Record of Decision
Remedial Alternative Selection for the Wetland Area at Dunbarton Bay in Support of Steel Creek Integrator Operable Unit (U)

CERCLIS Number: 71

SRNS-RP-2013-00730

Revision 1

April 2018

DISCLAIMER

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Prepared for
U.S. Department of Energy
and
Savannah River Nuclear Solutions, LLC
Aiken, South Carolina

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April 2018

Savannah River Site
Aiken, South Carolina

Prepared by:

Savannah River Nuclear Solutions, LLC
for the
U. S. Department of Energy under Contract DE-AC09-08SR22470
Savannah River Operations Office
Aiken, South Carolina

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DECLARATION FOR THE RECORD OF DECISION

Unit Name and Location

Wetland Area at Dunbarton Bay in Support of Steel Creek Integrator Operable Unit (IOU)
Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Identification Number: OU- 71
Savannah River Site
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Identification Number: SC1 890 008 989
Aiken, South Carolina
United States Department of Energy

The Wetland Area at Dunbarton Bay (WADB) in Support of the Steel Creek Integrator Operable Unit (IOU) is listed as a Resource Conservation and Recovery Act (RCRA) 3004(u) Solid Waste Management Unit/CERCLA subunit part of the Steel Creek IOU listed in Appendix C of the Federal Facility Agreement (FFA) for the Savannah River Site (SRS).

The FFA is a legally binding agreement between regulatory agencies (United States Environmental Protection Agency [USEPA] and South Carolina Department of Health and Environmental Control [SCDHEC]) and regulated entities (United States Department of Energy [USDOE]) that establishes the responsibilities and schedules for the comprehensive remediation of SRS. The media associated with this operable unit are surface ash/soil.

Statement of Basis and Purpose

This decision document presents the selected remedial action for the WADB in support of the Steel Creek IOU, which is located at the SRS near Aiken, South Carolina. The remedy was chosen in accordance with CERCLA, as amended by the Superfund Amendments Reauthorization Act (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the information contained in the Administrative Record File for this site.

The USEPA, SCDHEC, and USDOE concur with the selected remedy.

Assessment of the Site

A release of ash contaminated with arsenic, cesium-137(+D), potassium-40, radium-226(+D), and uranium-238(+D) occurred at the WADB into the environment. The response action selected in this Record of Decision (ROD) is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

Description of the Selected Remedy

The selected remedy for the WADB in Support of the Steel Creek IOU is excavation of 16,820 m^3 (22,000 yd^3) of ash and contaminated soil media from the boundary of the P-Area Ash Basin (PAB) to the edge of the 30-m (100-ft) buffer at Dunbarton Bay and transporting the waste to an approved ex situ containment facility located off-SRS property. The 30-m (100-ft) buffer is used to protect Dunbarton Bay's sensitive ecosystem from damage caused by excavation and construction activity. Additionally, the selected remedy includes land use controls (LUCs) for ten hectares (ha) (25 acres [ac]), since the entire volume of contaminated media will not be excavated and some materials would remain in place at the WADB.

LUCs for the WADB will be in effect until concentrations of hazardous substances are at levels that will allow for unrestricted use and exposure and include the following:

- Warning and limited access signs at the subunit boundaries to prevent unrestricted use and access to area where ash/contaminated soil is present (Dunbarton Bay).
- Notifying USEPA and SCDHEC in advance of any major changes in land use that would necessitate re-evaluation of the remedy or excavation of waste.
- Institutional controls (i.e., administrative controls) and use restrictions for onsite workers via the Site Use/Site Clearance Program. Other administrative controls to ensure worker safety include work controls, worker training, and worker briefing of health and safety requirements.
- SRS access controls against trespassers as described in the 2013 RCRA 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.

This remedy was selected because it meets the remedial action objectives (RAOs), provides overall protection of human health and the environment, complies with Applicable or Relevant and Appropriate Requirements (ARARs), and is cost-effective. The remedy provides a high level of long-term protection to the radioactive and hazardous constituents that remain in place.

The RCRA permit will be revised to reflect selection of the final remedy using the procedures under 40 CFR Part 270, and South Carolina Hazardous Waste Management Regulations R.61-79.264.101; 270.

Statutory Determinations

Based on the *Focused Corrective Measures Study / Feasibility Study for the Wetland Area at Dunbarton Bay in Support of the Steel Creek IOU* (SRNS 2013a), the WADB poses a threat to human health. Therefore, Sub-Alternative A-3b, Excavation of 16,820 m^3 (22,000 yd^3) of Ash and Off-SRS Containment and LUCs, has been selected as the remedy for the WADB. As part of the selected remedy, the future land use of the WADB will be unrestricted (i.e., no LUCs) where ash/contaminated soil media is excavated (4.8 ha [12 ac]) and restricted by LUCs where the ash/contaminated soil media will remain in place (10 ha [25 ac]).

In accordance with Section 121(c) of CERCLA and the NCP §300.430(f)(5)(iii)(c), a statutory review will be conducted within 5 years of initiation of the remedial action, and every 5 years thereafter, to ensure that the remedy continues to be protective of human health and the environment.

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action (unless justified by a waiver), is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. This remedy does not satisfy the statutory preference for treatment as a principal element of the remedy because

it does not reduce the toxicity, mobility, or volume of materials comprising principal threats through treatment.

In the long term, if the property, or any portion thereof, is ever transferred from USDOE, the U.S. Government and/or USDOE will take those actions necessary pursuant to Section 120(h)(1) of CERCLA. Those actions will include in any contract, deed, or other transfer document, notice of the type and quantity of any hazardous substances that were known to have been stored (for more than one year), released, or disposed of on the property. The notice will also include the time at which the storage, release, or disposal took place to the extent such information is available.

In addition, if the property, or any portion thereof, is ever transferred by deed, the U.S. Government will also satisfy the requirements of CERCLA 120(h)(3). The requirements include a description of the remedial action taken, a covenant, and an access clause. 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.

LUCs will be implemented through the following:

- The contract, deed, or other transfer document shall also include restrictions precluding residential use of the property. However, the need for these restrictions may be reevaluated 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 reevaluation of the LUCs will be done through an amended ROD with USEPA and SCDHEC review and approval.
- In addition, if the site is ever transferred to nonfederal ownership, a survey plat of the operable unit (OU) will be prepared, certified by a professional land surveyor, and recorded with the appropriate county recording agency.

In the event of a property lease or interagency agreement, the equivalent restrictions will be implemented as required by CERCLA Section 120(h).

The selected remedy for the WADB leaves hazardous substances in place that pose a potential future risk and will require land use restrictions for as long as necessary to keep the selected

remedy fully protective of human health and the environment. As agreed on March 30, 2000, among the USDOE, USEPA, and SCDHEC, SRS is implementing a Land Use Control Assurance Plan (LUCAP) to ensure that the LUCs required by numerous remedial decisions at SRS are properly maintained and periodically verified. The unit-specific Land Use Control Implementation Plan (LUCIP) incorporated by reference into this ROD will provide details and specific measures required to implement and maintain the LUCs selected as part of this remedy. The USDOE is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the LUCs selected under this ROD. The LUCIP, developed as part of this action, will be submitted concurrently with the Corrective Measures Implementation (CMI) / Remedial Action Implementation Plan (RAIP), as required in the FFA for review and approval by USEPA and SCDHEC. Upon final approval, the LUCIP will be appended to the LUCAP and is considered incorporated by reference into the ROD, establishing LUC implementation and maintenance requirements enforceable under CERCLA. The approved LUCIP will establish implementation, monitoring, maintenance, reporting, and enforcement requirements for the unit. The LUCIP will remain in effect unless and until modifications are approved by the USEPA and SCDHEC as needed to be protective of human health and the environment. LUCIP modification will only occur through another CERCLA document.

Data Certification Checklist

This ROD provides the following information:

- Constituents of concern (COCs) and their respective concentrations (Section V).
- Baseline risk represented by the COCs (Section VII).
- Cleanup levels established for the COCs and the basis for the levels (Section VIII).
- Current and reasonably anticipated future land and groundwater use assumptions used in the Baseline Risk Assessment (BRA) and ROD (Section VI).
- Potential land and groundwater use that will be available at the site as a result of the selected remedy (Section VI).

- Estimated capital, operation and maintenance, and total present worth cost; discount rate; and the number of years over which the remedy cost estimates are projected (Section IX).

- Key decision factor(s) that led to selecting the remedy (i.e., a description of the manner in which the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria) (Section X).

- How source materials constituting principal threats are addressed (Section VIII, Section XI).

May 7, 2018
Date

Angelia A. Holmes
Acting Assistant Manager for Infrastructure and Environmental Stewardship
U. S. Department of Energy
Savannah River Operations Office

5/21/18
Date

Franklin E. Hill
Director
Superfund Division
U. S. Environmental Protection Agency - Region 4

6/4/18
Date

Daphne G. Neel
Bureau Chief
Bureau of Land and Waste Management
South Carolina Department of Health and Environmental Control

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DECISION SUMMARY
REMEDIAL ALTERNATIVE SELECTION (U)

Wetland Area at Dunbarton Bay in Support of Steel Creek Integrator Operable Unit

CERCLIS Number: 71

SRNS-RP-2013-00730
Revision 1

April 2018

Savannah River Site
Aiken, South Carolina

Prepared By:

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Savannah River Nuclear Solutions, LLC
for the
U. S. Department of Energy under Contract DE-AC09-96SR18500
Savannah River Operations Office
Aiken, South Carolina

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LIST OF ACRONYMS AND ABBREVIATIONS

ac	acre
ARAR	Applicable, or Relevant and Appropriate Requirement
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CM	Contaminant Migration
CMI	Corrective Measures Implementation
CMI	Corrective Measures Study
CFR	Code of Federal Regulation
COC	constituent of concern
COPC	constituents of potential concern
CSM	conceptual site model
EPC	exposure point concentration
ERA	ecological risk assessment
FFA	Federal Facility Agreement
ft, ft^2, ft^3	feet, square feet, cubic feet
FS	Feasibility Study
ha	hectare
HBL	health-based limit
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
LLC	Limited Liability Company
LUC	Land Use Controls
LUCAP	Land Use Control Assurance Plan
LUCIP	Land Use Control Implementation Plan
km, km^2	kilometer, square kilometers
m, m^2, m^3	meter, square meters, cubic meters
MCL	maximum contaminant limit
MDL	minimum detection level
mi, mi^2	mile, square miles
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Protection Act
NPL	National Priorities List
OU	operable unit
PAB	P-Area Ash Basin
PRG	preliminary remedial goals
PTSM	principal threat source material
PW	present worth
RAIP	Remedial Action Implementation Plan
RAO	remedial action objective

LIST OF ACRONYMS AND ABBREVIATIONS (*continued*)

RCRA	Resource Conservation and Recovery Act
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RG	remedial goal
RGO	remedial goal option
RI	Remedial Investigation
RME	reasonable maximum exposure
ROD	Record of Decision
RSL	regional screening level
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments Reauthorization Act
SB/PP	Statement of Basis/Proposed Plan
SCDHEC	South Carolina Department of Health and Environmental Control
SREL	Savannah River Ecology Laboratory
SCHWMR	South Carolina Hazardous Waste Management Regulations
SRNS	Savannah River Nuclear Solutions, LLC
SRS	Savannah River Site
TCLP	Toxicity Characteristic Leaching Procedure
TRV	toxicity reference value
UCL	upper confidence limit
USDOE	United States Department of Energy
WADB	Wetland Area in at Dunbarton Bay
WSRC	Washington Savannah River Company, LLC
yd, yd^2, yd^3	yard, square yards, cubic yards

I. SAVANNAH RIVER SITE AND OPERABLE UNIT NAME, LOCATION, AND DESCRIPTION

Unit Name, Location, and Brief Description

Wetland Area at Dunbarton Bay in support of Steel Creek Integrator Operable Unit (IOU)
Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Identification Number: OU-71
Savannah River Site
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Identification Number: SC1 890 008 989
Aiken, South Carolina
United States Department of Energy (USDOE)

Savannah River Site (SRS) occupies approximately 802.9 km^2 (310 mi^2) of land adjacent to the Savannah River, principally in Aiken and Barnwell counties of South Carolina (Figure 1). SRS is located approximately 40.2 km (25 mi) southeast of Augusta, Georgia, and 32.1 km (20 mi) south of Aiken, South Carolina.

The USDOE owns SRS, which historically produced tritium, plutonium, and other special nuclear materials for national defense and the space program. Chemical and radioactive wastes are by-products of nuclear material production processes. Hazardous substances, as defined by the CERCLA, are currently present in the environment at SRS.

The Federal Facility Agreement (FFA) (FFA 1993) for SRS lists the Wetland Area at Dunbarton Bay (WADB), a subunit of Steel Creek Integrator Operable Unit (IOU), as a Resource Conservation and Recovery Act Solid Waste Management Unit/Comprehensive Environmental Response, Compensation and Liability Act (RCRA/CERCLA) unit requiring further evaluation.

The WADB was evaluated through an investigation process that integrates and combines the RCRA corrective action process with the CERCLA remedial process to determine the actual or potential impact to human health and the environment of releases of hazardous substances to the environment.

II. SITE AND OPERABLE UNIT COMPLIANCE HISTORY

SRS Operational and Compliance History

The primary mission of SRS has been to produce tritium, plutonium, and other special nuclear materials for our nation's defense programs. Production of nuclear materials for the defense program was discontinued in 1988. SRS has provided nuclear materials for the space program, as well as for medical, industrial, and research efforts up to the present. Chemical and radioactive wastes are by-products of nuclear material production processes. These wastes have been treated, stored, and in some cases, disposed at SRS. Past disposal practices have resulted in soil and groundwater contamination.

Hazardous waste materials handled at SRS are managed under RCRA, a comprehensive law requiring responsible management of hazardous waste. Certain SRS activities require South Carolina Department of Health and Environmental Control (SCDHEC) operating or post-closure permits under RCRA. SRS received a RCRA hazardous waste permit from the SCDHEC, which was most recently renewed on February 11, 2014. Module VIII of the Hazardous and Solid Waste Amendments (HSWA) portion of the RCRA permit mandates corrective action requirements for non-regulated solid waste management units subject to RCRA 3004(u).

On December 21, 1989, SRS was included on the National Priorities List (NPL). The inclusion created a need to integrate the established RCRA facility investigation (RFI) program with CERCLA requirements to provide for a focused environmental program. In accordance with Section 120 of CERCLA 42 United States Code Section 9620, USDOE has negotiated a FFA (FFA 1993) with the United States Environmental Protection Agency (USEPA) and SCDHEC to coordinate remedial activities at SRS into one comprehensive strategy, which fulfills these dual regulatory requirements. USDOE functions as the lead agency for remedial activities at SRS, with concurrence by the USEPA - Region 4 and the SCDHEC.

Operable Unit Operational and Compliance History

The WADB is located southeast of the P-Area Ash Basin (PAB) within the Steel Creek IOU boundary near the headwaters of Meyers Branch and extends into Dunbarton Bay, which is located south of Powerline Road (also referred to Ash Flow Road or SRS Road 74-28). The dominant feature of the WADB is a Carolina bay called Dunbarton Bay (Figure 2).

Carolina bays are shallow elliptical depressions that vary in size, are oriented northwest to southeast, are commonly 0.6 to 1.2 m (2 to 4 ft) deep, and are found on the southeastern Atlantic coastal plain area. Their widespread extent was unknown until the use of aerial photography in the 1930s at Myrtle Beach, SC.

The most widely accepted theory of Carolina bay formation is that originally there were shallow depressions in the landscape with an aquitard underneath that allowed precipitation to perch above the aquitard surface. Prevailing winds then shaped the depressions into the now familiar elliptical shape. The cause of the original depression, however, is still unknown.

Carolina bays, in general, have a history of disturbance. Ditching and drainage was a common practice, primarily to support cultivation. Bays on the SRS have been protected from such disturbances since 1951, and some bays on the SRS have been restored to pre-disturbance conditions. Dunbarton Bay has been identified as a designated wetland at the WADB subunit.

SRS began early infrastructure development between 1951 and 1955, including the construction of P-Reactor (SRNS 2010). P-Reactor operated from 1954 to 1988, and was shutdown in 1991. Similar to the other reactor areas at SRS, P Area utilized a coal-fired powerhouse to generate steam and electricity, with coal ash (coal combustion products) produced as a waste of boiler operations. In P Area, this ash was mixed with water and transferred to PAB via a sluice line. The PAB is an unlined, earthen containment basin that received sluice from 1951 to 1991. During the years of 1973 to 1974, significant amounts of ash within the basin were removed and placed around the perimeter of the basin

and to the north along the access road that led to the basin, including in the vicinity of Outfall P-007, which is located north of the PAB. Additionally, the Outfall P-007 received releases of contaminants (cesium-137) from process line discharges that originated from the P-Area Disassembly Basin. In the summer of 2010, an area of ash overflow was discovered during the removal activities at the PAB.

The ash overflow area begins at the southern edge of the PAB and extends approximately 762 m (2,500 ft) into Dunbarton Bay, which is located south of the Powerline Road (Figure 3). Dunbarton Bay has been designated as wetlands.

Representatives from the USEPA, SCDHEC, and USDOE met on August 5, 2010 to discuss and evaluate the need for a remedial action with regard to the ash overflow area at Dunbarton Bay. The three agencies agreed that this additional area was outside the scope of the remedial action for the PAB. The newly discovered ash overflow area in Dunbarton Bay was administratively assigned as a subunit of Steel Creek IOU in the SRS FFA and named the WADB.

USEPA, SCDHEC, and USDOE agreed to the development of a Sampling and Analysis Plan (SRNS 2010) to investigate the nature and extent of ash contamination at the WADB. Sampling was conducted in 2010 and 2011 and included collection of groundwater, surface water within Dunbarton Bay, ash/soil, and ecological data. Human health risk assessment (HHRA), principal threat source material (PTSM), ecological risk assessment (ERA), groundwater quality, and contaminant migration evaluations were performed with the collected definitive-level analytical data.

