INTEGRATION OF CERCLA AND RCRA REQUIREMENTS AT THE RADIOACTIVE WASTE BURIAL GROUNDS, SAVANNAH RIVER SITE, AIKEN, SOUTH CAROLINA (U)

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ABSTRACT

The purpose of this paper is to present the comprehensive approach being taken at the Savannah River Site (SRS) to consolidate regulatory documents, characterization and assessment activities for 3 contiguous waste management facilities. These facilities cover 7.12×10^5 m^2 (194 acres) and include an Old Radioactive Waste Burial Ground a Low Level Radioactive Waste Disposal Facility, and a closed Mixed Waste Management Facility. Each of these facilities include one or more operable units including solvent tanks, transuranic waste storage pads, research lysimeters and experimental confinement disposal vaults.

The Mixed Waste Management Facility and Low Level Radioactive Waste Disposal Facility are in the process of RCRA closure because of settlement agreements with the South Carolina Department of Health and Environmental Control (SCDHEC). The Old Burial Ground is a CERCLA regulated site because of dates of operation but all sites must comply with CERCLA requirements since the SRS was placed on the National Priorities List in December, 1989.

All of these facilities have differing submittal dates for regulatory documents but similar and continuous environmental problems. The characterization and risk assessment require simultaneous efforts for all facilities to adequately define the nature and extent of past, present and future environmental impact. Current data indicates that contaminant plumes in both soil and water are comingled, interspersed and possibly exist internally within the contiguous facilities, requiring a combined investigative effort. This paper describes the combination of regulatory documents leading to this comprehensive and integrative approach for burial ground characterization at the Savannah River Site.

INTRODUCTION

The Savannah River Site (SRS) is a 7.28×10^8 m^2 (300 sq. miles) facility of the U. S. Department of Energy's Defense Nuclear Complex. The SRS began production operations for plutonium, tritium and other strategic radionuclides in 1952. Historically, five production reactors have operated at the SRS along with 2 separations facilities, a fuel preparation facility, administrative and services support areas and waste management and storage facilities. As a result of production operations, considerable quantities of solid and liquid wastes have been produced and will continue to be produced. The liquid wastes are by definition high level and are stored in tank farms in the separations areas. These wastes will be processed for permanent storage through the Defense Waste Processing Facility. Figure 1 shows the geography and facilities of the Savannah River Site.

BACKGROUND

Solid wastes, along with minor amounts of liquid wastes, have historically been disposed of in a shallow land burial area located within the central, upland portions of the site. Original radioactive and mixed solid wastes, including contaminated clothing, process equipment, offsite defense materials, laboratory equipment and a variety of other types of material, were placed uncontained in shallow, slit trenches in an area known as the Old Burial Ground (used between 1952 and 1974). One hundred and sixty-two (162) trenches are known or thought to exist within the Old Burial Ground along with twenty-two (22) radioactive solvent tanks, numerous encapsulated and retrievable transuranic wastes, test lysimeters, a burning trench and other miscellaneous burials. Best current data suggests that this unit contains 1.07×10^{17} Bq (2.8×10^6 curies)

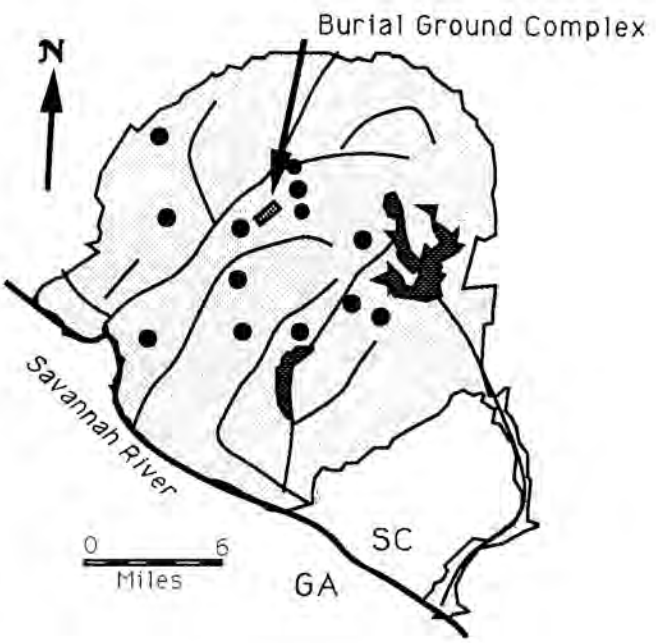

Fig. 1. Savannah River site.

of activity, 18,000 kg of depleted uranium, 8,000 kg of normal uranium, plus 380 kg of other radionuclides (1). These estimates do not include other metals, plastics or liquids. The general layout of the Old Burial Ground is seen on Fig. 2. Trench areas labeled as TRU wastes contain intermediate level and TRU wastes.

