LUCIP for the
TNX Groundwater (082-G), Old TNX Seepage Basin (904-076G), and
New TNX Seepage Basin (904-102G)

Land Use Control Implementation Plan for TNX Operable Unit

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United States Department of Energy

Savannah River Site

Land Use Control Implementation Plan (LUCIP) for TNX Area Operable Unit (U)

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Aiken, South Carolina

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LIST OF ACRONYMS AND ABBREVIATIONS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Constituent of Concern
CSM	conceptual site model
DG	Discharge Gully
ECA	Environmental Compliance Authority
FFA	Federal Facility Agreement
GMZA	Groundwater Mixing Zone Application
IPSL	Inactive Process Sewer Line
LUC	Land Use Control
LUCIP	Land Use Control Implementation Plan
LUCAP	Land Use Control Assurance Plan
NTSB	New TNX Seepage Basin
ODA	Overflow Discharge Area
OTSB	Old TNX Seepage Basin
OU	Operable Unit
pCi	picocurie
PCM	Post-Closure Manager
QA	Quality Assurance
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
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
WSRC	Westinghouse Savannah River Company, LLC

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1.0 INTRODUCTION

This Land Use Control Implementation Plan (LUCIP) has been prepared for TNX Area Operable Unit (OU) at the Savannah River Site (SRS). The purpose of the LUCIP is to describe how the land use controls (LUCs) selected in the TNX Area OU Record of Decision (ROD) will be implemented and maintained. These LUCs are:

- Providing access controls for on-site workers via the Site Use Program, Site Clearance Program, work control, worker training, worker briefing of health and safety requirements and identification signs located at the waste unit boundaries.

- Notifying the USEPA and SCDHEC in advance of any changes in land use or excavation of waste.

- Providing access controls against trespassers as described in the 1992 RCRA Part B Permit Renewal Application, Volume I, Section F.1, which describes the security procedures and equipment, 24-hour surveillance system, artificial or natural barriers, control entry systems, and warning signs in place at the SRS boundary.

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 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 LUCAP 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 which were selected as part of the remedial action for TNX Area OU. This additional document, the TNX Area OU LUCIP, contains the detailed and specific measures required to implement and maintain the LUCs selected as part of this particular remedial decision. The USDOE is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the LUCs per the approved LUCIP. Upon final approval, the LUCIP will be appended to the LUCAP and is considered incorporated by

reference into the TNX Area Operable Unit ROD, establishing LUCs implementation and maintenance requirements enforceable under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The LUCIP will remain in effect unless and until modifications are approved as needed to be protective of human health and the environment. This LUCIP will be evaluated for accuracy during the 5-year remedy review.

2.0 OVERVIEW OF TNX AREA OU REMEDIAL ACTION

2.1 TNX Area OU

The T Area consists of three OUs: the TNX Area OU, the TNX Outfall Delta, Lower Discharge Gully and Swamp (TNX OD) OU, and the X-001 Outfall Drainage Ditch OU; two site evaluation areas: the Neutralization Sump 678-T and the TNX Area Process Sewer Lines As Abandoned; and three buildings: 678-T, 677-T and 672-T. It is anticipated that the X-001 Outfall Drainage Ditch OU, site evaluation areas and remaining T Area buildings will be included under an area-wide ROD. The TNX Area OU is located 0.4 km (0.25 mi) east of the Savannah River on a terrace between Upper Three Runs Creek to the north and Fourmile Branch to the south (Figure 1). TNX Area OU consists of four major subunits: the New TNX Seepage Basin (NTSB)/Inactive Process Sewer Line (IPSL); the TNX Burying Ground (TBG)/Vadose Zone; the Old TNX Seepage Basin (OTSB)/IPSL/Upper Discharge Gully (UDG); and the TNX Groundwater (082-G).

The T Area was a pilot-scale testing and evaluation facility that supported fuel and target manufacturing chemical processes and the Defense Waste Processing Facility (DWPF). Presently, the buildings and laboratories located in the T Area are undergoing decontamination and decommissioning.

2.1.1 New TNX Seepage Basin/Inactive Process Sewer Line

The NTSB is an unlined earthen basin approximately 80 by 120 m (260 by 400 ft) in size. The NTSB includes the following four components:

- An Inlet Basin, 15 by 21 m (50 by 70 ft) in size and 1.2 m (4 ft) deep
- A Main Basin, 21 by 82 m (70 by 270 ft) in size and 2.1 m (7 ft) deep
- An Overflow Discharge Area (ODA), an irregularly shaped area defined by site topography with maximum lengths of 60 by 41 m (200 by 135 ft) and an area of approximately 2,500 m2 (27,000 ft2)

The operational history of the NTSB reveals that this basin was placed in operation in 1980 after closure of the OTSB. The NTSB operated until 1988. The NTSB, like the OTSB, received process wastewater flows from TNX pilot-scale simulations conducted in support of DWPF and the plant separations area. This wastewater consisted primarily of simulated nonradioactive sludge along with other nonradioactive wastes such as glass frit and laboratory sink discharges. No known hazardous waste was released to the basin. Prior to 1983, the discharges to the NTSB also included simulated nonradioactive salt supernate. On August 13, 1988, discharges to the NTSB were rerouted to the TNX Effluent Treatment Plant. When the IPSL was taken out of operation, the discharge from the process sewerline to the NTSB was plugged and a manhole where the process sewerline splits to the Effluent Treatment Plant and to the NTSB was filled with concrete, covering the outlet to the seepage basin.

