Record of Decision Remedial Alternative Selection for the F-Area Burning/Rubble Pits (231-F, 231-1F, and 231-2F)

by
E. Palmer
Westinghouse Savannah River Company
Savannah River Site
Aiken, South Carolina 29808

DOE Contract No. DE-AC09-96SR18500

DISCLAIMER

508/1205

United States Department of Energy

Savannah River Site

Record of Decision
Remedial Alternative Selection for the
F-Area Burning/Rubble Pits
(231-F, 231-1F, and 231-2F) (U)

WSRC-RP-96-868
Revision 1
February 1997

Westinghouse Savannah River Company
Savannah River Site
Aiken, SC 29808

Prepared for the U. S. Department of Energy under Contract No. DE-AC09-96-SR18500

SAFETY • RESPONSIBILITY • SECURITY
SRS
SAVANNAH RIVER SITE

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Prepared for
U. S. Department of Energy
and
Westinghouse Savannah River Company
Aiken, South Carolina

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Savannah River Site
Aiken, South Carolina

Prepared by:

Westinghouse Savannah River Company
for the
U. S. Department of Energy Under Contract DE-AC09-96SR18500
Savannah River Operations Office
Aiken, South Carolina

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DECLARATION FOR THE RECORD OF DECISION

Unit Name and Location

F-Area Burning/Rubble Pits (231-F, 231-1F, and 231-2F)
Savannah River Site
Aiken, South Carolina

The F-Area Burning/Rubble Pits (FBRP)(231-F, 231-1F, and 231-2F) source unit is listed as a Resource Conservation and Recovery Act (RCRA) 3004(u) Solid Waste Management Unit/Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) unit in Appendix C of the Federal Facility Agreement (FFA) for the Savannah River Site.

Statement of Basis and Purpose

This decision document presents the selected remedial alternative for the FBRP located at the SRS in Aiken, South Carolina. The selected alternative was developed in accordance with CERCLA, as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record File for this specific RCRA/CERCLA unit.

Description of the Selected Remedy

The preferred alternative for the FBRP source operable unit is Institutional Controls which will preclude residential use of this land. Implementation of the Institutional Controls alternative requires both near-term and long-term actions which will be protective of human health and the environment. For the near-term, signs will be posted at the source unit which indicate that this area was used for the disposal of waste material and contains buried waste. In addition, existing SRS access controls will be used to maintain the use of this site for industrial use only. Groundwater contamination at the FBRP will be addressed within the Technical Memorandum and Summary for the FBRP. Based upon the conclusions of this document, one of three options described below will be selected and implemented. If options 1 or 2 are selected, the new groundwater operable unit will be placed into Appendix C of the Federal Facility Agreement. The Technical Memorandum and Summary for the FBRP will contain the proposed implementation schedule for this groundwater operable unit.

1) If no upgradient source is indicated, the contribution of the FBRP source unit is confirmed and a ROD for the FBRP groundwater will be pursued.

2) If a previously unrecognized upgradient source is identified, a new groundwater operable unit will be created which will undergo Remedial Investigation/Feasibility Study assessment.

3) If an existing upgradient groundwater operable unit is determined to be the source of the contamination, the boundaries of the existing operable unit will be modified to include the groundwater contamination in the FBRP area.

In the long-term, if the property is ever transferred to non-federal ownership, the U.S. Government would create a deed for the new property owner which would include information in compliance with Section 120(h) of CERCLA. The deed shall include notification disclosing former waste management and disposal activities taken on the site. The deed notification shall, in perpetuity, notify any potential purchaser that the property

has been used for the management and disposal of construction debris and other materials, including hazardous substances.

The deed shall also include deed restrictions precluding residential use of the property. However, the need for these restrictions could be reevaluated at the time of ownership transfer in the event that contamination no longer poses an unacceptable risk under residential use.

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

The FBRP Corrective Measures Implementation/Remedial Action Report (CMI/RAR) post-ROD document will identify the actions to be taken for the institutional control remedy. The CMI/RAR will be submitted to the regulatory agencies four months after issuance of the ROD. The regulatory review period, SRS revision period, and final regulatory review and approval period for the CMI/RAR will be 90 days, 60 days, and 30 days respectively.

The SCDHEC has modified the SRS RCRA permit to incorporate the selected remedy.

Statutory Determinations

Based on the FBRP RCRA Facility Investigation/Remedial Investigation (RFI/RI) Report and the Baseline Risk Assessment (BRA), the FBRP poses no significant risk to the environment and minimal risk to human health. Because risk levels exceed 1×10^{-6}, a decision was made to implement the Institutional Controls alternative in an effort to be fully 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, and is cost-effective. The random distribution and low levels of contaminants in the soils make treatment impractical. Institutional controls will result in hazardous substances, pollutants, or contaminants remaining in the source unit. Because treatment of the principal threats of the site was found to be impracticable, this remedy does not satisfy the statutory preference for treatment as a principal element.

Section 300.430 (f)(4)(ii) of the NCP requires that a Five Year Review of the ROD be performed if hazardous substances, pollutants, or contaminants remain in the source unit. The three Parties have determined that a Five Year Review of the ROD for the FBRP would be performed to ensure continued protection of human health and the environment.

2/6/97
Date

Thomas F. Heenan
Assistant Manager for Environmental Quality
U.S. Department of Energy, Savannah River Operations Office

3/27/97
Date

John H. Hankinson, Jr.
Regional Administrator
U.S. Environmental Protection Agency

4/22/97
Date

R. Lewis Shaw
Deputy Commissioner
Environmental Quality Control
South Carolina Department of Health and Environmental Control

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DECISION SUMMARY
REMEDIAL ALTERNATIVE SELECTION
FOR THE F-AREA BURNING/RUBBLE PITS (231-F, 231-1F, AND 231-2F) (U)

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Aiken, South Carolina

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

SRS occupies approximately 310 square miles of land adjacent to the Savannah River, principally in Aiken and Barnwell counties of South Carolina (Figure 1). SRS is a secured U.S. Government facility with no permanent residents. SRS is located approximately 25 miles southeast of Augusta, Georgia and 20 miles south of Aiken, South Carolina.

SRS is owned by the U.S. DOE. Management and operating services are provided by Westinghouse Savannah River Company (WSRC). SRS has historically produced tritium, plutonium, and other special nuclear materials for national defense. Chemical and radioactive wastes are by-products of nuclear material production processes. Hazardous substances, as defined by CERCLA, are currently present in the environment at SRS.

The Federal Facility Agreement lists the FBRP, as a RCRA/CERCLA unit requiring further evaluation using an investigation/assessment process that integrates and combines the RFI process with the CERCLA RI to determine the actual or potential impact to human health and the environment.

Figure 1 shows the location of the FBRP in relation to other facilities at SRS, Figure 2 shows the location of the FBRP within the F-Area, and Figure 3 shows the layout of the FBRP with sample locations and monitoring wells.

The FBRP comprise a RCRA/CERCLA source unit located within the SRS, approximately 3000 feet west of F-Area and 1100 feet north of SRS Road C. Upper Three Runs is located approximately 2,300 feet northwest of the pits. The local topography of the area is flat upland and the pits are at an elevation of 290 feet above mean sea level and 170 feet above Upper Three Runs. The water table is 70 to 100 feet below ground surface in the area of the FBRP. Surface drainage is to the northwest toward an ephemeral tributary of Upper Three Runs about 7.5 miles upstream of its confluence with the Savannah River.

The two contiguous burning/rubble pits, which cover a total area of 1.05 acre, are designated as 231-F and 231-1F; a twenty foot wide berm of undisturbed soil separates these two pits. The rubble pit (231-2F) covers about 0.13 acre. Approximate dimensions of the pits are:

- o 231-F: 275 feet x 62 feet x 10 feet
- o 231-1F: 325 feet x 89 feet x 10 feet
- o 231-2F: 165 feet x 33 feet x 4-9 feet.

The pits have been backfilled with soil; the pit cover is mounded above the surrounding terrain, which is essentially level, to enhance drainage. Vegetation has been established on the pits to reduce erosion.

II. OPERABLE UNIT HISTORY AND COMPLIANCE HISTORY

Operable Unit History

Between 1951 and 1973, SRS used Pits 231-F and 231-1F to burn a variety of wastes which were considered non-hazardous at that time. Some of these waste materials (degreasers and solvents) are now considered to be hazardous based on ingestion or possible dermal contact. Waste was usually burned on a monthly basis. The chemical composition and volumes of the disposed waste are unknown, but waste materials burned included paper, plastics, wood, rubber, rags, cardboard, oil, degreasers, and spent organic solvents. No known or suspected radioactive materials were allowed in the burning pits. These radioactive wastes were managed in the Radioactive Waste Burial Ground about 1.5 miles east. Pit 231-2F was used exclusively as a rubble pit. Large volumes of uncontaminated construction debris disposed in the pits may have included relatively small, nonhomogeneously distributed amounts of low level contamination by cesium-137, strontium-90, and iodine-129. Traces of these radionuclides may also have entered the burning/rubble pits as fallout. Uranium-238, radium-226, and potassium-40 are all naturally occurring radionuclides; radium is always associated with uranium. The typical soils in this region contain

Figure 1 **Location of the F-Area Burning/Rubble Pits (231-F and 231-1F) and Rubble Pit (231-2F) in Relation to Major Savannah River Site Facilities**

