LUCIP for the
K-Area Reactor Seepage Basin, 904-65G

Appendix A of Post-Construction Report/Final Remediation Report for the K-Area Reactor Seepage Basin, 904-65G

WSRC-RP-2002-4030, Revision.1, July 2002

NOTE: The Westinghouse Savannah River Company (WSRC) and Department of Energy (DOE) organizations responsible for environmental restoration at the Savannah River Site underwent name changes in 2003, as shown below. The responsibilities as outlined in the following document did not change.

| **Organization** | **Previous Name** | **Current Name** |
|---|---|---|
| WSRC | Environmental Restoration Division (ERD) | Soils and Groundwater Closure Projects (SGCP) |
| DOE | Environmental Restoration Division (ERD) | Soil and Groundwater Project (SGP) |

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# APPENDIX A

# LUCIP

# for

# K-AREA REACTOR SEEPAGE BASIN

## LAND USE CONTROL IMPLEMENTATION PLAN

This K-Area Reactor Seepage Basin (KRSB) Land Use Control Implementation Plan (LUCIP) will be appended to the Savannah River Site (SRS) Land Use Control Assurance Plan (LUCAP). SRS is responsible for implementing the land use controls (LUCs) (e.g., inspections, maintenance, etc.) outlined in this unit-specific LUCIP.

The selected remedy leaves hazardous substances in place that pose a potential future risk and will require land use restrictions for an indefinite period of time. As negotiated with the United States Environmental Protection Agency (USEPA), and in accordance with USEPA Region IV policy (Johnston 1998), the Savannah River Site (SRS) has developed a LUCAP (WSRC 2002b) to ensure that land use restrictions are maintained and periodically verified. This LUCIP provides detailed and specific measures required for the land use controls selected as part of this remedy. The United States Department of Energy (USDOE) is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the land use controls herein. Upon final approval, the LUCIP will be appended to the LUCAP and is considered incorporated by reference into the PCR/FRR, establishing land use controls implementation and maintenance requirements enforceable under the Comprehensive Environmental Response, Compensation, and Recovery Act (CERCLA). The approved LUCIP will establish implementation, monitoring, maintenance, reporting, and enforcement requirements for the unit. The LUCIP will remain in effect until modified as needed to be protective of human health and the environment. LUCIP modification will only occur through another CERCLA document.

# 1.0 REMEDY SELECTION

## 1.1 KRSB Operable Unit

Located in K Area in the south-central portion of SRS, the KRSB Operable Unit (OU) lies approximately 100 feet west of K Reactor (Building 105-K).

The KRSB was constructed in 1957 to receive low-level radioactive wastewater from disassembly basin purges from K Reactor . The basin dimensions are approximately 40 x 20 meters (135 x 70 feet), with an average depth of 2.1 meters (7 feet) below land surface (bls). From 1957 until 1960, the KRSB received low-level radioactive purge water from the K-Area Disassembly Basin via a 183-meter (600-feet) long, 7.6-centimeter (3-inch) diameter polyethylene pipe buried approximately 0.6 to 1.2 meter (2 to 4 feet) bls.

Groundwater contamination above maximum contaminant levels (MCLs) has not been associated with the KRSB Operable Unit.

According to the Savannah River Site Future Use Project Report (USDOE 1996), residential use of SRS land should be prohibited.

## 1.2 Nature and Extent of Contamination in KRSB Soils and Pipeline

The KRSB OU consists of a source term. The source term area of contamination (AOC) includes a 40 m long x 20 m wide x 2.1 m deep (131 ft long x 66 ft wide x 7 ft deep) basin and a 183 m (600 ft) long polyethylene process sewer line. The following is a brief summary of radionuclides including the principal threat source material (PTSM) as defined in the Plug-in Record of Decision (ROD) document.

- KRSB is radiologically contaminated. Five radionuclides have been identified as human health constituents of concern (COCs) in the seepage basin soils: cesium-137, strontium-90, plutonium-239/240, americium-241, and cobalt-60. Radionuclides in

soils around the perimeter of the seepage basin were determined not to be a human health risk. Carbon-14 and strontium-90 were retained as final contaminant migration constituents of concern (CMCOCs) in basin soil only. Only radionuclides were identified as COCs.