The Focused Corrective Measures Study/Feasibility Study (CMS/FS) Report (SRNS 2013a) was developed to evaluate remedial alternatives for hazardous substances existing at the WADB. The goals of the remedial actions are to protect human health and the environment and to mitigate the effects of contamination. The focused CMS/FS developed the remedial action objectives (RAOs) and remedial goal options (RGOs) for the remedial actions.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

Both RCRA and CERCLA require the public to be given an opportunity to review and comment on the draft permit modification and proposed remedial alternative. Public participation requirements are listed in South Carolina Hazardous Waste Management Regulation (SCHWMR) R.61-79.124 and Sections 113 and 117 of CERCLA (42 United States Code Sections 9613 and 9617). These requirements include establishment of an Administrative Record File that documents the investigation and selection of the remedial alternative for addressing the WADB. The Administrative Record File must be established at or near the facility at issue.

The SRS FFA Community Involvement Plan (WSRC 2011) is designed to facilitate public involvement in the decision-making process for permitting, closure, and the selection of remedial alternatives. The plan addresses the requirements of RCRA, CERCLA, and the National Environmental Policy Act (NEPA). SCHWMR R.61-79.124 and Section 117(a) of CERCLA, as amended, require the advertisement of the draft permit modification and notice of any proposed remedial action and provide the public an opportunity to participate in the selection of the remedial action. The *Statement of Basis/Proposed Plan for the Wetland Area at Dunbarton in Support of Steel Creek Integrator Operable Unit (U)* (SRNS 2013), a part of the Administrative Record File, highlights key aspects of the investigation and identifies the preferred action for addressing the WADB.

The FFA Administrative Record File, which contains the information pertaining to the selection of the response action, is available at the following locations:

U.S. Department of Energy
Public Reading Room
Gregg-Graniteville Library
University of South Carolina – Aiken
471 University Parkway
Aiken, South Carolina 29803
(803) 641-3504

Thomas Cooper Library
Government Information and Maps Department
University of South Carolina
1322 Greene Street
Columbia, South Carolina 29208
(803) 777-4841

The RCRA Administrative Record File for SCDHEC is available for review by the public at the following locations:

The South Carolina Department of Health and Environmental Control
Bureau of Land and Waste Management
2600 Bull Street
Columbia, South Carolina 29201
(803) 898-2000

The South Carolina Department of Health and Environmental Control
Aiken Environmental Affairs Office
206 Beaufort Street, Northeast
Aiken, South Carolina 29801
(803) 642-1637

The public was notified of the public comment period through mailings of the *SRS Environmental Bulletin*, a newsletter sent to citizens in South Carolina and Georgia, and through notices in the *Aiken Standard*, the *Allendale Citizen Leader*, the *Augusta Chronicle*, the *Barnwell People-Sentinel*, and *The State* newspaper. The public comment period was also announced on local radio stations.

The Statement of Basis / Proposed Plan (SB/PP) 45-day public comment period began on December 19, 2013 and ended on February 1, 2014. A Responsiveness Summary, prepared to address any comments received during the public comment period, is provided in Appendix A of the Record of Decision (ROD). A Responsiveness Summary will also be available with the final RCRA permit. No public comments were received.

IV. SCOPE AND ROLE OF THE OPERABLE UNIT

Due to the complexity and size of multiple waste units in different areas, the SRS is divided into watersheds for the purpose of managing a comprehensive cleanup strategy. The SRS is segregated into six watersheds: Upper Three Runs, Fourmile Branch, Pen Branch, Steel Creek, Lower Three Runs, and the Savannah River. In addition, the SRS also identifies six Integrator Operable Units (IOUs), which are the surface water bodies and associated wetlands that correspond to the six respective watersheds. Waste units within a watershed may be evaluated and remediated individually or grouped with other waste units and evaluated as part of a larger Area Operable Unit (OU). Upon disposition of all the waste units that may potentially impact a watershed, a final comprehensive ROD for the corresponding IOU (i.e., surface water and associated wetlands) will be pursued with

additional public involvement. The WADB is located within the Steel Creek IOU watershed.

A release of hazardous substances into the environment has occurred at the WADB. The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

V. OPERABLE UNIT CHARACTERISTICS

This section presents the conceptual site model (CSM), provides an overview of the characterization activities, and presents the characterization results and constituents of concern (COCs).

Conceptual Site Model for the WADB

The conceptual site model (CSM) is an objective framework for assessing data pertinent to the investigation. The CSM identifies and evaluates suspected sources of contamination, contaminant release mechanisms, potentially affected media (secondary sources of contamination), potential exposure pathways, and potential human and ecological receptors.

The WADB is located in a remote part of SRS and it not within any administrative or industrial areas that are currently designated for industrial land use. The environmental setting precludes any residential (unrestricted) or industrial land use in the future. Therefore, the most likely receptor scenario is an onsite worker (i.e., a worker who is conducting research, collecting samples, performing maintenance, etc.). However, in order to support risk management decision-making, a variety of hypothetical receptors are evaluated in the HHRA. These include the standard (i.e., default) unrestricted (i.e., residential) and industrial land use scenarios, as well as the site-specific IOU onsite worker and adolescent trespasser scenarios.

The primary source of contamination at the WADB is coal ash from the PAB and runoff from the P007 Outfall. If the primary source were to contact other media, secondary

sources of contamination could be created through several release mechanisms. The ash material, deep soil, and surface water were evaluated as secondary sources. The potential secondary release mechanisms include generation of fugitive dust by wind or other surface soil disturbance, biotic uptake, radiation emissions, and infiltration / percolation / leaching to groundwater. The primary exposure pathway for evaluation relative to human receptors is exposure to surface ash/soil (0 to 0.3 m [0 to 1 ft]) via incidental ingestion, dermal contact, inhalation of windblown dust, and external exposure to radionuclides (Figure 4). All-depths soils offer a potential exposure pathway for a future industrial worker under an excavation scenario and was considered in the PTSM analysis. The potential of contaminants to leach from soil to groundwater was evaluated in the contaminant migration (CM) analysis. Ingestion of surface water and groundwater are also complete pathways for human receptors.

From an ecological risk perspective, the habitat at Dunbarton Bay likely supports both terrestrial and aquatic/semi-aquatic receptors to some degree. The media of concern are primarily the surficial ash (0 to 0.3 m [0 to 1 ft]) and surface water. Terrestrial receptors include earthworm (soil invertebrate), old-field mouse (herbivorous mammal), short-tailed shrew (insectivorous mammal), raccoon (omnivorous mammal), American robin (insectivorous bird), and red-tailed hawk (carnivorous bird). Aquatic/semi-aquatic receptors include aquatic organisms, benthic (sediment) dwelling organisms, raccoon (mammalian aquatic predator), and green heron (avian aquatic predator).

Media Assessment

The *Focused Corrective Measures Study / Feasibility Study for the Wetland Area at Dunbarton Bay in Support of Steel Creek IOU* (SRNS 2013a) contains detailed information and analytical data for all the characterization investigations conducted and samples taken in the media assessment of the WADB. It is available in the Administrative Record File (Section III of this document).

Ash/Soil Investigation

The ash deposition area begins on the south side of the PAB and extends in a southerly direction for approximately 762 m (2,500 ft) into Dunbarton Bay. The maximum width at the leading edge of the ash deposition area is approximately 300 m (985 ft). The depth of ash deposition is variable and ranges from 0.15 to 0.9 m (0.5 to 3 ft) in thickness (Figure 3). The area of ash deposition is approximately 15 hectares (38 acres), which has a total volume of approximately 61,332 m^3 (80,220 yd^3) of ash.

In June 2010, ten ash/soil sample locations within Dunbarton Bay were sampled from the 0 to 0.3 m (0 to 1 ft) ash/soil interval and analyzed for metals and radionuclides. This definitive level data was used in the HHRA and PTSM evaluation. In addition, data was collected and analyzed for metals by the Savannah River Ecology Laboratory (SREL) in 2011/2012, which was considered in the weight-of-evidence evaluation. A Sampling and Analysis Plan (SAP) was developed in 2011 to address data gaps identified in the original dataset (SRNS 2011). These data gaps pertained primarily to the ERA. Site-specific biological field studies were initiated for metals associated with the ash media. The studies targeted both biotic (i.e., fauna) and abiotic (i.e., ash/soil) media.

Groundwater Investigation

Thirteen monitoring wells were used to assess groundwater quality from April 2011 until February 2012 and analyzed for metals, gross alpha, nonvolatile beta, trichloroethyelene, and tetrachloroethyelene. A single detection of naturally-occurring beryllium and gross alpha particles exceeded their respective maximum contaminant level (MCL) in one well. Four subsequent sampling events from the same well did not detect any further concentrations exceeding the MCLs. Additionally, four monitoring wells were installed to address the data uncertainty associated with the groundwater media and to determine if there is a contaminant migration issue from Dunbarton Bay into other areas of SRS or off-site.

Surface Water Investigation

Two surface water samples were taken in June 2010 and analyzed for metals, nonvolatile beta, and radium-226. Surface water was intended for sampling in 2011 as part of the SAP (SRNS 2011). However, Dunbarton Bay was dry due to the regional drought conditions and no surface water samples were obtained.

Surface water is only intermittently present in the WADB, indicating that the surrounding area and Dunbarton Bay is hydraulically isolated from the aquifer. The potentiometric surface averaged 70 m (230 ft) above msl beneath Dunbarton Bay and the lowest spot, which could be located in the wetland, measured 73 m (238 ft) above msl creating a minimum vadose zone thickness of at least 2 m (8 ft).

The volume of water that can be retained in the area is also limited. Ditches were constructed in the area to carry stormwater runoff from Dunbarton Bay to Meyers Branch. As a result, the area can only reach a water-level potential equal to the depth of the ditching system elevation.

Media Assessment Results

A HHRA, ERA, contaminant migration analysis, and principle threat source material (PTSM) evaluation was conducted for the WADB (SRNS 2013a). The results are summarized below.

Ash/Soil

Per the HHRA described in more detail in Section VII, the potential risk to the four human receptors evaluated exceeds 1.0E-06 for exposure to contaminants in surface ash/soil interval (0 to 0.3 m [0 to 1 ft] and are summarized below.

Arsenic, cesium-137(+D), potassium-40, radium-226(+D), and uranium-238 (+D) were identified as human health refined COCs (RCOCs) for both the future resident scenario and the future industrial worker scenario. Arsenic, cesium-137(+D), potassium-40, radium-226(+D) were identified as human health RCOCs for both the IOU onsite worker

and the trespasser. No PTSM RCOCs were identified for the ash/soil media at Dunbarton Bay.

Based on the results of the ERA, there is no clear evidence that Dunbarton Bay is negatively impacting ecological receptors. Dunbarton Bay appears to support a healthy and diverse ecosystem in a similar manner to those ecosystems in uncontaminated adjacent areas. The overall weight-of-evidence leads to the conclusion that the naturally-occurring trace metals associated with the coal ash that are present within Dunbarton Bay do not pose unacceptable risk to representative populations inhabiting or utilizing the area or to special species of concern. Therefore, no ecological RCOCs for either the ash/soil media have been identified.

For contaminant migration, no constituents have been identified at the WADB that would have the potential to migrate to the aquifer and exceed MCLs (or regional screening levels [RSLs]/preliminary remediation goals [PRGs] in the absence of a MCL) within 1,000 years. Therefore, no CM RCOCs have been determined for the ash/soil media.

Groundwater

In terms of the groundwater, only two analytes exceeded their respective drinking water standard (gross alpha and beryllium). However, gross alpha and beryllium were not considered groundwater RCOCs since both analytes occurred only once in a single well (RGW-7C). Four subsequent sampling events resulted in concentrations less that the drinking water standards for gross alpha and beryllium. Therefore, no RCOCs have been identified for the groundwater.

Surface Water

No constituents were identified as human health or ecological RCOCs for the surface water media.

Site-Specific Factors

A 30-m (100 ft) buffer was established around the Dunbarton Bay to be protective of the environment of the bay, thus preventing damage and destruction to its sensitive ecosystem during remedial activities at the WADB.

VI. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Land Uses

According to the Savannah River Site Future Use Project Report (USDOE 1996), residential uses of SRS land should be prohibited. The *Land Use Control Assurance Plan for the Savannah River Site* (WSRC 1999) designates the WADB as being located outside any industrial buffer zones. However, no current/future use or development is anticipated for the WADB based on the SRS land use policy. Land use at the WADB will be restricted with USDOE maintaining control of the land.

Groundwater Uses/Surface Water Uses

WADB shallow groundwater has not been impacted by previous SRS operations. Although there is no anticipated current or future use of the groundwater, SRS procedures, in conjunction with South Carolina regulations will prevent use of the groundwater without prior approval.

VII. SUMMARY OF OPERABLE UNIT RISKS

Baseline Risk Assessment

As a component of the RFI/Remedial Investigation (RI) process, a BRA was performed to evaluate risks associated with the WADB (SRNS 2013). The BRA estimates what risks the site poses if no action were taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. The BRA includes human health and ecological risk assessments, fate and transport analysis (i.e. contaminant migration), and a PTSM evaluation. Because of its location in a remote part of SRS, the HHRA evaluated the risk for the IOU onsite worker, adolescent trespasser, future industrial worker, and future resident for risk management decision-

making. This section of the ROD summarizes the results of the BRA for the WADB (SRNS 2013).

Summary of Human Health Risk Assessment

The WADB was assessed as a single surface ash/soil (0 to 0.3 m [0 to 1 ft]) exposure unit in the HHRA. A streamlined approach that considered both standardized and site-specific receptor scenarios/exposure assumptions was used for this evaluation. Groundwater media was also assessed by comparing unit concentrations to drinking water standards.

The standard USEPA future resident exposure scenario evaluates long-term risks to individuals expected to have unrestricted use of the unit. It assumes that residents hypothetically live on the unit and are exposed chronically, both indoors and outdoors, to unit contaminants. The exposure assumptions for this scenario are 30 years, 350 days per year, and 24 hours per day.

The future industrial worker exposure scenario is also a standard USEPA scenario, which addresses long-term risks to workers who are exposed to unit contaminants within an industrial setting. The exposure assumptions for this scenario are 25 years, 250 days per year, and 8 hours per day.

The site-specific IOU onsite worker receptor scenario involves a worker who is performing maintenance, collecting samples, or conducting research. The exposure assumptions for the onsite worker are 20 years, 150 days per year, and 8 hours per day. These site-specific parameters were based on input provided by SREL for a wetlands researcher.

The site-specific adolescent trespasser receptor scenario evaluates long-term risks to individuals expected to routinely trespass on the unit. This receptor would most likely be a local adolescent who would have access to the unit and would utilize the unit for wading, playing, or other recreational activities. The exposure assumptions for the adolescent trespasser are 10 years, 90 days per year, and 18 hours a day.

The potential exposure pathways for evaluation of human receptors included:

- Exposure to surface ash/soil media (0 to 0.3 m [0 to 1 ft]) via incidental ingestion, dermal contact, inhalation, and external exposure from radionuclides.
- Exposure to surface water media (if present) via ingestion (conservative drinking water standard comparison only).
- Exposure to groundwater via ingestion (conservative drinking water standard comparison).

The USEPA publishes RSLs for nonradiological constituents and PRGs for radiological constituents that are risk-based concentrations (or activities) that can be used to evaluate potentially contaminated waste sites. RSLs and PRGs combine current USEPA toxicity values with standard exposure factors that represent reasonable maximum exposure (RME) conditions to estimate contaminant concentrations in soil that the agency considers protective of humans over a lifetime. The concentrations are based on direct exposure pathways for which generally accepted methods, models, and assumptions have been developed for specific land use conditions.

The *USEPA Regional Screening Levels* website (USEPA 2011) was the source of RSLs used in this assessment. The website was accessed on February 27, 2012. The generic table published in November 2011 used all default parameters for both the residential and industrial worker scenarios. The RSLs for the onsite worker and adolescent trespasser scenarios were obtained by using the website calculator function to derive site-specific RSLs.

The *USEPA Superfund Radionuclide Preliminary Remediation Goals for Superfund* website (USEPA 2010) was the source of the PRGs used in this assessment. The website was also accessed on February 27, 2012. The PRGs for a residential scenario were obtained by using the website calculator function to derive site-specific PRGs. These site-specific PRG values were calculated by eliminating the fruit and vegetable consumption pathways as standard input assumptions and using all other default parameters (SRNS 2012). The PRGs for an industrial worker scenario were obtained from the generic table that assumed

all default parameters. The PRGs for the onsite worker and adolescent trespasser scenarios were obtained by using the website calculator function to derive site-specific PRGs.

The first step of the formal HHRA for ash/soil media was a data screening exercise to identify human health constituents of potential concern (COPCs). The maximum detected soil concentration for each constituent was compared to a residential RSL or PRG value and SRS background concentration, if appropriate (i.e., for naturally occurring constituents only). Constituents that exceeded the soil media screening criteria were identified as COPCs and were carried forward to the quantified risk evaluation.

The quantitative risk assessment was implemented by a streamlined approach, which used the RSLs/PRGs to calculate the human health risk estimates for the WADB. The risk estimate was calculated using the following equation:

Cancer Risk = (exposure point concentration / RSL or PRG) x 1E-06

The exposure point concentration (EPC) is identified as the lesser of the maximum detected value or the 95% upper confidence limit (UCL) of the mean concentration. Carcinogenic constituents with an individual cancer risk greater than 1E-06 were identified as human health COCs.

For noncarcinogens, the hazard estimate was calculated using the following equation:

Noncancer Hazard Quotient = EPC / RSL

If the total media hazard index (HI) was less than 1, then no COCs were identified. If the total media HI was greater than or equal to 1, then the constituents were segregated based on relevant target organs. Hazard Quotients (HQs) were summed according to target organs. Constituents were identified as human health COCs if the total organ HQ was greater than or equal to 0.1 and the total organ HI was greater than or equal to 1.

A recommendation of whether or not a human health COC should be carried forward for further remedial evaluation was based on a thorough analysis of each constituent in an

uncertainty discussion. COCs that were not eliminated in the refinement process based on a weight-of-evidence evaluation were classified as human health RCOCs.

The Risk Assessment Guidance for Superfund (RAGS) Part D tables are presented for the human health RCOCs in the ash/soil media identified in the BRA to support the human health risk discussion. Table 1 lists the COCs and their exposure point concentrations. Table 2 provides a summary of the cancer toxicity data. Tables 3 through 6 provide the calculated risk levels for each of the receptor scenarios.

Specifically, human health RCOCs identified for the standard future resident scenario were arsenic (risk = 5.5E-05), cesium-137(+D) (risk = 5.5E-05), potassium-40 (risk = 8.8E-05), radium-226(+D) (risk = 1.9E-04), and uranium-238(+D) (risk = 2.9E-06). The total cumulative risk was 3.9E-04 (Table 3).