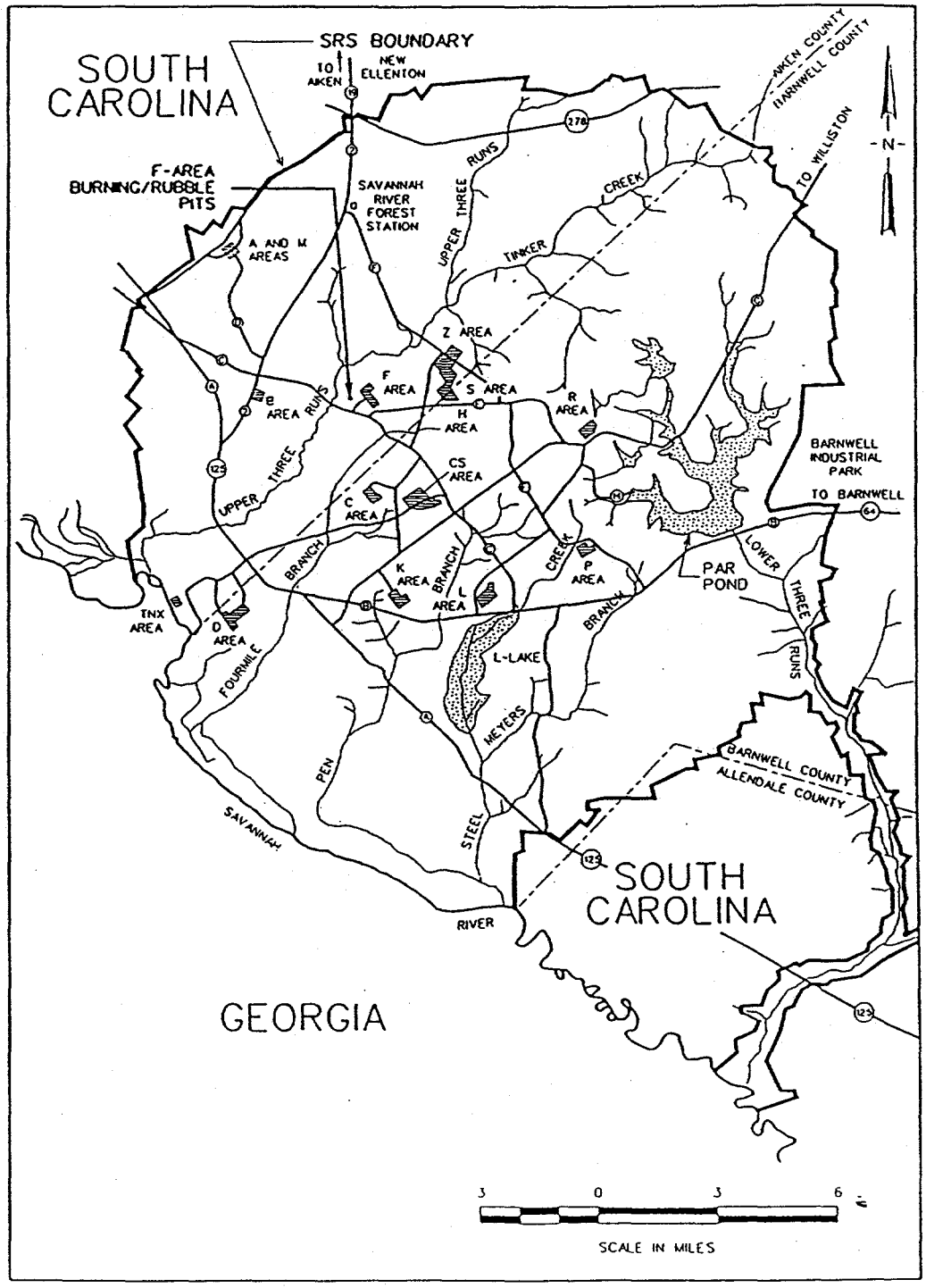
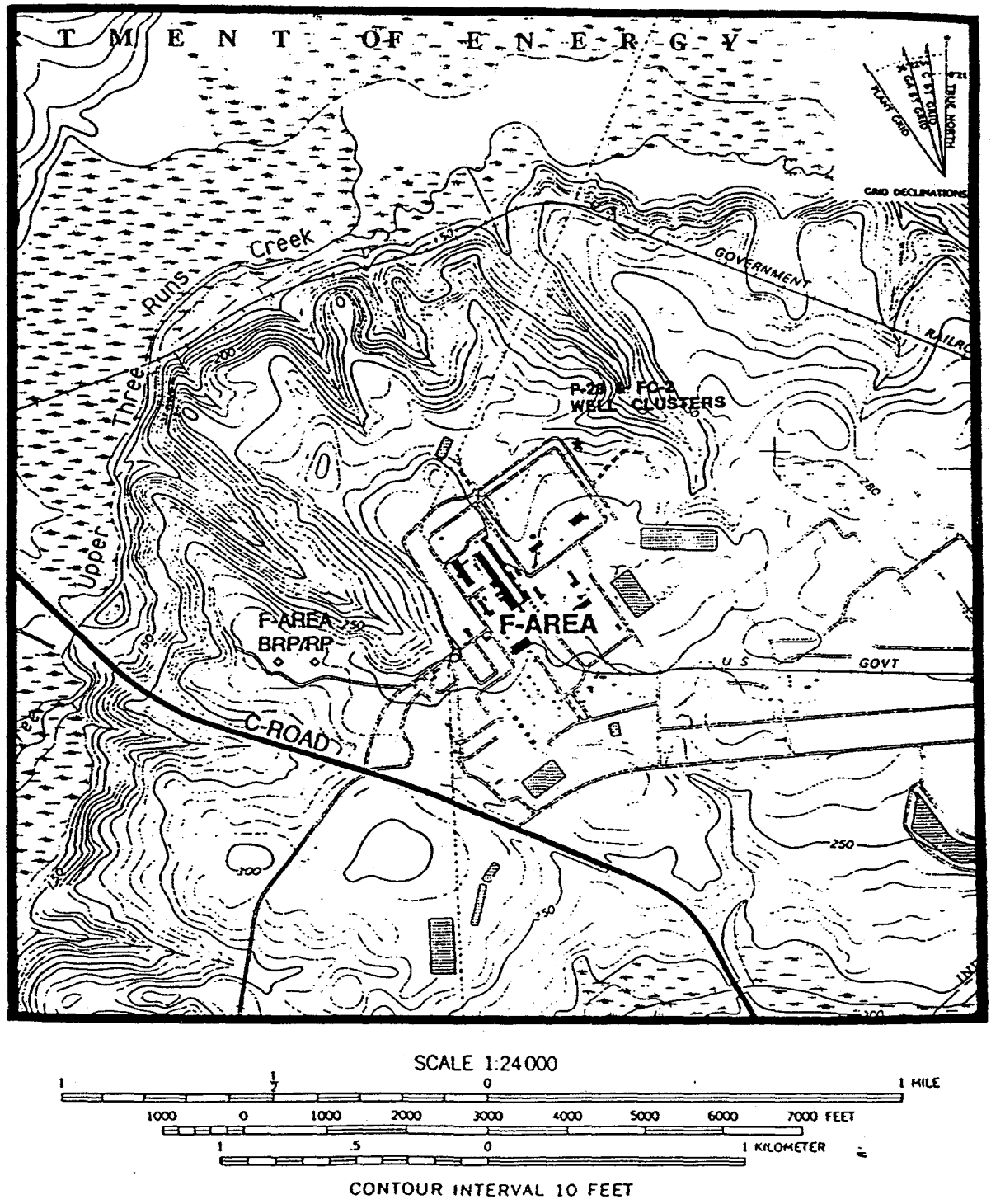
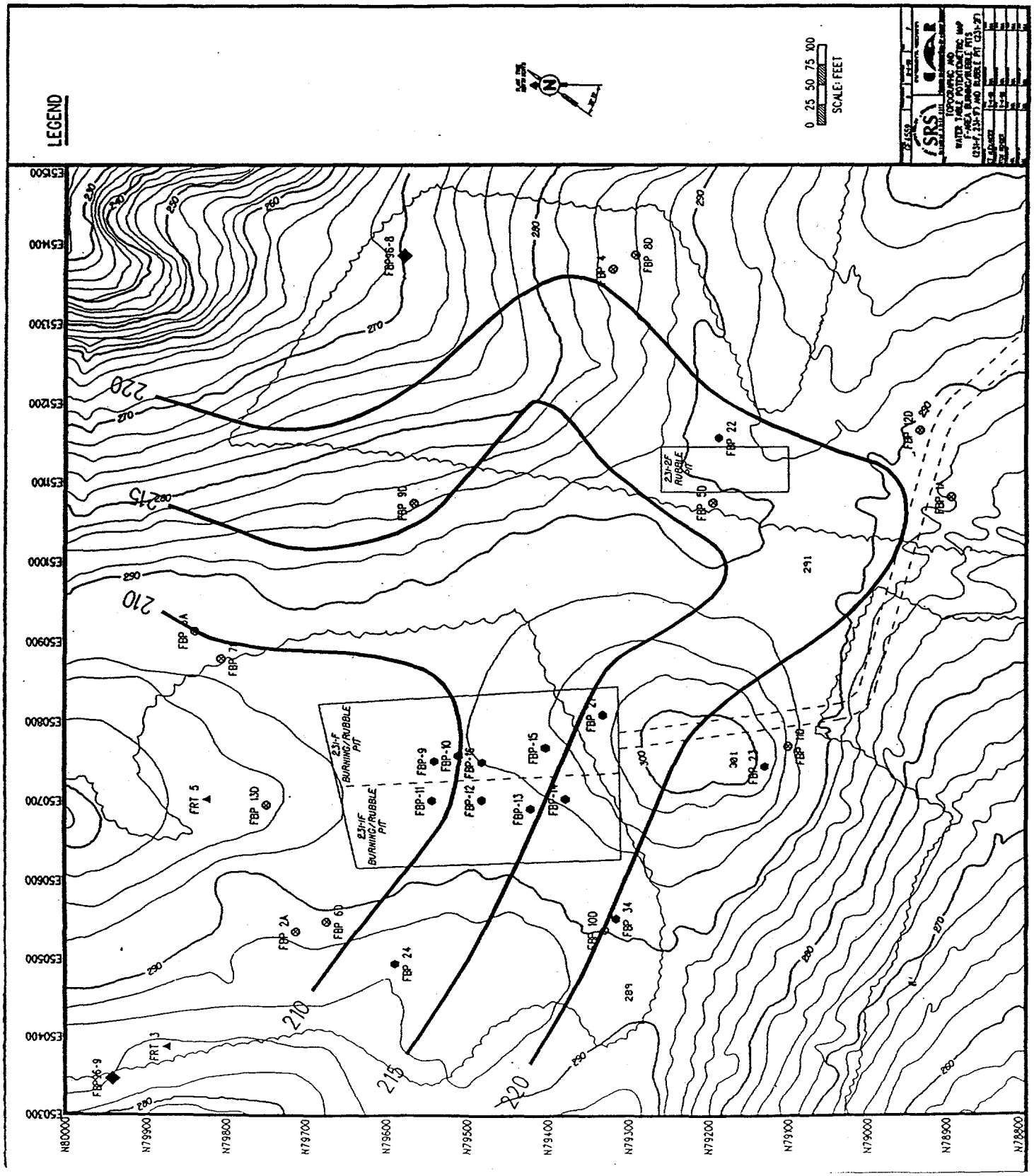


Figure 2 **F-Area Burning/Rubble Pits (FBRP) in Relation to the F-Area**



Adapted from USGS 7.5 Minute Quadrangle: New Ellenton SW, Rev. 1981

Figure 3 **Topographic and Water Table Potentiometric Map of the F-Area Burning/Rubble Pits (231-F and 231-1F) and Rubble Pit (231-2F)**



about twice as much uranium and potassium as the average soil in the United States.

Burning of waste in the SRS pits was discontinued by October 1973. A layer of soil was then placed over the residue in the pits and they were subsequently used as rubble pits. Materials allowed in the rubble pits included concrete, bricks, tile, asphalt, plastic, metal, empty drums, wood products, and rubber. When the pits were filled to capacity in 1978, a layer of clayey soil was placed over the contents and the surface was compacted and mounded. Vegetation has been established to reduce erosion.

Compliance History

At SRS, waste materials are managed which are regulated under RCRA, a comprehensive law requiring responsible management of hazardous waste. Certain SRS activities have required Federal operating or post-closure permits under RCRA. SRS received a hazardous waste permit from the South Carolina Department of Health and Environmental Control on September 5, 1995. Part V of the permit mandates that SRS establish and implement an RFI Program to fulfill the requirements specified in Section 3004(u) of the Federal permit.