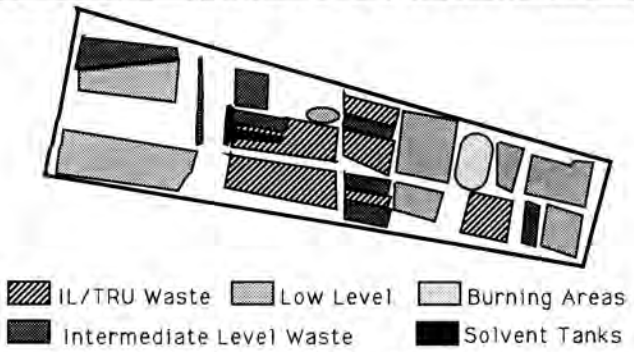

Fig. 2. General layout of the old burial ground.

Originally, the Old Burial Ground was a separate RFI/RI operable unit with a work plan due date to the EPA in December, 1990. This work plan was submitted for EPA review and comments were received in June, 1991. These comments described the original document as technically inadequate because it did not consider the environmental effects of the entire burial ground complex, therefore, WSRC proposed to DOE-SRS to combine the facilities into one unit with one work plan, Baseline Risk Assessment and ultimate Proposed Plan. Figure 3 is a bar schedule showing the original Old Burial Ground RFI/RI process due dates and the modified schedule from the program and document integration.

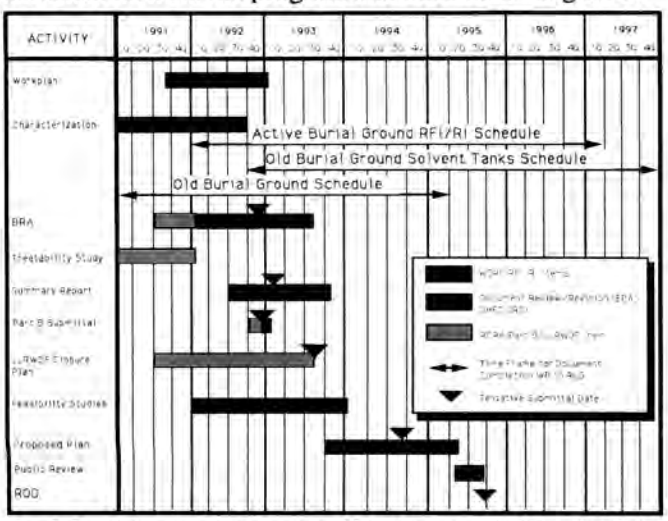

Fig. 3. Burial ground complex RFI/RI and RCRA schedule.

This proposal effectively accelerated the RFI/RI schedules for the LLRWDF (used from 1973 to present) and MWMF (combined under the title of Active Burial ground) as well as the Old Burial Ground Solvent Tanks. The combination of these facilities into one unit also effectively included burial complex facilities under the integrated RCRA/CERCLA process. These facilities were either not included in a regulatory program or their status was uncertain. Region IV EPA accepted the proposal with a new work plan due date of March, 1992. The combined facilities were renamed the Burial Ground Complex.

Figure 4 denotes all of the facilities within the LLRWDF portion of the Burial Ground Complex (2). The most difficult problem associated with the integration effort is the incorporation of the SCDHEC mandated RCRA closure and associated requirements of the MWMF/LLRWDF within the overall RCRA/CERCLA (RFI/RI) efforts. It is currently estimated that 2.4×10^{15} Bq (64,718 curies) of activity exists in

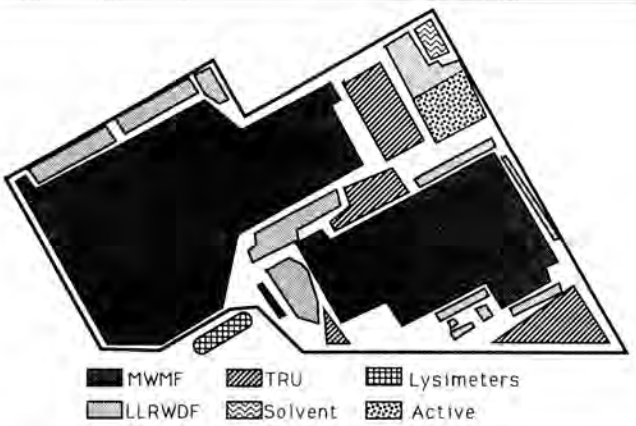

Fig. 4. Facilities within the active burial ground.

the LLRWDF and 8.3×10^{16} Bq (2,237,700 curies) in the MWMF (1).

As was seen on Fig. 3, the RCRA closure of the MWMF follows a legally mandated schedule approved of by SCDHEC therefore, the integrated documents for the RFI/RI process at the burial grounds must follow a program that leaves this schedule intact. Because work was proceeding towards the RCRA Part B closure of the MWMF, groundwater and ecological characterizations were underway to support a baseline risk assessment for this facility. These studies included groundwater data from the LLRWDF and Old Burial Ground and included the ecological impact from the combined facilities. These efforts, already underway, allowed for the expedited schedules for the combined facilities. The greatest concern was to enhance these studies to support a CERCLA type characterization and risk assessment for all of the facilities while maintaining the legal requirements of RCRA for the MWMF. Also, it became necessary to consider source terms and trench contents to a much greater degree than required under RCRA alone.