- KRSB contains principal threat source material (PTSM). For the plug-in remedy, PTSM has been defined as highly contaminated basin soils and any other unit-related soils that pose a radiological risk equal to or greater than $1x10^{-3}$ to the future industrial worker. The KRSB OU characterization data indicate that a maximum cumulative risk of $1.3 \times 10^{-2}$ may result from exposure of a future industrial worker to basin soils that exceed the PTSM threshold. Cesium-137 is the predominant risk driver under this scenario.

## 1.3 Remedial Action Overview

The selected remedial action (RA) for the KRSB OU was in situ stabilization of the basin with a low-permeability soil cover system, and in situ grouting of the process pipeline. This remedy entails the following actions:

- Pipeline grouting was used to stabilize any potential contamination left inside the pipeline and prevent access by small animals.

- In situ stabilization through grouting was used to treat PTSM soil in the basin which poses a risk in excess of $1 \times 10^{-3}$ for future industrial workers.

- Consolidation of contaminated soil outside the basin exceeding PTSM criteria. Consolidated PTSM soil was stabilized with the rest of the soil in the basin.

- A low permeability soil cover system was provided over the in situ stabilized soil to reduce water infiltration and to provide shielding to potential receptors on the surface.

- Implementation of LUCs, including warning signs, to ensure continued protection of human health or the environment.

The post-remedial action conceptual site model, Figure A-1, shows the broken pathways and the remaining residual risk to the future industrial worker.

## 2.0 LAND USE CONTROLS

In order to ensure the protectiveness of the remedy described above, the KRSB OU land use control objective is to:

- Prevent contact, removal, or excavation of buried waste or pipelines in the OU areas designated in the LUCIP and preclude future residential or agricultural use of the area.

Current access controls and a deed notification needed to maintain the LUCs are described in the following sections of this LUCIP.

### 2.1 Access Controls

#### *2.1.1 On-Site Workers*

In accordance with WSRC 1D, *Site Infrastructure and Services Manual*, Procedure 3.02, "Site Real Property Configuration Control," use of all lands and waters on SRS shall be coordinated via the Site Use Program. All employees, contractors, and visitors to the SRS require adherence to the Site Use Program. This Program ensures that all work performed on the SRS that adds, modifies, or removes features portrayed on the SRS development maps is authorized. No use of land (i.e., excavation or any other land use) shall be undertaken without prior approval documented by a Site Use Permit. This authorization is obtained through the completion of a Site Clearance Request Form. Also, in accordance with Procedure 3.02, all work at SRS that adds to or modifies features or facilities portrayed on SRS development maps (i.e., plot plans of facilities/utilities at SRS) will be authorized by a Site Clearance Permit before any excavation activities are conducted. All site clearance requests will be reviewed to verify that either an approved

Site Use Permit has been obtained or that an existing Site Use Permit has sanctioned the request.

The SRS, specifically the Site Development, Planning, and Mapping Department, is responsible for updating, maintaining, and reviewing site maps, including Federal Facility Agreement (FFA) OU identifications. If a site clearance request is made that may impact a FFA OU, the Site Clearance Request Form is sent to the FFA OU reviewer, who is in the ERD, for either approval or disapproval. The roles and responsibilities of each individual are detailed in WSRC 1D, Procedure 3.02. Verification of USDOE approval for intended land use must be obtained before issuance of a Site Clearance Permit. The site use and site clearance processes are applicable to all activities and personnel on site (including subcontractors).

The processes are controlled within the SRS Quality Assurance (QA) Program. The SRS QA Program is the governing QA Program for all SRS activities, including those in the ERD. The activities that are performed in the ERD must comply with SRS QA Program procedures as well as ERD-specific procedures.