Hazardous substances, as defined by CERCLA, are also present in the environment at the SRS. On December 21, 1989, SRS was included on the National Priorities List. This inclusion created a need to integrate the established RFI Program with CERCLA requirements to provide for a focused environmental program. In accordance with Section 120 of CERCLA, DOE has negotiated a Federal Facility Agreement (FFA, 1993) with U. S. Environmental Protection Agency (EPA) and SCDHEC to coordinate remedial activities at SRS into one comprehensive strategy which fulfills these dual regulatory requirements.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

Both RCRA and CERCLA require that the public 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. These requirements include establishment of an Administrative Record File that documents the investigation and selection of the remedial alternatives for addressing the FBRP soils and groundwater. The Administrative Record File must be established at or near the facility at issue. The *SRS Public Involvement Plan* (DOE, 1994) is designed to facilitate public involvement in the decision-making process for permitting, closure, and the selection of remedial alternatives. The SRS Public Involvement Plan addresses the requirements of RCRA, CERCLA, and the National Environmental Policy Act. 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 F-Area Burning/Rubble Pits (231-F, 231-1F, and 231-2F)* (WSRC, 1996e), which is part of the Administrative Record File, highlights key aspects of the investigation and identifies the preferred action for addressing the FBRP.

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

U. S. Department of Energy
Public Reading Room
Gregg-Graniteville Library
University of South Carolina-Aiken
171 University Parkway
Aiken, South Carolina 29801
(803) 641-3465

Thomas Cooper Library
Government Documents Department
University of South Carolina
Columbia, South Carolina 29208
(803) 777-4866

Reese Library
Augusta State University
2500 Walton Way
Augusta, Georgia 30910
(706) 737-1744

Asa H. Gordon Library
Savannah State University
Tompkins Road
Savannah, Georgia 31404
(912) 356-2183

The public was notified of the public comment period through mailings of the *SRS Environmental Bulletin*, a newsletter sent to approximately 3500 citizens in South Carolina and Georgia, through notices in the *Aiken Standard*, the *Allendale Citizen Leader*, the *Augusta Chronicle*, the *Barnwell People-Sentinel*, and *The State* newspapers. The public comment period was also announced on local radio stations.

The 45-day public comment period began on September 17, 1996 and ended on October 31, 1996. A public comment meeting was held on October 15, 1996. A Responsiveness Summary was prepared to address comments received during the public comment period. The Responsiveness Summary is provided in Appendix A of this Record of Decision.

IV. SCOPE AND ROLE OF OPERABLE UNIT WITHIN THE SITE STRATEGY

The overall strategy for addressing the FRBP was to: (1) characterize the source unit delineating the nature and extent of contamination and identifying the media of concern (perform the RFI/RI); (2) perform a baseline risk assessment to evaluate media of concern, constituents of concern (COCs), exposure pathways, and characterize potential risks; and (3) evaluate and perform a final action to remediate, as needed, the identified media of concern.

The FBRP operable unit consists of source materials, soils, and groundwater. It is located within the Upper Three Runs Watershed. Source control and groundwater operable units within this watershed will be evaluated to determine impacts, if any, to associated streams and wetlands. SRS will manage all source control units to prevent impact to the Upper Three Runs Watershed. Groundwater contamination has been documented during the FBRP groundwater monitoring program in both upgradient and downgradient wells. The Technical Memorandum and Summary for the FBRP is being finalized and will determine how groundwater contamination in this area will be addressed. This contamination will, therefore, not be dealt with concurrently with the FBRP source operable unit. The proposed action for the FBRP source unit is intended as a final action. Upon disposition of all source control and groundwater operable units within this watershed, a final, comprehensive ROD for the watershed will be pursued.

V. SUMMARY OF OPERABLE UNIT CHARACTERISTICS

The Data Summary Report (WSRC, 1994), RFI/RI Report (WSRC, 1996a), BRA (WSRC, 1996b), and Corrective Measures Study/Feasibility Study (WSRC, 1996c) contain detailed analytical data for all of the environmental media samples taken in the characterization of the FBRP. These documents are available in the Administrative Record (See Section III).

Soils

Analytical data indicate that little or no significant contamination of the soil outside of the FBRP has occurred. During the preparation of the RFI/RI Report, it was noted that constituents of potential concern (including arsenic, benzo(a)pyrene, cadmium, cesium-137, chromium, heptachlorodibenzo-p-dioxin, lead, manganese, PCB-1254, and radium) were confined to the debris interval of the soil within the pits. This distribution and the contaminant transport modeling results indicate limited mobility of these contaminants in the soil. Despite being a groundwater risk driver, carbon tetrachloride was not detected in the soil of the FBRP source unit.

The approximate pit boundaries and sample locations are shown on Figure 3.

Arsenic was found in most of the samples from the debris interval in Pits 231-F and 231-1F, but was only found in one sample in Pit 231-2F. The highest value reported was 15.2 mg/kg (parts per million) in the 2-4 foot interval of boring 16 in Pit 231-F. Cadmium was only found in nine samples from Pits 213-F and 231-1F, with a maximum value of 22.2 mg/kg in the 6-8 foot sample from boring 13 in Pit 231-1F. This sample also yielded the highest reported values for chromium (16,000 mg/kg), copper (917 mg/kg), manganese (1030 mg/kg), and nickel (7140 mg/kg), suggesting a concentration of metals from a single source.

The maximum value for benzo(a)pyrene was 2.37 mg/kg, found in the 4-6 foot interval of boring 14 in Pit 231-1F. Benzo(a)pyrene was only identified in a single sample from Pit 231-2F. Heptachlorodibenzo-p-dioxin was found in two samples in Pit 231-2F and 16 samples in Pits 231-F and 231-1F. The maximum value, 0.009 mg/kg, was reported from the 6-8 foot interval in boring 13, Pit 231-1F. PCB-1254 was found in four samples in Pit 231-2F, including the highest value, 9.14 mg/kg, an estimated value, in the 6-8 foot interval in boring 17. This value is less than the industrial cleanup goal of 10 mg/kg. The 18 detects in Pits 231-F and 231-1F were all less than the residential cleanup goal of 1 mg/kg PCB-1254.

Cesium-137 was found in 11 samples in Pit 231-2F and 27 samples from Pits 231-F and 231-1F. The highest value was 32.4 pCi/g in the 8-10 foot sample from boring 12, Pit 231-1F. The maximum value for total alpha emitting radium was 4 pCi/g in the 6-8 foot interval in boring 13, Pit 231-1F.

VI. SUMMARY OF OPERABLE UNIT RISKS

Human Health Risk Assessment

As part of the investigation/assessment process for the FBRP, a BRA was performed using data generated during the assessment phase. Detailed information regarding the development of constituents of potential concern, the fate and transport of contaminants, and the risk assessment can be found in the RFI/RI and BRA reports. The process of designating the constituents of concern was based on consideration of background concentrations, frequency of detection, the relative toxic potential of the constituents, and human nutrient requirements. Constituents of potential concern are the constituents that are potentially site-related and are reported at a sufficient data quality level for use in the risk assessment.

An exposure assessment was performed to provide an indication of the potential exposures which could occur based on the chemical concentrations detected during sampling activities. The only current exposure scenario identified for the FBRP was for on-site visitors. Conservative future exposure scenarios identified for the FBRP included future industrial workers and future resident adults and children. The reasonable maximum exposure concentration value was used as the exposure point concentration.

Carcinogenic risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of pathway-specific exposure to cancer-causing contaminants. The risk to an individual resulting from exposure to non-radioactive chemical carcinogens is expressed as the increased probability of cancer occurring over the course of a 70 year lifetime. Cancer risks are related to the target risk range of one excess human cancer in a population of ten thousand (1×10^{-4}) to one in one million (1×10^{-6}) for incremental cancer risk at National Priorities List sites

Non-carcinogenic effects are also evaluated to identify a level at which there may be concern for potential health effects other than cancer-causing. The hazard quotient, which is the ratio of the exposure dose to the reference dose, is calculated for each contaminant. Hazard quotients are summed for each exposure pathway to determine the specific hazard index for each exposure scenario. If the hazard index exceeds unity (1.0),

there is concern that adverse health effects might occur.

The following sections discuss the carcinogenic risks and noncarcinogenic hazards for current visitors, hypothetical future workers, and hypothetical future residents. These risks are summarized in Table 1 (Burning Rubble Pits 231-F and 231-1F) and Table 2 (Rubble Pit 231-2F).

Current Land Use - Noncarcinogenic Hazards

The BRA shows that potential adverse noncarcinogenic health effects are not likely to occur, because none of the hazard indices exceeds a value of one.

Current Land Use - Carcinogenic Risks

Under the current land use scenario, human health risks were characterized for the current on-unit visitor. The highest estimated nonradiological cancer risk was 2×10^{-7} for dust inhalation from pit 231-2F. Media evaluated include soil inside the FBRP source unit, soil outside the FBRP source unit, associated airborne soil particulates, and surface water and sediment in an adjacent seasonal wetland.

The highest estimated radiological risk for each pathway was: 3×10^{-7} for direct radiation in all of the pits; 2×10^{-10} for ingestion of soil in the 231-2F pit; and 3×10^{-12} for inhalation of particulates from soil inside the FBRP.

Future Industrial Land Use - Noncarcinogenic Hazards

The hazard indices were less than one for all constituents by all exposure pathways.

Future Industrial Land Use - Carcinogenic Risks

The risks for chemical carcinogens were all within or below the target risk range. The maximum risk from soil ingestion was 5×10^{-6} driven by arsenic, heptachlorodibenzo-p-dioxin, and benzo(a)pyrene in Pits 231-F and 231-1F and 4×10^{-6} driven by PCB-1254 in Pit 231-2F.

Carcinogenic risk for radiological exposure was within the target risk range for all pathways. The highest risk under this pathway was 3×10^{-6} for exposure to soil from the 231-F and 231-1F pits. This risk was driven by cesium-137 and potassium-40. Potassium-40 is a naturally occurring radionuclide.

Future Residential Land Use - Noncarcinogenic Hazards

The hazard indices for noncarcinogenic hazards under a future resident scenario were less than one for all pathways except ingestion of soil from Pit 231-2F. The hazard index for ingestion of soil was 2.0, predominantly driven by PCB-1254 in Pit 231-2F.

Future Residential Land Use - Carcinogenic Risks

The nonradiological ingestion and dermal exposure pathways for the future on-unit resident had estimated carcinogenic risks within the target risk range. The highest risks were 2×10^{-5} for the soil ingestion pathway in Pits 231-F and 231-1F, driven by arsenic, benzo(a)pyrene, and heptachlorodibenzo-p-dioxin; 2×10^{-5} for the soil ingestion pathway in Pit 231-2F, driven by PCB-1254.

Carcinogenic risk for radiological exposure was within or below the target risk range for all pathways. The highest risk under the direct radiation pathway was 3×10^{-5} for ingestion of fruit grown in pits 231-F/1F. This risk was driven by cesium-137 and potassium-40.