For the standard future industrial worker scenario, arsenic (risk = 1.3E-05), cesium-137 (+D) (risk = 3.3E-05), potassium-40 (risk = 5.0E-05), radium-226(+D) (risk = 1.1E-04) and uranium-238(+D) (risk = 1.4E-06) were identified as human health RCOCs. The total cumulative risk was 2.1E-04 (Table 4).

For the IOU onsite industrial worker scenario, human health RCOCs identified were arsenic (risk = 6.5E-06), cesium-137(+D) (risk = 1.7E-05), potassium-40 (risk = 2.4E-05), and radium-226(+D) (risk = 5.1E-05). The total cumulative risk was 9.9E-05 (Table 5).

For the site-specific adolescent trespasser scenario, arsenic (risk = 3.0E-06), cesium-137 (+D) (risk = 1.3E-05), potassium-40 (risk = 1.6E-05), and radium-226(+D) (risk = 3.5E-05) were identified as human health RCOCs; the total cumulative risk was 6.7E-05 (Table 6).

There was no surface water present during the 2011 sampling event. Surface water that is intermittently present within the WADB did not represent a sustainable exposure scenario that warranted further remedial evaluation (i.e., not a problem warranting action) from a human health risk perspective. Therefore, no RCOCs were identified for the surface water media.

The groundwater media was evaluated by performing a comparison of unit concentrations to MCLs. Thirteen monitoring wells were used to assess groundwater quality from April 2011 until February 2012. A single detection of naturally-occurring beryllium and gross alpha particles exceeded their MCL in one well. Four subsequent sampling events from the same well did not detect any further concentrations which exceeded their respective MCL. Therefore, no RCOCs were identified for groundwater.

Summary of Ecological Risk Assessment

Ecological risk is associated with the potential for harmful effects to ecological systems resulting from exposure to an environmental stressor. A stressor is any physical, chemical, or biological entity that can induce an adverse response. Stressors may adversely affect specific natural resources or entire ecosystems, including plants and animals, as well as the environment with which they interact.

The ERA considered multiple lines-of-evidence to make a determination whether the ash media within Dunbarton Bay has in the past or will in the future pose a significant risk to wildlife receptors. These lines-of-evidence included the following: chemical analysis of the impacted medium, literature-based risk calculations, bioaccumulation and field tissue surveys, trophic level modeling, population/community evaluations, and toxicity testing information.

There was no clear evidence that Dunbarton Bay is negatively impacting ecological receptors, as it appears that it is as healthy and diverse an ecosystem as compared to similar areas adjacent to it that are not contaminated. The overall weight-of-evidence led to the conclusion that the naturally-occurring trace metals, associated with the coal ash that are present in the Dunbarton Bay ecosystem, do not pose an unacceptable risk to representative populations inhabiting or utilizing the area or to special species of concern. Therefore, no ecological RCOCs were identified and there are no problems warranting action from an ecological risk perspective.

Summary of the Fate and Transport Analysis

A contaminant migration analysis was performed to identify CM COCs. A constituent was identified as a CM COC if leachability modeling predicted the constituent will leach to groundwater and exceed MCLs (or RSLs/PRGs in the absence of a MCL) within 1,000 years. No CM RCOCs were identified at the WADB as a result of this evaluation.

Discussion of Principal Threat Source Material

Source material are those materials that include or contain hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or air that acts as a source for direct exposure. Principal threat waste is defined as those source materials that have a high toxicity or mobility and cannot be reliably contained or present a significant risk to human health or the environment (USEPA 1991). This source material is referred to as principal threat source material (PTSM) at SRS, and includes liquids and other highly mobile materials such as those released from surface soil due to volatilization or leaching, or materials having high concentrations of toxic compounds. The identification of PTSM based on mobility is evaluated under the contaminant migration analysis. In order to determine whether contaminants in ash/soil at the WADB should be considered PTSM, a quantitative assessment evaluating the toxicity of the source material was performed (SRNS 2013a). The maximum detected concentration for each constituent in the ash/soil media was used in the evaluation. The evaluation concluded that there were no contaminants that constitute PTSM at the WADB.

Conclusions

In summary, analysis of all data and weight-of-evidence indicates that problems warranting action only exist for human health receptors from exposure to the surface ash/soil media. No problems warranting action were identified for ecological receptors. Additionally, no problems warranting action were identified for contaminant migration, surface water, or groundwater media. As previously discussed, the HHRA evaluated multiple receptors for risk management purposes; however, problems warranting action are based on the IOU

onsite worker receptor scenario which was selected as the most appropriate receptor for the WADB.

VIII. REMEDIAL ACTION OBJECTIVES AND REMEDIAL GOALS

Remedial Action Objectives

RAOs are media- or OU-specific objectives for protecting human health and the environment. RAOs usually specify potential receptors and exposure pathways, and are identified during project scoping once the CSM is understood. RAOs describe what the remediation must accomplish and are used as a framework for developing remedial alternatives. The RAOs are based on the nature and extent of contamination, threatened resources, and the potential for human and environmental exposure. The following RAO is identified for the WADB and is protective of the IOU onsite worker:

- Prevent the IOU onsite worker from exposure to RCOC contaminants in surface ash/soil exceeding 1.0E-06 risk or exceeding SRS background concentrations.

Remedial Goals

RGOs serve to provide a range of cleanup goals for each COC and are typically identified along with the RAOs. Following public comment and approval of the SB/PP, the final cleanup goals or remedial goals (RGs) for the selected remedy are chosen from the RGOs and documented in the ROD.

RGs can be qualitative statements or numerical values often expressed as concentrations in soil and groundwater, or actions (installation of engineered barriers, placement of caps and covers, etc.) that achieve the RAO. These cleanup goals are either concentration levels that correspond to a specific risk or hazard or are based on Applicable, or Relevant and Appropriate Requirements (ARARs). Final RGs will be monitored to determine when the remedial action is complete.

RGs were calculated for the default future industrial worker and future resident (unrestricted) receptors, as well as the IOU onsite worker and adolescent trespasser receptors. All receptors correspond to a target cancer risk of 1×10^{-6} or target HQ of 1 and

are presented in Table 7. Since RCOCs were identified for human receptors only, the most restrictive RGO is identified as the lowest of the human health RGOs. There are no PTSM, ERA, contaminant migration, or groundwater RGOs identified for the WADB.

In contrast to the most restrictive RGOs, the most likely RGOs also consider a comparison to background levels. With the exception of cesium-137(+D), RCOCs identified for the ash media are also common constituents in SRS background soil at similar concentrations. Because of the inherently conservative nature of the risk assessment and RGO calculations, it is possible for the risk-based RGOs to be less than what occurs naturally in background soil. In order to practically achieve the cleanup level for these common constituents, the RGO is set as the 95th percentile concentration in SRS background soil. The 95th percentile is selected because it provides an accurate picture of where 95 percent of SRS background concentrations for these constituents are expected to fall, as opposed to an average or maximum concentration that could either overstate or understate the cleanup level. This is particularly important when concentrations in the "contaminated" media are similar to background concentrations and an outlier or slight fluctuation in the lab analysis could result in unnecessary remediation of soils containing naturally-occurring constituents at levels that are found in background.

The Most Likely RGs (i.e., 95th percentile of SRS background concentrations) for each of the RCOCs equate to a risk of <1E-04 which are within the USEPA target risk range for a residential scenario (i.e., unrestricted land use). For cesium-137(+D), the 95th percentile detected in SRS background soils is 0.34 pCi/g, which is very low when compared to "typical" anthropogenic fallout levels generally recognized at 1 pCi/g or less. To account for the variability in background concentrations of cesium-137(+D) and for consistency with generally recognized fallout levels, the RG for this RCOC is set at two times (2X) the 95th percentile of SRS background soil represented at 0.68 pCi/g. This activity equates to a residential risk of <1E-04 and is within the USEPA target risk range.

Following the ash removal and visual inspection that no ash remains, confirmation samples will be obtained from the excavation area. To confirm that the RAO has been met in the

excavation area, the mean concentration of all confirmation samples will be compared to the Most Likely RGs provided in Table 7. In addition, SRS will ensure that no single confirmation sample result will exceed the SRS maximum background concentration for each constituent.

Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA, as amended by the Superfund Amendments Reauthorization Act (SARA), requires that remedial actions for cleanup of hazardous substances must comply with requirements and standards set forth under federal and state environmental laws and regulations that are applicable or relevant and appropriate (i.e., ARARs). ARARs include only federal or state environmental or facility laws and regulations and do not include occupational safety or worker protection requirements. SARA requires that the remedial action for a site meet all ARARs unless a waiver is invoked.

ARARs consist of two sets of requirements: those that are applicable, and those that are relevant and appropriate. Applicable requirements are those substantive standards that specifically address the situation at a CERCLA site and are promulgated under federal or state environmental laws. If a requirement is not applicable, it may still be relevant and appropriate. "Applicability" is a legal and jurisdictional determination, while the determination of "relevant and appropriate" relies on professional judgment, considering environmental and technical factors at the site. A requirement may be "relevant", in that it covers situations similar to that at the site, but may not be "appropriate" to apply for various reasons and, therefore, not well suited to the site. In some situations, only portions of a requirement or regulation may be judged relevant and appropriate; if a requirement is applicable, however, all substantive parts must be followed. In addition, to ARARs, many federal and state environmental and public health programs include criteria, guidance, and proposed standards that are not legally binding but provide useful approaches or recommendations. Such information is required to-be-considered when RGs are developed.

Key ARARs associated with each alternative are discussed in more detail in the Description of Alternatives section. The complete list of ARARs for the selected remedy is presented in Table 8.

IX. DESCRIPTION OF ALTERNATIVES

This section presents and summarizes the remedial alternatives for WADB. Under CERCLA, it is desirable, when practical, to offer a range of alternatives to compare during the detailed analysis to arrive at the most effective cost-efficient remedial action. The range of alternatives may include options that 1) immobilize chemicals, 2) reduce the contaminant volume, and 3) reduce the need for long-term onsite management. For the WADB, alternatives were previously evaluated in the Focused CMS/FS (SRNS 2013a). The following remedial alternatives were evaluated for the WADB:

1) Alternative A-1: No Action;
2) Alternative A-2: LUCs for 15 ha (37 ac);
3) Alternative A-3: Excavation and Ex-situ Containment:
    a. A-3a: Excavation of 16,820 m^3 (22,000 yd^3) of Ash and On-SRS Containment with LUCs for 10 ha (25 ac) not excavated;
    b. A-3b: Excavation of 16,820 m^3 (22,000 yd^3) of Ash and Off-SRS Containment with LUCs for 10 ha (25 ac);
    c. A-3c: Excavation of 61,332 m^3 (80,220 yd^3) of Ash and On-SRS Containment; and
    d. A-3d: Excavation of 61,332 m^3 (80,220 yd^3) of Ash and Off-SRS Containment.

Under Alternative A-3, Ex situ Containment refers to transport and containment of the ash from the WADB waste unit. Ex situ containment was evaluated for both on-SRS and off-SRS facilities.

Remedy Components, Common Elements, and Distinguishing Features of Each Alternative

Alternative A-1: No Action

As required by the NCP, the No Action alternative is provided as a baseline for comparison against the other alternatives. No action is taken to restrict access, limit exposure, or reduce contaminant toxicity, volume, or mobility. LUCs are not in place and monitoring and reporting are not conducted. No resources would be expended in reducing contamination and contaminants would remain in place.

Total Present Worth Cost $0

Alternative A-2: Land Use Controls

This alternative involves only the use of LUCs to limit access to the area of the WADB where waste (ash/contaminated soil) has been delineated. LUCs includes both institutional controls (i.e., excavation permit restrictions, deed restrictions, requiring health and safety plans for entry, etc.) and physical access controls (i.e., physical barriers, warning signs, no trespassing signs, access controls, fencing, etc.) to minimize the potential for human exposure to contaminants by limiting land access or resource use at the waste unit. LUCs meet the threshold and balancing criteria requirements and are the least expensive alternative that is protective of human health and the environment and can meet the RAO. The extent of the area proposed to be under LUCs is provided in Figure 5 and apply to remedial alternatives A-2; 15 ha (37 ac), A-3a; 10 ha (25 ac), and A-3b; 10 ha (25 ac). LUCs are not required for remedial alternatives A-3c and A-3d since excavation would remove all the waste (ash/contaminated soil media) from the waste unit. Because of the long-lived nature of the contaminants, LUCs would need to be maintained until concentrations of hazardous substances are at levels that will allow for unrestricted use and exposure and would require five-year remedy reviews, inspections, and monitoring.

Total Present Worth Costs $1,824,099

Alternative A-3: Excavation of Ash with Ex Situ Containment

Alternative 3 consists of four Sub-Alternatives which all use excavation and ex situ containment, but differ in the location of ex situ containment (on-SRS vs. off-SRS), the volume of ash/contaminated soil which is excavated, and the use of LUCs. This alternative involves excavating the contaminated media in the WADB from the surface of the ash down to the native soil interface. Soil samples will be collected and analyzed to confirm if the RAO has been achieved by the cleanup. A SAP, which will include a sampling design as well as sample collection and analytical methods, will be developed and presented in the Corrective Measures Implementation/Remedial Action Implementation Plan (CMI/RAIP). This remedial alternative includes clearing and grubbing vegetation, road building, erosion control, grading, excavation of ash and contaminated soil, and then hauling it to an approved on-SRS or off-SRS ex situ containment facility. Sub-Alternatives A-3a and A-3b use a 30-m (100-ft) buffer area surrounding the Dunbarton Bay and two Sub-Alternatives A-3c and A-3d evaluate excavation of the total volume of ash and contaminated soil. The 30-m (100-ft) buffer is used to protect Dunbarton Bay's sensitive ecosystem from damage caused by excavation and construction activity. All four Sub-Alternatives can meet the threshold and balancing criteria requirements and are protective of human health and the environment. The four Sub-Alternatives can also meet the ARARs (Table 8) and the RAO.

Alternative A-3 must comply with ARARs. All Sub-Alternatives will need to comply with South Carolina Hazardous Waste Management (Regulation SC R61-79) and Identification of and Listing of Hazardous Waste (40 CFR 261) will be followed. A storm water permit will also need to be approved prior to the commencement of construction. Sub-Alternatives A-3c and A-3d will have the potential to trigger and need to comply with a variety of rules and regulations to perform work in a designated wetland, i.e., Dunbarton Bay. Sub-Alternatives A-3a and A-3c could trigger various federal and South Carolina regulations for an on-SRS ash disposal facility. Characterization and disposal of solid waste and/or hazardous waste, if any is generated, is required.

A-3a: Excavation of 16,820 m^3 (22,000 yd^3) of Ash and On-SRS Containment with LUCs

Proposes to excavate an approximately 4.9 ha (12 ac) of ash and contaminated soil from the boundary of the PAB to the edge of the 30-m (100-ft) buffer around the Dunbarton Bay and transport the waste to an approved ex situ containment facility located on-SRS property. This option employs LUCs for 10 ha (25 ac) since the entire volume of ash will not be excavated and a portion left in place.

Present Worth Cost $8,275.378

A-3b: Excavation of 16,820 m^3 (22,000 yd^3) of Ash and Off-SRS Containment and LUCs

Proposes to excavate 16,820 m^3 (22,000 yd^3) of ash and contaminated soil media from the boundary of the PAB to the edge of the 30-m (100-ft) buffer around the Dunbarton Bay and transport the waste to an approved ex situ containment facility located off-SRS property. This option employs LUCs for 10 ha (25 ac) since the entire volume of ash will not be excavated and a portion left in place.

Present Worth Cost $11,535,146

A-3c: Excavation of 61,332 m^3 (80,220 yd^3) of Ash and On-SRS Containment

Proposes to excavate entire volume of ash and contaminated soil including the Dunbarton Bay (80,220 yd^3) and transport the waste to an approved ex situ containment facility located on-SRS property. This option does not employ LUCs because all waste will be excavated and removed.

Present Worth Cost $13,055,204

A-3d: Excavation of 61,332 m^3 (80,220 yd^3) of Ash and Off-SRS Containment

Proposes to excavate entire volume of ash and contaminated soil including the Dunbarton Bay (80,220 yd^3) and transport the waste to an approved ex situ containment facility located

off-SRS property. This option does not employ LUCs because all waste will be excavated and removed.

Present Worth Cost $21,428,462

X. COMPARATIVE ANALYSIS OF ALTERNATIVES

This section summarizes the results of the detailed analysis of the remedial alternative in the WADB focused CMS/FS (SRNS 2013a). The NCP [40 CFR 300.430(e)(9)] requires that potential remedial alternative undergo detailed analysis using relevant evaluation criteria that will be used to select a final remedy. USEPA has established nine evaluation criteria to address the statutory requirements under CERCLA. The criteria fall into categories of threshold criteria, primary balancing criteria, and modifying criteria and are described in Table 9. The remedial alternatives have been evaluated against the threshold and primary balancing criteria. Modifying criteria (i.e. state or support agency acceptance and community acceptance) will be evaluated after the public comment period on the SB/PP. Provided below and in Table 10 is a summary of the comparison of the alternatives against the CERCLA evaluation criteria.

Overall Protection of Human Health and the Environment

With the exception of the No Action alternative (A-1), Alternatives A-2 and A-3 are all protective of human health and the environment and each can achieve the RAO.

Alternative A-2 provides for LUCs to prevent exposure to metallic and radionuclide contaminants in the ash/contaminated soil media. With rigorous adherence to the LUCs this alternative is protective of the IOU onsite worker and would leave all hazardous substances in place. Residual risk would still exceed 1E-06 or SRS background concentrations.

Sub-Alternatives A-3a, A-3b, A-3c, and A-3d are all more protective of the IOU onsite worker than Alternative A-2 because either a portion or all of the ash/contaminated soil media is excavated from the WADB subunit and interred in an approved and permitted ex situ containment waste disposal facility. Sub-Alternatives A-3c and A-3d are even more

protective of the IOU onsite worker than Sub-Alternatives A-3a and A-3b since all 61,332 m^3 (80,220 yd^3) of the ash and contaminated soil is removed from the WADB including the Dunbarton Bay leaving no hazardous substances in place.

