LUCIP for the
R-Area Reactor Seepage Basins, 904-57G, -58G, -59G, -60G, -103G, and -104G

Land Use Control Implementation Plan for R-Area Reactor Seepage Basins, 904-57G, -58G, -59G, -60G, -103G, and -104G

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United States Department of Energy
Savannah River Site

Land Use Control Implementation Plan (LUCIP) for R-Reactor Seepage Basins Operable Unit (U)

WSRC–RP–2004-4032

Revision 1

September 2004

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LIST OF ACRONYMS AND ABBREVIATIONS

CA	contamination area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Ci	curie
CMCOC	contaminant migration constituent of concern
COC	constituent of concern
ECA	Environmental Compliance Authority
FFA	Federal Facility Agreement
GWMZ	Groundwater Mixing Zone
HAZWOPER	Hazardous Waste Operations and Emergency Response
IC	institutional controls
LUC	Land Use Control
LUCIP	Land Use Control Implementation Plan
LUCAP	Land Use Control Assurance Plan
MCL	maximum contaminant level
OU	operable unit
pCi/L	picocurie per liter
PCM	Post-Closure Manager
PTSM	principal threat source material
QA	Quality Assurance
RAIP	Remedial Action Implementation Plan
RAO	remedial action objective
RBA	risk-based activity
RCRA	Resource Conservation and Recovery Act
RFI/RI/BRA	RCRA Facility Investigation/Remedial Investigation Report with Baseline Risk Assessment
ROD	Record of Decision
RRSB	R-Reactor Seepage Basins
SCDHEC	South Carolina Department of Health and Environmental Control
SGCP	Soil and Groundwater Closure Projects
SRS	Savannah River Site
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
UST	underground storage tank
WSRC	Westinghouse Savannah River Company, LLC

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1.0 INTRODUCTION

This Land Use Control Implementation Plan (LUCIP) has been prepared for the R-Reactor Seepage Basins (RRSB) OU at the Savannah River Site (SRS) (see Figure 1). The purpose of the LUCIP is to describe how the land use controls (LUCs) selected in the Record of Decision (ROD) (WSRC 2003c) will be implemented and maintained. The following LUCs have been selected for this OU:

- Prevent contact, removal, or excavation of contaminated soil and pipelines
- Preclude residential use of the area
- Prevent unauthorized access to contaminated groundwater in the area

The selected remedy leaves hazardous substances in place that pose a potential future risk and will require LUCs for an indefinite period of time. As agreed on March 30, 2000, among the United States Department of Energy (USDOE), the United States Environmental Protection Agency (USEPA), and the South Carolina Department of Health and Environmental Control (SCDHEC), SRS is implementing a Land Use Control Action Plan (LUCAP) (WSRC 1998a) to ensure that the LUCs required by numerous remedial decisions at SRS are properly maintained and periodically verified. The requirements of that LUCAP also apply to the LUCs that were selected as part of the remedial action for the RRSB OU. This additional document, the RRSB OU LUCIP, contains the specific measures required to implement and maintain the LUCs selected as part of this particular remedial decision. The LUCs shall be maintained until the OU is suitable for unlimited exposure and unrestricted use. Approval by USEPA and SCDHEC is required for any modification or termination of the institutional controls (ICs).

USDOE is responsible for implementing, maintaining, monitoring, reporting, and enforcing the LUCs in accordance with the approved LUCIP. Upon final approval, the LUCIP will be appended to the LUCAP and should be considered incorporated by reference into the RRSB/108-4R Overflow Basin OU ROD, establishing implementation and maintenance requirements for the

LUCs under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the SRS Federal Facility Agreement. The LUCIP will remain in effect unless and until modifications are approved by USEPA and SCDHEC as necessary for protection of human health and the environment. This LUCIP will be evaluated for accuracy during the five-year remedy review and any approved LUCIP modification will be appropriately documented for incorporation by reference into the RRSB/108-4R Overflow Basin OU ROD.

1.1 Document Format

The format of this document is consistent with the LUCIP template approved on March 18, 2003.

2.0 OVERVIEW OF R-REACTOR SEEPAGE BASINS OU REMEDIAL ACTION

2.1 Description of R-Reactor Seepage Basins OU

The RRSB consists of six unlined basins, process sewer lines, sanitary sewer lines and an area of contaminated vegetation north of the R-Reactor building (Building 105-R). All six basins were constructed between June 1957 and March 1958 and received an estimated 5-million gallons of purge water from the R-Reactor disassembly basin. A non-routine discharge due to a calorimeter test failure in 1957 released approximately 2,700 curies (Ci) of radionuclides primarily to Basin 1, with Basins 2 through 5 receiving a lesser amount. The primary radionuclides present were strontium-90 (Sr-90) and cesium-137 (Cs-137). Lesser amounts of transuranics were found in the purge water. The abandoned process sewer line extends from the R-Reactor disassembly basin to Basins 1 and 6. A sanitary sewer system was breached during the construction of Basins 1 and 5 and received the contaminated water discharged to the basins.

Basins 1 through 5 were all deactivated and backfilled by 1960. Basin 6 was deactivated in 1964 and backfilled in 1977. Currently all six basins are covered with an asphalt bioturbation barrier. See Figure 1.