2.1.2 TNX Burying Ground/Vadose Zone

The TBG, which consists of four known trenches at 6 to 8 ft below land surface (bls), was created in 1953 to dispose of debris from the accidental explosion of an experimental evaporator. A majority of the waste was excavated between 1982 and 1984. Waste in five areas within the original four trenches was not excavated due to underground and above-ground obstructions. Currently, most of the TBG underlies building slabs and Building 672-T. The groundwater beneath the TBG is known to be contaminated with chlorinated volatile organic compounds (CVOCs) sourced from releases to the vadose zone soil beneath the TBG at a depth of 6 to 14 m (20 to 45 ft) bls.

2.1.3 Old TNX Seepage Basin/Inactive Process Sewer Line/ Discharge Gully

The OTSB was an unlined excavation approximately 24 by 53 m (80 by 175 ft). The OTSB primarily includes the following components:

- An Inlet Basin, approximately 13 by 10 m (43 by 33 ft) in size and 2.4 m (8 ft) deep
- A Main Basin, approximately 39 by 25 m (129 by 83 ft) in size and 3 m (10 ft) deep
- The IPSL (east and north lines), which is a 19.8- to 20-cm (7.8 to 8 in) diameter VCP, 50 m (165 ft) (east line) and 33 m (108 ft) (north line) long, and approximately 1.2 to 4 m (4 to 4.5 ft) bls
- The DG, which is a gully approximately 1,330 m2 (14,318 ft2) in area (the DG includes both the UDG of the TNX Area OU and the LDG of the TNXOD OU).

The OTSB was an unlined liquid-waste disposal area that operated from the mid-1950s until 1980. The OTSB received a number of chemicals ranging from inorganic salts and low-level radionuclides to organic solvents through a series of process sewer lines originating from Buildings 677-T and 678-T. These lines are now inactive.

During periods of high flow, the Main Basin periodically overflowed downhill into the Savannah River flood plain adjacent to the TNX facility. In 1980, area wastewater was re-routed from the OTSB to the NTSB. During closure of the OTSB in 1981, the remaining liquid was drained to the nearby flood plain. As a result of these overflow events, erosion occurred in the hillside, forming a gully (DG) and sediment fan (Outfall Delta), and contaminated the inner portion of TNX swamp (Inner Swamp).

2.1.4 TNX Groundwater

Groundwater monitoring has been performed at TNX since the 1980s. This monitoring has identified CVOC contamination.

The unit is at an elevation of 46 m (150 ft) above mean sea level (msl). Local topography is relatively flat and slopes westward toward the Savannah River. A portion of the Savannah River flood plain swamp lies immediately west of the TNX Area OU at an elevation of 29 m (95 ft) msl.

2.2 Nature and Extent of Contamination in TNX Area OU

The COCs pertinent to the TNX Area OU, as presented in the ROD, include the source unit (e.g., contamination in the soil) from the waste units, the vadose zone under the TBG, and the groundwater in the area.

The nature and extent of contamination associated with the TNX Area OU, which includes the NTSB/IPSL, the OTSB/IPSL/DG, the TBG/Vadose Zone, and the groundwater subunits, is documented in the RFI/RI with Baseline Risk Assessment for the TNX-Area Operable Unit (WSRC, 1999) and the RFI/RI with Baseline Risk Assessment for the TNX Outfall Delta, Lower Discharge Gully and Swamp Operable Unit (WSRC, 2002). The RGs presented in the ROD were derived from risk assessment calculations presented in these documents, which also contain the supporting characterization results used to delineate the extent of contamination. The RGs and COCs associated with the TNX Area OU are presented by subunit in Table 1.

The COCs associated with the NTSB/IPSL are radium-226 and metals. The ODA associated with the NTSB/IPSL will also be institutionally controlled due to a risk to the future resident in excess of $1X10^{-6}$ residual risk due to barium, manganese, and nickel. The contamination at the TBG consists of VOCs in the deep vadose zone. The primary COCs for the OTSB subunit are mercury, thorium-228, radium-228, uranium (U)-233/234, U-235, and U-238. They are found in soils beneath the seepage basin and ISPLs and in discharge gully soils. The radionuclides remaining in the soil following the remedial action will have less than 1X10-3 residual risk, but will be inaccessible under the engineered cap.

