LUCIP for the
C-Area Reactor Seepage Basins, 904-66G, -67G, and 68G

Appendix A of Post-Construction Report/Final Remediation Report for C-Area Reactor Seepage Basins, 904-66G, -67G, and 68G

WSRC-RP-2002-4149, Revision.1, January 2003

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

LAND USE CONTROL IMPLEMENTATION PLAN

for the

C-AREA REACTOR SEEPAGE BASIN OU

(904-66G, -67G, and –68G)

LAND USE CONTROL IMPLEMENTATION PLAN

This C-Area Reactor Seepage Basin (CRSB) Land Use Control Implementation Plan (LUCIP) will be appended to the Savannah River Site (SRS) Land Use Control Assurance Plan (LUCAP). The United States Department of Energy (USDOE) is responsible for implementing the land use controls (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 SRS has developed a LUCAP (WSRC 2002) 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 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 Post-Construction Report/Final Remediation Report (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 CRSB Operable Unit

Located in C Area in the central portion of the SRS, the CRSB Operable Unit (OU) lies approximately 120 meters (m) (400 feet [ft]) west of C-Area Reactor perimeter fence.

The CRSB OU was constructed in 1957 to receive low-level radioactive wastewater from the C-Reactor (Building 105-C) disassembly basin purges. From 1957 until 1960, and from 1978 until 1986, the CRSB received purge water from the disassembly basin via an underground, polyethylene process sewer line, which measured approximately 245-m (800-ft) in length, with a diameter of 7.6-centimeter (cm) (3-inch [in]).

Three unlined (earthen) basins comprised the CRSBs. Basin 1 (904-66G) was L-shaped and was constructed with approximate outside dimensions of 80 x 10 m (250 x 35 ft) in the north-south direction, 55 x 10 m (180 x 35 ft) in the east-west direction, and with a depth of approximately 2.1 m (7 ft) below land surface (bls). Basin 2 (904-67G) was constructed with approximate outside dimensions of 90 x 20 m (300 x 60 ft), and a depth of 3.6 m (11 ft) bls. Basin 3 (904-68G) was constructed with approximate outside dimensions of 55 x 25 m (180 x 90 ft), and a depth of 3.7 m (12 ft) bls. Prior to remediation, these basins were open and had not been backfilled to grade.

Groundwater contamination above maximum contaminant levels (MCLs) has not been associated with the CRSB OU.

1.2 Nature and Extent of Contamination in CRSB Soils and Pipeline

The CRSB OU consists of a source term. The source term area of concern (AOC) includes the basins and the process sewer line. The following is a brief summary of the principal threat source material (PTSM) as defined in the Plug-in Record of Decision

(ROD) (WSRC 1999) and the Unit-Specific Plug-in ROD Amendment (WSRC 2002a) documents.

- Basin 1 PTSM is composed of cesium-137. The average cesium-137 concentration exceeds the 1 x 10^{-3} risk and treatment threshold value (TTV) from 0 to 1.8 m (0 to 6 ft) below the basin bottom.

- Basin 2 PTSM is composed of cesium-137. TTVs are exceeded from 0 to 1.2 m (0 to 4 ft) below the basin bottom. An analysis of the activities indicates that the cesium-137 levels associated with Basin 2 soils will decline below the TTV by 2002. This has been interpreted as short-term PTSM, and stabilization/solidification (S/S) is not considered a necessary component of the plug-in remedy for this basin, because current site access/site usage controls will prevent access to the basin as long as the soil is considered PTSM.

- No PTSM was detected in Basin 3. Because of this, no S/S was performed in Basin 3.

- There was no contaminant migration constituent of concern (CMCOC) in the basin soils or in the soil surrounding the process sewer line that will leach to groundwater and exceed MCLs within 1,000 years.

- No PTSM was associated with the process sewer line because radionuclides detected during the sampling did not exceed any of the TTVs.

- The PTSM at CRSB OU is not in direct contact with surface water or groundwater.

- Volatile organic compound (VOC) concentrations, metals, and pesticides in basin soils are below regulatory concern and did not invoke RCRA waste management methods for remediation waste streams. For detailed discussion on the results of characterization sampling and analysis for the CRSB OU refer to Section 3.0 of the Unit-Specific TER (WSRC 2000).