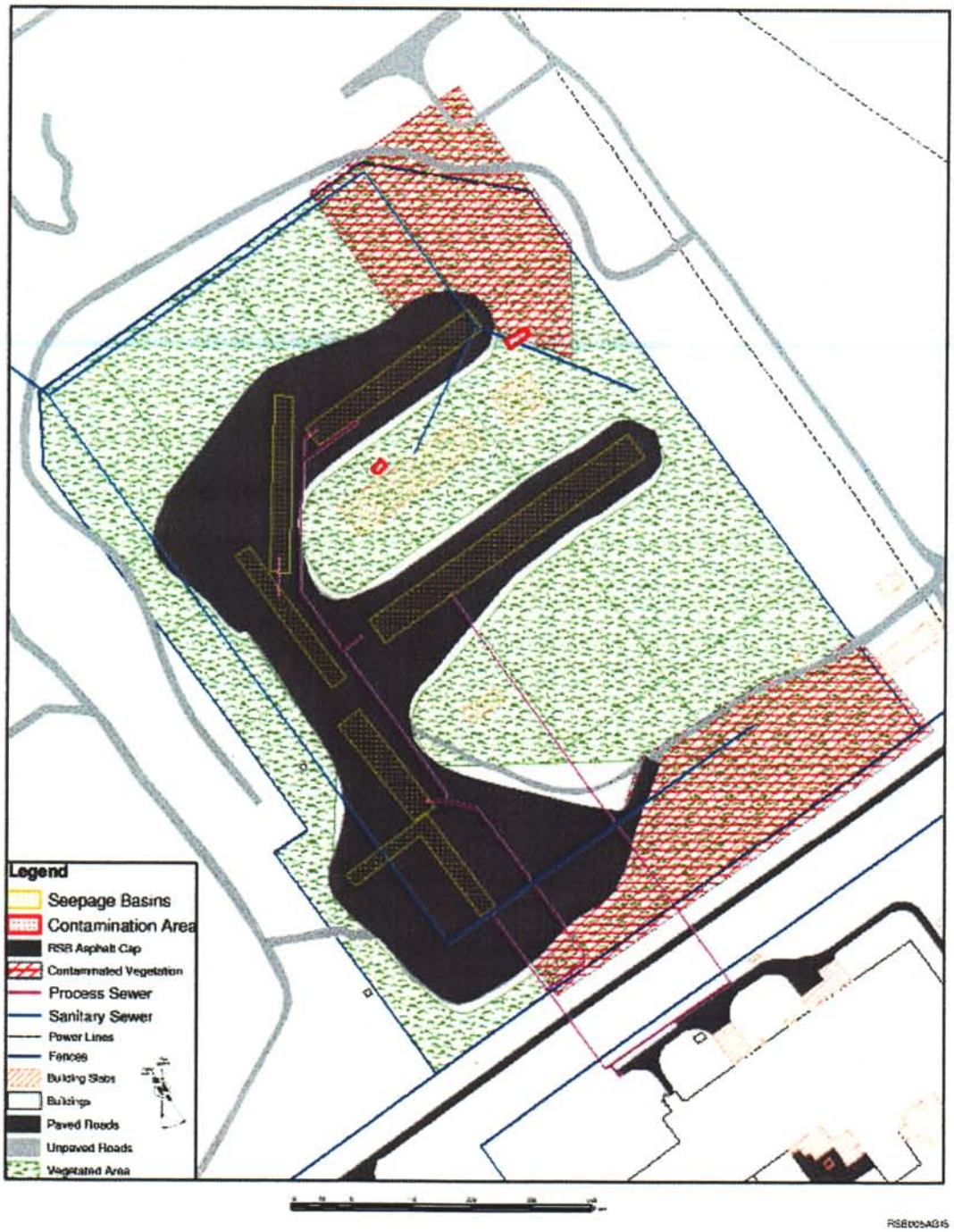

Figure 1. Pre-Remedial Action Layout of the R-Reactor Seepage Basins OU

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Based on the conclusions provided in the RCRA Facility Investigation (RFI)/Remedial Investigation (RI)/Baseline Risk Assessment (BRA) (WSRC 1998b), the Core Team has agreed that there are no problems warranting action (i.e., no constituents of concern (COCs)) for the surface water and sediment and the 108-4R Overflow Basin subunits; therefore, no further action will be taken for these subunits.

2.2 Nature and Extent of Contamination in R-Reactor Seepage Basins OU

The RRSB remedial action will leave soil and groundwater contamination at the unit above acceptable levels of risk for a long period of time. To prevent exposure to the contamination, long-term LUCs must be implemented until the risk is reduced to acceptable levels via radioactive decay to non-toxic stable elements. The residual risks are discussed below.

Seepage Basins 1 through 6 and Abandoned Process/Sanitary Sewer Lines

Table 1 identifies all human-health COCs and their associated risks for the future industrial worker. The subsurface soil that was evaluated for risk is located at the bottom of the basins and is covered by a least 8 feet of backfill. Due to the high risk associated with Cs-137 and the leachability of Sr-90, the soil at the bottom of the six basins was designated as principal threat source material (PTSM). The abandoned process/sanitary sewer lines were not evaluated quantitatively for risk. Based on the history and use of these lines, it is assumed that the contaminated portions of these lines are PTSM.