However, Sub-Alternatives A-3a and A-3b have the advantage for the protection of the environment since construction activities will not occur within the 30 m (100-ft) buffer around the Dunbarton Bay and will prevent damage to and destruction of the sensitive ecosystem of the bay. Therefore, Sub-Alternatives A-3a and A-3b will provide better protection of the wetland environment than A-3c or A-3d. Sub-Alternatives A-3a and A-3b excavate 16,820 m^3 (22,000 yd^3) of ash/contaminated soil media and are also combined with LUCs to prevent IOU onsite worker exposure to hazardous substances remaining in the Dunbarton Bay as a mitigating control.

Compliance with ARARs

Chemical-Specific ARARs: All alternatives (A-2 and A3) have no Chemical-Specific ARARs identified.

Location-Specific ARARs: Alternative A-2 does not have to comply with any location specific ARARs because there is no excavation, treatment, or removal of ash or contaminated soil media and only LUCs are used to control access and land use for the entire area where ash has been deposited.

Since a portion of the ash is located in a designated wetland (Dunbarton Bay), Sub-Alternatives A-3c and A-3d will need to comply with a variety of rules and regulations to perform work in a designated wetland. Compliance with the substantive requirement of the Clean Water Act (CWA) will be required. Section 404 of the CWA states: “no activity that impacts waters of the United States shall be permitted if a practical alternative that has less adverse impacts exist. If there is not another viable alternative, the impacts to the wetlands must be mitigated.”

Sub-Alternatives A-3a and A-3b have the advantage since construction would not be performed in the designated wetland and would not trigger ARARs that are associated with

Alternatives A-3c or A-3d. Leaving a 30-m (100-ft) buffer at Dunbarton Bay provides additional assurances to avoid any impacts to the wetland.

Other location specific ARARs include applicable statutes for endangered, threatened, or rare species, as well as, the presence of archeological or cultural artifacts.

Action-Specific ARARs: Alternative 2 does not have to comply with action-specific ARARs since hazardous substances are not being generated, transported, or disposed.

Sub-Alternatives A-3a and A-3c would trigger various federal and South Carolina regulations if a permitted, on-SRS solid waste disposal facility is constructed. Sub-Alternatives A-3a, A-3b, A-3c, and A-3d would trigger requirements from 40 CFR Part 262, 264, and 268 for the characterization, transportation, and disposal of solid waste and/or hazardous waste (if any is generated). Non-hazardous, non-radioactive solid waste could be sent to a permitted, on-SRS solid waste landfill (none currently exist). Non-hazardous, non-radioactive solid waste could be sent to the regional permitted municipal solid waste landfill.

Short-term Effectiveness

Short-term effectiveness is not applicable to Alternative 1 since there is no action.

Alternative 2 presents no risk to workers or the community since no waste is generated, transported, or disposed by implementing LUCs.

Sub-Alternatives A-3a, A-3b, A-3c, and A-3d have the potential to minimally expose remediation workers to hazardous substances during excavation, construction, hauling, and earth moving activities. The removal of contaminated soil and ash would be performed consistent with SRS safety and health procedures to ensure minimal impact to the remediation worker during implementation. There is no risk to the community from these activities since the work area is not located in proximity to any community and is well within the SRS boundary.

A major advantage is recognized by Sub-Alternatives A-3a and A-3b because excavation and removal of ash and contaminated soil media is only partial and will not occur in a designated wetland. Sub-Alternatives A-3a and A-3b will not disturb, destroy, or negatively impact the sensitive ecosystem of the Dunbarton Bay and the buffer area. The buffer area is present to provide a barrier where construction activities will stop and be mitigated, thus preventing negative impact to and protecting the Dunbarton Bay from sedimentation, erosion, and destruction of flora and fauna.

Alternatively, Sub-Alternatives A-3c and A-3d propose to excavate and remove the entire 61,332 m^3 (80,220 yd^3) of ash and contaminated soil media from WADB subunit. These Sub-Alternatives (while being the most effective for reducing receptor risk) are also the most destructive to the environment. In order to implement Sub-Alternatives A-3c and A-3d, it will require clear cutting all the vegetation and mature trees, cutting and building temporary roads to provide access for heavy construction equipment, and excavation and removal of soil and ash in and around the Dunbarton Bay. The construction activities needed to implement A-3c and A-3d will virtually destroy and eliminate a portion of Dunbarton Bay as a natural resource. The construction activity and level of destruction to the Dunbarton Bay is an unavoidable short-term impact of implementing these two Sub-Alternatives. Due to the volume and location of the ash and contaminated media, there is no other feasible method or technology to cost-effectively accomplish the excavation without causing extensive and possibly irreversible destruction of the Dunbarton Bay.

Long-term Effectiveness and Permanence

With the exception of the No Action alternative, all alternatives provide long-term effectiveness and permanence.

For Alternative A-2, LUCs would be maintained until concentrations of hazardous substances are at levels that will allow for unrestricted use and exposure. Warning/limited access signs would be posted informing unauthorized personnel not to enter the posted area to prevent contact with hazardous substances. The use of LUCs can prevent the current

and future IOU onsite worker from being exposed to hazardous substances in the ash and contaminated soil.

LUCs will prevent human receptor exposure from residual ash remaining in the wetland after excavation and ex situ containment. The magnitude of residual risk would exceed 1E-06 or SRS background concentrations, all 15 ha (37 ac) of the WADB would require LUCs, and 5-year remedy reviews would be required until concentrations of hazardous substances are at levels that will allow for unrestricted use and exposure.

Sub-Alternatives A-3a and A-3b provide better effectiveness and permanence than is attainable with Alternative 2 because these alternatives excavate approximately16,820 m^3 (22,000 yd^3) of contaminated ash/contaminated soil media. The magnitude of residual risk is less than 1E-06 or SRS background concentrations within the removal area, but greater than 1E-06 or SRS background concentrations in Dunbarton Bay. Because residual ash remains in Dunbarton Bay, 10 ha (25 ac) of property will require LUCs until concentrations of hazardous substances are at levels that will allow for unrestricted use and exposure.

Sub-Alternatives A-3c and A-3d provide the best effectiveness and permanence than other alternatives. These Sub-Alternatives will permanently remove all of the ash and contaminated soil from the WADB subunit including the designated wetlands and dispose it safely in an approved ex situ containment facility. As such, there will be no need for LUCs or 5-year remedy reviews and land use will be unrestricted.

Reduction of Toxicity, Mobility, or Volume through Treatment

Treatment technologies were not evaluated for any of the remedial alternatives. Therefore, none of the remedial alternatives provide reduction of toxicity, mobility, or volume through active treatment.

Implementability

No implementation is required under the No Action alternative.

Alternative 2, LUCs have been implemented successfully within SRS at other waste units. There are no administrative or technical impediments for implementing LUCs at SRS.

Sub-Alternatives A-3a and A-3b can also be readily implemented using standard construction techniques for excavation and hauling the ash and contaminated soil media to an approved on-SRS or off-SRS ex situ containment facility.

A major disadvantage of Sub-Alternatives A-3c and A-3d is they may not be readily implemented or there may be difficulty associated with the construction because of working in the wetlands. Working conditions in a designated wetland will be more restrictive to mitigate damage from construction and more costly to restore (if possible) damage caused by the construction.

Another significant disadvantage for Sub-Alternatives A-3c and A-3d is if heavy precipitation should occur during the construction period, it would cause construction activities to be significantly delayed since Dunbarton Bay has the potential to accumulate precipitation. This condition would stop construction for an unknown period of time until conditions became suitable for earth-moving activities to restart.

Alternatively, permits for implementing Sub-Alternatives A-3c and A-3d may be more difficult to obtain. Although work performed under these Sub-Alternatives use standard earth working methods and earth moving equipment, the work will be performed in a designated wetland; thereby, increasing the length of time to mobilize and implement necessary controls.

Permitting of an onsite facility for implementation of Sub-Alternatives A-3a and A-3c may be very difficult to obtain as well as very costly. The additional costs estimated for the engineering and construction work to obtain an approved solid waste disposal facility permit are estimated to be $1.5 to $10 million, based on the selected disposal location. It is not certain if SRS could even expeditiously obtain the appropriate South Carolina solid waste permits so there is high uncertainty if on-SRS ex situ disposal is feasible in a timely manner. Conversely, permitting for implementing Sub-Alternatives A-3b and A-3d would

not be required since the material will be disposed of at an off-site solid waste disposal facility that is already permitted to receive this waste. The cost advantage of Sub-Alternatives A-3a and A-3c would easily be lost by the costs associated with obtaining the permits required to implement this alternative that are not included in the cost analysis. (An additional $1.5 to $10 million for engineering, preparation and siting would need to be added to this alternative). Therefore, a tradeoff for a more certain disposition route for disposal of the ash/contaminated soil media is justified instead of a less certain disposition route which has an uncertain outcome with potentially higher costs.

The time required to implement alternative A-2 is 6 months. The time to implement Sub-Alternatives A-3b and A-3d is 12 months and the time to implement Sub-Alternatives A-3a and A-3c is 18 months assuming an onsite disposal permit can be readily obtained.

Cost

The evaluation of an alternative must include capital, present-worth operational and maintenance costs. The cost estimates presented herein are based on the best available information regarding the anticipated scope of the alternatives. Changes in the cost of elements are likely to occur as a result of new information and data collected during the engineering design of the selected alternative. This is an order of magnitude engineering cost estimate expected to be within –30 to +50 percent of the actual project cost. The final cost of the project depends on actual labor and material cost, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, weather, diesel fuel cost, disposal fees, and other variables.

The present worth analysis is used to evaluate expenditures that occur over different time periods by discounting all future costs to a common base year, usually the current year. This allows the cost of remedial action alternatives to be compared on the basis of a single figure representing the amount of money that, if invested in the base year and disbursed as needed, would be sufficient to cover all costs associated with the remedial action over its planned duration.

For the purpose of estimating remedial action costs, the present worth analysis for WADB subunit is based on a standard period of 200 years for comparing costs for Sub-Alternatives A-2, A-3a, and A-3b and 2 years for Sub-Alternatives A-3c and A-3d (Table 11).

XI. THE SELECTED REMEDY

Detailed Description of the Selected Remedy

Sub-Alternative A-3b is the selected remedy for the WADB subunit. Sub-Alternative A-3b includes excavating 16,820 m^3 (22,000 yd^3) of ash and contaminated soil media from the boundary of the PAB to the edge of the 30-m (100-ft) buffer around the Dunbarton Bay and transporting the waste to an approved ex situ containment facility located off-SRS property. This option employs LUCs for 10 ha (25 ac), since the entire volume of waste will not be excavated and some materials would be left in place at the Dunbarton Bay (wetland area).

Sub-Alternative A-3b is protective of the IOU onsite worker and was evaluated to be the optimal alternative because it can achieve protection of the environment and attain ARARs by removal of 4.8 ha (12 ac) of ash and contaminated soil media. This Sub-Alternative is one of the least expensive of all the excavation Sub-Alternatives and is also the optimal Sub-Alternative for protection of the environment by establishing a 30-m (100-ft) buffer at Dunbarton Bay to prevent damage of the sensitive ecosystem of the bay from excavation activities. LUCs for 10 ha (25 ac) are combined with this Sub-Alternative to prevent human exposure to the ash and contaminated soil media that will remain in the Dunbarton Bay and will be in place until concentrations of hazardous substances are at levels that will allow for unrestricted use and exposure. Sub-Alternative A-3b (off-SRS containment) is preferable to Sub-Alternative A-3a (on-SRS containment) because a regulatory approved solid waste disposal facility does not exist on SRS property. This would require additional costs and construction of an approved solid waste disposal facility prior to implementation of A-3a. The additional cost for the engineering and construction work to obtain an approved solid waste disposal facility permit is estimated to be $1.5 to 10 million, based on the selected disposal location. Therefore, Sub-Alternative A-3b is the better tradeoff

because its guaranteed path for solid waste disposal is at a currently approved solid waste disposal facility. Sub-Alternative A-3b avoids the uncertainty of incurring an additional $1.5 to $10 million for permitting, engineering, and construction of a regulatory approved solid waste facility on SRS property.

The following LUC objectives are necessary to ensure protectiveness of the selected remedy:

- Prevent contact, removal or excavation of ash/contaminated soil media;
- Maintain the integrity of any current or future remedial system or monitoring system; and
- Prohibit the development and use of property for residential housing, elementary and secondary schools, child care facilities and playgrounds.

The LUC objectives will be met by the LUCs summarized in Table 12 and provided below:

- Warning and limited access signs at the WADB boundaries to prevent unrestricted use and access to the area where ash/contaminated soil is present (Dunbarton Bay).
- Notifying USEPA and SCDHEC in advance of any major changes in land use that would necessitate re-evaluation of the remedy or excavation of waste.
- Institutional controls (i.e., administrative controls) and use restrictions for onsite workers via the Site Use/Site Clearance Program. Other administrative controls to ensure worker safety include work controls, worker training, and worker briefings of health and safety requirements.
- SRS access controls against trespassers as described in the 2013 RCRA 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.

In the long term, if the property, or any portion thereof, is ever transferred from DOE, the U.S. Government and/or DOE will take those actions necessary pursuant to Section 120(h)(1) of CERCLA. Those actions will include in any contract, deed, or other transfer document, notice of the type and quantity of any hazardous substances that were known to have been stored (for more than one year), released, or disposed of on the property. The notice will also include the time at which the storage, release, or disposal took place to the extent such information is available.

In addition, if the property, or any portion thereof, is ever transferred by deed, the U.S. Government will also satisfy the requirements of CERCLA 120(h)(3). The requirements include a description of the remedial action taken, a covenant, and an access clause. 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 LUCs will be implemented through the following:

- The contract, deed, or other transfer document shall also include restrictions precluding residential use of the property. However, the need for these restrictions may be reevaluated 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 reevaluation of the LUCs will be done through an amended ROD with USEPA and SCDHEC review and approval.
- In addition, if the site is ever transferred to nonfederal ownership, a survey plat of the OU will be prepared, certified by a professional land surveyor, and recorded with the appropriate county recording agency.

In the event of a property lease or interagency agreement, the equivalent restrictions will be implemented as required by CERCLA Section 120(h).

The selected remedy for the WADB subunit leaves hazardous substances in place that pose a potential future risk and will require land use restrictions for as long as necessary to keep the selected remedy fully protective of human health and the environment. As agreed on

March 30, 2000, among the USDOE, USEPA, and SCDHEC, SRS is implementing a Land Use Control Assurance Plan (LUCAP) (WSRC 1999) to ensure that land use restrictions are maintained and periodically verified. The unit-specific Land Use Control Implementation Plan (LUCIP) that will be referenced in this ROD for the WADB will provide details and specific measures required for the LUCs selected as part of this remedy. The USDOE is responsible for implementing, maintaining, monitoring, reporting upon, and enforcing the LUCs described in this ROD. The LUCIP, developed as part of this action, will be submitted concurrently with the CMI/RAIP, as required in the FFA for review and approval by USEPA and SCDHEC. Upon final approval, the LUCIP will be appended to the LUCAP and is considered incorporated by reference into the ROD, establishing LUC implementation, and maintenance requirements enforceable under CERCLA and the *SRS Federal Facility Agreement*. The approved LUCIP will establish implementation, monitoring, maintenance, reporting, and enforcement requirements for the unit. The LUCIP will remain in effect unless and until modified as needed to be protective of human health and the environment. 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. Approval by USEPA and SCDHEC is required for any modification or termination of the LUCs.

USDOE has recommended that residential use of SRS land be controlled; therefore, future residential use and potential residential water usage will be restricted to ensure long-term protectiveness. LUCs will restrict the WADB to future industrial use and will prohibit unrestricted use of the area. Unauthorized excavation will also be prohibited and the waste unit will remain undisturbed. LUCs selected as part of this action will be maintained for as long as they are necessary and termination of any LUCs will be subject to CERCLA requirements for documenting changes in remedial actions.

Cost Estimate for the Selected Remedy

A detailed, activity-based breakdown of the estimated costs associated with implementing and maintaining the selected remedy is presented in Table 11. A summary of the costs is provided below:

Capital: $9,826,409

O&M Costs $1,708,736

Total Present-Worth Cost: $11,535,146

The cost estimate is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record File, an ESD, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to –30 percent of the actual project cost.

Estimated Outcomes of Selected Remedy

LUCs will be maintained for protection of human health and the environment at the WADB by restricting land disturbance activities and restricting land use to industrial use only.

The selected remedy for the WADB meets the RAO by eliminating or controlling all routes of exposure to residual contaminants in surface ash/contaminated soil exceeding 1.0E-06 risk or exceeding SRS background concentrations:

Waste Disposal and Transport

The waste streams generated as part of the selected alternative will be transported to the appropriate offsite disposal facility. In addition to the ash, the waste anticipated to be generated includes job control waste, personal protective equipment, and miscellaneous items. Prior to the transfer of these wastes to their final disposal facility, SRS will obtain an acceptability determination from the appropriate Regional Off-Site Rule Coordinator for disposal of CERCLA waste.

- All unused environmental samples may be returned to the waste site, within the Area of Contamination.

- Environmental sampling boreholes may be abandoned by backfilling with native soil. This is regardless of the level of contamination. The soil will be placed in the borehole in the reverse order as removed, to maintain the original stratigraphy.

XII. STATUTORY DETERMINATIONS

Based on the *Focused CMS/FS for the Wetland Area at Dunbarton Bay in Support of the Steel Creek IOU* (SRNS 2013a), the WADB poses a threat to human health. Therefore, Sub-Alternative A-3b, Excavation of 16,820 m^3 (22,000 yd^3) of Ash and Off-SRS Containment and LUCs, has been selected as the remedy for the WADB. As part of the selected remedy, the future land use of the WADB will be unrestricted (i.e., no LUCs) where ash/contaminated soil media is excavated (4.8 ha [12 ac]), and restricted by LUCs where the ash/contaminated soil media will remain in place (10 ha [25 ac]).

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action (unless justified by a waiver), is cost-effective, and utilizes permanent solutions to the maximum extent practicable.

In accordance with Section 121(c) of CERCLA and NCP §300.430(f)(5)(iii)(c), a statutory review will be conducted within 5 years of initiation of the remedial action, and every five years thereafter, to ensure that the remedy continues to be protective of human health and the environment.

XIII. EXPLANATION OF SIGNIFICIANT CHANGES

The remedy selected in this ROD does not contain any significant changes from the preferred alternative presented in the SB/PP. Comments on the SB/PP have not yet undergone the public comment period.

XIV. RESPONSIVENESS SUMMARY

The Responsiveness Summary is included as Appendix A of this document. It will be completed at the end of the public comment period for the SB/PP.