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Table 1. Summary of Refined COCs and Remedial Goals Associated with Contaminated Media at the TNX Area OU

Subunit	Media	Remedial Action Objectives	Refined COC	Remedial Goal	Basis
New TNX Seepage Basin (Inlet Basin)	Sediment	Protect future industrial worker from exposure to radium-226 in sediment.	Radium-226	0.16 pCi/g	1E-06 risk level
		Protect sediment-dwelling biota from exposure to arsenic, chromium, copper, lead, mercury, nickel, silver and zinc in the sediment.	Arsenic	8.2 mg/kg	HQ=1
			Chromium	80 mg/kg	HQ=1
			Copper	70 mg/kg	HQ=1
			Lead	35 mg/kg	HQ=1
			Mercury	0.15 mg/kg	HQ=1
			Nickel	30 mg/kg	HQ=1
			Silver	1.0 mg/kg	HQ=1
			Zinc	150 mg/kg	HQ=1
	Surface Water	Protect aquatic biota from exposure to aluminum, barium, boron, copper, iron, lead, manganese, mercury, nickel, silver, vanadium, and zinc in the surface water.	Aluminum	87 µg/L	HQ=1
			Barium	3.9 µg/L	HQ=1
			Boron	750 µg/L	HQ=1
			Copper	1.51 µg/L	HQ=1
			Iron	1000 µg/L	HQ=1
			Lead	0.15 µg/L	HQ=1
			Manganese	22.7 µg/L	HQ=1
			Mercury	0.012 µg/L	HQ=1
			Nickel	20.5 µg/L	HQ=1
			Silver	0.012 µg/L	HQ=1
			Vanadium	20 µg/L	HQ=1
			Zinc	13.7 µg/L	HQ=1

Table 1. Summary of Refined COCs and RGs Associated with Contaminated Media at the TNX Area OU (Continued)

Subunit	Media	Remedial Action Objectives	Refined COC	Remedial Goal	Basis
New TNX Seepage Basin (Main Basin)	Sediment	Protect sediment-dwelling biota from exposure to mercury and nickel in the sediment.	Mercury Nickel	0.15 mg/kg 30 mg/kg	HQ=1 HQ=1
	Surface Water	Protect aquatic biota from exposure to aluminum, barium, boron and iron in the surface water.	Aluminum Barium Boron Iron	87 µg/L 3.9 µg/L 750 µg/L 1000 µg/L	HQ=1 HQ=1 HQ=1 HQ=1

Table 1. Summary of Refined COCs and RGs Associated with Contaminated Media at the TNX Area OU (Continued)

Subunit	Media	Remedial Action Objectives	Refined COC	Remedial Goal	Basis
Old TNX Seepage Basin/ IPSL/ Discharge Gully					
OTSB/IPSL	Soil	Prevent mercury contamination to groundwater above MCL (2 µg/L).	Mercury	0.078 mg/kg	Contaminant migration soil cleanup level.
		Prevent human exposure to Radium-228 and Thorium-228 and from exceeding PTSM levels in soils at basin bottom.	Thorium-228 Radium-228	Remove or treat contaminated PTSM 23.44 pCi/g 21.75 pCi/g	Combined carcinogenic risk of 6 x 10^{-3}

Table 1. Summary of Refined COCs and RGs Associated with Contaminated Media at the TNX Area OU (Continued)

Subunit	Media	Remedial Action Objectives	Refined COC	Remedial Goal	Basis
Old TNX Seepage Basin/ IPSL/ Discharge Gully					
UDG	Soil	Prevent mercury contamination to groundwater above MCLs (2 µg/L)	Mercury	0.13 mg/kg	Contaminant migration soil cleanup level
LDG[1]	Soil	Prevent total uranium contamination to groundwater above MCLs (30 µg/L, 2 µg/L, respectively)	U-233/234 U-235 U-238 Mercury	1.31 pCi/g, 0.06 pCi/g, 1.31 pCi/g 0.63 mg/kg	
	Soil	Prevent future industrial worker exposure to Actinium-228, Cesium-137, Lead-212, Radium-228, Thorium-228, Thorium-234, Uranium-233/234, Uranium-235, and Uranium-238	Actium-228 Cesium-137 Lead-212 Radium-228 Thorium-228 Thorium-234 Uranium-233/234 Uranium-235 Uranium-238	0.07 pCi/g 0.10 pCi/g 0.73 pCi/g 0.07 pCi/g 0.04 pCi/g 45.43 pCi/g 68.80 pCi/g 0.82 pCi/g 3.13 pCi/g	1E-06 risk level

Table 1. Summary of Refined COCs and RGs Associated with Contaminated Media at the TNX Area OU (Continued)