Table 1 **Summary of Carcinogenic Risk and Noncarcinogenic HI Values for Soil, Current Visitors; Hypothetical Future Residents and Workers, Burning Rubble Pits 231-F and 231-1F**

Exposure Route	Current Visitor		Hypothetical Future Resident				Hypothetical Future Workers			
	Soil (0-2 ft)		Soil (0-2 ft)		Soil (0-4 ft)		Soil (0-2 ft)		Soil (0-4 ft)	
	Risk	Hazard	Risk	Hazard	Risk	Hazard	Risk	Hazard	Risk	Hazard
Incidental Ingestion										
nonradionuclides	2E-08	5E-04	2E-05	6E-01	2E-05	6E-01	5E-06	2E-02	5E-06	2E-02
radionuclides	2E-10	NA	2E-07	NA	2E-07	NA	5E-08	NA	5E-08	NA
Dermal Contact										
nonradionuclides	5E-09	2E-02	3E-06	2E-02	3E-06	3E-02	1E-06	7E-03	1E-06	8E-03
radionuclides	6E-13	NA	3E-10	NA	3E-10	NA	1E-10	NA	1E-10	NA
Direct (External) Radiation										
radionuclides	3E-07	NA	1E-05	NA	1E-05	NA	3E-06	NA	3E-06	NA
Inhalation - Dust(1)										
nonradionuclides	4E-11	9E-06	8E-08	2E-02	1E-07	1E-02	8E-09	4E-04	1E-08	3E-04
radionuclides	3E-12	NA	4E-10	NA	4E-10	NA	7E-10	NA	1E-12	NA
Inhalation - Volatiles(1)										
nonradionuclides	NC	NA	NC	NA	NC	NA	NC	NA	NC	NA
radionuclides	NC	NA	NC	NA	NC	NA	NC	NA	NC	NA
Ingestion - Leafy Produce(2)										
nonradionuclides	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
radionuclides	NA	NA	5E-07	NA	6E-06	NA	NA	NA	NA	NA
Ingestion - Tuberous Produce(2)										
nonradionuclides	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
radionuclides	NA	NA	2E-06	NA	4E-06	NA	NA	NA	NA	NA
Ingestion - Fruit Products(2)										
nonradionuclides	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
radionuclides	NA	NA	4E-06	NA	3E-05	NA	NA	NA	NA	NA
Total Risks/Hazards for Soil =	4E-07	2E-02	4E-05	6E-01	7E-05	6E-01	9E-06	3E-02	9E-06	3E-02

FBRP, ROD, TABLE 1, Summary of Risks, 231-F/F

NA - Not Applicable
NC - Not Calculated due to lack of data
(1) Values for inhalation of dust and volatiles in air are estimated from COPC concentrations in soil.
(2) Values for produce are estimated from COPC concentrations in soil.

Table 2 **Summary of Carcinogenic Risk and Noncarcinogenic HI Values for Soil, Current Visitors; Hypothetical Future Residents and Workers, Rubble Pit 231-2F**

Exposure Route	Current Visitor		Hypothetical Future Resident				Hypothetical Future Workers			
	Soil (0-2 ft)		Soil (0-2 ft)		Soil (0-4 ft)		Soil (0-2 ft)		Soil (0-4 ft)	
	Risk	Hazard	Risk	Hazard	Risk	Hazard	Risk	Hazard	Risk	Hazard
Incidental Ingestion										
nonradionuclides	2E-08	2E-03	2E-05	2E+00	2E-05	2E+00	4E-06	9E-02	4E-06	8E-02
radionuclides	2E-10	NA	2E-07	NA	2E-07	NA	3E-08	NA	5E-08	NA
Dermal Contact										
nonradionuclides	3E-09	5E-04	2E-06	8E-02	2E-06	5E-02	6E-07	2E-02	6E-07	1E-02
radionuclides	7E-13	NA	3E-10	NA	3E-10	NA	9E-11	NA	1E-10	NA
Direct (External) Radiation										
radionuclides	3E-07	NA	8E-06	NA	8E-06	NA	2E-06	NA	2E-06	NA
Inhalation - Dust(1)										
nonradionuclides	2E-07	3E-06	1E-07	NC	3E-08	2E-07	1E-08	NC	3E-09	5E-09
radionuclides	2E-12	NA	3E-10	NA	7E-10	NA	5E-10	NA	8E-13	NA
Inhalation - Volatiles(1)										
nonradionuclides	NC	NC	NC	NA	NC	NC	NC	NC	NC	NC
radionuclides	NA	NA	NA	NA	NA	NA	NC	NC	NC	NC
Ingestion - Leafy Produce(2)										
nonradionuclides	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
radionuclides	NA	NA	5E-07	NA	5E-06	NA	NA	NA	NA	NA
Ingestion - Tuberous Produce(2)										
nonradionuclides	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
radionuclides	NA	NA	2E-06	NA	3E-06	NA	NA	NA	NA	NA
Ingestion - Fruit Products(2)										
nonradionuclides	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
radionuclides	NA	NA	2E-06	NA	2E-05	NA	NA	NA	NA	NA
Total Risks/Hazards for Soil =	5E-07	3E-03	3E-05	2E+00	4E-05	2E+00	7E-06	1E-01	7E-06	9E-02

FIRP, ROD, TABLE 2, Summary of Risks, 231-2F

NA - Not Applicable
NC - Not Calculated due to lack of data
(1) Values for inhalation of dust and volatiles in air are estimated from COPC concentrations in soil.
(2) Values for produce are estimated from COPC concentrations in soil.

Ecological Risk Assessment

Based on characterization of the environmental setting and identification of potential receptor organisms, a conceptual site model was developed to determine the complete exposure pathways through which receptors could be exposed to constituents of potential concern.

Interpretation of the ecological significance of the unit-related contamination at the FBRP source unit concluded that there was no likelihood of unit-related constituents causing significant impacts to the community of species in the vicinity of the unit.

Site-Specific Considerations

Site-specific considerations, based on the conclusions of the BRA and RFI/RI, which suggest limited or no potential for significant risk include:

1) The FBRP contain a large volume of buried nonhazardous waste material and cover soil.

2) The levels of contamination recognized during Phase II characterization are generally very low; there is a preponderance of "non-detects". The contaminants are very stable chemically and exhibit limited mobility in the soil.

3) The groundwater monitoring program indicates that there has not been significant impact from the waste materials in the pits.

4) The FBRP are in a remote area which has been recommended as an industrial zone by the Citizens Advisory Board and the *Savannah River Site Future Use Project Report* (DOE, 1996), precluding future residential use.

Remedial Action Objectives

Remedial action objectives specify unit-specific contaminants, media of concern, potential exposure pathways, and remediation goals. The remedial action objectives are based on the nature and extent of contamination, threatened resources, and the potential for human and environmental exposure. Initially, preliminary remediation goals are developed based upon ARARs, or other information from the RFI/RI Report and the BRA. These goals should be modified, as necessary, as more information concerning the unit and potential remedial technologies becomes available. Final remediation goals will be determined when the remedy is selected and shall establish acceptable exposure levels that are protective of human health and the environment.

Constituents of potential concern are site- and media-specific, man-made and naturally occurring inorganic and organic chemicals, pesticides, and radionuclides detected at a unit under investigation. Constituents of concern are isolated from the list of constituents of potential concern by calculating carcinogenic risks and noncarcinogenic hazard indices. A constituent of concern contributes significantly to a pathway having a carcinogenic risk greater than 1×10^{-4} and a hazard index greater than 1.0. Risk levels at or above the upper-bound of the target risk range 1×10^{-4} are considered significant and these sites are expected to undergo remediation. Risk levels between 1×10^{-6} and 1×10^{-4} require consideration for remediation.

ARARs are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal, state, or local environmental law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. Three types of ARARs; action-, chemical-, and location-specific; have been developed to simplify identification and compliance with environmental requirements. Action-specific requirements set controls on the design, performance and other aspects of implementation of specific remedial activities. Chemical-specific requirements are media-specific, health-based concentration limits developed for site-specific levels of contaminants in specific media. Location-specific ARARs must consider federal, state, and local requirements that reflect the physiographical and environmental characteristics of the unit or the immediate area.

There were no action-specific or location-specific ARARs relevant to establishing remedial action objectives for the FBRP source unit. There also were no chemical-specific ARARs identified, however a to-be-considered guidance level for PCBs was identified. The Toxic Substances Control Act establishes an action level of 10 mg/kg for PCBs in soil. The maximum level of PCBs found in the 0 to 2 foot interval in any of the pits was 2.87 mg/kg in 231-2F. This value is below the to-be-considered guidance.

None of the risks associated with the soil in the FBRP source unit has been found to be greater than 1×10^{-4}. The only hazard index that exceeded 1.0 was for PCB-1254 from the 0-2 foot soil interval in Pit 231-2F for future residents. The hazard index for this exposure scenario was 2.0. The only guidance that was exceeded for soil concentrations was for PCB-1254 which had a maximum value of 2.87 mg/kg in the 0 to 2 foot interval. The to-be-considered guidance for PCBs specifies recommended soil action levels of 1.0 mg/kg for residential use and 10-25 mg/kg for industrial use (EPA, 1990). The maximum PCB-1254 concentration in Pit 231-2F is well below the range for industrial land use.

Table 3 lists the Remedial Goal Options for intermediate risk contaminants (1×10^{-4} to 1×10^{-6}) for soil by receptor for all of the pits. Figure 4 is a graphical summary of the conceptual site risk model for soil for all of the pits for both future residents and future on-site workers.

VII. DESCRIPTION OF THE CONSIDERED ALTERNATIVES

Description of the Considered Alternatives for the FBRP Source Control Operable Unit

The RFI/RI and BRA indicate that the FBRP source unit poses minimal risk to the environment and minimal risk to human health when industrial exposure scenarios are assumed. Although the risks are generally within the target risk range, this Corrective Measures Study/Feasibility Study was conducted to consider possible actions which could reduce the risks to 1×10^{-6} or less.

The Corrective Measures Study/Feasibility Study included detailed analyses for five alternatives which are described below.

Alternative 1. No Remedial Action

Under this alternative, no remedial action would be taken at the FBRP. EPA policy and regulations require consideration of a no remedial action alternative to serve as a basis against which other alternatives can be compared. Because no remedial action would be taken and the FBRP would remain in their present condition, there are no costs associated with this alternative and there would be no reduction or mitigation of risk.

Alternative 2. Institutional Control

Under this alternative, institutional controls would be implemented at the FBRP. Implementation of this alternative will require both near- and long-term actions. For the near-term, signs will be posted indicating that this area was used to manage hazardous materials. In addition, existing SRS access controls will be used to maintain the use of this site for industrial use only.

In the long-term, if the property is ever transferred to non-federal ownership, the U.S. Government would, in compliance with Section 120(h) of CERCLA, create a deed for the new property owner. The deed would include notification disclosing former waste management and disposal activities as well as remedial actions taken on the site. The deed notification would, in perpetuity, notify any potential purchaser that the property has been used for the management and disposal of non-hazardous, inert construction debris, and that wastes containing hazardous substances, such as degreasers and solvents, were also managed and burned on the site.