XV. POST-ROD DOCUMENT SCHEDULE AND DESCRIPTION

An implementation schedule showing the ROD submittal date, post-ROD document submittals, and remedial action start date is provided in Figure 6.

XVI. REFERENCES

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

SRNS, 2010. *Record of Decision Remedial Alternative Selection for the P-Area Operable Unit (PAOU) (U)*, SRNS-RP-2009-01368, Revision 1, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

SRNS, 2011. Sampling and Analysis Plan for the Wetland Area at Dunbarton Bay (NBN) in Support of Steel Creek Integrator Operable Unit (U), SGCP-SAP-2010-00007, Revision 1, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

SRNS, 2012. *Regulatory Document Handbook*, ERD-AG-006, Revision 17, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

SRNS, 2013a. Focused Corrective Measures Study / Feasibility Study Report for the Wetland Area at Dunbarton Bay in Support of Steel Creek Integrator Operable Unit (U), SRNS-RP-2012-00252, Revision 1.1, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

SRNS 2013b. Statement of Basis / Proposed Plan for the Wetland Area at Dunbarton Bay in Support of Steel Creek Integrator Operable Unit (U), SRNS-RP-2013-00115, Revision 1, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

USDOE, 1996. SRS Future Use Project Report, Stakeholder Preferred Recommendations for SRS Land Use Facilities, United States Department of Energy, Savannah River Operations Office, Aiken, SC

USEPA, 2010. *USEPA Preliminary Remediation Goals for Radionuclides*, United States Environmental Protection Agency, website accessed February 27, 2012, http://epa-prg-ornl.gov/radionuclides/

USEPA 2011. *USEPA Regional Screening Levels*, United States Environmental Protection Agency, website accessed February 27, 2012, http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm

WSRC, 1999. *Land Use Control Assurance Plan for the Savannah River Site*, WSRC-RP-98-4125, Revision 1.1, latest update, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

WSRC, 2011. *Savannah River Site Federal Facility Agreement Community Involvement Plan (U)*, WSRC-RP-96-120, Revision 7, Savannah River Nuclear Solutions, LLC, Savannah River Site, Aiken, SC

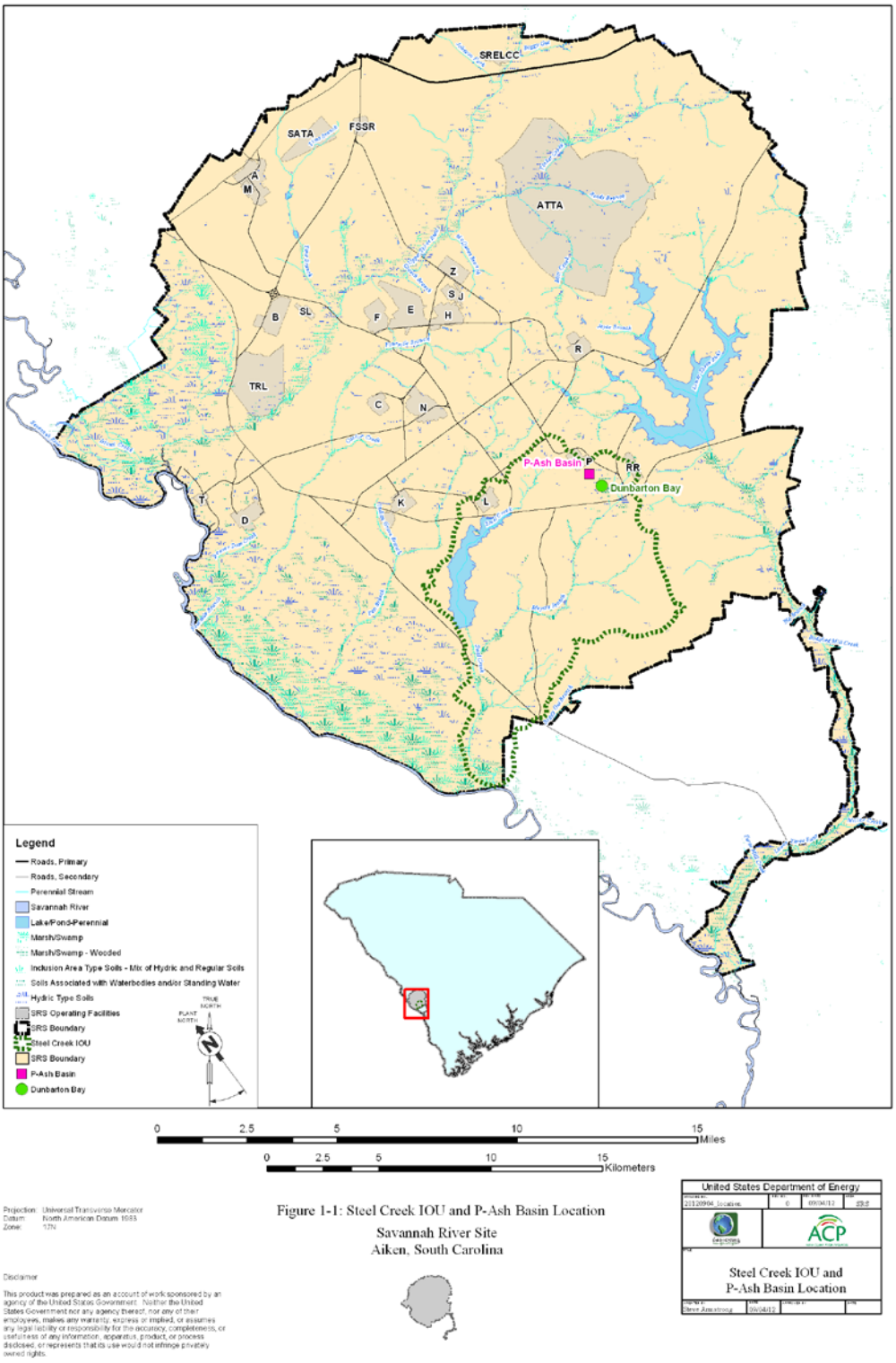

Figure 1. Location of the Wetland Area at Dunbarton Bay within the Savannah River Site

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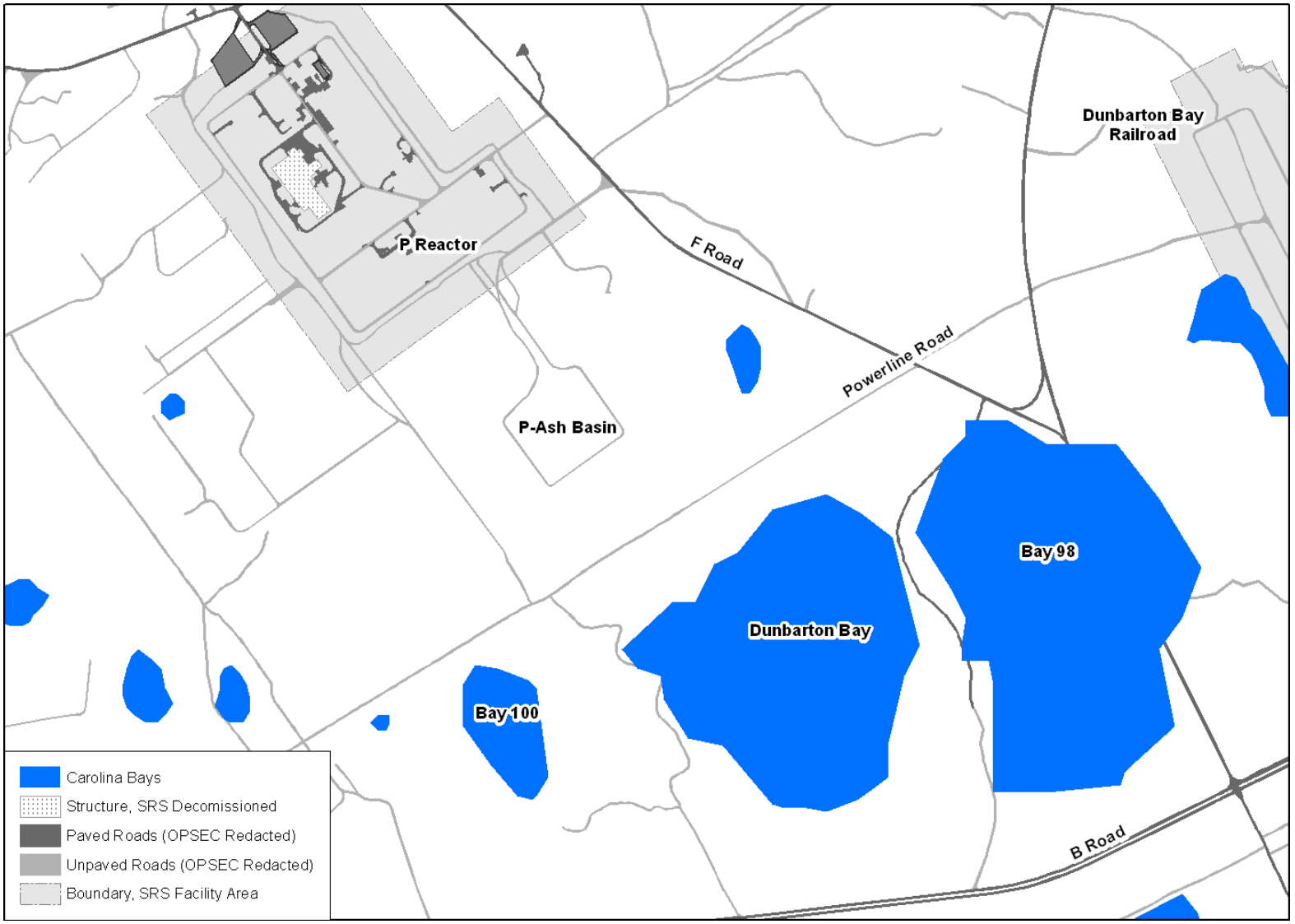


Figure 2. Layout of the Wetland Area at Dunbarton Bay

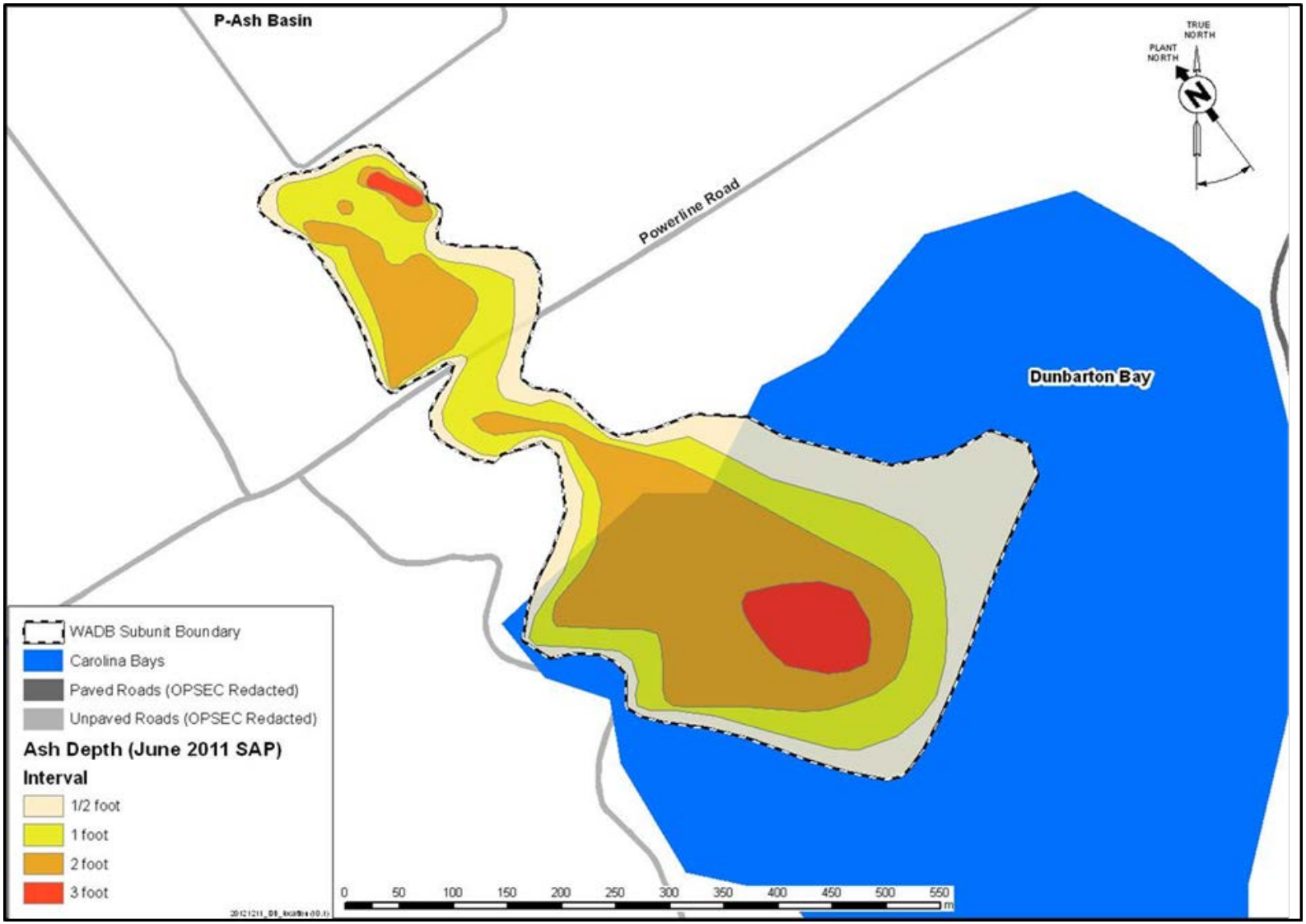
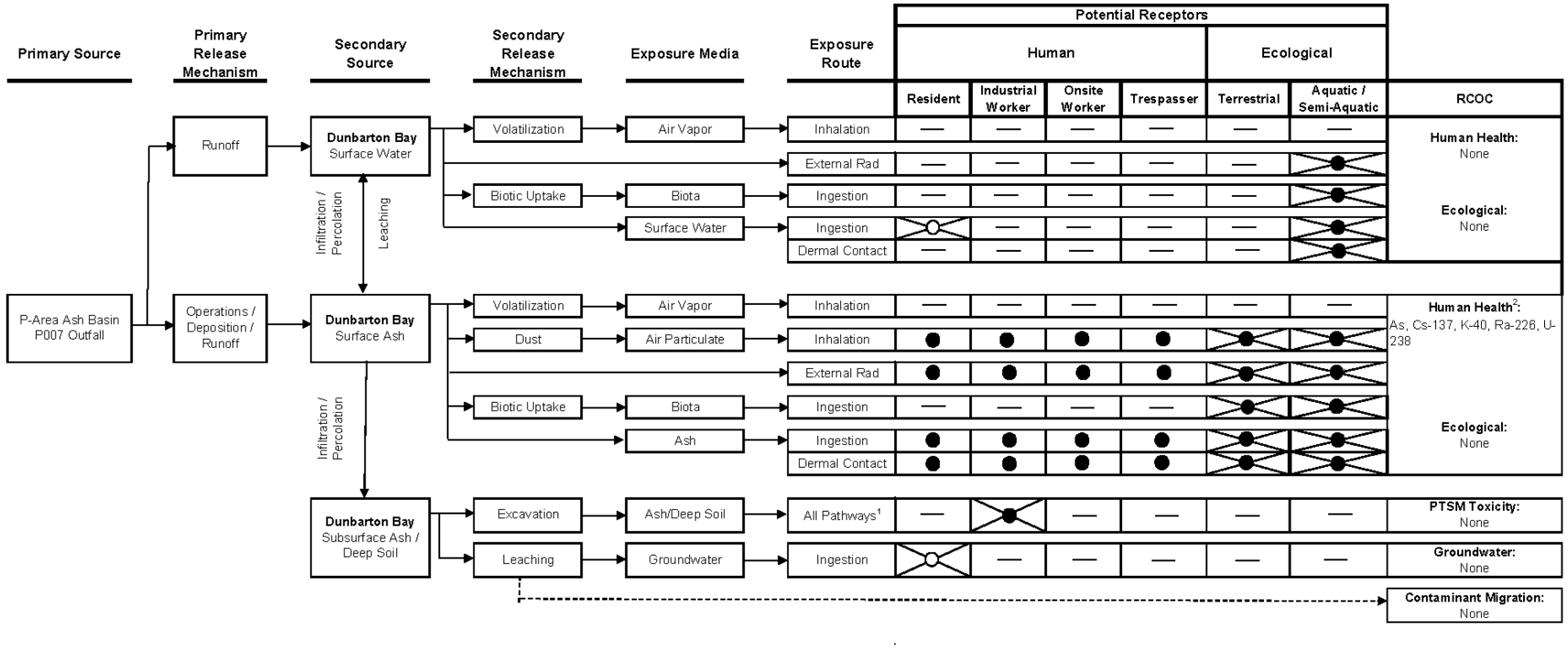


Figure 3. Delineation of the Wetland Area at Dunbarton Bay and Ash Plume



Pathways: current, historic, and future
Complete exposure pathway for quantitative evaluation; RCOCs identified
Complete exposure pathway for quantitative evaluation; no RCOCs identified
Complete exposure pathway for qualitative evaluation (i.e., comparison to MCLs), no RCOCs identified
Incomplete exposure pathway
Contaminant migration analysis

1 All pathways represents ingestion, inhalation, dermal contact, and external radiation exposure for the principal threat source material (PTSM) evaluation for toxicity.