Subunit	Media	Remedial Action Objectives	Refined COC	Remedial Goal	Basis
TNX Burying Ground and Vadose Zone	Groundwater	Prevent VOCs in the deep Vadose Zone from contaminating groundwater above MCLs.	Carbon Tetrachloride PCE TCE	5 µg/L 5 µg/L 5 µg/L	Maximum Contaminant Level for groundwater cleanup
TNX Groundwater (Water Table Aquifer)	Groundwater	Protect the future industrial worker from exposure to carbon tetrachloride, PCE and TCE in groundwater above MCLs.	Carbon Tetrachloride PCE TCE	5 µg/L 5 µg/L 5 µg/L	Maximum Contaminant Level for groundwater cleanup
		Protect the future industrial worker from exposure to radiological constituents and mercury in groundwater above MCLs.	Gross Alpha Total Uranium Total Radium(Ra-226 and Ra-228) Mercury	15 pCi/L 30 µg/L* 5 pCi/L 2 µg/L	Maximum Contaminant Level for groundwater cleanup

*MCL effective 12/8/03

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2.3 Remedial Action Selected

2.3.1 NTSB/IPSL

The NTSB/IPSL subunit consists of four sections – the IPSL that delivered wastewater to a small settling area (Inlet Basin), a larger basin (Main Basin) that is connected to the Inlet Basin and received the "decanted" wastewater, and an Overflow Discharge Area where wastewater was released when the main Basin overflowed.

As stated in the Record of Decision Remedial Alternative Selection for the TNX Area OU (WSRC-RP-2003-4017), the selected RA for the TNX Area OU included the following elements for the NTSB:

- In situ grouting of the IPSL
- Discharge of surface water in the NTSB to an approved location (ground surface, permitted outfall or wastewater treatment facility)
- Backfill of the Main Basin and Inlet Basin with clean soil
- Implementation of institutional controls to ensure the integrity of the backfilled basins and overflow discharge area and prevent the future industrial worker from excavating contaminated media via access controls and field walkdown/maintenance and to prevent residential use through property notices/restrictions.
- Institutional controls will remain in place in perpetuity or until Core Team [United States Department of Energy (US DOE), United States Environmental Protection Agency (US EPA), and South Carolina Department of Health and Environmental Control (SCDHEC)] concurrence that no unacceptable risk to receptors is present.

A conceptual site model (CSM) is presented in Appendix C as figure C-1 which illustrates how implementation of the remedial action breaks the exposure pathways for the NTSB/IPSL/ODA subunit.

2.3.2 Old TNX Seepage Basin/IPSL and Discharge Gully

The selected remedy for the OTSB/IPSL/DG subunit is Engineered Cap with PTSM Removal and Institutional Controls. The selected remedy for this subunit entails the following:

- Removal of existing OTSB backfill
- Excavation of IPSL (where accessible) and associated radiologically contaminated soils for disposal
- Plugging ends of IPSL sections not excavated during this action
- Excavation of the PTSM layer in the OTSB (2- to 3-ft soil interval at the original bottom of the inlet and main basins)
- Backfill of pipeline excavation and replacement of asphalt
- Disposal of PTSM-contaminated soils and pipeline (estimated 2,180 yd^3 total) at an approved disposal facility
- Backfill of the OTSB and DG using the current backfill material where practical
- Placement of engineered soil cap (and associated institutional controls) over the OTSB and DG (from the TNX facility to the base of the slope at the TNX Outfall Delta)
- Monitoring of the subsurface for the presence of perched water in contact with waste exceeding CM RGs under the cover

- Implementation of institutional controls to ensure the integrity of the engineered cap and prevent the future industrial worker from excavating contaminated media via access controls and field walkdown/maintenance and to prevent residential use through property notices/restrictions. Institutional controls will remain in place in perpetuity or until Core Team concurrence that no unacceptable risk to receptors is present.

A CSM is presented in Appendix C as figure C-2 which illustrates how implementation of the remedial action breaks the exposure pathways for the OTSB/IPSL/DG subunit.

2.3.3 TNX Groundwater

The selected remedy for the TNX Groundwater subunit is Extraction in High Chlorinated Volatile Organic Compound (CVOC) Area with Monitoring/Mixing Zone and Institutional Controls. The selected remedy for this subunit entails the following:

- Extraction of volatile organic compounds (VOCs) in the high concentration areas of the Vadose Zone (i.e., SVE)

- Continued operation of existing pump-and-treat system until monitoring determines that passive remediation (mixing zone) is appropriate.

- Use of mixing zone and institutional controls, institutional controls will consist of deed restrictions and/or administrative directives, such as the Site Use Program, prohibiting installation of drinking waster wells to prevent use of groundwater beneath TNX with concentrations of contaminants above MCLs. These controls will remain in effect until Core Team concurrence that COC concentrations in groundwater do not present unacceptable risk to receptors. The applicability of a mixing zone application will be evaluated after conclusion of remediation of surface units and decontamination and decommissioning of the existing TNX facility. These activities are scheduled for completion in 2007.

