Conf-9208251--84-Rev.1

WSRC-MS--92-175-Rev.1

DE93 002695

PROGRESS IN THE ENVIRONMENTAL RESTORATION AT THE SAVANNAH RIVER SITE (SRS) (U)

J. M. Pope

Westinghouse Savannah River Company
Savannah River Site
Aiken, South Carolina 29808

and

Linda McClain

U. S. Department of Energy
Field Office Savannah River
Aiken, South Carolina 29802

A paper proposed for presentation at the
Spectrum '92 Meeting
Idaho Falls, ID
August 23-27, 1992

and for publication in the proceedings

DISCLAIMER

PROGRESS IN THE ENVIRONMENTAL RESTORATION AT THE SAVANNAH RIVER SITE (SRS)

Dr. James M. Pope, Manager
Environmental Restoration Department
Westinghouse Savannah River Company
Savannah River Site[a]
Building 703–A, A–131
P.O. Box 616
Aiken, SC 29802

Ms. Linda McClain, DOE-SR Chief
Environmental Assessment Branch
U. S. Department of Energy
Savannah River Field Office
P. O. Box A
Aiken, SC 29802

ABSTRACT

The Environmental Restoration (ER) Program has continued to achieve significant accomplishments important to the mission of cleaning up inactive waste sites, performing corrective actions on contaminated groundwater, planning for decontaminating/decommissioning surplus facilities and ensuring that the environment and the health and safety of people are protected. The multifaceted cleanup at SRS represents noteworthy milestones across the DOE complex. The associated lessons learned and key elements of the progress will be presented in the course of the paper.

Our recent RCRA waste site closure work has included:

- Metallurgical Laboratory Basin and related Carolina Bay Groundwater Diversion System – 0.2 acres
- Underground Storage Tank 105–C – 8400 gallons
- M–Area Settling Basin & Lost Lake Reclamation – 3 acres
- F– and H–Area Seepage Basins – 22 acres
- Mixed Waste Management Facility – 58 acres

Combined, these projects mark some of the largest and most challenging waste site cleanup closures in the DOE complex. We are particularly proud that no injuries nor contaminations were incurred during the remediation of these waste sites.

Integral to our progress has been the development of a proactive relationship with state and federal regulatory agencies which has produced significant "firsts" in the RCRA program. This productive effort has yielded the following advances:

- WSRC organized interactive monthly and supplemental meetings between SCDHEC, EPA Region IV, and DOE–HQ to identify their views which were addressed as over 25 waste site investigation work and closure plans were submitted for regulatory approval during the past year.

- Created the basis/mechanism for a funding advance from DOE–HQ to SCDHEC to support regulatory review of documents. This initiative was offered complex–wide following DOE's endorsement.

- Combined regulatory documents from our review cycles and saved considerable expenditures in FY 91 and 92. Other cost saving measures were also implemented in our commitment to a "better, cheaper, and faster" program.

Our contaminated groundwater treatment program has continued to be the standard for the complex. In excess of 260,000 pounds of organics have been removed from over 1.4 billion gallons of groundwater since the treatment program began in 1985. Recently a new air stripper has been added to increase this capacity.

Our Decontamination and Decommissioning (D&D) program represents another progressing activity which is part of the overall cleanup at SRS. A site–wide survey of all facilities was rigorously updated to determine the presence of any radiological and hazardous contamination. This survey became the basis for the SRS draft D&D 30-Year Plan. Subsequently, the detailed planning for the Separations Equipment Development (SED) facility was initiated and a task team identified to perform the D&D work.

[a] Operated for the U.S. Department of Energy by Westinghouse Savannah River Company under Contract No. DE–AC09–89SR18035.

SPECIFIC PROGRESS

A. Waste Site Closures

The *Metallurgical Laboratory Basin* was an earthen basin, which overflowed to an adjacent Carolina Bay, situated in the A–Area of the SRS. It was operated from 1956 until 1985. Primarily noncontact cooling water was received with small amounts of RCRA F–Listed wastes: halogenated and nonhalogenated solvents, spent cyanide plating bath solution, and routine metallurgical laboratory rinse waters.