Table 1. Human Health Constituents of Concern and Associated Risk

COCs	Baseline Risk[1]
Cesium-137	9.0×10^{-2}
Americium-241	2.0×10^{-4}
Cobalt-60	2.0×10^{-5}
Plutonium-238	2.0×10^{-6}
Plutonium-239/240	1.0×10^{-5}
Strontium-90	1.0×10^{-4}

[1]Baseline risk for hypothetical future industrial workers for soils at depths of 8.0 to 14.5 ft.

Surface Water and Sediment COCs

There are no COCs for the surface water and sediment.

Ecological COCs

Based on the RFI/RI/BRA no final ecological COCs were identified for the SSL, basins, abandoned process sewer lines and associated vegetation. Subsequent to the completion of the BRA, an area of surface radioactivity near Basin 5 was identified. This area is approximately 15 X 20 feet. Therefore, it is a very limited area for ecological exposure. The maximum concentration of 858 pCi/g for Cs-137 is less than the ecological RGO of 1,830 pCi/g identified in the RFI/RI/BRA. Therefore no ecological COCs are identified.

Contaminant Migration Final COCs

Analyses from a vadose zone transport model identified americium-241 (Am-241), carbon-14 (C-14), plutonium-239/240 (Pu-239/240), and Sr-90 as contaminant migration constituents of concern (CMCOCs) since they are estimated to leach from the soil in the future at activity levels that exceed their risk-based activities (RBAs) (WSRC 1997). A more extensive study was performed that showed that the maximum saturated-zone concentrations calculated for C-14 and Pu-239/240 will not exceed the maximum contaminant level (MCL) or RBA for any combination of basin, water table, or basin cover configuration (WSRC 2002a). Therefore, C-14 and Pu-239/240 are no longer considered CMCOCs that warrant further action.

Groundwater COCs

During the characterization activities, the nature and extent of groundwater contamination were investigated (WSRC 1998b). Sr-90 was identified as the only COC in groundwater; however, Am-241 was also retained as a COC in the RFI/RI/BRA because of a single 1.3 pCi/L detection in one well in 1996. Subsequent samples taken in 2003 at this well were nondetects for Am-241. These results indicate that, to date, Am-241 is not present in groundwater at elevated levels. The extent of the Sr-90 groundwater contamination has not extended significantly beyond the footprint of the RRSB, and the contamination is located in the upper aquifer zones above the tan clay confining zone.

2.3 Remedial Action Selected

The selected remedial action for the RRSB OU includes the following elements:

- Installation of a 6-inch, reinforced-concrete, intruder barrier system with granite warning monuments extended over the PTSM and contaminated pipelines inside the RRSB
- Excavate all contaminated process and sanitary sewer lines and associated soil above PTSM levels located outside the boundary fence and dispose of on-unit in a trench covered by a concrete intruder barrier.
- Removal of contaminated vegetation associated with the RRSB and disposal within the RRSB boundary fence
- Placement of an asphalt bioturbation barrier over the contaminated vegetation area to prevent further disturbance of contaminated surface and subsurface soil
- Implementation of the requirements of the approved mixing zone application (WSRC 2002b) to ensure that groundwater contamination attenuates, as approved, by the SCDHEC.

- Continue implementation of ICs to ensure current workers and future industrial workers are protected from exposure to the contaminated media.

- Excavation and on-unit disposal of two small contamination areas (CAs).

The post-remedial action conceptual site model (see Appendix C to this LUCIP) shows the broken pathways and the remaining residual risk to the future industrial worker.

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

3.0 LAND-USE CONTROL OBJECTIVES

To reduce the residual risk, the LUC objectives will achieve the following:

- Maintain the use of the site for industrial activities only. This LUC objective attains the remedial action objectives (RAOs) to prevent residential development within the OU and prevents residential exposure to the contaminated media at the RRSB OU.

- Prevent unauthorized access to the unit as long as the waste remains a threat to human health or the environment. This LUC objective attains the RAO to prevent current, remedial and future industrial workers from exposure to the contaminated media at the RRSB OU.

- Provide public notices for disclosing former waste management and disposal activities and remedial actions taken on the site. This LUC supports RAOs that protect industrial workers, residents, trespassers, and inadvertent intruders from exposure to the contaminated media at the RRSB OU.

- Prevent unauthorized residential or agricultural access to groundwater. This LUC supports RAOs to protect industrial workers, residents, trespassers, and inadvertent intruders from exposure to the contaminated media at the RRSB OU and helps prevent the spread of groundwater contamination.

4.0 IMPLEMENTATION OF LAND-USE CONTROLS

This section describes the LUCs selected in the ROD to achieve the objectives stated in Section 3.0.

Implementation of Industrial Use Only, Deed Notification and Public Notification

The RRSB OU will be maintained for industrial use only in perpetuity.

In the long term, if the property is ever transferred to nonfederal ownership, the U.S. Government will take those actions necessary pursuant to Section 120(h) of CERCLA. These actions will include a deed notification disclosing former waste management and disposal activities as well as remedial action taken on the site. The deed shall include groundwater use control and deed restrictions precluding residential use of the property. The new owner will be required to ensure that the integrity of these controls continues until the contaminated media no longer pose an unacceptable threat to human health and the environment.