A CSM is presented in Appendix C as figure C-3 which illustrates how implementation of the remedial action breaks the exposure pathways for the TBG/vadose zone/groundwater subunit.

3.0 LAND-USE CONTROL OBJECTIVES

Considering the residual risk mentioned above, the LUC objectives are to:

- Maintain the use of the site for industrial activities only.
- Prevent unauthorized access to the unit as long as the waste remains a threat to human health or the environment.
- Provide public notices for disclosing former waste management and disposal activities and remedial actions taken on the site.
- Prevent unauthorized residential or agricultural access to groundwater.

4.0 IMPLEMENTATION OF LAND-USE CONTROL

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

4.1 Property Record Notices

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 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. 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.

4.3 Other Public Notices

The LUCIP identifies the area under land use restriction via a survey plat. The Survey Plat will be incorporated in this LUCIP upon completion of the construction phase. The Survey Plat will appear in Appendix A-1, with the line marked, "AREA SUBJECT TO LAND USE CONTROLS".

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

4.4 Site Use Program

SRS is required under DOE Order 430.1A, *Life Cycle Management* (USDOE 1998), to implement an asset management program for the use, maintenance, and disposal of physical assets, including real estate. SRS has complied with this Order though the establishment of its Site Use Program per WSRC 1D, *Site Infrastructure and Services Manual*, Procedure 3.02, "Site Real Property Configuration Control" (WSRC 2003a). All employees, contractors, and visitors to the SRS are required to adhere 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 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 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.

SRS is responsible for updating, maintaining, and reviewing site maps, including Federal Facility Agreement (FFA 1993) operable unit (OU) identifications. If a site clearance request is made that may impact an FFA OU, the Site Clearance Request Form is sent to the appropriate FFA OU reviewer 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 per WSRC 1Q Manual (WSRC 2003b). The SRS QA program is the governing QA program for 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. No major change in land use nor excavation at the TNX Area OU shall be undertaken without USEPA and SCDHEC approval.

4.5 Signage

To prevent unknowing entry and to ensure that unrestricted use of the waste unit does not occur while under ownership of the government, access control warning signs will be posted at the

unit. The signs will be legible for a distance of at least 25 feet. There are several subunits at the TNX Area OU with individual signs. The details of the signs are shown in appendix D.

Custodial responsibilities for maintenance and inspection of the TNX Area Operable Unit will be maintained by the Post-Closure Maintenance Group within SGCP.

4.6 Other Access Controls and Security/Surveillance Measures

While under the ownership of US DOE, access control of the entire SRS will be maintained in accordance with the 1992 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.

4.7 Field Inspection and Maintenance for Institutional Controls

After the remediation of the TNX Area Operable Unit, maintenance activities will be required per this remedial action. It is anticipated that no operations other than Groundwater Mixing Zone Application (GMZA) monitoring (WSRC 1999b) will be required.

USEPA and SCDHEC will be notified of any events and/or actions that indicate some potential compromise of institutional controls within 30 days of identification. These events or actions will be documented in the FFA Annual Progress Report. All other routine maintenance activities will be documented and maintained in files subject to US EPA and SCDHEC review and audit. A copy of the completed inspection form is maintained in the SGCP Document Control. The LUCs will be implemented as long as the waste remains a threat to human health or the environment."

The following steps will be implemented to maintain the geosynthetic soil covers for as long as 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 (e.g., the access control warning signs). (Appendix B provides a unit specific checklist for the TNX Area OU waste units).

- Perform necessary repairs (when required as identified during inspection) to maintain the functional integrity of the soil cover 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 Substances Contingency Plan (NCP), a five-year review of the ROD for the TNA Area OU will be performed as long as the waste remains a threat to human health or the environment.

The waste unit inspectors are to be trained in Hazardous Waste Operations and Emergency Response (i.e., HAZWOPER), RCRA Well Inspections (SGCP-specific training), SGCP RCRA Waste Unit Inspections, 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, 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.

5.0 REFERENCES

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

USDOE, 1996. *Savannah River Site Future Use Project Report*, Stakeholder-Preferred Recommendations for SRS Land and Facilities, USDOE Savannah River Operations Office, January 1996

USDOE, 1998. DOE Order 430.1A, *Life Cycle Management* (Approved 10/14/98)

WSRC, 2003a. WSRC Procedure Manual 1D, *Site Infrastructure and Services Manual (U)*, Procedure 3.02, "Site Real Property Configuration Control", Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 2003b. WRSC Procedure Manual 1Q, *Quality Assurance (U)*, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

WSRC, 2003c. "Record of Decision Remedial Alternatives Selection for the TNX Area Operable Unit (U)", Revision 0, March 2003, Westinghouse Savannah River Company, Savannah River Site, Aiken, SC