Metals and organics were detected in basin sediments and upper levels of the underlying soil, although in the latter case the levels were below RCRA hazardous waste limits. During groundwater sampling, organics have been detected in basin monitoring wells; however, the organics are part of the general A– and M–Areas contamination as opposed to currently emanating from the basin.

This basin was closed according to a consent decree in the following manner:

Dewatering the basin;

Placing of gravel layer as a stable base;

Excavating the sewer line;

Placing excavated soil and the vitrified clay sewer line in the basin as backfill;

Capping the basin with a soil cap system using a 2-foot-thick kaolin clay layer as the low permeability component; and,

Installing a groundwater diversion system to ensure a clean condition of the adjacent Carolina Bay.

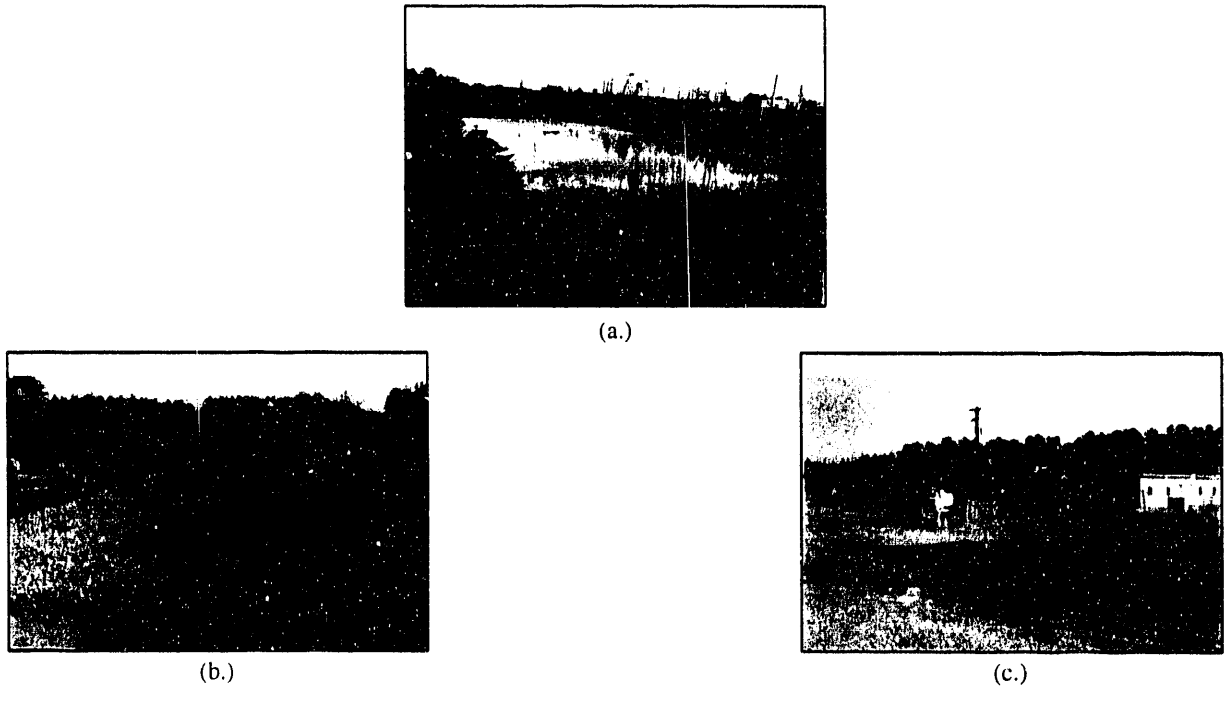
Basin closure was completed in May 1992, on schedule and within the initial budget.

Figure 1 (a, b, and c) shows the evolution of the work leading to regulatory certification of the closure.