Implementation of Access Controls

Presently, the current worker is protected for exposure via the Site Use Program, Site Clearance program, work control, worker training, worker briefing of health and safety requirements, 6-foot boundary fence, and warning signs (see Table 2). Trespassers' exposure to the waste unit is controlled by security procedures and equipment, surveillance system, and warning signs.

If the land is ever transferred from federal to nonfederal ownership, public notifications, deed restrictions, etc., shall be implemented as discussed above. The deed restrictions will require the future hypothetical owner to ensure that unauthorized exposure to the contaminated groundwater and soil is prevented.

The planned remedial action will include the following engineering barriers that will serve as LUCs to prevent exposure of the future worker, trespasser, and inadvertent intruder to contaminated groundwater, soil, and vegetation.

- A reinforced-concrete intruder barrier will be installed over all PTSM. Granite monuments will be installed on the concrete intruder barrier to warn future generations of the presence of the highly toxic radioactive waste associated with the sewer lines and basins.

- All contaminated vegetation will be removed and disposed of on-unit under the additional asphalt bioturbation barrier.

Table 2. Land Use Controls for R-Reactor Seepage Basins

Type of Control	Purpose of Control	Duration	Implementation	Affected Areas[a]
1. Property Record Notices[b]	Provide notice to anyone searching records about the existence and location of contaminated areas.	Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use	Notice recorded by DOE in accordance with state laws at County Register of Deeds office: 1) if the property or any portion thereof is ever transferred to non-federal ownership	All waste management areas and other areas where hazardous substances are left in place at levels requiring land use and/or groundwater restrictions.
2. Property record restrictions[c]: A. Land Use B. Groundwater	Restrict use of property by imposing limitations. Prohibit the use of groundwater.	Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use	Drafted and implemented by DOE upon transfer of affected areas. Recorded by DOE in accordance with state law at County Register of Deeds office.	All waste management areas and other areas where hazardous substances are left in place at levels requiring land use and/or groundwater restrictions.
3. Other Notices[d]	Provide notice to county/city about the existence and location of waste disposal and residual contamination areas for zoning/planning purposes.	Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use	Notice recorded by DOE in accordance with state laws at County Register of Deeds office: 1) if the property or any portion thereof is ever transferred to non-federal ownership	All waste management areas and other areas where hazardous substances are left in place at levels requiring land use and/or groundwater restrictions.
4. Site Use Program[e]	Provide notice to worker/developer (i.e.., permit requestor) on extent of contamination and prohibit or limit excavation/penetration activity.	As long as property remains under DOE control	Implemented by DOE and site contractors Initiated by permit request	Remediation systems, all waste management areas and areas where levels require land use and / or groundwater restrictions.
5. Physical Access Controls[f] (e.g., intruder barrier fences, gates)	Control and restrict access to workers and the public to prevent unauthorized entry	Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use	Controls maintained by DOE	At RRSB OU and SRS boundary
6. Warning Signs[g]	Provide notice or warning to prevent unauthorized uses	Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use	Signage maintained by DOE	At RRSB OU and SRS boundary
7. Security Surveillance Measures	Control and monitor access by workers/public	Until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use	Established and maintained by DOE Necessity of patrols evaluated upon completion of remedial actions.	Patrol of selected area throughout SRS, as necessary.

[a]Affected areas – Specific locations identified in the SRS LUCIP or subsequent post-ROD documents.
[b]Property Record Notices – Refers to any non-enforceable, purely informational document recorded along with the original property acquisition records of DOE and its predecessor agencies that alerts anyone searching property records to important information about residual contamination; waste disposal areas in the property.
[c]Property Record Restrictions – Includes conditions and/or covenants that restrict or prohibit certain uses of real property and are recoded along with original property acquisition records of DOE and its predecessor agencies.
[d]Other Notices – Includes information on the location of waste disposal areas and residual contamination depicted on as survey plat, which is provided to a zoning authority (i.e., city planning commission) for consideration in appropriate zoning decisions for non-DOE property.
[e]Site Use Program – Refers to the internal DOE/DOE contractor administrative program(s) that requires the permit requestor to obtain authorization, usually in the form of a permit, before beginning any excavation/penetration activity (e.g., well drilling) for the purpose of ensuring that the proposed activity will not affect underground utilities/structures, or in the case contaminated soil or groundwater, will not disturb the affected areas without the appropriate precautions and safeguards.
[f]Physical Access Controls – Physical barriers or restrictions to entry.
[g]Signs – Posted command, warning or direction.

4.1 Property Record Notices

In the long term, if the property is ever transferred to nonfederal ownership, the U.S. Government will take those actions necessary pursuant to Section 120(h) of CERCLA. Those actions will include a deed notification disclosing former waste management and disposal activities as well as remedial actions taken on the site. The contract for sale and the deed will contain the notification required by CERCLA Section 120(h).

The deed notification shall, in perpetuity, notify any potential purchaser that the property has been used to manage and dispose of waste. This requirement is consistent with the intent of Resource Conservation and Recovery Act (RCRA) deed notification requirements at final closure of a RCRA facility if contamination will remain at the unit.