2 Resident RCOCs (risk) = As (5.5E-05), Cs-137(+D) (5.5E-05), K-40 (8.8E-05), Ra-226(+D) (1.9E-04), U-238(+D) (2.9E-06). Total cumulative risk (**TCR) = 3.9E-04**
Industrial Worker RCOCs (risk) = As (1.3E-05), Cs-137(+D) (3.3E-05), K-40 (5.0E-05), Ra-226(+D) (1.1E-04), U-238(+D) (1.4E-06). **TCR = 2.1E-04**
Onsite Worker RCOCs (risk) = As (6.5E-06), Cs-137(+D) (1.7E-05), K-40 (2.4E-05), Ra-226(+D) (5.1E-05). **TCR = 9.9E-05**
Adolescent Trespasser RCOCs (risk) = As (3.0E-06), Cs-137(+D) (1.3E-05), K-40 (1.6E-05), Ra-226(+D) (3.5E-05). **TCR = 6.7E-05**

Figure 4. Conceptual Site model for the Wetland Area at Dunbarton Bay

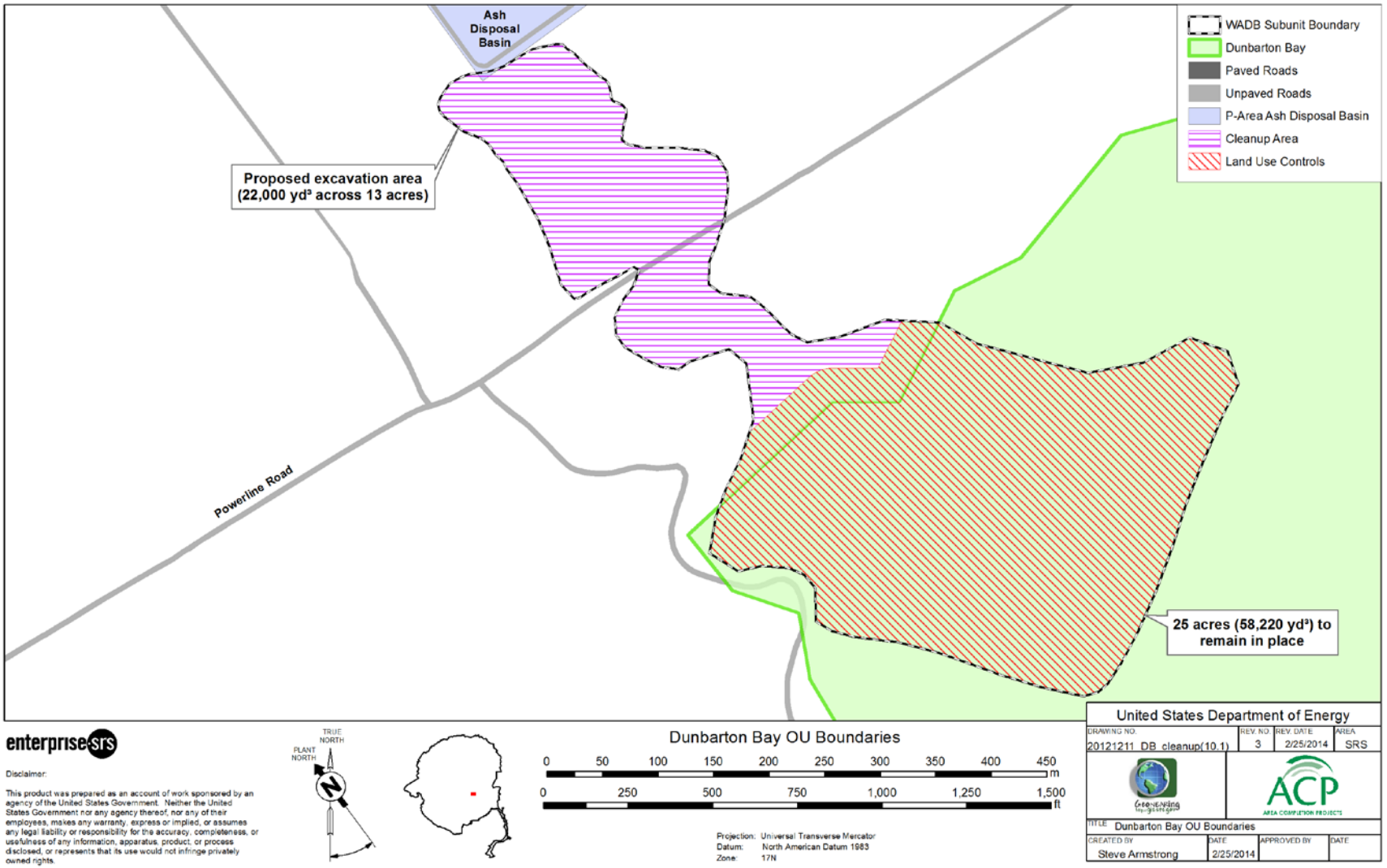
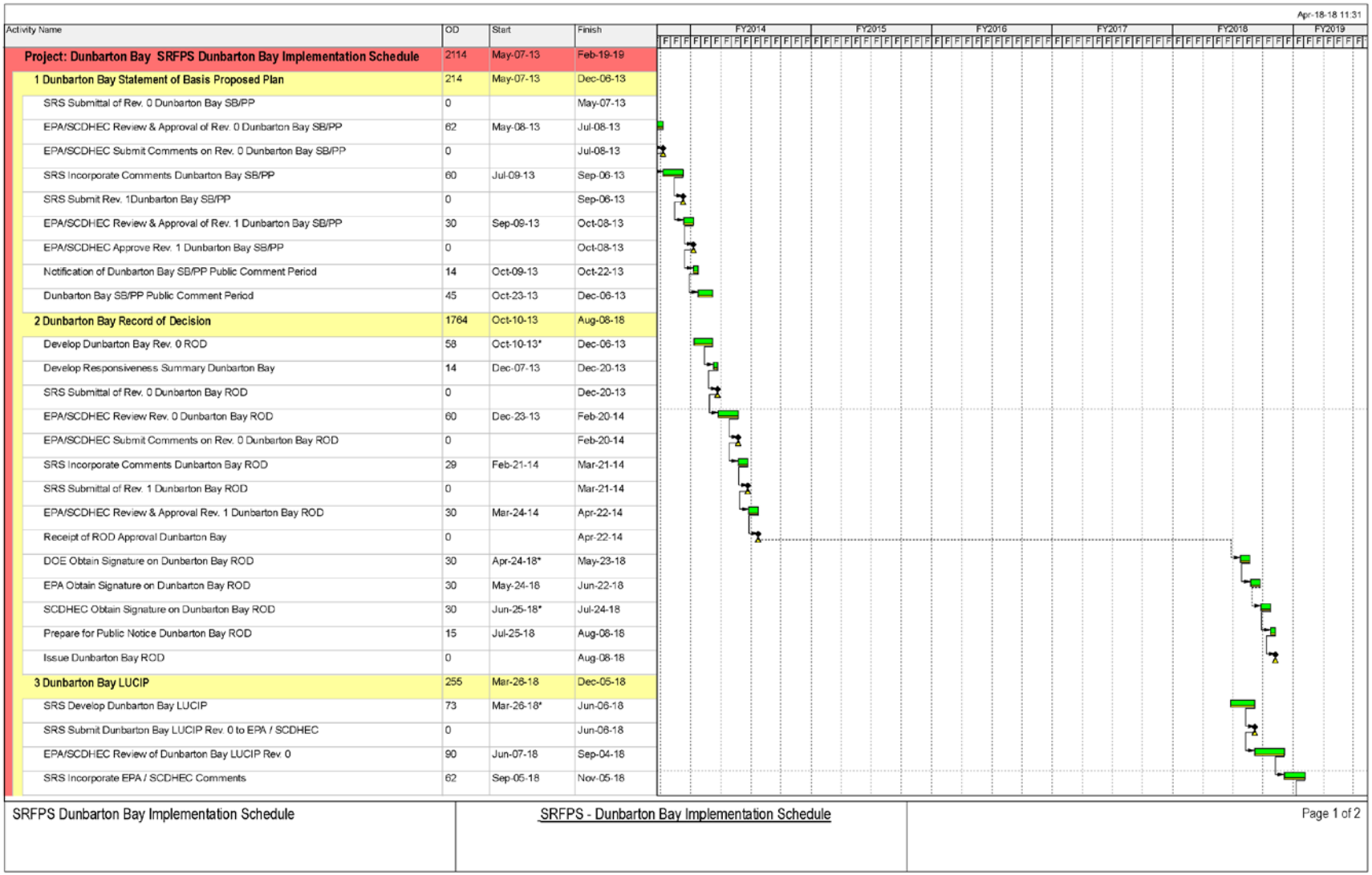
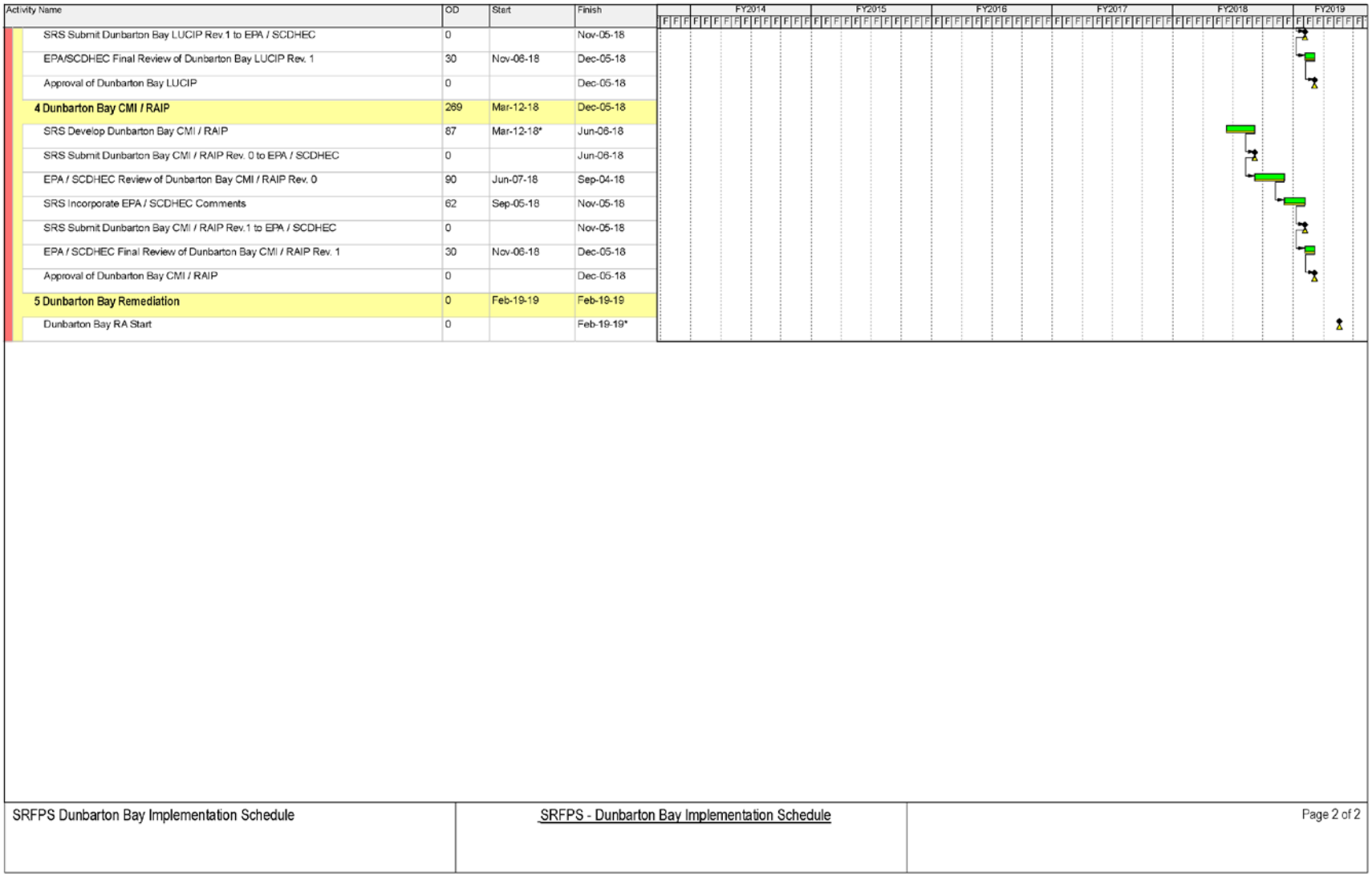


Figure 5. Ash to be Excavated and LUCs for the Wetland Area at Dunbarton Bay



Activity Name	OD	Start	Finish
Project: Dunbarton Bay SRFPS Dunbarton Bay Implementation Schedule	2114	May-07-13	Feb-19-19
1 Dunbarton Bay Statement of Basis Proposed Plan	214	May-07-13	Dec-06-13
SRS Submittal of Rev. 0 Dunbarton Bay SB/PP	0		May-07-13
EPA/SCDHEC Review & Approval of Rev. 0 Dunbarton Bay SB/PP	62	May-08-13	Jul-08-13
EPA/SCDHEC Submit Comments on Rev. 0 Dunbarton Bay SB/PP	0		Jul-08-13
SRS Incorporate Comments Dunbarton Bay SB/PP	60	Jul-09-13	Sep-06-13
SRS Submit Rev. 1Dunbarton Bay SB/PP	0		Sep-06-13
EPA/SCDHEC Review & Approval of Rev. 1 Dunbarton Bay SB/PP	30	Sep-09-13	Oct-08-13
EPA/SCDHEC Approve Rev. 1 Dunbarton Bay SB/PP	0		Oct-08-13
Notification of Dunbarton Bay SB/PP Public Comment Period	14	Oct-09-13	Oct-22-13
Dunbarton Bay SB/PP Public Comment Period	45	Oct-23-13	Dec-06-13
2 Dunbarton Bay Record of Decision	1764	Oct-10-13	Aug-08-18
Develop Dunbarton Bay Rev. 0 ROD	58	Oct-10-13*	Dec-06-13
Develop Responsiveness Summary Dunbarton Bay	14	Dec-07-13	Dec-20-13
SRS Submittal of Rev. 0 Dunbarton Bay ROD	0		Dec-20-13
EPA/SCDHEC Review Rev. 0 Dunbarton Bay ROD	60	Dec-23-13	Feb-20-14
EPA/SCDHEC Submit Comments on Rev. 0 Dunbarton Bay ROD	0		Feb-20-14
SRS Incorporate Comments Dunbarton Bay ROD	29	Feb-21-14	Mar-21-14
SRS Submittal of Rev. 1 Dunbarton Bay ROD	0		Mar-21-14
EPA/SCDHEC Review & Approval Rev. 1 Dunbarton Bay ROD	30	Mar-24-14	Apr-22-14
Receipt of ROD Approval Dunbarton Bay	0		Apr-22-14
DOE Obtain Signature on Dunbarton Bay ROD	30	Apr-24-18*	May-23-18
EPA Obtain Signature on Dunbarton Bay ROD	30	May-24-18	Jun-22-18
SCDHEC Obtain Signature on Dunbarton Bay ROD	30	Jun-25-18*	Jul-24-18
Prepare for Public Notice Dunbarton Bay ROD	15	Jul-25-18	Aug-08-18
Issue Dunbarton Bay ROD	0		Aug-08-18
3 Dunbarton Bay LUCIP	255	Mar-26-18	Dec-05-18
SRS Develop Dunbarton Bay LUCIP	73	Mar-26-18*	Jun-06-18
SRS Submit Dunbarton Bay LUCIP Rev. 0 to EPA / SCDHEC	0		Jun-06-18
EPA/SCDHEC Review of Dunbarton Bay LUCIP Rev. 0	90	Jun-07-18	Sep-04-18
SRS Incorporate EPA / SCDHEC Comments	62	Sep-05-18	Nov-05-18

Figure 6. Post-ROD Schedule



Activity Name	OD	Start	Finish
SRS Submit Dunbarton Bay LUCIP Rev 1 to EPA / SCDHEC	0		Nov-05-18
EPA/SCDHEC Final Review of Dunbarton Bay LUCIP Rev. 1	30	Nov-06-18	Dec-05-18
Approval of Dunbarton Bay LUCIP	0		Dec-05-18
4 Dunbarton Bay CMI / RAIP	269	Mar-12-18	Dec-05-18
SRS Develop Dunbarton Bay CMI / RAIP	87	Mar-12-18*	Jun-06-18
SRS Submit Dunbarton Bay CMI / RAIP Rev. 0 to EPA / SCDHEC	0		Jun-06-18
EPA / SCDHEC Review of Dunbarton Bay CMI / RAIP Rev. 0	90	Jun-07-18	Sep-04-18
SRS Incorporate EPA / SCDHEC Comments	62	Sep-05-18	Nov-05-18
SRS Submit Dunbarton Bay CMI / RAIP Rev.1 to EPA / SCDHEC	0		Nov-05-18
EPA / SCDHEC Final Review of Dunbarton Bay CMI / RAIP Rev. 1	30	Nov-06-18	Dec-05-18
Approval of Dunbarton Bay CMI / RAIP	0		Dec-05-18
5 Dunbarton Bay Remediation	0	Feb-19-19	Feb-19-19
Dunbarton Bay RA Start	0		Feb-19-19*

Figure 7. Post-ROD Schedule *(continued/end)*

Table 1. Summary of Constituents of Concern and Medium-Specific Exposure Point Concentrations

Scenario Timeframe: Current/Future
Medium: Wetland Area at Dunbarton Bay
Exposure Medium: Surface Ash/Soil (0-1 ft)

Exposure Route	Constituent of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Min	Max					
Ash/Soil Onsite – Direct Contact	Arsenic	1.82	33.6	mg/kg	10/10	21.4	mg/kg	95% UCL
	Cesium-137 (+D)	0.0513	5.19	pCi/g	10/10	3.42	pCi/g	95% UCL
	Potassium-40	ND	16.4	pCi/g	9/10	13.3	pCi/g	95% UCL
	Radium-226 (+D)	0.347	2.38	pCi/g	10/10	2.38	pCi/g	Max
	Uranium-238 (+D)	0.294	2.51	pCi/g	10/10	2.07	pCi/g	95% UCL

Key
mg/kg = milligrams per kilogram
pCi/g = picocuries per gram
95% UCL = 95% upper confidence limit of the mean concentration
Max = maximum detected concentration
ND = non-detect
(+D) = plus daughters

Table 2. Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal

Constituent of Concern	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (Mo/Yr)
Arsenic	1.50E+00	---	$(mg/kg\text{-}day)^{-1}$	A	USEPA	Nov., 2011
Cesium-137 (+D)	4.33E-11[a] 3.17E-11[b]	---	risk/pCi	A	USEPA	Aug., 2010
Potassium-40	6.18E-11[a] 1.51E-11[b]	---	risk/pCi	A	USEPA	Aug., 2010
Radium-226 (+D)	7.30E-10[a] 2.95E-10[b]	---	risk/pCi	A	USEPA	Aug., 2010
Uranium-238 (+D)	2.10E-10[a] 5.62E-11[b]	---	risk/pCi	A	USEPA	Aug., 2010

Pathway: Inhalation

Constituent of Concern	Unit Risk	Units	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (Mo/Yr)
Arsenic	4.30E-03	$(ug/m^3)^{-1}$	---	---	A	USEPA	Nov., 2011
Cesium-137 (+D)	---	---	1.19E-11	risk/pCi	A	USEPA	Aug., 2010
Potassium-40	---	---	1.03E-11	risk/pCi	A	USEPA	Aug., 2010
Radium-226 (+D)	---	---	1.16E-08	risk/pCi	A	USEPA	Aug., 2010
Uranium-238 (+D)	---	---	9.35E-09	risk/pCi	A	USEPA	Aug., 2010

Pathway: External (Radiation)

Constituent of Concern	Cancer Slope or Conversion Factor	Exposure Route	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date (Mo/Yr)
Arsenic	NA	NA	NA	NA	NA	NA
Cesium-137 (+D)	2.54E-06	External exposure	risk/year per pCi/g	A	USEPA	Aug., 2010
Potassium-40	7.98E-07	External exposure	risk/year per pCi/g	A	USEPA	Aug., 2010
Radium-226 (+D)	8.49E-06	External exposure	risk/year per pCi/g	A	USEPA	Aug., 2010
Uranium-238 (+D)	1.14E-07	External exposure	risk/year per pCi/g	A	USEPA	Aug., 2010

Key
--- = no information available
A = human carcinogen
NA = not applicable
mg/kg = milligram per kilogram
ug/m^3 = micrograms per cubic meter
risk/pCi = risk per picocurie

a = resident (child + adult) slope factor
b= industrial worker, onsite worker and trespasser (adult) slope factor

USEPA, November 2011. *Regional Screening Levels* website, United States Environmental Protection Agency http://epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. Website accessed February 27, 2012.

