.E. of the Federal Facility Agreement, which states that "SRS releases of source, special nuclear, and byproduct materials in compliance with legally enforceable DOE regulations or orders issued pursuant to the AEA are 'federally permitted releases' as defined in Section 101(10) of CERCLA, 42 U.S.C. § 9601 (10) ."

Comment [ELW2]: what is being quoted in this?

SRS E-AREA FACILITY VADOSE ZONE AND GROUNDWATER MONITORING

At the meetings with the EPA and SCDHEC the Vadose Zone and Groundwater Monitoring program, the performance assessment basis, and the monitoring results were discussed.

Performance Assessment

The Performance Assessment (PA) for the Savannah River Site E-Area LLWDF was prepared to meet the requirements of Chapter IV of the USDOE Order 435.1. The Order specifies that a performance assessment should provide reasonable assurance that a low-level waste disposal facility will comply with the performance objectives of the Order. The performance assessment is used as a means to determine the allowable radionuclide concentrations and inventories in each type of disposal unit. Disposal inventory limits over the 1,000 year compliance period have been developed for the following pathways: groundwater protection, air, all-pathways, inadvertent intruder, and radon. A groundwater transport analysis was conducted to determine maximum well concentrations as a function of time outside a 100 meter buffer zone surrounding the disposed waste within the facility boundary. The flow and transport analyses were conducted to describe in detail the migration of species from the disposal units through the vadose zone to the underlying water table. The results were then input into a vadose zone and aquifer transport model to compute maximum groundwater concentration for radionuclides within the 100 meter compliance region. Groundwater protection disposal limits for each disposal unit were developed from the computed maximum groundwater concentrations compared to the performance measure from DOE Order 435.1 (in this case, the maximum contaminant levels (MCL's) from the EPA drinking water standards). Disposal limits for groundwater protection are set to ensure that the MCL's are not exceeded at the point of compliance. A similar process is conducted for each of the pathways. These inventory limits are used to establish the waste acceptance criteria for the E-Area LLW Facility.

Performance Monitoring and Compliance

A comprehensive, state-of-the-art vadose zone monitoring system (VZMS) is successfully verifying performance of low-level radioactive waste disposal trenches. The VZMS Program was initiated in 1999 and has continued through 2007. This program will continue to support disposal operations by equipping trenches with the needed monitoring devices to ensure that the groundwater is being protected and to increase confidence in the Performance Assessment.
Many monitoring components have been providing data for over 5 years. Long-term monitoring criteria were considered in the selection of the sensors and samplers allowing these components to be calibrated or replaced as needed. For example, in FY2006, approximately 13 new wells and 74 monitoring devices were installed predominantly around the Component-in-Grout Trench and Slit Trench #5 (CIG & ST#5). The samples are being analyzed for tritium to ensure groundwater resources are being protected. Performance modeling has been conducted utilizing the data obtained from the vadose zone lysimeters.

Presently, the VZMS relies on a dense array of instruments and samplers, with approximately 500, installed in just under 100 wells around the existing shallow disposal trenches. In just over five years, the VZMS has produced a sizable amount of data on subsurface conditions at the Slit Trenches. The data include contaminant concentrations from lysimeter samples sent for laboratory analysis.

The tritium concentrations for all of the trench disposal units averaged around background at the Action Level Lysimeters and are well below the Action Levels. Slit Trench #5 wells were installed at the end of FY05 and in early FY06, and therefore, were not sampled in FY06.
The SRS performance measure for groundwater protection is to ensure that the disposal of LLW does not cause groundwater to exceed EPA drinking water standards for radionuclides at a compliance point that is 100 meters from the disposal units and inside of the E-Area LLW Facility. In the Monitoring Plan tritium was selected for monitoring and analysis. The drinking water standard for tritium is 20 pCi/ml. Using the Performance Assessment calculations, it was determined that a tritium concentration of 400 pCi/ml in the lower vadose zone under the disposal location just above the groundwater may result in a 20 pCi/ml concentration at the 100 meter compliance point. Therefore, in the Monitoring Plan a 100 pCi/ml Action Level was established at 25% of the value that could eventually result in an exceedance at the 100 meter compliance point. Action will be taken if any tritium migration exceeds the Action Level (i.e., 100 pCi/ml for tritium) in the lower vadose zone region. Since the compliance point for groundwater is 100 meters from the E-Area LLW disposal units (the 100 meter buffer zone is included within the facility boundary), the VZMS is a very effective early warning system to allow assessment, trending, and corrective action, if needed.

Results of the monitoring program indicate the tritium concentrations in the vadose zone are significantly below the Action Level associated with the deepest lysimeter (i.e., closest to the groundwater) of 100 pCi/ml. In fact the tritium concentrations are around background for the Action Level lysimeters.