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APPENDIX A

SURVEY PLAT (Later)

The applicable Survey Plats for the TNX OU waste units will be provided in the PCR/CMIR documentation with as-built information for the waste unit closures. (See Section 2.2 of the LUCIP)

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APPENDIX B

FIELD INSPECTION CHECKLIST

FOR TNX AREA OPERABLE UNIT

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FIELD INSPECTION CHECKLIST
FOR TNX AREA OPERABLE UNIT WASTE UNIT

❑ **SCHEDULED** ❑ **UNSCHEDULED**

A= Satisfactory X= Unsatisfactory (Explanation required)	A or X	Observation of Corrective Action Taken
1. Verify that there are 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 the vegetative cover for grass density, with no bare spots more than 3-feet by 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 waste unit signs (21) are in acceptable condition, have the correct information and are legible from a distance of 25 feet		
6. Check the soil cover for signs of erosion or depressions (subsidence).		
7. Check for signs of burrowing animals.		
9. Check the integrity of drainage ditches for the presence of excessive erosion, sediment buildup, and any debris restricting water flow.		

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 of this waste unit. Refer to post-closure inspection procedures.

NOTE: All monitoring wells associated with this waste unit are inspected using the SGCP Monitoring Well Inspection Procedure in compliance with South Carolina Hazardous Waste Management Regulation R.61-79, Subpart F, Groundwater Monitoring.

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APPENDIX C

POST-REMEDIAL ACTION CONCEPTUAL SITE MODEL

FOR THE TNX AREA OPERABLE UNIT POST-REMEDIAL ACTION

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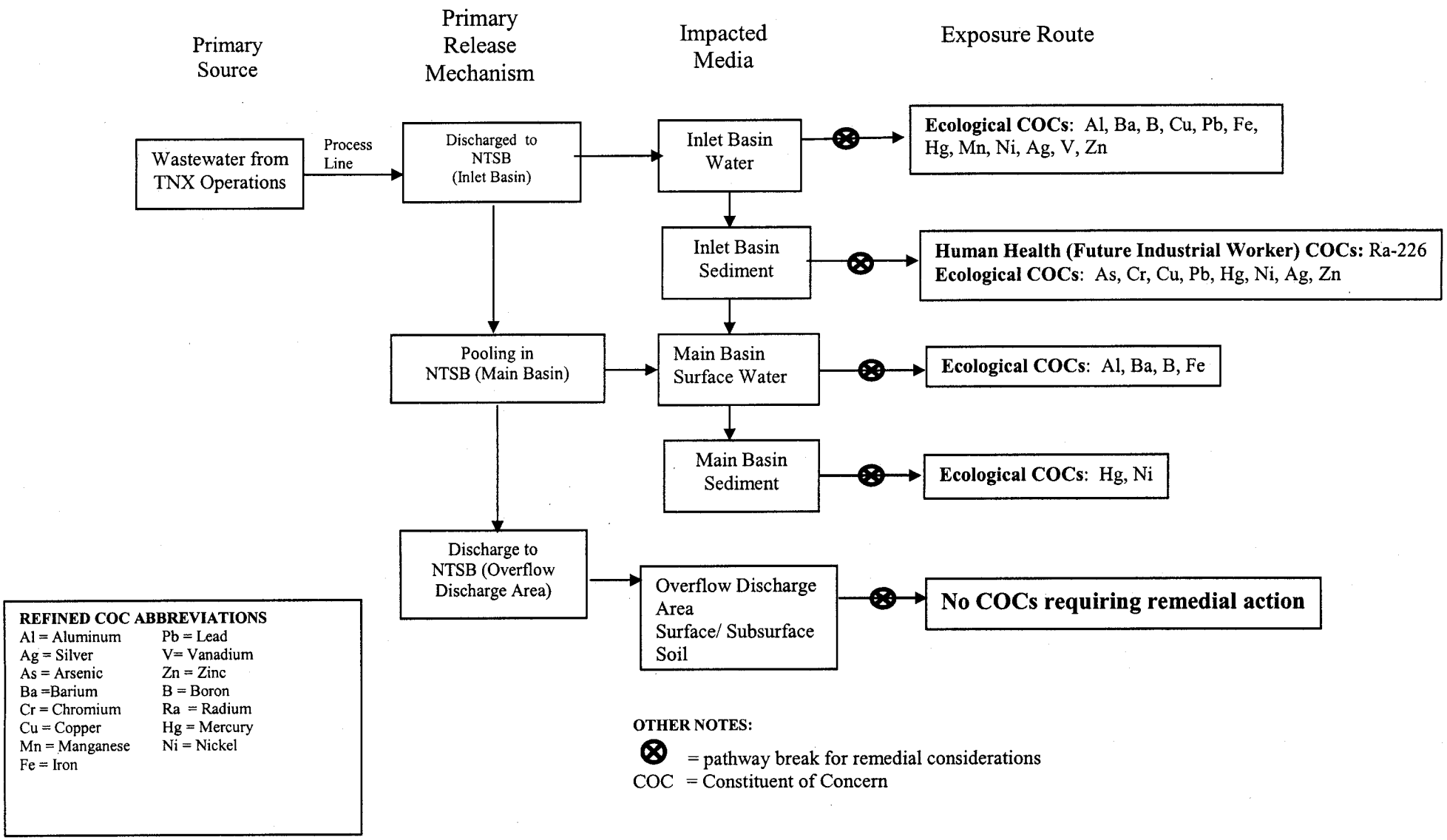