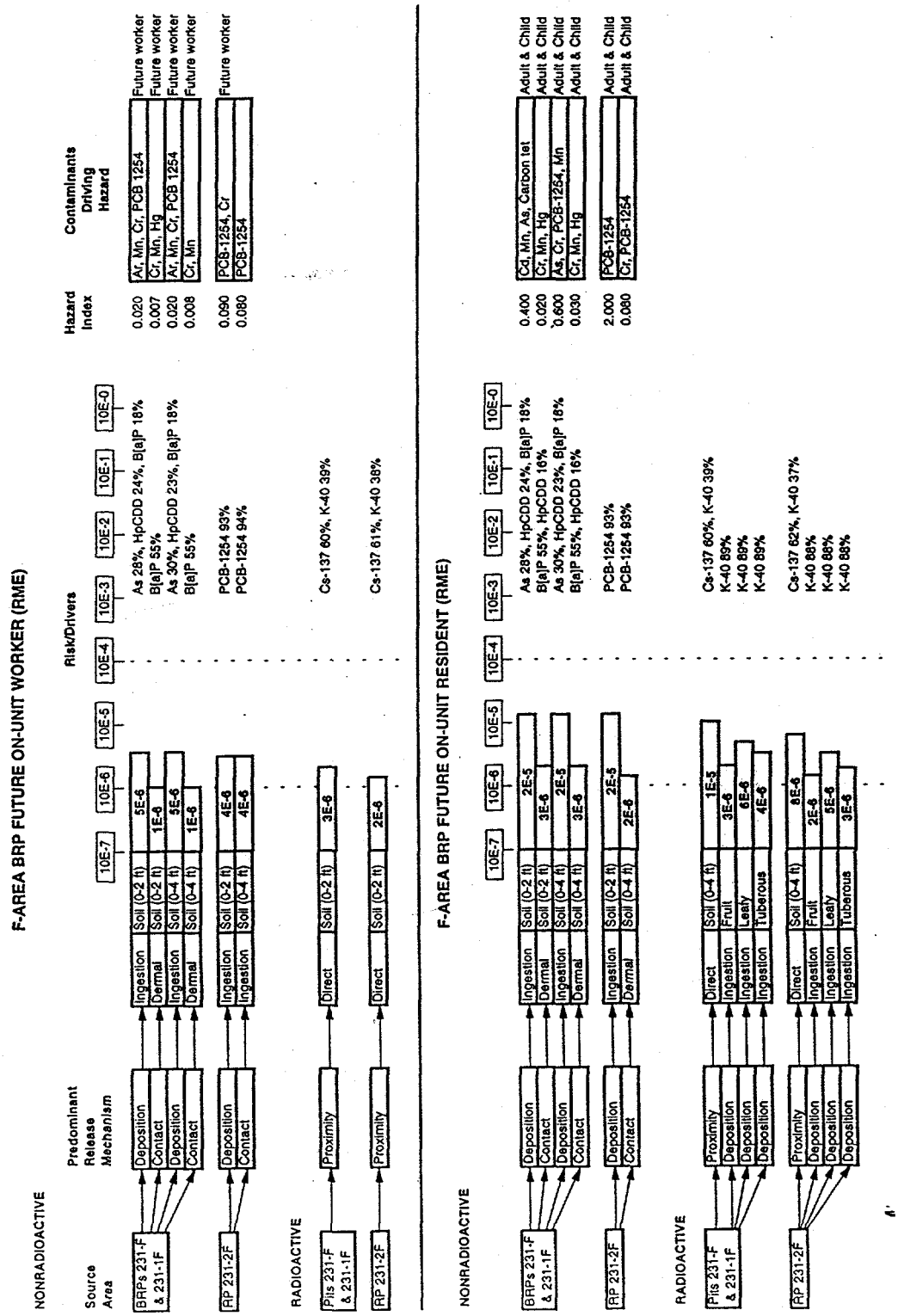
The deed would also include deed restrictions precluding residential use of the property. However, the need for these deed restrictions could be reevaluated at the time of transfer in the event that contamination no longer poses an unacceptable risk under residential use.

Table 3 **Remedial Goal Options for Intermediate Risk Contaminants of Concern for Soil by Receptor for the F-Area Burning/Rubble Pits (231-F/1F) and Rubble Pit (231-2F)**

Medium	Chemical	Target Cancer Risk			Target Hazard Quotient			Reasonable Maximum
		1×10^{-4}	1×10^{-5}	1×10^{-6}	3	1	0.1	EPC
BRPs 231-F/1F, Future Resident								
Soil (mg/kg)	Arsenic	80.152	8.015	0.8015	—	—	—	5.29
	HpCDD	0.079	0.0079	0.00079	—	—	—	0.00411
	B[a]P	16.225	1.623	0.162	—	—	—	0.649
Soil (pCi/g) (Radionuclides)	Cs-137	27.918	2.792	0.279	—	—	—	1.77
	K-40	103.390	10.339	1.034	—	—	—	4.27
BRPs 231-F/1F, Future Worker								
Soil (mg/kg)	Arsenic	370.769	37.077	3.708	—	—	—	5.29
	HpCDD	0.374	0.0374	0.00374	—	—	—	0.00411
Soil (pCi/g) (Radionuclides)	Cs-137	104.118	10.412	1.041	—	—	—	1.77
	K-40	384.685	38.469	3.847	—	—	—	4.27
RP 231-2F, Future Resident								
Soil (mg/kg)	PCB-1254	1.44E+01	1.44E+00	1.44E-01	4.72	1.57	0.157	0.178
Soil (pCi/g) (Radionuclides)	Cs-137	27.898	2.790	0.279	—	—	—	1.77
	K-40	103.268	10.327	1.033	—	—	—	4.27
	Sr-90	51.282	5.128	0.513	—	—	—	2.96
RP 231-2F, Future Worker								
Soil (mg/kg)	PCB-1254	6.51E+01	6.51E+00	6.51E-01	123	40.9	4.09	0.178
Soil (pCi/g) (Radionuclides)	Cs-137	104.118	10.412	1.041	—	—	—	1.77
	K-40	384.685	38.469	3.847	—	—	—	4.27

Note:
HpCDD is Heptachlorodibenzo-p-dioxin
B[a]P is Benzo[a]pyrene
PCB-1254 is a contaminant of concern for 231-2F soil only.
Potential future resident/worker exposure to soil contaminants includes ingestion, dermal contact, and inhalation of particulates.
EPC is Exposure Point Concentration.. Reasonable maximum EPC is the lower of the 95% UCL of the transformed data or the maximum.

Figure 4 **Conceptual Site Risk Model for Soil for the F-Area Burning/Rubble Pits**



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

There are no construction costs associated with this alternative. The cost for surveying the land, installing signs, and filing with the Aiken County Records is estimated to be $2,000. Five year reviews of remedy would be required; the estimated present value for these reviews over the next 30 years is $8,000. The total present value cost for Alternative 2 would be $10,000.

The remaining risk via soil ingestion to future on-site workers would be 5 x 10^{-6} and the hazard index would be 0.02 for Pits 231-F and -1F. The risk and hazard index from Pit 231-2F would be 4 x 10^{-6} and 0.09 respectively.

Alternative 3. Native Soil Cover (4')

Under this alternative, a four foot thick cover of native soil would be installed over the present surface of each of the pits to reduce the likelihood that future excavation for construction of a typical basement would expose waste or contaminated soil. If the property is ever transferred to private ownership, in compliance with CERCLA 120(h), the U.S. Government would create a deed with notifications and restrictions similar to those identified in Alternative 2. A deed restriction prohibiting excavation below four feet would also be filed in Aiken County Records. The deed restrictions on excavation below four feet would be necessary to prevent potential exposure of future workers or residents to buried waste which may contain low concentrations of hazardous constituents.

The cost for developing a CERCLA Remedial Design/Remedial Action Work Plan would be $50,000. The construction costs associated with this alternative are estimated at $347,000 for the installation of a four foot thick native soil cover. The cost for surveying the land, installing signs, and filing with the Aiken County Records is estimated to be $2,000. Present value costs of maintenance over 30 years is $8000. Five year reviews of remedy could be required; the estimated present value for these reviews over the next 30 years is $8,000. Total present value costs for this alternative are estimated at $415,000.

Remaining risks from the pits would be insignificant. The hazard indices from all pits would be less than 1.0.

Alternative 4. Thermal Desorption/Incineration

Under this alternative, the upper four feet of contaminated soil and waste in the pits would be excavated for treatment to eliminate the PCB-1254 and other organic contaminants by thermal desorption/incineration. The soil would be fed through a high temperature rotary kiln to extract the volatile organic contaminants from the soil. The extracted gases would then be destroyed in the incinerator. The treated soil would be returned to the site and vegetation would be established to prevent erosion. If the property is ever transferred to private ownership, in compliance with CERCLA 120(h), the U.S. Government would create a deed with notifications and restrictions similar to those identified in Alternative 2. Deed restrictions on excavation below four feet would be necessary to prevent potential exposure of future workers or residents to buried waste which may contain low levels of hazardous constituents.

A National Emission Standards for Hazardous Air Pollutants permit would be required because of the potential for atmospheric releases during remediation; the cost of obtaining this permit would be $150,000. The estimated cost for developing a CERCLA Remedial Design/Remedial Action Work Plan would be $150,000. The cost for excavation and backfilling would be $412,000. The cost for thermal desorption/incineration is $6,166,000. The deed notifications and restrictions would cost $2,000. The total cost for this alternative would be $6,880,000.

This alternative is protective of human health and would permanently reduce risk to less than 1 x 10^{-6} for ingestion of soil in Pit 231-2F. The remaining risk to future residents would be 6 x 10^{-6} (from

arsenic) for nonradiological exposure and 1 x 10^{-5} for radiological exposure for direct radiation in Pits 231-F and 231-1F and 8 x 10^{-6} for pit 231-2F. The risk for ingestion of fruit is 3 x 10^{-6} for BRPs 231-F and -1F and 2 x 10^{-6} for RP 231-2F. The risks from ingestion of leafy vegetables is 6 x 10^{-6} for the BRPs and 5 x 10^{-6} for the RP. The risk from ingestion of tuberous vegetables is 4 x 10^{-6} for the BRPs and 3 x 10^{-6} for the RP.

Alternative 5. Offsite Soil Disposal

Under this alternative, the upper four feet of soil in the pits would be excavated and transported to a licensed offsite disposal facility. The excavation would be filled to grade with clean native soil and cover vegetation would be established. If the property is ever transferred to private ownership, in compliance with CERCLA 120(h), the U.S. Government would create a deed with notifications and restrictions similar to those identified in Alternative 2. Deed restrictions on excavation below four feet would also be necessary to prevent potential exposure of future workers or residents to buried waste which may contain low levels of hazardous constituents.

The cost for developing a CERCLA Remedial Design/Remedial Action Work Plan would be $150,000. The cost for excavation and backfilling would be $411,000. The cost for transportation is estimated to be $761,000. The cost for disposal is $3,350,000. The deed notifications and restrictions would cost $2,000. The total cost for this alternative would be $4,674,000.