1.3 Remedial Action Overview

The selected remedial action (RA) for the CRSB OU was in situ stabilization of Basin 1, installation of a low-permeability soil cover system over the extent of all three basins, and in situ grouting of the process sewer pipeline. This remedy entailed the following actions:

- Pipeline grouting was used to stabilize and immobilize any potential contamination left inside the pipeline, and prevent access by small animals.
- In situ stabilization of Basin 1 through grouting was used to treat PTSM soil that posed a risk in excess of 1×10^{-3} for future industrial workers.
- Contaminated soil outside the basins exceeding PTSM criteria would have been consolidated. No soil consolidation was required for the CRSB OU.
- A low permeability soil cover system was provided over contaminated soil and the in situ stabilized soil to reduce water infiltration and to provide shielding to potential receptors on the surface.
- Implementation of land use controls, including access control warning signs and a fence, to ensure continued protection of human health or the environment.

The post-remedial action conceptual site model (see Attachment A-3) shows the broken pathways and the remaining residual risk to the future industrial worker.

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

2.0 LAND USE CONTROLS

Considering the residual risk mentioned above, and in order to ensure the protectiveness of the remedy described above, the CRSB OU land use control objectives are to:

- prevent contact, removal, or excavation of buried waste or pipelines in the OU areas designated in the LUCIP;
- maintain the use of the site for industrial activities only; and
- prevent unauthorized access to the closed CERCLA unit as long as the waste remains a threat to human health or the environment.

Current access controls and a deed notification needed to maintain the future land use controls 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* (WSRC 2002g), 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 insures 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) (FFA 1993) OU identifications. If a site clearance request is made that may impact an FFA OU, the Site Clearance Request Form is sent to the FFA OU reviewer, who is in the Environmental Restoration Division (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.

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 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 CRSB OU shall be undertaken without 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.

The access control warning signs for the soil cover will be legible from a distance of at least 25 ft. The soil cover access control warning sign is shown in Figure A-3 (Attachment A-4 to this LUCIP).

The access control warning signs for the underground grouted pipeline will be legible from a distance of at least 25 ft. The underground pipeline access control warning sign is shown in Figure A-4 (Attachment A-4 to this LUCIP).

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

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 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.

2.2 Deed Notification

In the long term, if the property is ever transferred to non-federal ownership, the US 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 for the management and disposal of waste. These requirements are also consistent

with the intent of the RCRA deed notification requirements at final closure of a RCRA facility if contamination will remain at the unit.

The deed shall also include deed restrictions precluding residential use of the property. 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 through an amended ROD with USEPA and SCDHEC review and approval.

In addition, if the site is ever transferred to non-federal ownership, a survey plat of the OU will be prepared, certified by a professional land surveyor, and recorded with the appropriate county recording agency.

Per Section 3.6 of the LUCAP, this LUCIP identifies the area under land use restriction via a Survey Plat (see Attachment A-1, Drawing No. SK-C-53122). Note: The line marked "AREA SUBJECT TO LAND USE CONTROLS" on the Survey Plat defines the area subject to land use controls.

2.3 Field Walkdowns and Maintenance for Institutional Controls

After the remediation of the CRSB OU, 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 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 ERD 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 fence and access control warning signs). (Attachment A-2 provides a unit-specific inspection checklist for the CRSB waste unit).

- Perform necessary repairs (when required as identified during inspection) to maintain the functional integrity of the soil cover, fence, and access control 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 CRSB OU will be performed as long as the waste remains a threat to human health or the environment.