Figure C-1. Post Remedial Action Conceptual Site Model for TNX Area OU NTSB/IPSL/ODA Subunits

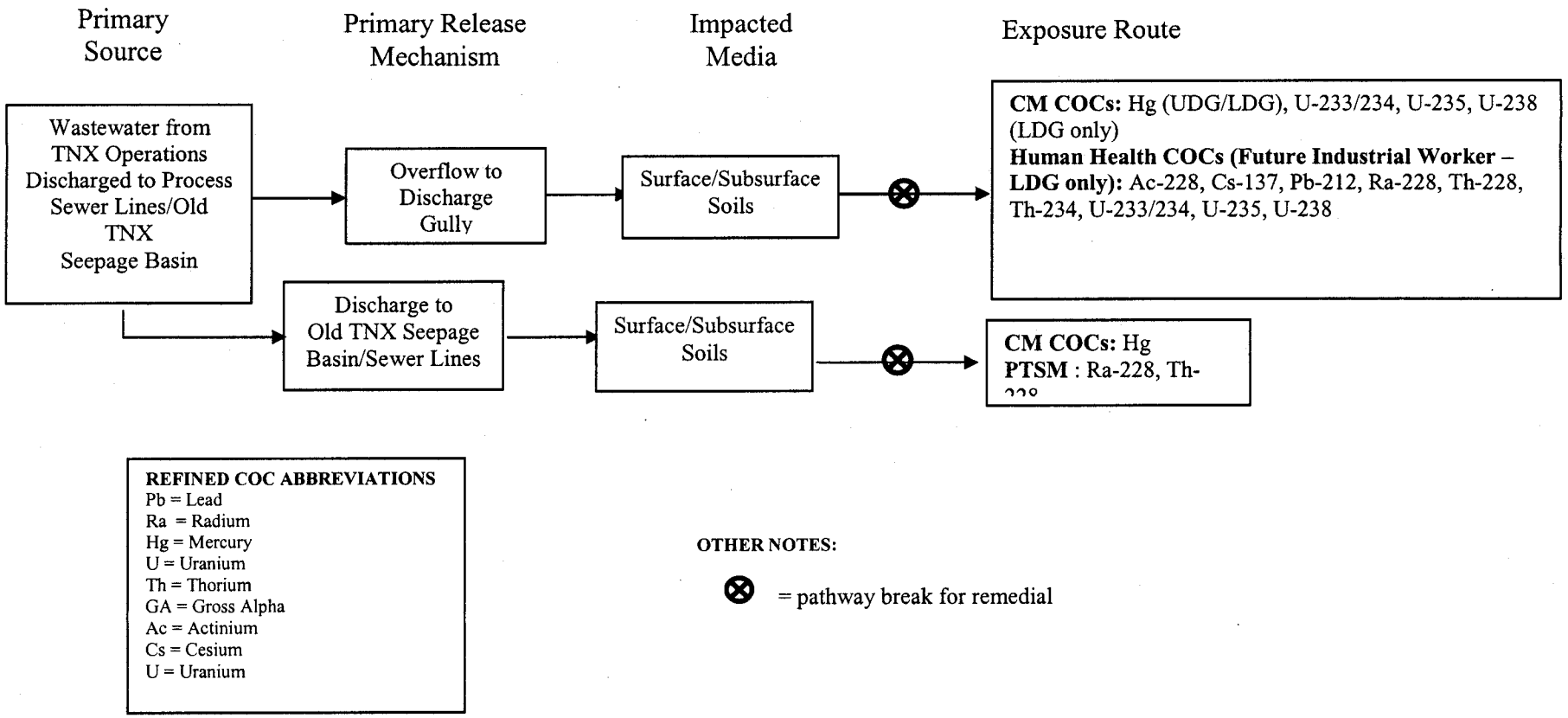

Figure C-2. Post Remedial Action Conceptual Site Model for TNX Area OU OTSB/IPSL/DG Subunits