4.2 Property Record Restrictions

The deed shall also include restrictions precluding residential use of the property and/or any other property record restrictions necessary to achieve the LUC objectives. The deed shall contain appropriate provisions to ensure that the restrictions continue with the land. USDOE shall provide a copy of the executed deeds to the regulatory agencies as soon as practicable after the transfer of fee title, but no later than 30 days. However, the need for these deed restrictions may be re-evaluated at the time of transfer in the event that exposure assumptions differ and/or the residual contamination no longer poses an unacceptable risk under residential use. Any re-evaluation of the need for the deed restrictions will be done though an amended ROD.

USDOE shall provide USEPA and SCDHEC 6 months notice prior to transfer to ensure that USEPA and SCDHEC can be involved in discussions to ensure that appropriate provisions are included in the transfer terms or conveyance documents to maintain effective ICs. If it is not possible for the facility to notify USEPA and SCDHEC at least six months prior to any transfer or sale, then the facility will notify USEPA and SCDHEC as soon as possible but no later than 60 days prior to the transfer or sale of any property subject to ICs. In addition to the land transfer

notice and discussion provisions above, USDOE further agrees to provide USEPA and SCDHEC with similar notice, within the same time frames, as to federal to federal transfer of property.

4.3 Other Public Notices

The LUCIP identifies the area under land use restriction in Appendix A via a design sketch (SK-C-53215). The sketch provides a plan views of the site with a line marked depicting the "SURFACE AREA SUBJECT TO LAND USE CONTROLS" and a line marked depicting the "CURRENT ESTIMATED LOCATION OF THE GROUNDWATER PLUME SUBJECT TO LAND USE CONTROLS." Preparation of a certified survey plat will be deferred until the site is transferred to non-federal ownership. Preparing the survey plat coincident with land transfer will maximize the accuracy of the groundwater area under the restrictive covenant. The deferred survey plat will be appended to this LUCIP when it is completed.

In addition, if the site is ever transferred to nonfederal ownership, a professional land surveyor-certified survey plat of the OU will be prepared at or near the time of conveyance to support the LUCIP required restrictive covenants on land use and will be recorded with the appropriate county recording agency.

4.4 Site Use Program

Under DOE Order 430.1A, *Life Cycle Management* (USDOE 1998), SRS is required to implement an asset management program for the use, maintenance, and disposal of physical assets, including real estate. SRS complies with this Order through its Site Use Program, which is conducted in accordance with WSRC 1D, *Site Infrastructure and Services Manual*, Procedure 3.02, "Site Real Property Configuration Control" (WSRC 2003a). All employees, contractors, and visitors at SRS are required to adhere to the Site Use Program. This program ensures authorization of any work performed at SRS if the work adds, modifies, or removes features portrayed on the SRS development maps. No land use (e.g., excavation) shall be undertaken without prior approval documented by a Site Use Permit. To obtain this authorization, a Site Clearance Request Form must be completed. In accordance with WSRC 1D, 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 activities are conducted. All Site Clearance Requests will be reviewed to verify that either an approved Site Use Permit has been obtained or that the request is sanctioned by an existing Site Use Permit. All land use requirements applicable for the OU will be provided to the Site Use Program for use in determining issuance of Site Clearance permits. In addition, the Site Use permit must be amended when the geographic configuration or buffer zone used to establish the permit boundary changes or there is a change to the permitted land use.

SRS is responsible for updating, maintaining, and reviewing site maps, including Federal Facility Agreement (FFA) (1993) OU identifications. If a Site Clearance Request potentially impacts an FFA OU, the Site Clearance Request Form is sent to the appropriate FFA OU reviewer for approval. The roles and responsibilities of each individual are detailed in WSRC 1D, Procedure 3.02. Before a Site Clearance Permit is issued, verification of USDOE approval for intended land use must be obtained. The site use and site clearance processes are applicable to all activities and personnel on site (including subcontractors). The USEPA and SCDHEC will be notified within 30 days of any changes to the Site Use Program that impacts actual land use requirements by USDOE by revising the LUCAP.

The processes are controlled within the SRS Quality Assurance (QA) Program in accordance with WSRC 1Q Manual, *Quality Assurance* (WSRC 2003b). The SRS QA program governs all SRS activities.

SRS identifies all buildings and facilities on maps used in the Site Use Program. This waste unit is identified on these maps as a 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. The USDOE will notify the USEPA and the SCDHEC in writing of changes in land use or excavation at least sixty (60) days prior to the initiation of such changes to obtain USEPA and SCHEC positions on the proper changes. USDOE shall seek prior concurrence of

USEPA and SCDHEC before any anticipated action that may disrupt the effectiveness of the land use controls, or any action that may alter or negate the need for land use controls.

4.5 Physical Access Controls

Presently the RRSB OU is surrounded by a 6-foot chain link fence, locked gates, and warning signs on the fence. The remedial action will retain the fence and will include a concrete intruder barrier, asphalt bioturbation barrier, warning signs, and granite warning monuments. USDOE will maintain these controls as long as the waste poses an unacceptable threat to human health and the environment or until the land is transferred to nonfederal ownership. Deed restrictions will require the new owner to continue maintenance of LUCs and engineered barriers as needed until the waste unit no longer poses an unacceptable threat to human health and the environment.