This alternative is protective of human health and would permanently reduce risk to less than 1 x 10^{-6} for soil related risks in all of the pits.

VIII. SUMMARY OF COMPARATIVE ANALYSIS OF THE ALTERNATIVES

Description of Nine Evaluation Criteria

Each of the remedial alternatives was evaluated using the nine criteria established by the National Oil and Hazardous Substances Contingency Plan (NCP). The criteria were derived from the statutory requirements of CERCLA Section 121. The NCP [40 CFR § 300.430 (e) (9)] sets forth nine evaluation criteria that provide the basis for evaluating alternatives and selecting a remedy. The criteria are:

- overall protection of human health and the environment,
- compliance with ARARs,
- long-term effectiveness and permanence,
- reduction of toxicity, mobility, or volume through treatment,
- short-term effectiveness,
- implementability,
- cost,
- state acceptance, and
- community acceptance.

In selecting the preferred alternative, the above mentioned criteria were used to evaluate the alternatives developed in the *F-Area Burning/Rubble Pits (231-F, 231-1F, and 231-2F) Corrective Measures Study/Feasibility Study (U)* (WSRC, 1996e). The nine criteria are used to evaluate all the alternatives, based on human health and environmental protection, cost, and feasibility issues. Brief descriptions of all nine criteria are given in the following section.

Overall Protection of Human Health and the Environment - The remedial alternatives are assessed to determine the degree to which each alternative eliminates, reduces, or controls threats to human health and the environment through treatment, engineering methods, or institutional controls.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) - ARARs are Federal and state environmental regulations that establish standards which remedial actions must meet. There are three types of ARARs: (1) chemical-specific, (2) location-specific, and (3) action-specific.

Chemical-specific ARARs are usually health- or risk-based levels or methodologies which, when applied to unit-specific conditions, result in the

establishment of numerical values. Often these numerical values are promulgated in Federal or state regulations.

- Location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they are in specific locations. Some examples of specific locations include floodplains, wetlands, historic places, and sensitive ecosystems or habitats.

Action-specific ARARs are usually technology- or remedial activity-based requirements or limitations on actions taken with respect to hazardous substances or unit-specific conditions. These requirements are triggered by the particular remedial activities that are selected to accomplish a remedy.

The remedial activities are assessed to determine whether they attain ARARs or provide grounds for invoking one of the five waivers for ARARs. These waivers are:

- the remedial action is an interim measure and will become a part of a total remedial action that will attain the ARAR,
- compliance will result in greater risk to human health and the environment than other alternatives,
- compliance is technically impracticable from an engineering perspective,
- the alternative remedial action will attain an equivalent standard of performance through use of another method or approach,
- the state has not consistently applied the promulgated requirement in similar circumstances or at other remedial action sites in the state.

In addition to ARARs, compliance with other criteria, guidance, and proposed standards that are not legally binding, but may provide useful information or recommended procedures should be reviewed as To-Be-Considered when setting remedial objectives.

Long-Term Effectiveness and Permanence - The remedial alternatives are assessed based on their ability to maintain reliable protection of human health and the environment after implementation.

Reduction of Toxicity, Mobility, or Volume Through Treatment - The remedial alternatives are assessed based on the degree to which they employ treatment that reduces toxicity (the harmful nature of the contaminants), mobility (ability of the contaminants to move through the environment), or volume of contaminants associated with the unit.

Short-Term Effectiveness - The remedial alternatives are assessed considering factors relevant to implementation of the remedial action, including risks to the community during implementation, impacts on workers, potential environmental impacts (e.g., air emissions), and the time until protection is achieved.

Implementability - The remedial alternatives are assessed by considering the difficulty of implementing the alternative including technical feasibility, constructability, reliability of technology, ease of undertaking additional remedial actions (if required), monitoring considerations, administrative feasibility (regulatory requirements), and availability of services and materials.

Cost - The evaluation of remedial alternatives must include capital and operational and maintenance costs. Present value costs are estimated within +50/-30 percent, per EPA guidance. The cost estimates given with each alternative are prepared from information available at the time of the estimate. The final costs of the project will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs may vary from the estimates presented herein.

State Acceptance - In accordance with the Federal Facility Agreement (FFA), the State is required to comment/approve the RFI/RI Report, the Baseline

Risk Assessment, the Corrective Measures Study/Feasibility Study, and the Statement of Basis/Proposed Plan

Community Acceptance - The community acceptance of the preferred alternative is assessed by giving the public an opportunity to comment on the remedy selection process. A public comment period was held and public comments concerning the proposed remedy are addressed in the Responsiveness Summary of this Record of Decision.

Detailed Evaluation

The remedial action alternatives discussed in Section VII have been evaluated using the nine criteria just described. Tables 4 through 8 present the evaluation of the remedial alternatives.

IX. THE SELECTED REMEDY

The preferred action at the FBRP is institutional controls (Alternative 2).

Implementation of this alternative will require both near- and long-term actions. For the near-term, signs will be posted indicating that this area was used to manage hazardous materials. In addition, existing SRS access controls will be used to maintain use of this site for industrial use only.

In the long-term, if the property is ever transferred to non-federal ownership, the U.S. Government will create a deed for the new property owner which will include information in compliance with Section 120(h) of CERCLA. The deed will include notification disclosing former waste management and disposal activities on the site. The deed notification will, in perpetuity, notify any potential purchaser that the property has been used for the management and disposal of non-hazardous, inert construction debris, and that wastes containing hazardous substances, such as degreasers and solvents, were also managed and burned on the site.

The deed will also include restrictions precluding residential use of the property. However, the need for these deed restrictions could be reevaluated at the time of transfer in the event that contamination no longer poses an unacceptable risk under residential use.

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

The Institutional Controls Alternative is intended to be the final action for the FBRP source unit. The solution is intended to be permanent and effective in both the long and near terms. Alternative 2 is considered to be the least cost option that is still protective of human health and the environment. Alternatives 3, 4, and 5 offer only an incremental reduction in risk and hazard for a substantial increase in cost (up to 688 times).

This proposal is consistent with EPA guidance and the National Contingency Plan for sites that have relatively large volumes of waste with low levels of contamination and is an effective use of risk management principles.

Since the initial groundwater assessment did not conclusively determine where the groundwater contamination was coming from, further assessment of the groundwater contamination was conducted under the groundwater assessment program addendum to the Work Plan (WSRC, 1996d) to determine whether the FBRP source unit is the source of the contamination. Depending on the results of the groundwater assessment, three possible options were recognized for addressing the groundwater contamination:

1) If no upgradient source is indicated, the contribution of the FBRP source unit is confirmed and a ROD for the FBRP groundwater will be pursued.

2) If a previously unrecognized upgradient source is identified, a new groundwater operable unit will be created which will undergo Remedial Investigation/Feasibility Study assessment.

Table 4 Evaluation of Alternative 1 - No Remedial Action Under the Nine CERCLA Criteria

Alternative - 1 No Remedial Action

Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness	Reduction of Toxicity, Mobility, or Volume	Short-Term Effectiveness	Implementability	Cost	State Acceptance	Community Acceptance
• *Protectiveness*	• *Compliance with contaminant specific ARARs*	• *Magnitude of residual risk*	• *Treatment process used and materials treated*	• *Protection of community during remedial actions*	• *Ability to construct and operate the technology*	• *Capital costs*	• *Features of the alternative the state supports*	• *Features of the alternative the community supports*
No remedial action taken. Will not reduce risks from those reported in the BRA.	The level of PCB-1254 exceeds the to-be-considered guidance for residential land use.	No risks above 1 x 10^{-4} from soil, HI<1.	Not applicable. No treatment used.	Not applicable. No remediation performed.	Not applicable. No remedial action taken.	None.	Not applicable. The state supported Institutional Controls.	Not applicable. The community has supported the Institutional Controls remedy.
	• *Compliance with Action-Specific ARARs*	• *Adequacy and reliability of controls*	• *Amount of hazardous materials destroyed or treated*	• *Protection of workers during remedial action*	• *Reliability of the technology*	• *Operating and maintenance costs*	• *Features of the alternative about which the state has reservations*	• *Features of the alternative about which the community has reservations*
	No remedial action taken. Not applicable	Not applicable.	None destroyed or treated.	Not applicable. No remediation performed.	Not applicable. No technology applied.	None.	Not applicable. The state supported Institutional Controls.	Not applicable. The community has supported the Institutional Controls remedy.
	• *Compliance with Location-Specific ARARs*		• *Degree of expected reduction in toxicity, mobility, and volume*	• *Environmental impacts*	• *Ease of undertaking additional remedial action, if necessary*		• *Elements of the alternative the state strongly opposes*	• *Elements of the alternative the community strongly opposes*
	The site is in compliance with all location-specific ARARs.		No reduction in toxicity, mobility, or volume.	None.	Very easy.		Not applicable. The state supported Institutional Controls.	Not applicable. The community has supported the Institutional Controls remedy.
	• *Compliance with other criteria, advisories, and guidance*		• *Degree to which treatment is irreversible*	• *Time until remedial action objectives are achieved*	• *Ability to monitor effectiveness of the remedy*			
	No remedial action taken. Not applicable		Not applicable.	Not applicable.	Easy to monitor.			
			• *Type and quantity of residuals remaining after treatment*	• *Contaminants*	• *Coordination with and ability in obtaining approvals from other agencies*			
			Not applicable. Nothing is changed.	Level of PCB-1254 not reduced.	Not applicable. No remedial action taken.			
					• *Availability of necessary equipment and specialists and offsite services*			
					Not applicable. No remedial action taken.			
					• *Availability of prospective technologies*			
					Not applicable. No remedial action taken.			