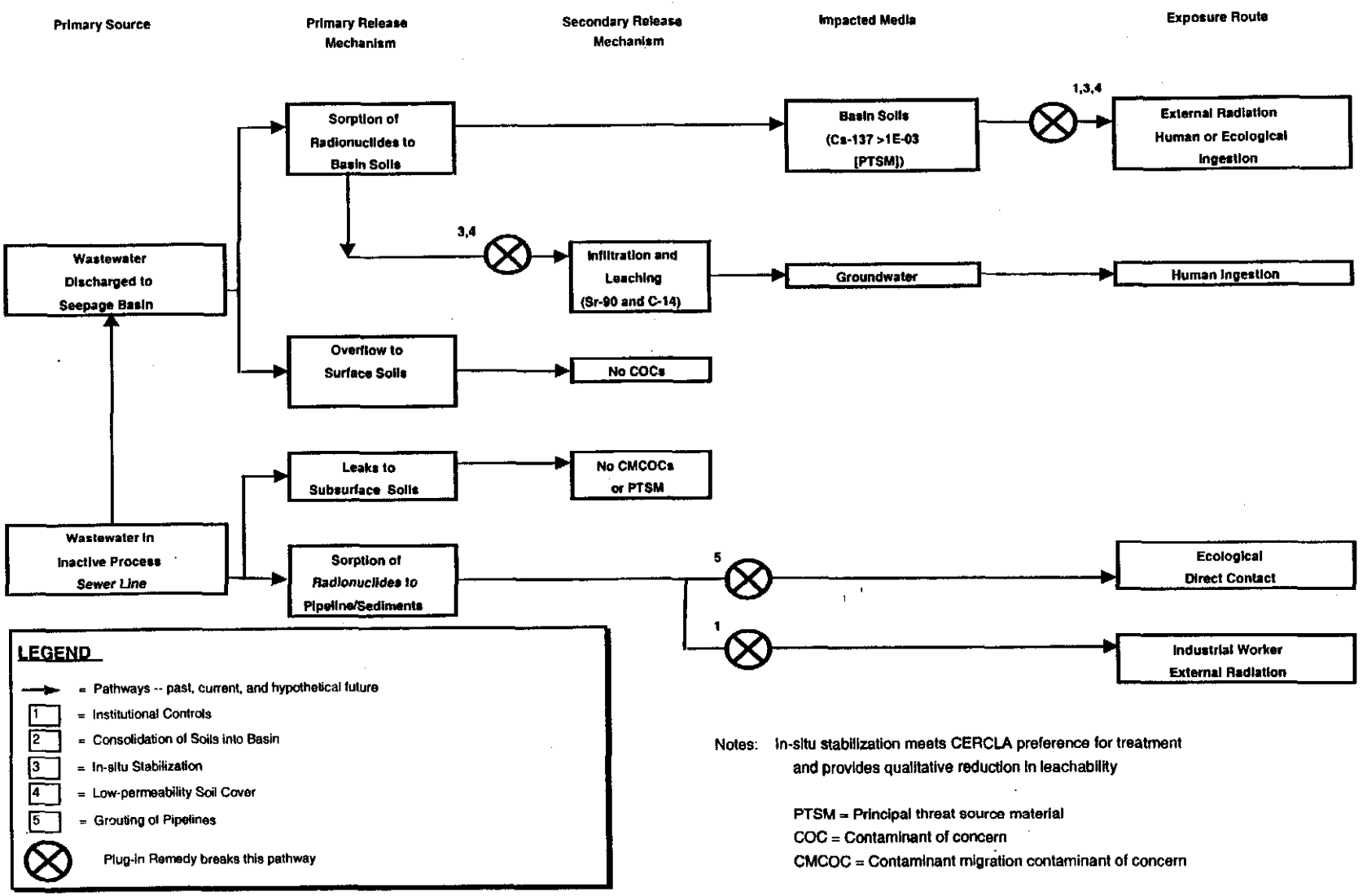


**Figure A-1. Conceptual Site Model for K-Area Reactor Seepage Basin Post Remedial Action**

SRS identifies all buildings and facilities on maps used in the Site Use/Site Clearance Program. This waste unit is identified on these maps as a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) facility.

Any work proposed in these areas will be strictly controlled and workers will be appropriately trained and briefed about health and safety requirements if work is deemed necessary for maintenance. No major change in land use nor excavation at the KRSB OU shall be undertaken without United States Environmental Protection Agency (USEPA) and South Carolina Department of Health and Environmental Control (SCDHEC) approval. To prevent unknowing entry and to ensure that unrestricted use of the waste unit does not occur while under ownership of the government, identification signs will be posted at the unit.

Custodial responsibilities for maintenance and inspection of the KRSB waste site will be maintained by the Post-Closure Maintenance group within the ERD.