The areas subject to land-use controls are shown on Sketch SK-C-53215 in Appendix A. The sketch shows the surface area subject to LUCs and the current extent of groundwater subject to LUCs. It is expected that the extent of groundwater contamination will change and; consequently, the extent of the groundwater LUCs will also change.

The effectiveness of the LUCs will be monitored by annual field inspections in accordance with the Field Inspection Checklist in Appendix B. The effectiveness of the LUCs will be further evaluated in the 5-year remedy review.

4.6 Warning Signs and Granite Monuments

To prevent unknowing entry and to ensure that unrestricted use of the waste unit does not occur while the unit is under ownership of the government, or concentrations sufficiently reduced to allow for unrestricted use, access control warning signs and granite monuments will be placed at the unit. The signs will be legible for a distance of at least 25 feet. The signs will read as follows:

- R-Reactor Seepage Basins OU (Bldgs: 904-57G, 58G, 59G, 60G, 103G, 104G)

- "Danger – Unauthorized Personnel Keep Out. This unit contains radiological hazardous substances. Do not dig or excavate. Do not enter without contacting the waste unit custodian." See Appendix D for figure showing standard warning sign for the RRSB OU.
- Custodian: Manager, Post-Closure
- Phone: (803) 952-6882

Granite monuments will be placed on the concrete intruder barrier. The warnings on the granite monuments will read as follows:

"Danger – Buried Radioactive Waste – Do not Dig"

Custodial responsibilities for maintenance and inspection of the RRSB OU will be maintained by the Post-Closure Maintenance Group within Soil Groundwater Closure Projects (SGCP).

4.7 Other Access Controls and Security/Surveillance Measures

While under the ownership of USDOE, access control of the entire SRS will be maintained in accordance with the 2000 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 access control 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.

4.8 Field Inspection and Maintenance for Institutional Controls

After remediation of the RRSB OU, only maintenance activities will be required by this remedial action. No operations other than groundwater mixing zone (WSRC 2002b) monitoring will be required.

The R-Reactor Seepage Basin will be inspected annually according to the Field Inspection Checklist in Appendix B. USEPA and SCDHEC will be notified by USDOE of any events and/or

actions that indicate potential compromise of the ICs and the proposed action to address the potential compromise within 30 days of identification. The FFA Annual Progress Report, submitted to the regulatory agencies by USDOE, will provide the status of the ICs and will address any control deficiencies or inconsistent uses of ICs. In the event of property transfer or lease, the Annual Report will cite findings on the following: whether the use of the property is affected by the deed or lease restrictions and controls; whether property use conforms with the deed or lease restrictions and controls; and whether the owners and state/local agencies have been notified regarding the deed or lease restrictions and controls.

All other routine maintenance activities will be documented and maintained in files subject to USEPA and SCDEHC review and audit. A copy of the completed inspection checklist is maintained in the SGCP Document Control. The LUCs shall be maintained until the concentration of hazardous substances associated with the unit have been reduced to levels that allow for unlimited exposure and unrestricted use.

The waste unit inspectors are to be trained in Hazardous Waste Operations and Emergency Response (HAZWOPER), RCRA Well Inspections (SGCP-specific training), SGCP RCRA Waste Unit Inspections, Radiological Worker Training, 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, different personnel may conduct the inspections and grass cutting operations.

This unit-specific LUCIP, including the checklist (Appendix B), will be appended to the SRS LUCAP upon final regulatory approval of the completed remedial action.

5.0 REFERENCES

FFA, 1993. *Federal Facility Agreement for the Savannah River Site*, Administrative Docket No. 89-05-FF (Effective Date: August 16, 1993)

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APPENDIX A

DESIGN SKETCH

SK-C-53215 LAND USE CONTROL IMPLEMENTATION PLAN SKETCH

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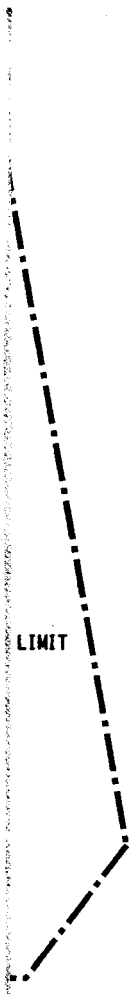

EXIST CONCRETE/ASPHALT SURFACE

ASPHALT BIOTURBATION BARRIER

CONCRETE INTRUDER BARRIER

DRAINAGE FLOW

P — PROCESS SEWER LINE

SCADA — SCADA CABLE

FP — FIRE PROTECTION

SS — SANITARY SEWER LINE

DW — DOMESTIC WATER

S — STORM DRAIN

SURFACE AREA LIMITS

GROUNDWATER PLUME

1 ROW — POWER LINE RIGHT OF WAY

NOTES:

1. THE EXISTING UTILITIES OUTSIDE THE R REACTOR SEEPAGE BASIN PERIMETER FENCE LIMIT ARE NOT UNDER LAND USE CONTROL LIMITS.

2. THIS SKETCH PROVIDES A PLAN VIEW OF THE SITE WITH A LINE MARKED DEPICTING THE "SURFACE AREA SUBJECT TO LAND USE CONTROLS" AND A LINE MARKED DEPICTING THE "CURRENT ESTIMATED LOCATION OF THE GROUNDWATER PLUME SUBJECT TO LAND USE CONTROLS".