FBRP, TABLE 4, Alternative 1, No Remedial Action, 9 CERCLA Criteria

Table 5 Evaluation of Alternative 2 - Institutional Controls Under the Nine CERCLA Criteria

Alternative - 2 Institutional Controls

Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness	Reduction of Toxicity, Mobility, or Volume	Short-Term Effectiveness	Implementability	Cost	State Acceptance	Community Acceptance
• Protectiveness	*• Compliance with contaminant specific ARARs*	*• Magnitude of residual risk*	*• Treatment process used and materials treated*	*• Protection of community during remedial actions*	*• Ability to construct and operate the technology*	*• Capital costs*	*• Features of the alternative the state supports*	*• Features of the alternative the community supports*
Exceeds ARAR for future residents only. Will prevent residential use of this property.	There are no ARARs for FBRP. PCB-1254 levels are below the industrial TBC guidance of 10mg/kg.	Overall risk is 4×10^{-6}, HI = 0.09.	No treatment used.	Not applicable. No remediation performed.	No action taken. Not applicable.	Low.	The state supported Institutional Controls.	The community has supported Institutional Controls.
	• Compliance with Action-Specific ARARs	*• Adequacy and reliability of controls*	*• Amount of hazardous materials destroyed or treated*	*• Protection of workers during remedial action*	*• Reliability of the technology*	*• Operating and maintenance costs*	*• Features of the alternative about which the state has reservations*	*• Features of the alternative about which the community has reservations*
	Not applicable. No action taken.	Deed restrictions will effectively prevent future residential use of this land.	Not applicable. None destroyed.	Not applicable. No remediation performed.	Not applicable. No action taken	Low.	Not applicable. The state supported Institutional Controls.	Not applicable. The community has supported Institutional Controls.
	• Compliance with Location-Specific ARARs		*• Degree of expected reduction in toxicity, mobility, and volume*	*• Environmental impacts*	*• Ease of undertaking additional remedial action, if necessary*		*• Elements of the alternative the state strongly opposes*	*• Elements of the alternative the community strongly opposes*
	The site is in compliance with all location-specific ARARs.		Not applicable	None.	Very easy.		Not applicable. The state supported Institutional Controls.	Not applicable. The community has supported Institutional Controls.
	• Compliance with other criteria, advisories, and guidance		*• Degree to which treatment is irreversible*	*• Time until remedial action objectives are achieved*	*• Ability to monitor effectiveness of the remedy*			
	Not applicable. No action taken.		Not applicable.	Not applicable.	Easy to monitor.			
			• Type and quantity of residuals remaining after treatment	*• Contaminants*	*• Coordination with and ability in obtaining approvals from other agencies*			
			All contaminants remain.	PCB-1254 not reduced.	Not applicable. No action taken			
					• Availability of necessary equipment and specialists and offsite services			
					Not applicable. No action taken			
					• Availability of prospective technologies			
					Not applicable. No action taken			

TABLE 5, Alternative 2, Institutional Controls, 9 CERCLA Criteria

Table 6 Evaluation of Alternative 3 - Soil Cover (4') Under the Nine CERCLA Criteria

Alternative - 3 Native Soil Cover (4')

Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness	Reduction of Toxicity, Mobility, or Volume	Short-Term Effectiveness	Implementability	Cost	State Acceptance	Community Acceptance
• Protectiveness	*• Compliance with contaminant specific ARARs*	*• Magnitude of residual risk*	*• Treatment process used and materials treated*	*• Protection of community during remedial actions*	*• Ability to construct and operate the technology*	*• Capital costs*	*• Features of the alternative the state supports*	*• Features of the alternative the community supports*
The soil cover reduces all risks to below 1 x 10^{-6}.	There are no ARARs for FBRP. Will meet to-be-considered guidance for PCBs.	Risk remains beneath the cover. Excavation must be prevented.	Not applicable. No treatment provided.	No risks to the community while the cover is being constructed.	Easy to install the cover.	Low	Not applicable. The state has approved Institutional Controls.	Not applicable. The community has agreed with the Institutional Controls remedy.
	• Compliance with Action-Specific ARARs	*• Adequacy and reliability of controls*	*• Amount of hazardous materials destroyed or treated*	*• Protection of workers during remedial action*	*• Reliability of the technology*	*• Operating and maintenance costs*	*• Features of the alternative about which the state has reservations*	*• Features of the alternative about which the community has reservations*
	Must meet Clean Air Act requirements for dust.	Reliable unless excavation is too deep or deed restrictions not enforced.	Not applicable. None destroyed.	Minor risk to workers while cover is being built due to the use of heavy machinery & dust.	Cover can be breached. May be difficult to enforce no excavation.	Low. Must be inspected, mowed, repaired as needed.	Not applicable. The state has approved Institutional Controls.	Not applicable. The community has agreed with the Institutional Controls remedy.
	• Compliance with Location-Specific ARARs		*• Degree of expected reduction in toxicity, mobility, and volume*	*• Environmental impacts*	*• Ease of undertaking additional remedial action, if necessary*		*• Elements of the alternative the state strongly opposes*	*• Elements of the alternative the community strongly opposes*
	None applicable.		Cover will help reduce mobility to groundwater & airborne dust. No reduction in toxicity or volume.	Minor impact to the environment from heavy equipment and dust.	Easy, however, additional remediation may require removing the cover.		Not applicable. The state has approved Institutional Controls.	Not applicable. The community has agreed with the Institutional Controls remedy.
	• Compliance with other criteria, advisories, and guidance		*• Degree to which treatment is irreversible*	*• Time until remedial action objectives are achieved*	*• Ability to monitor effectiveness of the remedy*			
	Must comply with OSHA.		Covering is completely reversible.	Cover can be completed in less than one year.	Easy to monitor effectiveness of the cover.			
			• Type and quantity of residuals remaining after treatment	*• Contaminants*	*• Coordination with and ability in obtaining approvals from other agencies*			
			Not applicable. All contaminants remain.	Cover is barrier to PCB-1254 exposure.	Relatively easy to obtain approval for installing a cover.			
					• Availability of necessary equipment and specialists and offsite services			
					Easily available.			
					• Availability of prospective technologies			
					Readily available.			

TABLE6_Alternative 3_Native Soil Cover (4')_9 CERCLA Criteria

Table 7 **Evaluation of Alternative 4 - Thermal Desorption/Incineration Under the Nine CERCLA Criteria**

Alternative -4 Thermal Desorption/Incineration

Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness	Reduction of Toxicity, Mobility, or Volume	Short-Term Effectiveness	Implementability	Cost	State Acceptance	Community Acceptance
• *Protectiveness*	• *Compliance with contaminant specific ARARs*	• *Magnitude of residual risk*	• *Treatment process used and materials treated*	• *Protection of community during remedial actions*	• *Ability to construct and operate the technology*	• *Capital costs*	• *Features of the alternative the state supports*	• *Features of the alternative the community supports*
Offers complete protection of human health & the environment.	There are no ARARs for FBRP. Will meet to-be-considered guidance for PCBs.	Risk will be reduced to below 1×10^{-4}.	PCBs will be desorbed and incinerated.	Community will be completely protected while remediation is ongoing.	Implementable. Somewhat limited availability of equipment. Not a problem.	High.	Not applicable. The state has approved Institutional Controls.	Not applicable. The community has agreed with the Institutional Controls remedy.
	• *Compliance with Action-Specific ARARs*	• *Adequacy and reliability of controls*	• *Amount of hazardous materials destroyed or treated*	• *Protection of workers during remedial action*	• *Reliability of the technology*	• *Operating and maintenance costs*	• *Features of the alternative about which the state has reservations*	• *Features of the alternative about which the community has reservations*
	Must meet Clean Air Act requirements for dust.	Completely adequate and reliable. Destroys contaminants.	All soil can be treated to remove PCBs.	Protection from dust inhalation, contact with contaminated soil & injuries from heavy machinery needed.	Very reliable.	High operating costs, no maintenance after remediation.	Not applicable. The state has approved Institutional Controls.	Not applicable. The community has agreed with the Institutional Controls remedy.
	• *Compliance with Location-Specific ARARs*		• *Degree of expected reduction in toxicity, mobility, and volume*	• *Environmental impacts*	• *Ease of undertaking additional remedial action, if necessary*		• *Elements of the alternative the state strongly opposes*	• *Elements of the alternative the community strongly opposes*
	None applicable.		Virtually complete.	Erosion will be controlled.	Easy, but none should be required.		Not applicable. The state has approved Institutional Controls.	Not applicable. The community has agreed with the Institutional Controls remedy.
	• *Compliance with other criteria, advisories, and guidance*		• *Degree to which treatment is irreversible*	• *Time until remedial action objectives are achieved*	• *Ability to monitor effectiveness of the remedy*			
	OSHA must be followed.		Irreversible.	Approximately one year.	Easy to test.			
			• *Type and quantity of residuals remaining after treatment*	• *Contaminants*	• *Coordination with and ability in obtaining approvals from other agencies*			
			None.	PCB-1254 destroyed.	Need air permits.			
					• *Availability of necessary equipment and specialists and offsite services*			
					Somewhat limited.			
					• *Availability of prospective technologies*			
					Somewhat limited.			

Table 8 Evaluation of Alternative 5 - Offsite Soil Disposal Under the Nine CERCLA Criteria

Alternative -5 Offsite Soil Disposal

Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-Term Effectiveness	Reduction of Toxicity, Mobility, or Volume	Short-Term Effectiveness	Implementability	Cost	State Acceptance	Community Acceptance
• Protectiveness	*• Compliance with contaminant specific ARARs*	*• Magnitude of residual risk*	*• Treatment process used and materials treated*	*• Protection of community during remedial actions*	*• Ability to construct and operate the technology*	*• Capital costs*	*• Features of the alternative the state supports*	*• Features of the alternative the community supports*
Offers complete protection of human health & the environment.	There are no ARARs for FBRP. Will meet to-be-considered guidance for PCBs.	Risk will be reduced to below 1×10^{-4}.	PCB contaminated soil will be shipped to offsite waste facility.	Community will be completely protected while remediation is ongoing.	Implementable. Limited waste facilities available. Not a problem.	High.	Not applicable. The state has approved Institutional Controls.	Not applicable. The community has agreed with the Institutional Controls remedy.
	• Compliance with Action-Specific ARARs	*• Adequacy and reliability of controls*	*• Amount of hazardous materials destroyed or treated*	*• Protection of workers during remedial action*	*• Reliability of the technology*	*• Operating and maintenance costs*	*• Features of the alternative about which the state has reservations*	*• Features of the alternative about which the community has reservations*
	Must meet Clean Air Act requirements for dust. DOT for transportation.	Completely adequate and reliable.	None destroyed, but all removed from RP 231-2F.	Protection from dust inhalation, contact with contaminated soil & injuries from heavy machinery needed.	Very reliable.	High operating costs, no maintenance after remediation.	Not applicable. The state has approved Institutional Controls.	Not applicable. The community has agreed with the Institutional Controls remedy.
	• Compliance with Location-Specific ARARs		*• Degree of expected reduction in toxicity, mobility, and volume*	*• Environmental impacts*	*• Ease of undertaking additional remedial action, if necessary*		*• Elements of the alternative the state strongly opposes*	*• Elements of the alternative the community strongly opposes*
	None applicable.		Reduction of PCBs by removal.	Erosion will be controlled.	None needed.		Not applicable. The state has approved Institutional Controls.	Not applicable. The community has agreed with the Institutional Controls remedy.
	• Compliance with other criteria, advisories, and guidance		*• Degree to which treatment is irreversible*	*• Time until remedial action objectives are achieved*	*• Ability to monitor effectiveness of the remedy*			
	OSHA must be followed.		Irreversible.	Less than 6 months.	Easy to test.			
			• Type and quantity of residuals remaining after treatment	*• Contaminants*	*• Coordination with and ability in obtaining approvals from other agencies*			
			None.	PCB-1254 removed.	DOT regulations.			
					• Availability of necessary equipment and specialists and offsite services			
					Somewhat limited.			
					• Availability of prospective technologies			
					Somewhat limited.			

3) If an existing upgradient groundwater operable unit is determined to be the source of the contamination, the boundaries of the existing operable unit will be modified to include the groundwater contamination in the FBRP area.

The Technical Memorandum and Summary for the FBRP is being finalized. Based upon the conclusions of this document, one of the three options described above will be selected and implemented. If options 1 or 2 are selected, the new groundwater operable unit will be placed into Appendix C of the Federal Facility Agreement. The Technical Memorandum and Summary for the FBRP will contain the proposed implementation schedule for this groundwater operable unit.