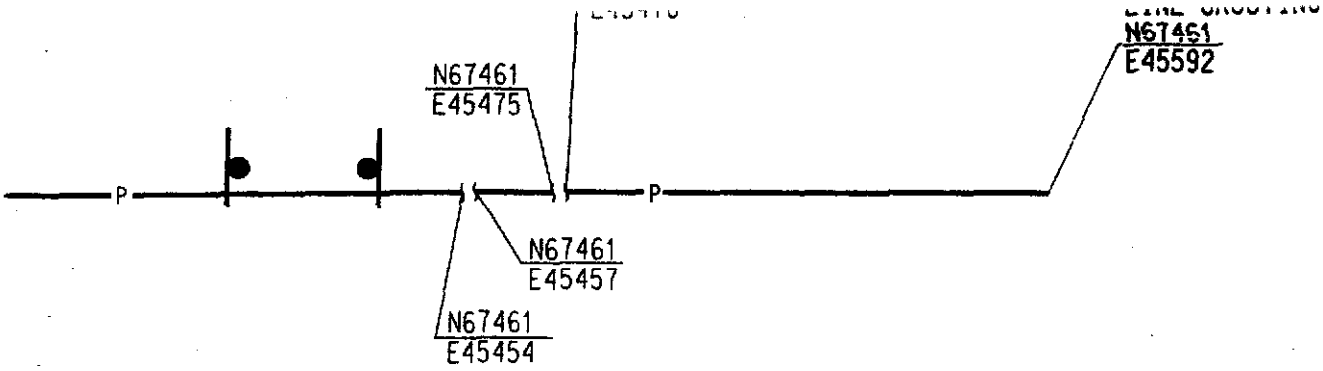
The waste site inspectors are to be trained and certified in Hazardous Waste Operations and Emergency Response (HAZWOPER), RCRA Well Inspections (ERD-specific training), ERD RCRA Waste Unit Inspections, Radiological Worker, etc., as applicable for the specific inspection. They will also be trained based 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 (Attachment A-2), will be appended to the SRS LUCAP.

ATTACHMENT A-1

SURVEY PLAT

SK-C-53122, Land Use Control Implementation Plan, Survey Plat (U)



LEGEND:

ACCESS WARNING SIGN

BOUNDARY MARKER

BARBED WIRE FENCE

REMEDIAL ACTION IMPLEMENTATION PLAN FOR THE C - REACTOR SEEPAGE BASIN (904-66G, 67G & 68G) CLOSURE

90

LAND USE CONTROL IMPLEMENTATION PLAN SURVEY PLAT (U)

DRAWING NO. SK-C-53122

444444445555555555666 6
234567890123456789012 3

PSC= DRAWN BY (ORIG): LAST CADD REV. BY: T.HICKMAN Scale shown on this drawing is only applicable
PLOT DATE 8/21/02 TIME DATE: 8/20/02

Land Use Control
Survey Plat (U)
(SK-C-53122)

ATTACHMENT A-2

ERD FIELD INSPECTION CHECKLIST for CRSB WASTE SITE

ATTACHMENT A-2

ERD FIELD INSPECTION CHECKLIST FOR CRSB WASTE SITE

Page 1 of 3

Waste Site: _____ A = Satisfactory 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 wells and roads are accessible.		
5. Verify that the five (5) waste unit signs, and the six (6) underground piping signs, are in acceptable condition, have correct information, and are legible from a distance of 25 feet.		
6. Verify that the fence is in good condition and that the gate is locked.		

ATTACHMENT A-2 (Continued)

ERD FIELD INSPECTION CHECKLIST FOR CRSB WASTE SITE
Page 2 of 3

Waste Site: __ A = Satisfactory X = Unsatisfactory (Comments required)	**A or X**	Comments or Corrective Action Taken (See Maintenance Register for Corrected Items)
7. Check the soil cover for signs of erosion or depressions (subsidence).		
8. Check for signs of burrowing animals (holes).		
9. Verify that there is no excavation, digging or construction activities over underground process piping (identified by signs).		
10. Other:		