Tank 105C was an 8400-gallon capacity underground storage vessel with 1.625-in.-thick steel walls. It received spent heat exchanger cleaning solution and neutralizing chemicals from the C Reactor. The only hazardous characteristic of the waste was a pH greater than 12.5, although the presence of tritium and other trace radionuclides resulted in a mixed waste classification. The tank contents were largely water with less than 10 volume percent of sludge.

The water was neutralized and transferred to the tank farm and awaits either reuse as makeup/process water or cleanup using the Effluent Treatment Facility thereby allowing discharge to a permitted outfall. The tank containing the sludge residue was then filled with a predetermined concrete mix which allowed all RCRA closure requirements to be satisfied.

About 15 cubic yards of contaminated soil in close proximity to the tank was excavated along with ancillary piping. These materials were sent to the Solid Waste Disposal



(a.)

(b.)

(c.)

Figure 1. Metallurgical Laboratory Basin: (a) before work started; (b) gravel addition during closure; and (c) closed and being seeded.

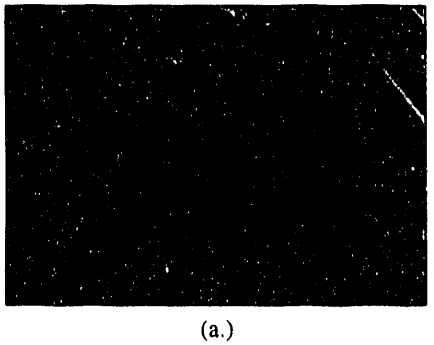
Facility (burial ground) to be contained in "B–25 boxes". The work was completed based on the original schedule and budget and State certified closed. Figure 2 (a, and b) provides some insight into the nature of the tank risers, etc., and then the final condition after closure.

The other closures were some of the largest accomplished across the DOE complex and were the subject of another recent paper(1).

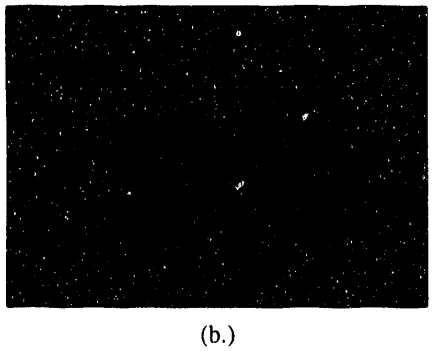
B. Cost Savings Initiatives

Cost savings initiatives were demonstrated in 1991–1992 which will have a significant impact on the environmental restoration program. The following is a discussion of some of those initiatives:

Firs., there have been significant cost savings in the CERCLA Program through consolidation of documents for related sites. The best example of this initiative is the Burial Ground Complex where the Old Burial Ground and the Low Level Radioactive Waste Disposal Facility (LLRWDF) have been combined into one workplan for characterization of the entire area. This not only represents sound technical sense, it also will reduce by half the number of CERCLA documents required. In addition, RCRA Part B Permit Application groundwater data will be used to support the CERCLA Remediation Investigation, and the RCRA Closure Plan for the LLRWDF will be used to support the CERCLA Feasibility Study required. In essence, RCRA mandates will support CERCLA documents.



(a.)



(b.)

Figure 2. Underground Storage Tank 105C:
(a) soil removal during closure;
(b) completed closure.

Second, there has been a concerted effort to utilize Risk Assessments to justify RCRA Clean Closures or CERCLA No Further Actions versus complex site closures where this is merited. The best examples include the Acid/Caustic Basins where a clean backfill RCRA closure on the H & P Basins will save over $1.5 million. In addition, CERCLA No Further Action on the Gunsites and the Grace Road Site will save significant dollars if EPA and SCDHEC concur.

Third, ER is utilizing the principles of Cost Time Management (CTM) to measure savings, reduce schedule time, and reduce the number of documents required. The average schedule time saved on waste site assessment is two (2) years with a corresponding $250K reduction in document costs per site. With over 100 sites in the program the savings potential is significant.