The SCDHEC has modified the SRS RCRA permit to incorporate the selected remedy.

This proposal is consistent with EPA guidance and is an effective use of risk management principles.

X. STATUTORY DETERMINATIONS

Based on the FBRP RCRA Facility Investigation/Remedial Investigation (RFI/RI) Report and the Baseline Risk Assessment (BRA), the FBRP poses no significant risk to the environment and minimal risk to human health. Because risk levels exceed 1×10^{-6}, a decision was made to implement the Institutional Controls alternative in order to be fully 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, and is cost-effective. The random distribution and low levels of contaminants in the soils make treatment impractical. Institutional controls will result in hazardous substances, pollutants, or contaminants remaining in the source unit. Because treatment of the principal threats of the site was found to be impracticable, this remedy does not satisfy the statutory preference for treatment as a principal element.

Section 300.430 (f)(4)(ii) of the NCP requires that a Five Year Review of the ROD be performed if hazardous substances, pollutants, or contaminants remain in the source unit. The three Parties have determined that a Five Year Review of the ROD for the FBRP would be performed to ensure continued protection of human health and the environment.

XI. EXPLANATION OF SIGNIFICANT CHANGES

There are no significant changes from the preferred alternative stated in the Statement of Basis/Proposed Plan.

The 45-day public comment period began on September 17, 1996 and ended on October 31, 1996. A public comment meeting was held on October 15, 1996. Comments that were received during the 45-day public comment period are addressed in Appendix A of the Record Of Decision and are available with the final RCRA permit.

XII. RESPONSIVENESS SUMMARY

A Responsiveness Summary of the comments received during the public comment period is included in Appendix A.

XIII. POST-ROD DOCUMENT SCHEDULE

The post-ROD document schedule is listed below and is illustrated in Figure 5:

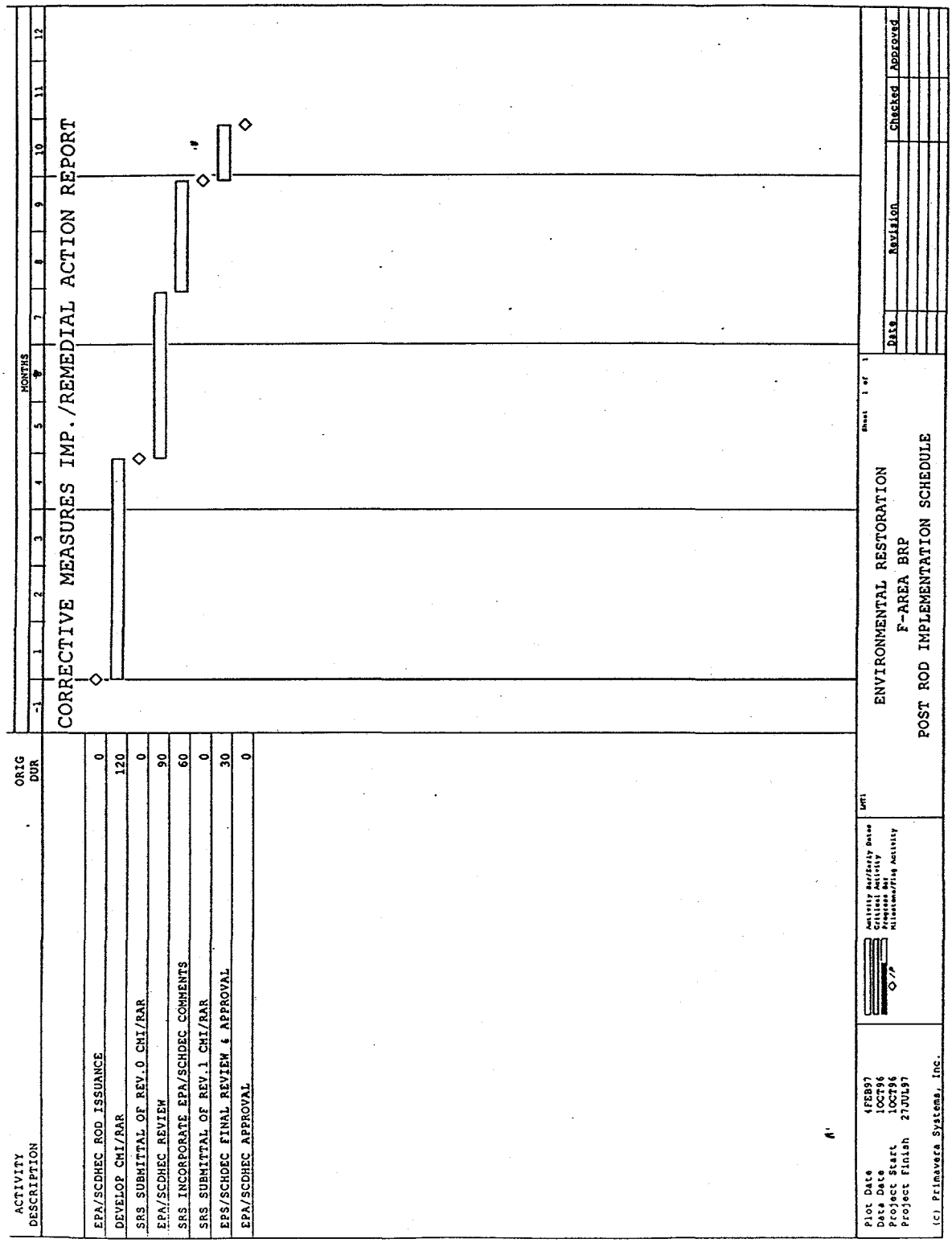
1) Corrective Measures Implementation/Remedial Action Report (CMI/RAR) (rev. 0) for Institutional Controls will be submitted 4 months after issuance of the ROD.

2) EPA and SCDHEC review of the CMI/RAR (rev. 0), (90 days).

3) SRS revision of CMI/RAR (rev. 0) after receipt of regulatory comments, (60 days).

4) EPA and SCDHEC final review of CMI/RAR (rev. 1), (30 days).

Figure 5 Post-ROD Document Schedule



XIV. REFERENCES

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WSRC, 1996e. *Statement of Basis/Proposed Plan for the F-Area Burning/Rubble Pits (231-F, 231-1F, and 231-2F)(U).* WSRC-RP-95-831, Rev. 1.2, Westinghouse Savannah River Company, Aiken, South Carolina (August 1996).

APPENDIX A - RESPONSIVENESS SUMMARY

Responsiveness Summary

The 45-day public comment period for *the Statement of Basis/Proposed Plan for the F-Area Burning/Rubble Pits (231-F, 231-1F, and 231-2F)* began on September 17, 1996 and ended on October 31, 1996. A public meeting was held on October 15, 1996. During the public meeting, there were two questions received during the Public Meeting and Comment Session on the Limited Action Proposed Plans/Permit Modifications presentations; and there was one public comment received during the Formal Public Comment Session. All of the comments are listed as recorded in the Savannah River Site Information Exchange transcript based on the October 15, 1996 Public Meeting.

Specific comments and responses are found below. The comments are italicized and the responses are bolded

Public Comments

The following two comments were received during the Limited Action Proposed Plans/Permit Modifications presentations.

1) *PUBLIC CITIZEN: What risk is there for animals or I guess future environmental, like if you were going to turn this into a park?*

Response to Comment 1):

The Baseline Risk Assessment investigated the ecological affects that any contaminants at the FBRP could have. This document determined that there is "essentially no likelihood that ecologically significant impacts to the community of species in the vicinity of the unit will occur". Therefore, the animal and plant species found in this area should not be affected by any contaminants found at the F-Area Burning/Rubble Pits. The Savannah River Site is currently considered to be a national environmental research park and as such, the site is/will be used for environmental research.

This site is located in close proximity to the F-Area which has a number of facilities which contain high levels of radioactive waste. It is unlikely that this particular area would be made available to the public as a recreational park in the near future. For this reason, it is recommended that the FBRP be retained as part of an industrial area.

2) *PUBLIC CITIZEN: Are you using like private landfills and private -- or I guess other communities that have developed? I mean it looks like a landfill to me. And it looks like there are landfills all over the country and there's a whole lot of landfills that have turned into like parks and stuff. Is that an opportunity here to turn it into a park or to use private models and maybe who have done this a lot? I guess the EPA guy was talking about streamlining. Are you guys using private streamlining ideas?*

Response to Comment 2):

The FBRP was operated very much like a small-scale landfill. Waste was deposited on a regular basis and, initially, was burned monthly. After burning ceased, the waste was deposited and finally covered by a layer of soil when the site was closed.

The Savannah River Site is currently considered to be a national environmental research park and as such, the site is/will be used for environmental research. The F-Area Burning/Rubble Pits have been shown to pose an insignificant threat to any plants or animals in the area.

This site is located in close proximity to the F-Area which has a number of facilities which contain high levels of radioactive waste. It is unlikely that this particular area would be made available to the public as a recreational park in the near future. For this reason, it is recommended that the FBRP be retained as part of an industrial area.

The following comment was received during the Formal Public Comment Session.

3) *Mike Rourak: My name is Mike Rourak and my question is directed directly to Mr. Brian Hennessey's earlier discussion [unintelligible] Silverton Road property, for example. In the Future Use Manual that was sent out to some of us about the disposal of close to a million acres of property for DOE, in your deed restrictions there're things that we cannot do. And we're going to need a little bit before we can respond back to Washington. Those of us who received the manual, we almost are going to need to know what those deed restrictions are because if we cannot have a subdivision then there's no need to bid the price accordingly or say that's what we want to use it for. If we cannot graze cattle there like we do in Tennessee at [unintelligible] or something or grow crops because we cannot put a well in for contamination, then we are left with only looking at it for the pine trees.*

So being federal, you own this property. Even with deed restrictions you've got to give us either a Phase I, II, or III audit. In this case, it's the seller who has to provide this liability, not necessarily the buyer's neglect of liability to due diligence. So it would really help if we knew what deed restrictions would be there to a more extent and also what we can use the land for. If I want to use it for applying 50 - -- under the Code of Federal Regulations 503, if I want to use it for bio solid disposal, can I do so? Because it's adjacent to your other property. So the deed restrictions that you brought up were of immense concern about responding back to the future use and the disposal of roughly 849,000 acres nationwide for – to be put back into – I understand from Washington, they would like to put it back mainly into public use to get the taxes off of it. Maybe not so much for the government, but for the local entities who lose the tax base. Thank you.

Response to Comment 3):

The SRS Future Use Project Report was distributed to inform citizens of the planned future uses of SRS. The recommendations that were presented in the report may change over time and will be discussed with the stakeholders. Deed restrictions for federal property are not determined until the land is transferred to non-federal control. At the time of property transfer, the need for deed restrictions will be evaluated. Due to natural attentuation, decay, etc., the conditions at specific areas may not warrant any deed restrictions. All legal requirements will be met at the time of property transfer.