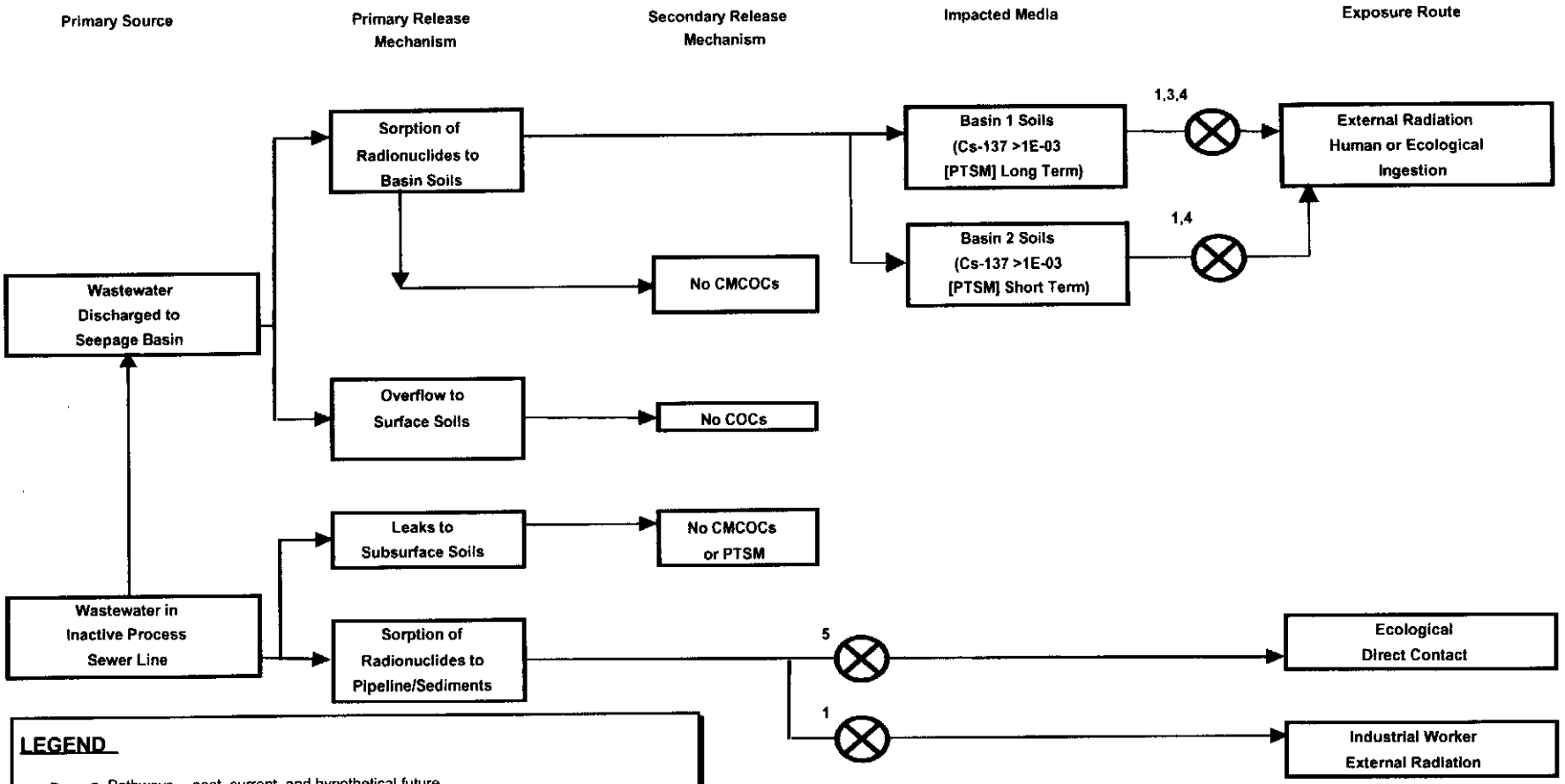
Inspected By:_____/_____Date:_____Time:_____
(Print Name) (Signature)

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.

ATTACHMENT A-3

CONCEPTUAL SITE MODEL FOR C-AREA REACTOR SEEPAGE BASIN POST REMEDIAL ACTION



LEGEND

- → = Pathways -- past, current, and hypothetical future
- 1 = Institutional Controls
- 2 = Consolidation of Soils into Basin
- 3 = In-situ Stabilization
- 4 = Low-permeability Soil Cover
- 5 = Grouting of Pipelines
- ⊗ Plug-in Remedy breaks this pathway

Notes: In-situ stabilization meets CERCLA preference for treatment and provides qualitative reduction in leachability, for Basin 1 only.