Fourth, ER is using the Observational Approach by DOE in order to accomplish multiple phases of work in parallel on CERCLA projects. Investigations and engineering work are being coordinated to minimize the schedule. The best example of success in this area is the R–Reactor Seepage Basins Assessment which was featured in a recent DOE sponsored workshop in Albuquerque.

Fifth, we are proposing to utilize regulatory documents for project purposes to save time and money. This entails using the Remedial Investigation workplan to represent the Functional Performance Requirements Document and using the Feasibility Study to serve the purpose of the Functional Design Criteria Document[2]. ER is being proactive with this idea and promulgating the "Savings through Common Documents" approach.

Sixth, ER Closures is documenting and sharing lessons learned on projects to realize future cost savings on all work. These lessons include better use of early assessment tools such as ground penetrating radar to identify interferences before construction or waste fixation proceeds.

Seventh, Program Management has developed a cost accounting system which tracks charges on a monthly basis. All charges are verified by cost engineers and managers. All projects are now being managed against an official budget baseline with change control rigor applied. This system allows ER to document costs saved against baselines as well as make more accurate calculations on budgeted cost of work performed vs. actual cost of work performed.

Already, significant cost savings have been realized and considerable time has been reduced from every waste site assessment schedule. SRS is committed to a proactive role with the regulators who are integral to these initiatives/successes. In these ways SRS is demonstrating a cost savings consciousness in achieving efficiencies throughout the program.

C. Groundwater Corrective Actions

Groundwater contamination exists as a result of SRS past operating practices. However, the contaminated groundwaters identified do not present an imminent risk to the offsite population or to onsite workers. In order to ensure a risk-based, cost-effective approach to these actions, an overall program plan has been developed for the management of contaminated groundwaters.

Initial corrective actions at SRS have been driven by regulatory requirements under RCRA. A major groundwater corrective action has been conducted at one large area at the SRS since 1985, and other corrective actions are planned. The contaminants of concern include organic solvents, radionuclides, and heavy metals, and their removal presents significant technical challenges. Our strategy evaluates the regulatory requirements, the long-term risks of the various contaminated groundwater units, the technical requirements associated with clean-up, and the availability of resources.

A major effort, undertaken in cooperation with the Savannah River Technology Center (SRTC), is the identification of the stratigraphy and hydrostratigraphy beneath the SRS. Understanding the geology of the site is a principal component of the assessment and remedial action programs. Another program is a sitewide comprehensive plan to log wells, drill boreholes, collect and describe core data, determine mineralogy of sediments, and interpret borehole geophysics. Our related studies on clays include sand sieve analyses, and clay tests for horizontal and vertical permeability, plasticity index, moisture content, sieve and hydrometer, and x-ray diffraction.

SRS has also implemented a Purge Water Management Plan (PWMP) for the groundwater monitoring network throughout the site. SRS is working with SCDHEC to obtain their approval of the plan. This plan sets trigger levels equal to the Toxicity Characteristic Leaching Procedure for heavy metals, inorganic, and organic groundwater contaminants at 100 times the Drinking Water Standards for radioisotopes. A classification system was adopted to place the purged groundwater into three categories. Table 1 lists and identifies the categories and types of contaminants.

Table 1

Category	Types of Contaminants
1. Hazardous Waste	Heavy metals, organics, and inorganics
2. Mixed Waste	Category 1 with radiochemicals
3. Radioactive Waste	Radiochemical

Past analytical data were evaluated for all groundwater monitoring wells throughout SRS to identify wells that exhibited contaminants above the set action levels. Once those groundwater monitoring wells were identified, they were not sampled until a containment and storage/treatment program was in place. Approximately 2,000 groundwater monitoring wells are sampled quarterly for a range of analyses. Approximately 8% of the 2,000 wells have been affected by the PWMP for various contaminants.

Since 1985, a full-scale air stripper (see Figure 3) was installed with 11 recovery wells to extract the volatile organics from the highest concentrations within the hydrogeologic regime. The air stripper is being operated at 500 gpm. Approximately 1.4 billion gallons have been treated and approximately half (260,000 lbs) of the suspected total amount of solvents have been removed. A 70 gpm air stripper has recently been placed in operation in the A-area.