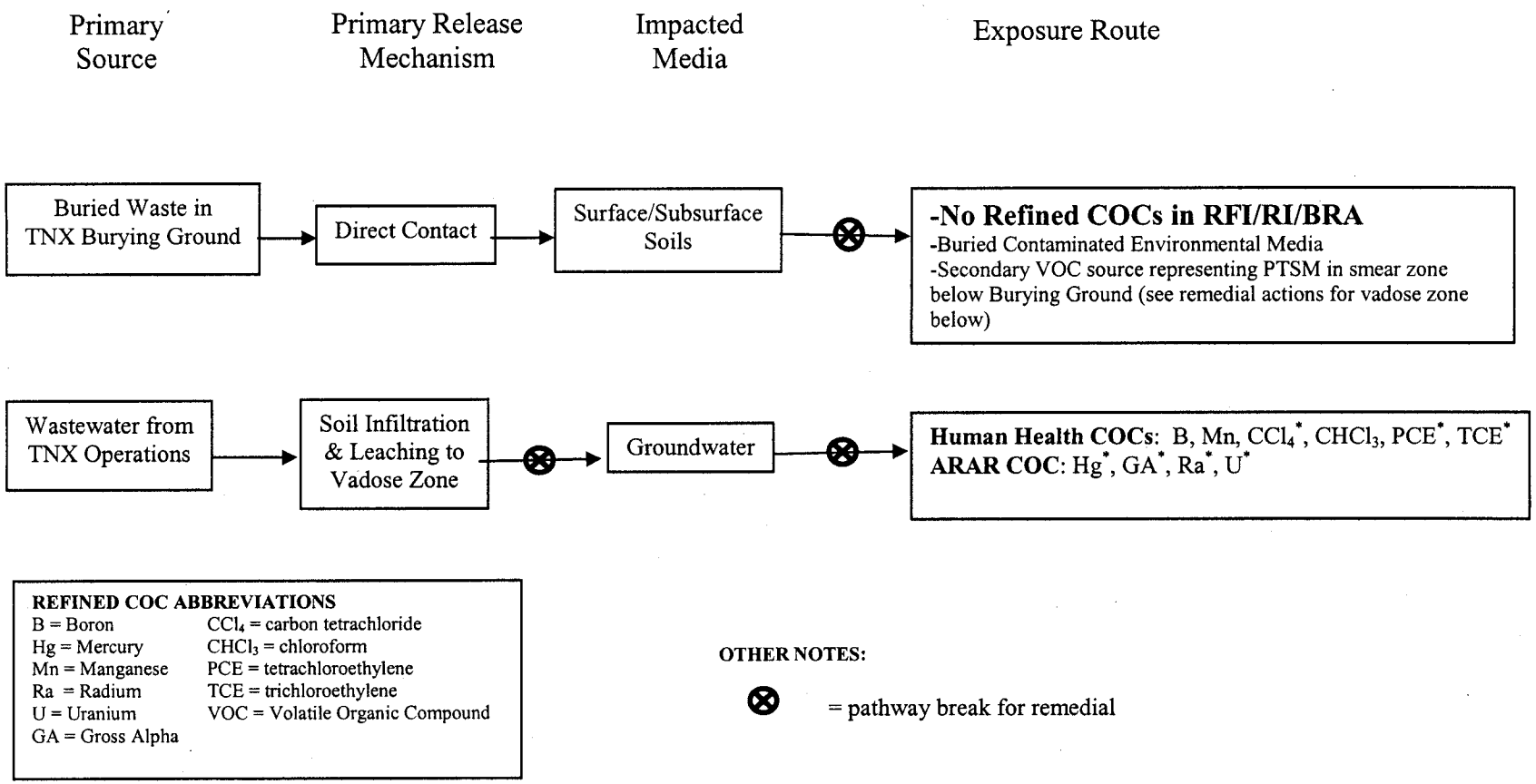

Figure C-3. Post Remedial Action Conceptual Site Model for TNX Area OU Burying Ground and Groundwater Subunits

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APPENDIX D

ACCESS CONTROL WARNING SIGNS

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New TNX Seepage Basin

904-102T

DANGER

UNAUTHORIZED PERSONNEL KEEP OUT.

THIS UNIT CONTAINS [HAZARDOUS, RADIOLOGICAL OR MIXED HAZARDOUS, AS APPLICABLE] SUBSTANCES.

DO NOT DIG OR EXCAVATE.

DO NOT ENTER WITHOUT CONTACTING THE WASTE UNIT CUSTODIAN.

CUSTODIAN: MANAGER, POST-CLOSURE MAINTENANCE

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

Old TNX Seepage Basin

904-76T

DANGER

UNAUTHORIZED PERSONNEL KEEP OUT.

THIS UNIT CONTAINS [HAZARDOUS, RADIOLOGICAL OR MIXED HAZARDOUS, AS APPLICABLE] SUBSTANCES.

DO NOT DIG OR EXCAVATE.

DO NOT ENTER WITHOUT CONTACTING THE WASTE UNIT CUSTODIAN.

CUSTODIAN: MANAGER, POST-CLOSURE MAINTENANCE

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