USEPA, August 2010. *Preliminary Remediation Goals for Radionuclides* website, United States Environmental Protection Agency http://epa-prg-ornl.gov/radionuclides/. Website accessed February 27, 2012.

Table 3. Resident Risk Characterization Summary – Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child/Adult

Medium	Exposure Medium	Exposure Route	Constituent of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)[1]	Exposure Routes Total
Wetland Area at Dunbarton Bay	Ash/Soil	Ingestion, Inhalation, Dermal Contact	Arsenic	NC	NC	NC	NA	5.5E-05
		Ingestion, Inhalation, External Exposure	Cesium-137 (+D)	NC	NC	NA	NC	5.5E-05
		Ingestion, Inhalation, External Exposure	Potassium-40	NC	NC	NA	NC	8.8E-05
		Ingestion, Inhalation, External Exposure	Radium-226 (+D)	NC	NC	NA	NC	1.9E-04
		Ingestion, Inhalation, External Exposure	Uranium-238 (+D)	NC	NC	NA	NC	2.9E-06
							Resident Ash/Soil Total Cumulative Risk =	**3.9E-04**

Key
NA = not applicable.
NC = not calculated. Risk was not calculated separately for each exposure pathway. The USEPA regional screening levels (RSLs) for nonradionuclides and the USEPA preliminary remediation goals (PRGs) for radionuclides that were used to calculate risk are risk-based concentrations (activities) that are derived from standardized equations which combine all of the exposure pathways and assumptions with USEPA toxicity data. Use of the RSL/PRG provides an exposure routes total risk estimate for each constituent.

USEPA, November 2011. *Regional Screening Levels* website, United States Environmental Protection Agency http://epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. Website accessed February 27, 2012.

USEPA, August 2010. *Preliminary Remediation Goals for Radionuclides* website, United States Environmental Protection Agency http://epa-prg-ornl.gov/radionuclides/. Website accessed February 27, 2012.

Table 4. Industrial Worker Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Industrial Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Route	Constituent of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)[1]	Exposure Routes Total
Wetland Area at Dunbarton Bay	Ash/Soil	Ingestion, Inhalation, Dermal Contact	Arsenic	NC	NC	NC	NA	1.3E-05
		Ingestion, Inhalation, External Exposure	Cesium-137 (+D)	NC	NC	NA	NC	3.3E-05
		Ingestion, Inhalation, External Exposure	Potassium-40	NC	NC	NA	NC	5.0E-05
		Ingestion, Inhalation, External Exposure	Radium-226 (+D)	NC	NC	NA	NC	1.1E-04
		Ingestion, Inhalation, External Exposure	Uranium-238 (+D)	NC	NC	NA	NC	1.4E-06
							Industrial Worker Ash/Soil Total Cumulative Risk =	**2.1E-04**

Key
NA = not applicable.
NC = not calculated. Risk was not calculated separately for each exposure pathway. The USEPA regional screening levels (RSLs) for nonradionuclides and the USEPA preliminary remediation goals (PRGs) for radionuclides that were used to calculate risk are risk-based concentrations (activities) that are derived from standardized equations which combine all of the exposure pathways and assumptions with USEPA toxicity data. Use of the RSL/PRG provides an exposure routes total risk estimate for each constituent.

USEPA, November 2011. *Regional Screening Levels* website, United States Environmental Protection Agency http://epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. Website accessed February 27, 2012.

USEPA, August 2010. *Preliminary Remediation Goals for Radionuclides* website, United States Environmental Protection Agency http://epa-prg-ornl.gov/radionuclides/. Website accessed February 27, 2012.

Table 5. Onsite Worker Risk Characterization Summary - Carcinogens

Scenario Timeframe: Current/Future
Receptor Population: Onsite Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Route	Constituent of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)[1]	Exposure Routes Total
Wetland Area at Dunbarton Bay	Ash/Soil	Ingestion, Inhalation, Dermal Contact	Arsenic	NC	NC	NC	NA	6.5E-06
		Ingestion, Inhalation, External Exposure	Cesium-137 (+D)	NC	NC	NA	NC	1.7E-05
		Ingestion, Inhalation, External Exposure	Potassium-40	NC	NC	NA	NC	2.4E-05
		Ingestion, Inhalation, External Exposure	Radium-226 (+D)	NC	NC	NA	NC	5.1E-05
							Onsite Worker Ash/Soil Total Cumulative Risk =	**9.9E-05**

Key
NA = not applicable.
NC = not calculated. Risk was not calculated separately for each exposure pathway. The USEPA regional screening levels (RSLs) for nonradionuclides and the USEPA preliminary remediation goals (PRGs) for radionuclides that were used to calculate risk are risk-based concentrations (activities) that are derived from standardized equations which combine all of the exposure pathways and assumptions with USEPA toxicity data. Use of the RSL/PRG provides an exposure routes total risk estimate for each constituent.

USEPA, November 2011. *Regional Screening Levels* website, United States Environmental Protection Agency http://epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. Website accessed February 27, 2012.

USEPA, August 2010. *Preliminary Remediation Goals for Radionuclides* website, United States Environmental Protection Agency http://epa-prg-ornl.gov/radionuclides/. Website accessed February 27, 2012.

Table 6. Adolescent Trespasser Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Adolescent Trespasser
Receptor Age: Adult (Adolescent)

Medium	Exposure Medium	Exposure Route	Constituent of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)[1]	Exposure Routes Total
Wetland Area at Dunbarton Bay	Ash/Soil	Ingestion, Inhalation, Dermal Contact	Arsenic	NC	NC	NC	NA	3.0E-06
		Ingestion, Inhalation, External Exposure	Cesium-137 (+D)	NC	NC	NA	NC	1.3E-05
		Ingestion, Inhalation, External Exposure	Potassium-40	NC	NC	NA	NC	1.6E-05
		Ingestion, Inhalation, External Exposure	Radium-226 (+D)	NC	NC	NA	NC	3.5E-05
							Adolescent Trespasser Ash/Soil Total Cumulative Risk =	**6.7E-05**

Key
NA = not applicable.
NC = not calculated. Risk was not calculated separately for each exposure pathway. The USEPA regional screening levels (RSLs) for nonradionuclides and the USEPA preliminary remediation goals (PRGs) for radionuclides that were used to calculate risk are risk-based concentrations (activities) that are derived from standardized equations which combine all of the exposure pathways and assumptions with USEPA toxicity data. Use of the RSL/PRG provides an exposure routes total risk estimate for each constituent.

USEPA, November 2011. *Regional Screening Levels* website, United States Environmental Protection Agency http://epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm. Website accessed February 27, 2012.

USEPA, August 2010. *Preliminary Remediation Goals for Radionuclides* website, United States Environmental Protection Agency http://epa-prg-ornl.gov/radionuclides/. Website accessed February 27, 2012.

Table 7. Summary of the RGOs for the Wetland Area at Dunbarton Bay

Media	RCOC[1]	Unit	ARAR[2]	HHRA Future Resident[3]	HHRA Industrial Worker[4]	HHRA IOU Onsite Worker[5]	HHRA Adolescent Trespasser[6]	PTSM[7]	ERA[8]	CM[9]	Most Restrictive RGO[10]	SRS Background 95th %[11]	SRS Background Maximum[11]	Most Likely RG[12]
Ash / Soil	Arsenic	mg/kg	---	0.39	1.6	3.3	7.1	---	---	---	0.39	*8.2*	22.9	8.2
	Cesium-137(+D)	pCi/g	---	0.0623	0.103	0.204	0.272	---	---	---	0.0623	0.34 *(0.68)*	3.3	0.68
	Potassium-40	pCi/g	---	0.150	0.265	0.552	0.819	---	---	---	0.150	*3.3*	8.5	3.3
	Radium-226(+D)	pCi/g	---	0.0127	0.0223	0.0464	0.0688	---	---	---	0.0127	*1.2*	1.7	1.2
	Uranium-238(+D)	pCi/g	---	0.725	1.49	NA[13]	NA[13]	---	---	---	0.725	*1.2*	1.9	1.2
Surface Water	None	---	---	---	---	---	---	---	---	---	---			---
Groundwater	None	---	---	---	---	---	---	---	---	---	---			---

1 - RCOC = refined constituent of concern
2 - ARAR = applicable or relevant and appropriate requirement.
3 - HHRA Resident = human health risk assessment. RGOs calculated for the future resident at a target risk of 1E-06.
4 - HHRA Industrial Worker = human health risk assessment. RGOs calculated for the future industrial worker at a target risk of 1E-06.
5 - HHRA IOU Onsite Worker = human health risk assessment. RGOs calculated for the IOU onsite worker at a target risk of 1E-06.
6 - HHRA Adolescent Trespasser = human health risk assessment. RGOs calculated for the adolescent trespasser at a target risk of 1E-06.
7 - PTSM = principal threat source material evaluation. No RCOCs identified.
8 - ERA = ecological risk assessment. No RCOCs identified.
9 - CM = contaminant migration analysis. No RCOCs identified.
10 - Most Restrictive RGO = the lesser of the ARAR, HHRA, PTSM, ERA and CM RGOs.
11 - SRS background 95th % and maximum concentrations from the SRS Background Soils Statistical Summary Report, Appendix B-2 (all depths), October 2006. Exception is cesium-137, which is from Appendix B-1 (0-1 ft). Two times (2x) the 95th %tile established as Most Likely RGO for cesium-137 since this is the generally accepted concentration for “typical” anthropogenic fallout.
12 - Most Likely RG = the most restrictive risk-based RGO if it is greater than background concentrations. If the most restrictive risk-based RGO is less than the background concentration, then the RGO defaults to a SRS background value. Sources of the RGOs in this column are highlighted in italics in the table.
13 - NA = not applicable. Uranium-238(+D) not identified as a HH RCOC for the IOU onsite worker or adolescent trespasser receptor scenarios.

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Table 8. Potential ARARs for the Selected Remedial Alternative for the WADB

LOCATION-SPECIFIC ARARs/TBC			
Location Characteristics	**Requirements**	**Prerequisite**	**Citation**
Floodplains and Wetlands			
Presence of wetlands as defined in 10 *CFR* 1022.4	Avoid, to the extent possible, the long- and short-term adverse effects associated with destruction, occupancy, and modification of wetlands and floodplains.	DOE actions that involve potential impacts to, or take place within, wetlands – **applicable.**	10 *CFR* 1022.3(a)
	Take action, to extent practicable, to minimize destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.		10 *CFR* 1022.3(a)(7) and (8)
	Undertake a careful evaluation of the potential effects of any new construction in wetlands. Identify, evaluate, and as appropriate, implement alternative actions that may avoid or mitigate adverse impacts on wetlands.		10 *CFR* 1022.3(b) and (d)
	If no practicable alternative to locating or conducting the action in the wetland is available, then before taking action, design or modify the action in order to minimize potential harm to or within the wetland, consistent with the policies set forth in E.O. 11990.		10 *CFR* 1022.14(a)
Location encompassing *aquatic ecosystem* as defined in 40 CFR 230.3(c)	No discharge of dredged or fill material into an aquatic ecosystem is permitted if there is a practicable alternative that would have less adverse impact. No discharge of dredged or fill material shall be permitted unless appropriate and practicable steps in accordance with 40 CFR 230.70 *et seq.* have been taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem. Must comply with the substantive requirements of the NWP 38, General Conditions, as appropriate, any regional or case-specific conditions recommended by the Corps District Engineer, after consultation. *Note:* Despite that consultation may be considered an administrative requirement; it should be performed to ensure activities are in compliance with substantive provisions of the permit.	Action that involves the discharge of dredged or fill material into waters of the United States, including jurisdictional wetlands – **applicable** Onsite CERCLA action conducted by Federal agency that involves discharge of dredged or fill material into *waters of the United States*, including jurisdictional wetlands – **relevant and appropriate**.	40 CFR 230.10(a) 40 CFR 230.10(d) Nationwide Permit (38) – Cleanup of Hazardous and Toxic Waste 33 *CFR* 323.3(b)
Floodplains and Wetlands *(cont'd)*			
Presence of wetlands	Requires Federal agencies to evaluate action to minimize the destruction, loss or degradation of wetlands and to preserve and enhance beneficial values of wetlands.	Actions that involve potential impacts to, or take place within, wetlands – **TBC**	Executive Order 11990 – *Protection of Wetlands* - Section 1.(a)

Table 8. Potential ARARs for the Selected Remedial Alternative for the WADB *(continued)*

LOCATION-SPECIFIC ARARs/TBC			
Location Characteristics	**Requirements**	**Prerequisite**	**Citation**
Endangered, Threatened or Rare Species			
Presence of migratory birds and their habitats	No person may take, possess, import, export, transport, sell, purchaser, barter or offer for sale, purchase or barter, any migratory bird, or the parts, nests, or eggs of such bird except as may be permitted under the terms of a valid permit.	If action is likely to impact migratory birds – **applicable**.	16 *USC* 703-704 – Migratory Bird Treaty Act
Historical, Archeological or Cultural Resources			
Presence of archeological or cultural artifacts	No person may excavate, remove, damage, or otherwise alter or deface, or attempt to excavate, remove, damage, or otherwise alter or deface any archaeological resource located on public lands unless such activity is pursuant to a permit issued under § 7.8 or exempted by § 7.5(b) of this part. *Note:* Prior to removal activities existing Site Use process requires approval by the Savannah River Archaeological Research Program. The SRARP is a division of the South Carolina Institute of Archaeology and Anthropology (SCIAA) at the University of South Carolina. The SRARP manages the archaeological and other historic resources for the U.S. Department of Energy.	Excavation and/or removal of archaeological resources from public lands – **applicable**.	43 *CFR* Part 7 – implementing the Archaeological Resources Protection Act of 1979.
All Land-disturbing Activities (i.e., excavation, clearing, grading, etc.)			
Managing storm water runoff from land-disturbing activities	Must comply with the substantive requirements for stormwater management and sediment control of *NPDES General Permit No. SCR100000* .	Large and small construction activities (as defined in R. 61-9) of more than 1 acre of land – **applicable**	SCDHEC R. 61-9.122.41 NPDES General Permit No. SCR100000
	The stormwater management and sediment control plan shall contain at a minimum the information provided in the following subsections:	Activities involving more than two acres and less than five acres of actual land disturbance which are not part of a larger common plan of development or sale – **applicable**	SCDHEC R. 72-307 I. – *South Carolina Storm Water Management and Sediment Reduction Regulations*
	A plan for temporary and permanent vegetative and structural erosion and sediment control measures which specify the erosion and sediment control measures to be used during all phases of the land disturbing activity and a description of their proposed operation;		SCDHEC R. 72-307 I.(3)(d)
	Provisions for stormwater runoff control during the land disturbing activity and during the life of the facility meeting the following requirements of subsections (e)1 and 2.		SCDHEC R. 72-307 I.(3)(e)

Table 8. Potential ARARs for the Selected Remedial Alternative for the WADB *(continued)*

ACTION-SPECIFIC ARARs/TBC			
Action	**Requirements**	**Prerequisite**	**Citation**
All Land-disturbing Activities (i.e., excavation, clearing, grading, etc.)			
Managing fugitive dust emissions from land disturbing activities	Emissions of fugitive particulate matter shall be controlled in such a manner and to the degree that it does not create an undesirable level of air pollution. Volatile organic compounds shall not be used for dust control purposes. Oil treatment is also prohibited.	Activities that will generate fugitive particulate matter (Statewide) – applicable	SCDHEC R. 61-62.6 Section III(a) and Section III(d)- *Control of Fugitive Particulate Matter Statewide*
Waste Characterization and Storage – (e.g., excavated coal ash, contaminated soils/sediments, debris)			
Characterization of *solid* waste	Must determine if the solid waste is a hazardous waste using the following method: Should first determine if waste is excluded from regulation under 40 *CFR* 261.4.	Generation of solid waste as defined in 40 *CFR* 261.2 – applicable	40 *CFR* 262.11(a) SCDHEC R. 61-79 262.11*(a)*
	Must determine if waste is listed as hazardous waste in subpart D of 40 *CFR* Part 261.	Generation of solid waste which is not excluded under 40 *CFR* 261.4(a) – applicable	40 *CFR* 262.11(b) SCDHEC R. 61-79 262.11*(b)*
	Must determine whether the waste is identified in subpart C of 40 *CFR* Part 261 by either: 1) Testing the waste according to the methods set forth in subpart C of 40 CFR part 261, or according to an equivalent method approved by the Administrator under 40 CFR 260.21; or 2) Applying knowledge of the hazard characteristic of the waste in light of materials or processes used.	Generation of solid waste that is not excluded under 40 *CFR* 261.4 **– applicable**	40 *CFR* 262.11(c) SCDHEC R. 61-79 262.11*(c)*
	Must refer to Parts 261, 262, 264, 265, 266, 268, and 273 of Chapter 40 for possible exclusions or restrictions pertaining to management of the specific waste.	Generation of solid waste which is determined to be hazardous waste – **applicable**	40 CFR 262.11(d) SCDHEC R.61-79 262.11*(d)*