Furthermore, our "Integrated Demonstration" processing, which utilizes horizontal wells to extract organics, has enabled the latest technologies such as methane enhanced biodegradation and catalytic destruction to be evaluated for future full-scale applications. SRS experiences with bioremediation and Dense Non-Aqueous Phase Liquid (DNAPL) have been shared in various workshops.

D. Decontamination/Decommissioning (D&D)

The near term D&D effort on surplus facilities emphasizes the Separations Equipment Development (SED) facility and the Heavy Water Component Test Reactor (HWCTR), both of which are part of the EM-40 program.

1. HWCTR Status: A general plan has been produced for the accomplishment of pre-D&D activities which will lead to the D&D Plan for the HWCTR Project. The D&D plan will be developed in accordance with the requirements of DOE Order 5820.2A, Chapter V, "Decommissioning of Radioactively Contaminated Facilities".

Three alternatives for the D&D of HWCTR have been evaluated. The protective confinement approach is advantageous as long as current activities onsite limit access by the general public; excellent confinement of the residual activity is provided by in-place dry storage as the radiation from ^{60}Co diminishes. Entombment provides the most-secure confinement of the activity but at some increased cost. Dismantling

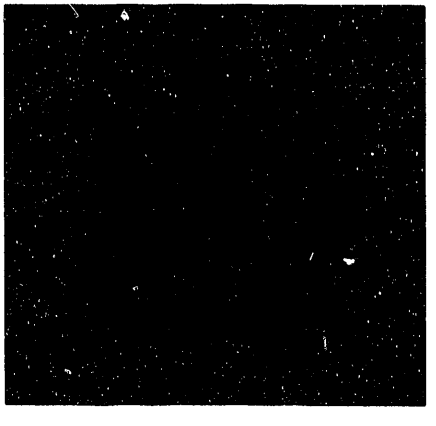


Figure 3. M-Area air stripper used in groundwater treatment to remove volatile organics. Stripper is 40 ft tall.

HWCTR has no apparent advantages other than a demonstration at the Savannah River Site, because of the long-term commitment to safeguarding radioactive material, and the relative cost is high.

The induced radioactivity in HWCTR is currently about 2 x 10^4 Ci; general area radiation levels are typically 3 mR/hr. In 35 years, the decay of ^{60}Co will lower the radiation levels by a factor approaching 100, and the remaining radioactivity will be about 2 x 10^3 Ci of ^{63}Ni.

2. **SED Status:** An outline of the Project Plan and the Project Logic Diagram have been completed and are being utilized presently. Complete Project Plan issuance is scheduled for 3/93.

Security issues related to the facilities have been resolved with good coordination between WSRC and DOE Classification. This has resulted in the downgrading of facility entry and visual access from "Q" cleared personnel to uncleared personnel with escort. As a result, significant cost savings have been identified to date and further cost savings are expected.

An Action Description Memorandum (ADM) was sent to DOE-HQ in December 1991. The NEPA documentation is the critical path to start D&D work. The projected start date of physical D&D work is 1st quarter of FY95. A Safety Evaluation Report will be utilized for the actual D&D activities.

ACKNOWLEDGMENTS

The authors recognize the support of DOE-HQ-EM40, the DOE-SR Environmental Division, and the WSRC organizations including the Environmental Protection Department, Engineering and Projects Division and the Savannah River Technology Center.

REFERENCES

1. J. M. POPE and L. C. GOIDELL, "An Overview of the Major Progress in the Environmental Restoration Program at the SRS", Proceedings of the Environmental Remediation '91 Conference, Pasco, Washington, September 8-11, 1991.

2. W. D. HOFFMAN, "CERCLA Document Flow: Compressing Schedule, Saving Cost and Expediting Reviews, at SRS", Proceedings of the Environmental Remediation '91 Conference, Pasco, Washington, September 8-11, 1991.

END

DATE FILMED

2/1/93