The warning signs for the soil cover will be legible from a distance of at least 25 feet. The soil cover signs will read as follows:

K-REACTOR SEEPAGE BASIN
(904-65G)

**DANGER** UNAUTHORIZED PERSONNEL

**KEEP OUT**

THIS WASTE UNIT WAS USED TO
MANAGE HAZARDOUS SUBSTANCES.
DO NOT DIG OR EXCAVATE.
DO NOT ENTER WITHOUT CONTACTING THE
WASTE SITE CUSTODIAN.

CUSTODIAN: MANAGER, POST CLOSURE MAINTENANCE

**Phone: (803) 725- 7243 Pager ID: 19192**

The warning signs for the underground grouted pipeline will be legible from a distance of at least 25 feet. The underground pipeline signs will read as follows:

K-REACTOR SEEPAGE BASIN

DANGER

UNAUTHORIZED PERSONNEL
KEEP OUT

THIS SUBSURFACE PIPING
WAS USED TO CONVEY
HAZARDOUS SUBSTANCES

DO NOT DIG OR EXCAVATE
WITHOUT CONTACTING THE
WASTE SITE CUSTODIAN

CUSTODIAN: MANAGER, POST-CLOSURE MAINTENANCE

**Phone: (803) 725- 7243 Pager ID: 19192**

### *2.1.2 Trespassers*

While under the ownership of USDOE, access control of the entire SRS will continue to be maintained in accordance with the 1992 Resource Conservation and Recovery Act (RCRA) Part B Permit Renewal Application, Volume I, Section F.1. This section

describes the 24-hour surveillance system (R.61-79.264.14(b)(1)), artificial or natural barriers (R.61-79.264.14(b)(2)(i)), control entry systems (R.61-79.264.14(b)(2)(ii)), and warning signs (R.61-79.264.14(c)) in place at the SRS boundary to comply with the security requirements for a RCRA-permitted facility.

## 2.2 Deed Notification

In the long term, a deed notification will be filed in the appropriate county records in accordance with CERCLA 120(h), which requires the government to create a deed when land on which any hazardous substance was stored, released, or disposed of is transferred to non-federal ownership. In the event the property is transferred, a deed notification will be filed with Aiken County. Per CERCLA 120(h)(3)(A), the deed shall contain, to the extent practical, such information as is available based on the complete search of agency files, including the following:

- A notice of the type and quantity of such hazardous substances
- Notice of the time at which such storage, release, or disposal took place
- A description of the remedial action taken

Although the above information is known and documented, for federal land, a deed is not applicable. If or when this parcel of land is sold to a private entity, a deed will be filed with the appropriate county and the conditions of CERCLA 120(h)(3)(A) will be satisfied.

Per CERCLA 120(h)(3)(B), the deed shall also contain a covenant warranting that

- All remedial action necessary to protect human health and the environment with respect to any such substance remaining on the property has been taken before the date of such transfer.

- Any additional remedial action found to be necessary after the date of such transfer should be conducted by the United States Government.

- A clause granting the United States Government access to the property in any case in which remedial action or corrective action is found to be necessary after the date of such transfer.

The deed notification shall, in perpetuity, notify any potential purchaser that the property has been used for management and disposal of radioactive oil and chemical wastewater. The deed shall also include restrictions precluding residential use of property. However, the need for these deed restrictions may be re-evaluated at the time of transfer in the event that contamination no longer poses an unacceptable risk under residential use. In addition, if the site is ever transferred to non-federal ownership, a survey plat of the area will be prepared by a certified professional land surveyor and recorded with the county recording agency.

## 2.3 Field Walkdowns and Maintenance for Institutional Controls

After the remediation of the KRSB, only maintenance activities will be required per this remedial action. No operations will be required.

The results of any events or actions that indicate some potential compromise of institutional controls will be documented in the Federal Facility Agreement (FFA) Annual Progress Report. All other routine maintenance activities will be documented and maintained in files subject to USEPA and SCDHEC review and audit. A copy of the completed inspection form is maintained in the Environmental Restoration Division Administrative Record Files.