60 120 180

1" = 60'

R REACTOR SEEPAGE BASIN OPERABLE UNIT CLOSURE (904-57G,58G,59G,60G,103G AND 104G)

LAND USE CONTROL IMPLEMENTATION PLAN (U)

SK-C-53215, REV 1

DRAWN BY (ORIG): P. CALAIS
TIME

LAST CADD REV. BY: P. CALAIS
DATE:

Scale shown on this drawing is only applicable when plotted at 30"x42" (actual drawing size)

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APPENDIX B

FIELD INSPECTION CHECKLIST

FOR R-REACTOR SEEPAGE BASINS

FIELD INSPECTION CHECKLIST

FOR R-REACTOR SEEPAGE BASINS

904-57G, -58G, -59G, -60G, -103G, -104G

☐ **SCHEDULED** ☐ **UNSCHEDULED**

A= Satisfactory X= Unsatisfactory (Explanation required)	A or X	Observation of Corrective Action Taken
1. Verify that the roads are accessible.		
2. Verify that the waste unit signs (16) and granite monument (6) are in acceptable condition, have the correct information, and are legible from a distance of 25 feet.		
3. Verify that the fence is in good condition and locked.		
4. Verify that there are no unauthorized excavation, digging, or construction activities in the RRSB OU.		
5. Check the integrity of drainage ditches for the presence of excessive erosion, sediment buildup, and any debris restricting water flow.		
6. Verify that no woody vegetation is growing through the asphalt bioturbation barrier. Remove or identify as needed.		
7. Visually check the buffer vegetative grass density, with no bare spots more than 3 by 3 feet in area. The height of the vegetative cover should not impair the visual inspection of the asphalt or concrete cover. This will be determined by the inspector.		

FIELD INSPECTION CHECKLIST

FOR R-REACTOR SEEPAGE BASINS

(904-57G, -58G, -59G, -60G, -103G, -104G) (Continued)

A= Satisfactory X= Unsatisfactory (Explanation required)	A or X	Observation of Corrective Action Taken
8. Verify granite monuments are in place and legible		
9. Check the asphalt cover for signs of cracking or depressions (subsidence).		
10. Check for signs of burrowing animals.		
11. Check sedimentation basins for excessive sediment build up as indicated by the sediment markers		

Inspected by:

_____ / _____ Date:_____
(Print Name) (Signature)

Post-Closure Manager:

_____ / _____ Date:_____
(Print Name) (Signature)

CAUTION: The inspector shall notify the Post-Closure Manager (PCM) and Environmental Compliance Authority (ECA) **IMMEDIATELY** if there has been a breach or compromise of the institutional controls at this waste unit. The notification shall be in accordance with SRS post-closure inspection procedures.

NOTE: Monitoring wells associated with this waste unit are maintained in accordance with SGCP Monitoring Well Procedures.

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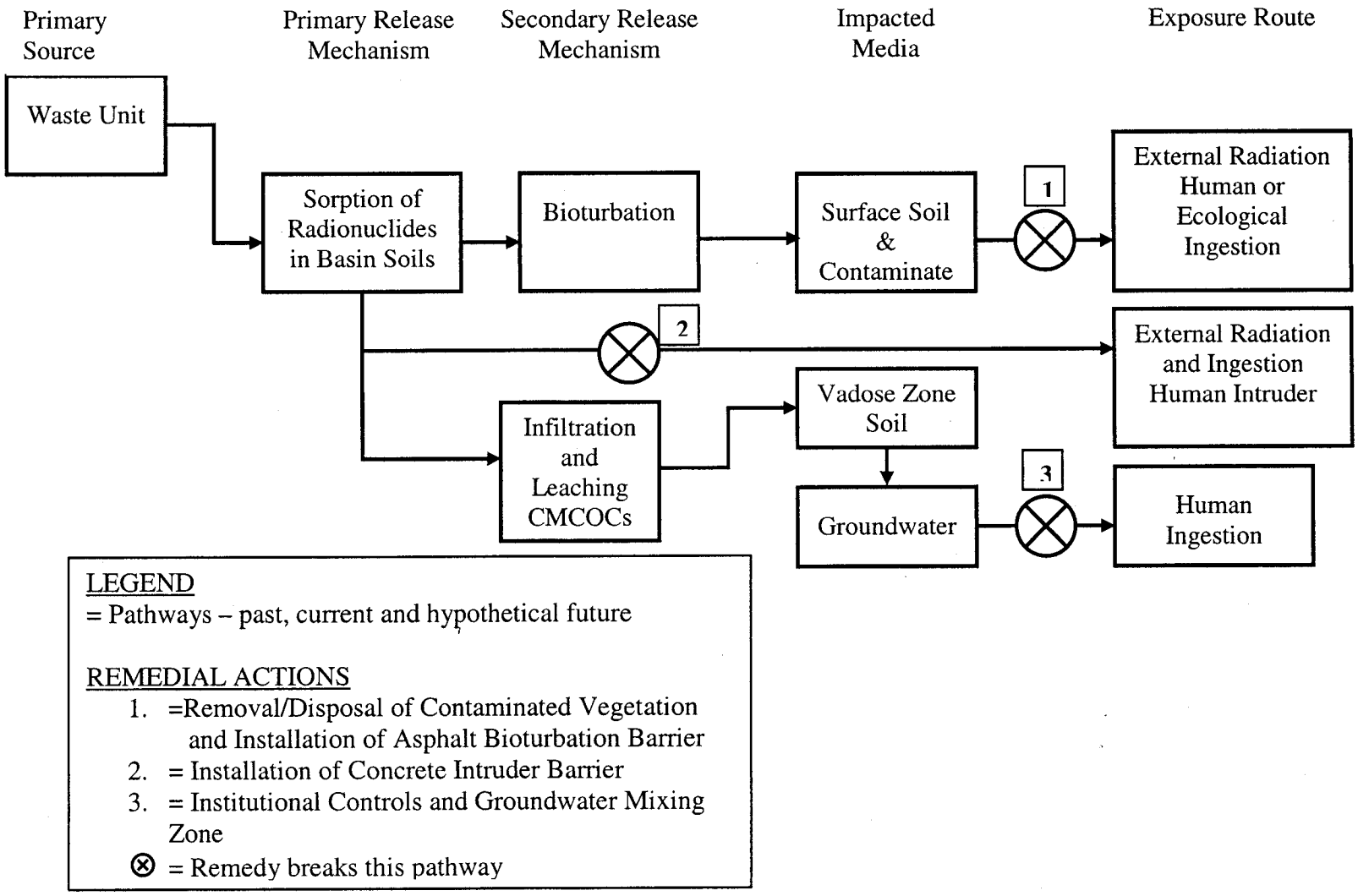
APPENDIX C