The results for the Slit Trenches illustrate that the groundwater resources are being protected. This protection is evidenced by the fact that the tritium concentrations in the lower vadose zone nearest the groundwater are below the Action Level of 100 pCi/ml and are in fact at background concentration. Action will be taken significantly before the concentrations exceed the true value of concern of 400 pCi/ml. This concentration in the lower vadose zone has been shown by modeling may result in a concentration of 20 pCi/ml at the 100 meter compliance point established by DOE Order 435.1. The Action Level was established at a quarter of the value so early assessment could take place.

EPA AND SCDHEC REACTION TO THE INFORMATION PRESENTED

As a result of EPA's review of the information shared with them by DOE, EPA asserted in a letter on January 31, 2007, that the tritium detected in the Vadose Zone by the monitoring system was a release to the environment according to CERCLA. SCDHEC followed with a letter dated March 16, 2007, that made a similar assertion. In a letter on February 16, 2007, EPA rescinded the Off-Site Rule acceptability for the E-Area Facility Trenches and directed the DOE to immediately stop using the Trenches for disposal of CERCLA wastes.

EPA allowed the DOE to present information concerning the alleged release and in March, 2007, SRS presented information to SCDHEC and EPA to demonstrate to them that the tritium that was detected in the Vadose Zone was within the limits prescribed by the DOE Disposal Authorization Statement (the "Federal Permit") issued by DOE-HQ to allow operation of the Facility. To restore Off-Site Rule to the Facility, it was decided that the following information must be presented and be convincing to the EPA and SCDHEC.

> The facility operation is permitted under a Federal program that does not pose a threat to human health and the environment.
>
> There has not been a release beyond the facility boundary
>
> If a release has occurred, it is not environmentally significant and it is controlled by an enforceable agreement.
>
> There is no receptor at the Facility boundary.
>
> The operation of the Facility, therefore, is operated and permitted under a Federal Program and is protective of human health and the environment.

Part of the justification that there has not been a release beyond the Facility boundary stems from the fact that DOE's definition of the Facility boundary is consistent with the Nuclear Regulatory Commission (NRC) definition:

> 10 CFR 61 part 61.7(a) Concepts says: "The disposal facility…The disposal site is that portion of the facility which is used for disposal of waste and consists of disposal units and a buffer zone. A disposal unit is a discrete portion of the disposal site into which waste is placed for disposal. For near-surface disposal, the disposal unit is usually a

trench. A buffer zone is a portion of the disposal site that is controlled by the licensee and that lies under the site and between the boundary of the disposal site and any disposal unit…"

This definition is critical to show that the waste unit at SRS's E-Area LLW Facility is the trench and is as expected by the regulations to be a trench. A buffer zone around the trench units is expected and is part of the Facility. Therefore, the standards for protectiveness of human health and the environment apply to the Facility boundary including the buffer zone. Therefore, the EPA's knowledge of a migration of tritium from the Trench should not be considered a release beyond the facility boundary, nor does the tritium migration meet the definition of release under the CERCLA Off-Site Rule.

PUBLIC INVOLVEMENT IN WASTE MANAGEMENT AT THE SAVANNAH RIVER SITE

The SRS Public Involvement Program became centered on the SRS Citizens Advisory Board (CAB) and through its public meetings other interested members of the public. The SRS Radioactive Waste Program now works primarily with the Waste Management Committee (WMC) of the SRS CAB as well as with members of the public to address SRS's waste management operations.

The CAB is comprised of 25 individuals from South Carolina and Georgia who are chosen by an independent panel of citizens from approximately 250 applicants. The board members reflect the cultural diversity of the population affected by SRS. The members, who serve two- or three-year terms, represent all walks of life, including the business world, academia, local government, environmental and special interest groups, and the general public. Two of the members specifically represent economically disadvantaged persons. In addition the South Carolina Department of Health and Environmental Control (SCDHEC) and the Environmental Protection Agency Region IV (EPA) personnel are represented at the CAB meetings as Ex-Officio Members. Of course this brings the opportunity to have the regulators involved in the discussions of the various SRS issues.

The methodology for public input has been provided through the CAB and the CAB's agreed bylaws that require a response from DOE along with reports of progress to resolve issues associated with a recommendation.

PUBLIC INVOLVEMENT ON THE CERCLA OFF-SITE RULE ISSUES

In several public meetings with the CAB the stakeholders were informed and kept involved in the issues concerning disposal of CERCLA waste from D&D project in the E-Area Facility Trenches. In fact, all of the information used to brief the EPA and SCDHEC was presented to the CAB to allow them to be educated on the issues and be as informed as possible of the implications involved of no longer disposing of CERCLA waste in the E-Area Facility Trenches. The regulatory basis for operation of the Facility was discussed, along with the Performance Assessment and its resulting disposal limits that demonstrated the fact that the facility was protective of human health and the environment. It is deemed extremely important to educated

and inform the public as soon as possible after such an event to maintain confidence in the safe operations and the integrity of the staff at SRS.