The following steps will be implemented to maintain the low permeability soil cover, for as long as it is necessary to prevent contaminant migration above MCL:

- Perform periodic (annual) visual inspections for evidence of damage to the soil cover due to erosion or intrusion by burrowing animals. The inspection will also address upkeep of the vegetative cover and access control barriers (i.e., the warning signs). (Attachment 2 provides a unit-specific inspection data sheet for the KRSB waste unit).

- Perform necessary repairs (when required as identified during inspection) to maintain the functional integrity of the soil cover and the warning signs.

- Enforce SRS institutional controls through access controls by restricting access to the closed waste unit. Institutional controls will be maintained as long as the waste remains a threat to human health or the environment.

- As required by the National Oil and Hazardous Substance Contingency Plan (NCP), a five-year review of the ROD for the KRSB unit will be performed as long as the waste remains a threat to human health or the environment.

The waste site inspectors are to be trained and certified as Hazardous Waste Operators (HAZWOPER), RCRA Well Inspectors (Environmental Restoration Division [ERD] specific training), ERD RCRA Waste Unit Inspectors, Radiological Workers, etc., as applicable for the specific inspection. They will also be trained based on the individual requirements of the regulatory approved closure documents for each waste unit. In addition, the inspectors are to attend yearly refresher courses. Over the years no single person will conduct all of the inspections or grass cutting operations.

This unit-specific LUCIP, including the checklist, will be appended to the SRS LUCAP.

Per Section 3.6 of the LUCAP, this LUCIP identifies the area under land-use restriction via a survey plat (see Attachment 1). If the OU is ever transferred to non-federal ownership, a survey plat of the area, prepared by a certified professional land surveyor, will be recorded with the county recording agency.

# ATTACHMENT 1

## SURVEY PLAT

**SK-C-53105, Rev. 2, Land Use Control Implementation Plan, Survey Plat (U)**

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REFERENCE: PCR/FRR # WSRC-RP-2002-4030

# K - REACTOR SEEPAGE BASIN (904-65G) CLOSURE LAND USE CONTROL IMPLEMENTATION PLAN

## SURVEY PLAT (U)

## DRAWING NO. SK-C-53105, REV. 2

| | | | |
|---|---|---|---|
| 33444444444455555555556666 8901234567890123456789012 3 | PSC= PLOT DATE | DRAWN BY (ORIG): TIME | LAST CADD REV. BY: T.HICKMAN DATE: |

## ATTACHMENT 2

## ER INSPECTION DATA SHEET FOR KRSB WASTE SITE
**Page 1 of 2**

| **Waste Site:** _____<br>A = Satisfactory<br>X = Unsatisfactory (Comments required) | **A or X** | Comments or Corrective Action Taken (See Maintenance Register for Corrected Items) |
|---|---|---|
| 1. Verify that there is no excavation, digging, or construction activities on the soil cover. | | |
| 2. Verify that no woody vegetation is growing on the soil cover. Remove or identify, as needed. | | |
| 3. Visually check vegetative cover for grass density, with no bare spots more than 3-feet in area. The height of the vegetative cover should not impair the visual inspection of the soil cover. This will be determined by the inspector. | | |
| 4. Verify that the roads are accessible. | | |
| 5. Verify that the four (4) waste unit signs, and the four (4) underground piping signs, are in acceptable condition, have correct information, and are legible from a distance of 25 feet. | | |
| 6. Check the soil cover for signs of erosion or depressions (subsidence). | | |

## ATTACHMENT 2 (Cont.)

## ER INSPECTION DATA SHEET FOR KRSB WASTE SITE
**Page 2 of 2**

| **Waste Site:** _____<br>A = Satisfactory<br>X = Unsatisfactory (Comments required) | **A or X** | Comments or Corrective Action Taken (See Maintenance Register for Corrected Items) |
|---|---|---|
| 7. Check for signs of burrowing animals (holes). | | |
| 8. Verify that there is no excavation, digging or construction activities over underground process piping (identified by signs). | | |
| 9. Other: | | |

Inspected By:_____/_____Date:_____Time:_____
(Print Name) (Signature)

Reviewed By:_____/_____Date:_____Time:_____
Post-Closure Manager or Designee (Print Name) (Signature)

**Note: USEPA and SCDHEC must be notified within 30 days of identification of any area where any breach or compromise of restrictions placed on this institutional control OU has occurred.**