DISCUSSION

Environmental Restoration geologists and engineers have maintained that is was not feasible or practical to separate the environmental effects of the various burial ground facilities by regulatorily defined units. The geology under the BGC is complex and known releases have occurred from the three main facilities. The presence of carbonates and highly variable distributary sands, silts and muds as well as faulting or slumping is known or suspected to occur under the BGC. The combination of these geological features provides for both horizontal and vertical localized complexities in groundwater flow patterns.

Known contaminant plumes existing beyond the boundaries of the facilities are shown in Fig. 5. The principal contaminant is tritium, but plumes of TCE and metals are known or suspected. Internal groundwater and soils plumes are known to exist from historical data but are not currently mapped or monitored. This discrepancy will be addressed in the RFI/RI work plan. Identification of the sources of these plumes, not specifically required under RCRA, is a necessity under CERCLA.

Under the integrated approach, the work plan will draw upon the MWMF Part B data as historical and screening information and add additional characterization work as necessary to comply with the RFI/RI program. Also, the work

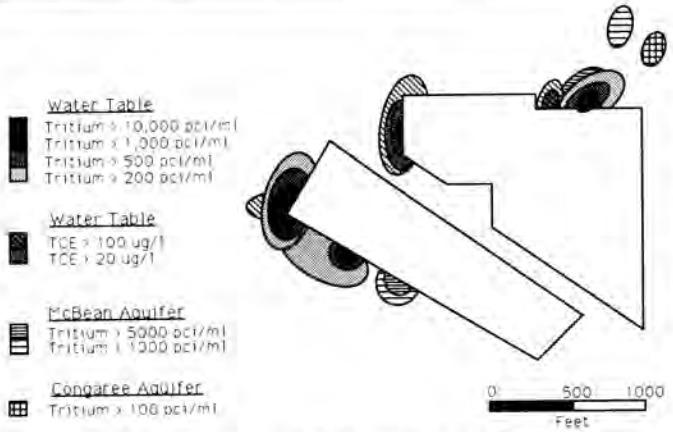

Fig. 5. Burial ground complex contaminated groundwater plumes.

plan will reference RCRA work to be performed, or work that is ongoing but will not be complete until the characterization phase (such as the groundwater flow and transport modelling). To comply with the RCRA cap integrity requirements, horizontal drilling will be proposed for areas under the cap while aggressive attempts will be made to complete all required characterization of the LLRWDF prior to the mandated cap being constructed. Additional CERCLA data will be acquired for the soils underlying the burial ground as well as for the perched water, more ecological data will be acquired and precise geophysical trench maps will be completed.

This approach will funnel data into the Baseline Risk Assessment, which will be compiled from two parts. The first part is completed for the Part B requirements and will include groundwater, Point of Compliance well data and Point of Exposure data. The second part will include trench source terms, perched water data, soils data and additional ecological data with most of this information coming from the work plan described characterization efforts. All of this data will be combined into a singular stand alone document for regulatory submittal.

CONCLUSIONS

Scientifically valid characterization and assessment of the radioactive waste burial grounds at the SRS required a comprehensive and integrative approach for CERCLA and RCRA legally mandated requirements. If separate investigations for individual facilities within the burial ground complex were completed then duplication of effort would have occurred for certain facilities while other facilities would have been under-investigated. It would be possible under this scenario for RCRA to preclude a comprehensive CERCLA investigation for portions of the LLRWDF and MWMF. Overall costs would be greater because of duplication of efforts, differing subcontractor deliverable documents and startup fees. Table I summarizes the document integration effects.

This approach was possible because of the RCRA characterization efforts begun for the Part B document. The RCRA Part B Permit will be more complete because of the inclusion of data generated from the CERCLA characterization efforts while the CERCLA program was greatly accelerated for all of the BGC facilities because of the data being compiled for the Part B. The combined documents protect the legal integrity of the Part B while addressing CERCLA concerns. The combined approach enhances the CERCLA assessment by allowing for a more cost effective and thorough investigation. Further integration of the program will proceed once the characterization and Part B is complete and the Risk Assessment submitted.

TABLE I

Document Integration Results

Document	Combined With	Results
Part B CP		maintain dates
Part B BRA	RFI/RI BRA	no duplication, include LLRWDF
LLRWDF CP	RFI/RI Data	separate char. unnecessary
LLRWDF BRA	RFI/RI BRA	LLRWDF BRA unnecessary
LLRWDF IAPP	RFI/RI data	separate char. unnecessary
RFI/RI WP	Part B efforts	no duplication of characterization
RFI/RI BRA	Part B BRA	no duplication & comp. document
RI Summary		include comp. data for facilities

CP = Closure Plan
BRA = Baseline Risk Assessment
IAPP = Interim Action Proposed Plan
WP = Work Plan

REFERENCES

1. J. W. COOK, "Radionuclide Inventory of E-Area (U)", WSRC-RP-91-709, (June, 1991)
2."RFI/RI Work Plan-Integrated Burial Ground Complex-Draft", WSRC-RP-92-17, (January, 1992)

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