PTSM = Principal threat source material
COC = Constituent of concern
CMCOC = Contaminant migration constituent of concern

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

ATTACHMENT A-4

ACCESS CONTROL WARNING SIGNS

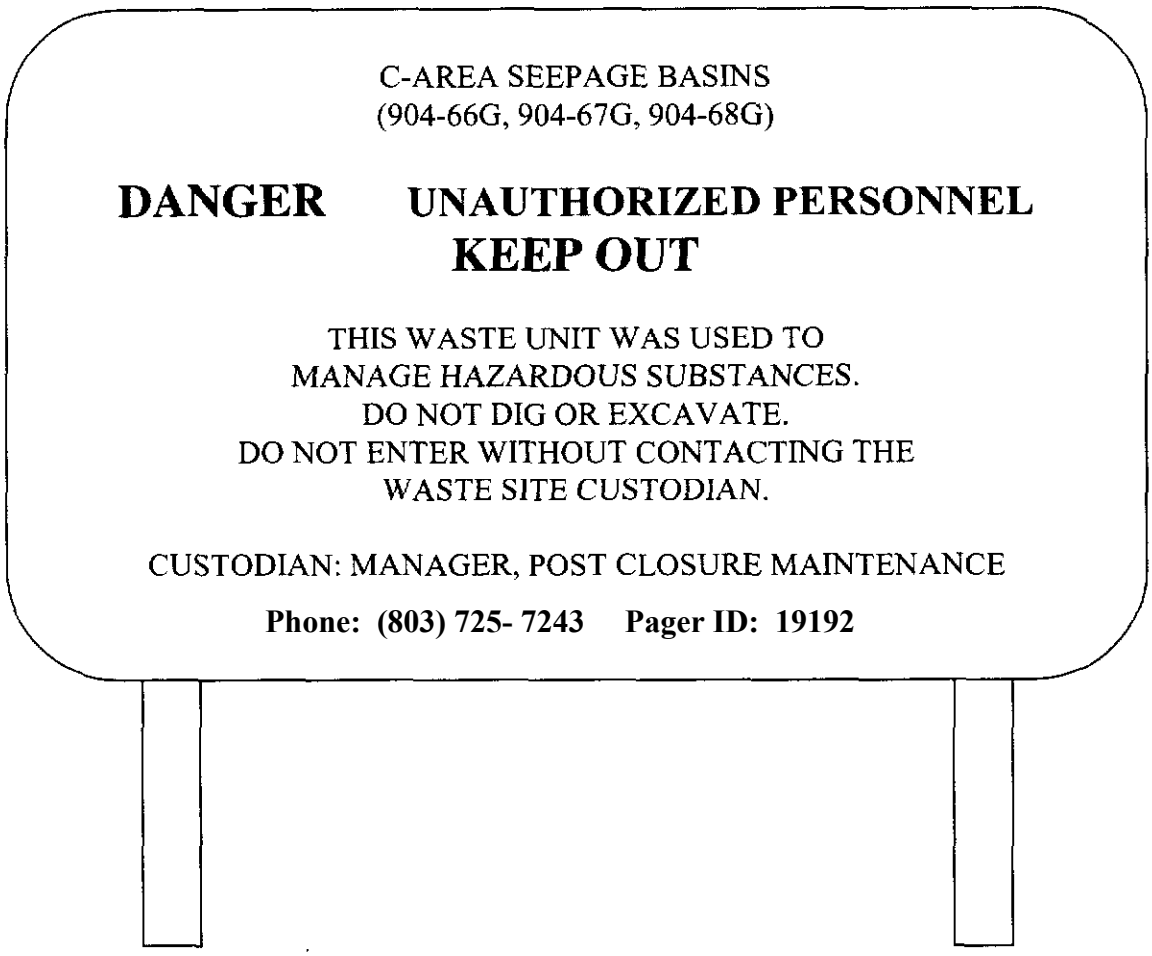


Figure A-2. Soil Cover Access Control Warning Sign

C-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

Figure A-3. Underground Piping Access Control Warning Sign