Table 8. Potential ARARs for the Selected Remedial Alternative for the WADB *(continued)*

ACTION-SPECIFIC ARARs/TBC			
Action	**Requirements**	**Prerequisite**	**Citation**
Waste Characterization and Storage – (e.g., excavated coal ash, contaminated soils/sediments, debris) (continued)			
Determination for management of *hazardous* waste[1]	Must determine each EPA Hazardous Waste Number (waste code) applicable to the waste in order to determine the applicable treatment standards under 40 CFR 268 *et seq.* *Note:* This determination may be made concurrently with the hazardous waste determination required in Sec. 262.11 of this chapter.	Generation of hazardous waste for storage, treatment or disposal – **applicable**	40 CFR 268.9(a) SCDHEC R.61-79 268.9*(a)*
	Must determine the underlying hazardous constituents (as defined in 40 CFR 268.2[i]) in the characteristic waste.	Generation of RCRA characteristic hazardous waste (not D001 non-wastewaters treated by CMBST, RORGS, or POLYM of Section 268.42, Table 1) for storage, treatment or disposal – **applicable**	40 CFR 268.9(a) SCDHEC R.61-79 268.9*(a)*
	Must determine if the hazardous waste meets the treatment standards in 40 CFR 268.40, 268.45, or 268.49 by testing in accordance with prescribed methods or use or generator knowledge of waste. *Note:* This determination can be made concurrently with the hazardous waste determination required in 40 CFR 262.11.	Generation of hazardous waste for storage, treatment or disposal – **applicable**	40 CFR 268.7(a) SCDHEC R.61-79 268.7*(a)* (1)
Disposal of *solid waste* off-SRS	Disposal of solid waste at facilities and/or sites permitted or registered by the Department for processing or disposal of that waste stream. Waste must meet state classification system for the permitted facilities.	Generation of solid waste intended for off-SRS disposal – **applicable**	SCDHEC R. 61-107.15
Disposal of Hazardous Waste Offsite (e.g., excavated ash, contaminated soils/sediment, debris)			
Disposal of RCRA-*hazardous waste* in off-site, land-based unit[1]	May be land disposed if it meets the requirements in the table "Treatment Standards for Hazardous Waste" at 40 CFR 268.40 before land disposal.	Land disposal, as defined in 40 CFR 268.2, of restricted RCRA waste – **applicable**	40 CFR 268.40(a) SCDHEC R. 61-79 268.40*(a)*

Table 8. Potential ARARs for the Selected Remedial Alternative for the WADB *(continued)*

ACTION-SPECIFIC ARARs/TBC			
Action	**Requirements**	**Prerequisite**	**Citation**
Disposal of Hazardous Waste Offsite (e.g., excavated ash, contaminated soils/sediment, debris) (continued)			
Disposal of RCRA-*hazardous waste* in off-site, land-based unit[1] *(continued)*	All underlying hazardous constituents [as defined in 40 CFR 268.2(i)] must meet the Universal Treatment Standards, found in 40 CFR 268.48 Table UTS prior to land disposal.	Land disposal of restricted RCRA characteristic wastes (D001-D043) that are not managed in a wastewater treatment system that is regulated under the CWA, that is CWA equivalent, or that is injected into a Class I nonhazardous injection well – **applicable**	40 CFR 268.40(e) SCDHEC R. 61-79 268.40*(e)*
	Must be treated according to the alternative treatment standards of 40 CFR 268.49(c) or Must be treated according to the UTSs [specified in 40 CFR 268.48 Table UTS] applicable to the listed and/or characteristic waste contaminating the soil prior to land disposal.	Land disposal, as defined in 40 CFR 268.2, of restricted hazardous soils – **applicable**	40 CFR 268.49(b) SCDHEC R. 61-79 268.49*(b)*
	To determine whether a hazardous waste identified in this section exceeds the applicable treatment standards of 40 CFR 268.40, the initial generator must test a sample of the waste extract or the entire waste, depending on whether the treatment standards are expressed as concentration in the waste extract or waste, or the generator may use knowledge of the waste. If the waste contains constituents (including UHCs in the characteristic wastes) in excess of the applicable UTS levels in 40 CFR 268.48, the waste is prohibited from land disposal, and all requirements of part 268 are applicable, except as otherwise specified.	Land disposal of RCRA toxicity characteristic wastes (D004-D011) that are newly identified – **applicable**	40 CFR 268.34(f) SCDHEC R. 61-79 268.34*(f)*

Table 8. Potential ARARs for the Selected Remedial Alternative for the WADB *(continued)*

ACTION-SPECIFIC ARARs/TBC			
Action	**Requirements**	**Prerequisite**	**Citation**
Disposal of Hazardous Waste Offsite (e.g., excavated ash, contaminated soils/sediment, debris) (continued)			
Disposal of RCRA-*hazardous waste debris* in off-site, land-based unit[1]	Must be treated prior to land disposal as provided in 40 CFR 268.45(a)(1)-(5) unless EPA determines under 40 CFR 261.3(f)(2) that the debris no longer contaminated with hazardous waste or the debris is treated to the waste-specific treatment standard provided in 40 CFR 268.40 for the waste contaminating the debris.	Land disposal, as defined in 40 CFR 268.2, of restricted RCRA-hazardous debris – **applicable**	40 CFR 268.45(a) SCDHEC R. 61-79 268.45*(a)*
Transportation of Wastes			
Transportation of hazardous materials	Shall be subject to and must comply with all applicable provisions of the HMTA and DOT HMR at 49 CFR 171-180.	Any person who, under contract with a department or agency of the federal government, transports "in commerce," or causes to be transported or shipped, a hazardous material – **applicable**	49 CFR 171.1(c)
Transportation of samples (i.e. solid waste, soils and wastewaters)	Are not subject to any requirements of 40 CFR Parts 261 through 268 or 270 when: • the sample is being transported to a laboratory for the purpose of testing; or • the sample is being transported back to the sample collector after testing. • the sample is being stored by sample collector before transport to a lab for testing.	Samples of solid waste or a sample of water, soil for purpose of conducting testing to determine its characteristics or composition – applicable	40 CFR 261.4(d)(1)(i)-(iii) SCDHEC R. 61-79 261.4(d) (1)
	In order to qualify for the exemption in 40 CFR 261.4 (d)(1)(i) and (ii), a sample collector shipping samples to a laboratory must: • Comply with U.S. DOT, U.S. Postal Service, or any other applicable shipping requirements. • Assure that the information provided in (1) thru (5) of this section accompanies the sample. Package the sample so that it does not leak, spill, or vaporize from its packaging.		40 CFR 261.4(d)(2)(i) 40 CFR 261.4(d)(2)(i)(A)and (B) SCDHEC R. 61-79 261.4*(d)* (2)(i)(A) and (B)

Table 8. Potential ARARs for the Selected Remedial Alternative for the WADB *(continued)*

ACTION-SPECIFIC ARARs/TBC			
Action	**Requirements**	**Prerequisite**	**Citation**
Transportation of Waste (continued)			
Transportation of hazardous waste onsite[1]	The generator manifesting requirements of 40 CFR 262.20-262.32(b) do not apply. Generator or transporter must comply with the requirements set forth in 40 CFR 263.30 and 263.31 in the event of a discharge of hazardous waste on a private or public right-of-way.	Transportation of hazardous wastes on a public or private right-of-way within or along the border of contiguous property under the control of the same person, even if such contiguous property is divided by a public or private right-of-way **– applicable**	40 CFR 262.20(f) SCDHEC R. 61-79 262.20(f)
Transportation of hazardous waste off-site	Must comply with the generator requirements of 40 CFR 262.20-23 for manifesting, Sect. 262.30 for packaging, Sect. 262.31 for labeling, Sect. 262.32 for marking, Sect. 262.33 for placarding, Sect. 262.40, 262.41(a) for record keeping requirements, and Sect. 262.12 to obtain EPA ID number.	Generator who initiates the off-site shipment of RCRA-hazardous waste – **applicable**	40 CFR 262.10(h) SCDHEC R. 61-79 262.10*(h)*

[1] The requirements from 40 CFR Part 262, 264, and 268 contained in this table regarding characterization, storage, and disposal of hazardous waste will be triggered if any generated wastes, including ash, soil or debris are characterized as RCRA hazardous wastes.

ARAR = applicable or relevant and appropriate requirement
CFR = Code of Federal Regulations
CWA = Clean Water Act
DEACT = deactivation
DOT = U.S. Department of Transportation
EPA = U.S. Environmental Protection Agency
HMR = Hazardous Materials Regulations
HMTA = Hazardous Materials Transportation Act
LDR = Land Disposal Restrictions
RCRA = Resource Conservation and Recovery Act of 1976
SCDHEC = South Carolina Department of Health and Environmental Control
TCLP = Toxicity Characteristic Leaching Procedure
UHC = underlying hazardous constituents
UTS = Universal Treatment Standard
WWTU = Waste Water Treatment Unit

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Table 9. Description of CERCLA Evaluation Criteria

Threshold Criteria
• *Overall Protection of Human Health and the Environment* determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
• *Compliance with ARARs* evaluates whether the alternative meets Federal State and environmental statutes, regulations, and other requirements that pertain to the site. ARARs may be waived under certain circumstances. ARARs are divided into chemical-specific, location-specific, and action-specific criteria.
Primary Balancing Criteria
• *Long-Term Effectiveness and Permanence* considers the ability of an alternative to maintain protection of human health and the environment over time. It evaluates magnitude of residual risk and adequacy of reliability of controls.
• *Reduction of Toxicity, Mobility, or Volume of Contaminant through Treatment* evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
• *Short-Term Effectiveness* considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
• *Implementability* considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
• *Cost* includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
Modifying Criteria
• *State Support/Agency Acceptance* considers whether USEPA and SCDHEC agree with the analyses and recommendations by the USDOE. Approval of the Record of Decision constitutes approval of the selected alternatives by the regulatory agencies.
• *Community Acceptance* considers whether the local community agrees with the Preferred Alternative. Comments received on the Statement of Basis / Proposed Plan during the public comment period are an important indicator of community acceptance. Comments from the public are considered in the final remedy selection in the ROD.

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Table 10. Comparison of Alternatives against the CERCLA Evaluation Criteria

Criterion	A-1	A-2	A-3a	A-3b*	A-3c	A-3d
	No Action	Land Use Controls	Excavation On-SRS Containment and LUCs (22,000 yd^3)	Excavation Off-SRS Containment and LUCs (22,000 yd^3)	Excavation On-SRS Containment (80,220 yd^3)	Excavation Off-SRS Containment (80,220 yd^3)
Overall Protection of Human Health and the Environment						
Human Health	Not protective of IOU onsite worker because there are no controls or remediation	Minimally protective of IOU onsite worker because of access controls	More protective of IOU onsite worker because a portion of contaminants are removed		Optimally protective of IOU onsite worker because all contaminants are removed	
Environment	Not protective because contaminants remain in place	Protective of the environment because no ECO/CM/ PTSM/RCOCs	Optimally protective of environment because Carolina Bay is protected		Least protective and causes more destruction of the Carolina Bay than any of the other sub-alternatives	
Compliance with ARARs						
Chemical-specific	No ARAs exist	No ARAs exist	If soils are found to be hazardous, SC Hazardous Waste Management Regulation (SC R61-79); Listing of Hazardous Waste (40 CFR-261)			
Location-specific	No ARAs exist	No ARAs exist	Various federal and South Carolina regulations are applicable for protection and mitigation of damage to wetlands			
Action-specific	No ARAs exist	No ARAs exist	Various federal and South Carolina regulations are applicable for management of stormwater and solid waste disposal			

Table 10. Comparison of Alternatives against the CERCLA Evaluation Criteria *(continued)*

Criterion	A-1	A-2	A-3a	A-3b*	A-3c	A-3d
	No Action	Land Use Controls	Excavation On-SRS Containment and LUCs (22,000 yd^3)	Excavation Off-SRS Containment and LUCs (22,000 yd^3)	Excavation On-SRS Containment (80,220 yd^3)	Excavation Off-SRS Containment (80,220 yd^3)
Long-Term Effectiveness and Performance						
Magnitude of Residual Human Health Risk	Residual human health risk remains >$1x10^{-6}$ or SRS background concentrations		Residual human health risk <$1x10^{-6}$ or SRS background concentrations, not >$9.95x10^{-5}$ in Dunbarton Bay; five-year remedy reviews required; 25 acres require LUCs		Residual human health risk <$1x10^{-6}$ or SRS background concentrations; no five-year remedy reviews required; no LUCs required	
Adequacy of Controls	Not adequately protective of human health receptors	Effective in preventing human exposure, breaking exposure pathway; contaminants left in place; LUCs required as long as contaminants are present	Controls are adequate because contaminated media is removed from wetland and LUCs are required for Dunbarton Bay		Controls will not be required because the entire volume contaminated media is removed	
Permanence	Not permanent. Leaves contaminants ash/soil media in wetlands		Excavation of contaminated media will be permanent; contaminated media remains in Dunbarton Bay to prevent destruction of ecosystem		Excavation of contaminated media will be permanent	
Treatment						
Treatment type	No active treatment					
Degree of Expected Reduction in Toxicity, Mobility or Volume	No reduction		No reduction via treatment			

Table 10. Comparison of Alternatives against the CERCLA Evaluation Criteria *(continued)*

Criterion	A-1	A-2	A-3a	A-3b*	A-3c	A-3d
	No Action	Land Use Controls	Excavation On-SRS Containment and LUCs (22,000 yd^3)	Excavation Off-SRS Containment and LUCs (22,000 yd^3)	Excavation On-SRS Containment (80,220 yd^3)	Excavation Off-SRS Containment (80,220 yd^3)
Short-term Effectiveness and Performance						
Amount of Hazardous Material Destroyed or Treated	None					
Risk to Remedial Worker	None		Minimal; Health and Safety Plan will be implemented to protect remedial workers			
Risk to Community	None					
Risk to Environment	None		Low; Dunbarton Bay is protected by a 100-ft buffer; no construction activity in bay		High; Likely destruction of Dunbarton Bay and ecosystem	
Time to Implement and Achieve RAO	Never	6 months	12 months		18 months	

Table 10. Comparison of Alternatives against the CERCLA Evaluation Criteria *(continued)*

Criterion	A-1	A-2	A-3a	A-3b*	A-3c	A-3d
	No Action	**Land Use Controls**	**Excavation On-SRS Containment and LUCs (22,000 yd^3)**	**Excavation Off-SRS Containment and LUCs (22,000 yd^3)**	**Excavation On-SRS Containment (80,220 yd^3)**	**Excavation Off-SRS Containment (80,220 yd^3)**
Implementability						
Availability of Materials, Equipment, Contractors	Not Applicable		Readily Available			
Ability to Construct and Operate Technology	Not Applicable		Straight forward		May be difficult if precipitation accumulates in wetland	
Ability to Obtain Permits/Approvals from Other Agencies	Not Applicable		Complicated due to permitting issues with H Area; Will require lead time to procure required permits; permits required before remedial action can begin	Easy; No impediments	Difficult if wetlands are excavated; Will require lead time to procure required permits; permits required before remedial action can begin	
Estimated Capital Cost						
Total Capital Cost	$0	$115,362	$6,566,642	$9,826,409	$12,956,534	$21,329,792
Present Worth O&M Cost	$0	$1,708,737	$1,708,737	$1,708,737	$98,670	$98,670
Total Cost	$0	$1,824,099	$8,275,378	$11,535,146	$13,055,204*	$21,428,462

* Does not include costs associated with On-SRS receiving facility (i.e., preparation, permitting, or receiving waste). Estimates range from $1.5 to $10 Million in additional costs.

Table 11. Total Estimated Costs of the Remedial Alternatives for the WADB

Remedial Alternative	Total Estimated Cost
A-1 No Action	$0
A-2 Land Use Controls	$1,824,099
A-3a Excavate 22,000 yd^3/On-SRS ex situ containment, LUCs	$8,275,378*
A-3b Excavate 22,000 yd^3/Off-SRS ex situ containment, LUCs	$11,535,146
A-3c Excavate 80,220 yd^3/On-SRS ex situ containment	$13,055,204*
A-3d Excavate 80,220 yd^3/Off-SRS ex situ containment	$21,428,462

*Does not include costs associated with On-SRS receiving facility (i.e., preparation, permitting or receiving waste). Estimates range between $1.5 to $10 Million additional costs.

Table 12. Land Use Controls for the WADB

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 USDOE in accordance with state laws at County Register of Deeds office if the property or any portion thereof is ever transferred to non-federal ownership.	Waste management areas identified in this ROD 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 USDOE upon any transfer of affected areas. Recorded by USDOE in accordance with state law at County Register of Deeds office.	Waste management areas identified in this ROD where hazardous substances are left in place at levels requiring land use and/or groundwater restrictions.
3. Other Notices[d]	Provide notice to city &/or county 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 USDOE in accordance with state laws at County Register of Deeds office if the property or any portion thereof is ever transferred to non-federal ownership.	Waste management areas identified in this ROD 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 USDOE control	Implemented by USDOE and site contractors Initiated by permit request	Waste management areas and remediation systems identified in this ROD where hazardous substances are left in place at levels requiring land use and / or groundwater restrictions.
5. Physical Access Controls[f] (e.g., fences, gates, portals)	Control and restrict access to workers and the public to prevent unauthorized access.	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 USDOE.	Security is provided at site boundaries in accordance with SRS procedures.
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 USDOE.	Warning signs will be posted in accordance with applicable site procedures and will be placed in appropriate areas at the Dunbarton Bay.
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 USDOE Necessity of patrols evaluated upon completion of remedial actions or property transfer.	Patrol of waste management areas identified in this ROD, as necessary.

[a]Affected areas – Specific locations identified in the OU-specific 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 USDOE 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 recorded along with original property acquisition records of USDOE 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-USDOE property.
[e]Site Use Program – Refers to the internal USDOE/USDOE 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.

APPENDIX A –
RESPONSIVENESS SUMMARY

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Responsiveness Summary

The 45-day public comment period for the Statement of Basis/Proposed Plan (or Proposed Plan) for the WABD began on December 19, 2013 and ended on February 1, 2014. No public comments were received.

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