As we discussed the challenges with the CAB in our public meetings the CAB became concerned that there may be significant costs to the taxpayers to curtail disposal of CERCLA waste at SRS. The alternative to disposal of the CERCLA LLW at SRS was to ship the waste to another location in the United States, probably in Utah or Nevada. The CAB noted in a draft Recommendation dated July 2, 2007:

"For a number of years, the trenches have been receiving waste from D&D activities at SRS, specifically decommissioning actions that were being done under CERCLA removal actions or Engineering Evaluation/Cost Analysis. DOE still has approximately 150,000 cubic meters of CERCLA decommissioning waste that needs disposition. If this waste stream is sent off-site, cost projects could reach will into the 100 million dollar range versus approximately 9 million if the trenches can be used."

The same draft Recommendation stated:

"The SRS CAB understand that the three parties are working toward a compromise for using the E-Area Trenches for CERCLA waste disposal and offers the following recommendations (Response to the recommendation should be issued by the three parties in a TRI-Party letter signed by the three agencies):

1. EPA restore DOE's CERCLA Off-Site Rule Authority for the SRS trenches.
2. In future dispositions at the SRS trenches, DOE minimize disposal of tritium generated from CERCLA actions to the extent practical (tritium is byproduct material as defined by the Atomic Energy Act (AEA) and regulated by DOE under the authority of AEA).
3. The three parties utilize a Core Team approach to determine how the E-Area Trenches can be made part of the enforceable FFA while at the same time utilize the existing Performance Assessment in lier of the CERCLA risk assessment methodology (i.e. 9 Criteria of Superfund) to determine appropriate clean up actions. Included documentation that acknowledges DOE's authority for the slit trenches under the AEA instead of CERCLA and formalize the agreement in a MOU/MOA that outlines the trench site closure criteria and regulatory oversight."

In this same public forum, EPA and SCHEC made presentations and provided discussions during the DOE presentations that both educated and informed the public and the CAB about their position and rationale concerning the issues at hand. The CAB decided to table a vote on the draft Recommendation in order for the three agencies (DOE, EPA, and SCDHEC) to work out a compromise if possible. With this urging from the public input, the three agencies did just that.

RESULTS OF SUCCESSFUL REGULATORY AND PUBLIC INVOLVEMENT

In a series of meetings, a compromise position was negotiated among all three parties. The result of the negotiation was documented in a letter from DOE to EPA and SCDHEC in October, 2007. All parties agreed to accelerate the placement of an enhanced interim cover over the E-Area

LLW Facility and increase regulatory participation in the determination of final closure decisions. In all other respects, DOE will operate the Facility under its Atomic Energy Act authority, and in accordance with its Disposal Authorization Statement. In exchange for these agreements, EPA agreed to restore Off-Site Rule Acceptability for the Trenches, allowing the Trenches to receive CERCLA LLW. In addition, EPA and SCDHEC have agreed that once Off-Site Acceptability is restored, the trenches are an acceptable option for the disposal of CERCLA LLW. In January 2008, the EPA provided DOE with a letter that restored the acceptability of the E-Area Slit Trenches for the receipt of CERCLA wastes for disposal.

SRS, EPA and SCDHEC did just as the CAB requested. They presented all of the information requested in the draft Recommendation and will continue to keep the CAB informed as future decisions are made. The important lessons here are that with proper education, the stakeholders can make informed decisions and be part of the decision making process, thus helping all of the DOE programs maintain a positive public image and provide public input that can influence the outcome even when the issues are extremely important. As a result of the success of the public involvement and the resulting negotiations, the CAB sent all three parties a letter of commendation applauding the proactive deliberations and providing the CAB's appreciation for the successful collaborative efforts.

REFERENCES

1. "Presentation to CAB Concerning the Off-Site Rule" by Helen Belencan, DOE, Howard Pope, DOE, and W. T. Goldston, WSRC May 21, 2007.
2. "E-Area Slit Trench Operations and Alternatives," presentation to the CAB WM Committee by Helen Belencan, DOE and Howard Pope, DOE, June 25, 2007.
3. DOE Order 435.1 *Radioactive Waste Management.*
4. Letter from Joe Ortaldo, CAB to Jeffrey Allison, Manager DOE-SR dated 8/21/07, "Disposal of CERCLA Waste in SRS E-Area Trenches"
5. Atomic Energy Act (AEA) of 1954, as amended