POST-REMEDIAL ACTION CONCEPTUAL SITE MODEL

FOR THE R-REACTOR SEEPAGE BASINS

POST-REMEDIAL ACTION

Figure C-1. Post-Remedial Action Conceptual Site Model for R-Reactor Seepage Basins OU



APPENDIX D

ACCESS CONTROL WARNING SIGNS

and

Typical Granite Marker

R-Reactor Seepage Basins Waste Unit

Building Numbers: 904-57G, -58G, -59G, -60G, -103G, and -104G

DANGER

UNAUTHORIZED PERSONNEL KEEP OUT

THIS UNIT CONTAINS RADIOLOGICAL SUBSTANCES.

DO NOT DIG OR EXCAVATE.

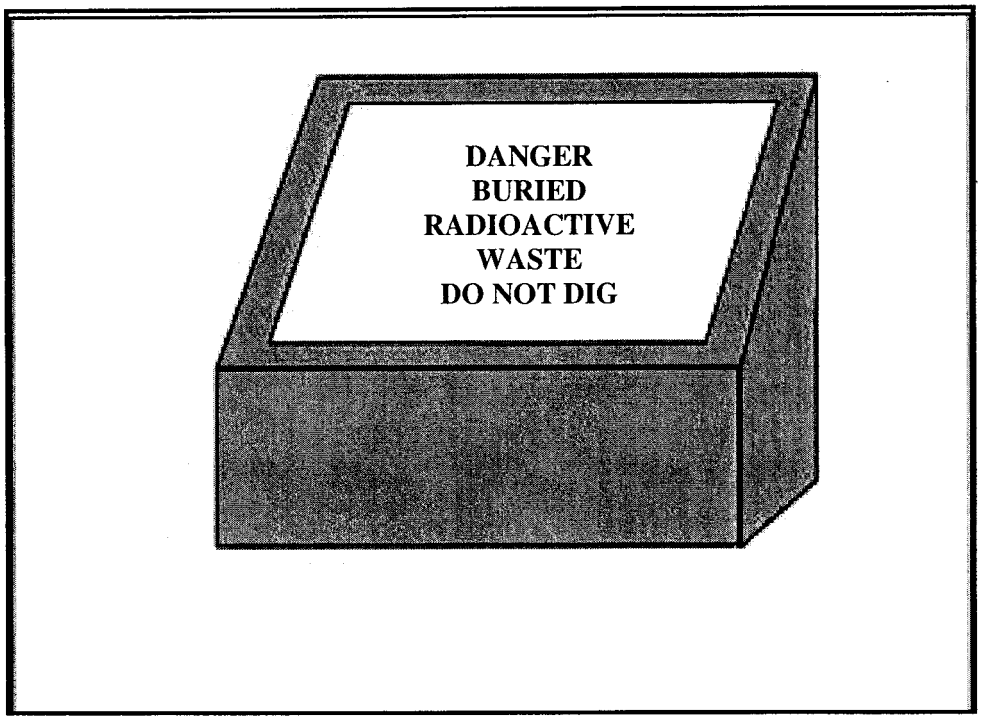
DO NOT ENTER WITHOUT CONTACTING THE

WASTE UNIT CUSTODIAN.

CUSTODIAN: MANAGER, POST-CLOSURE MAINTENANCE

PHONE: (803) 952-6882

Figure D-1. Access Control Warning Sign



TYPICAL SINGLE SLANT GRANITE MONUMENT
APPROXIMATELY 24" X 10" X 16"

Figure D-2. Typical Granite Warning Monument

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