EPA's Role in the Site Remediation and Cleanup Program at SRS

May 2024

Jon Richards, SRS Federal Facility Agreement Remedial Project Manager & Radiation Expert, U.S. EPA

What does the EPA do at SRS?

- Our job is to protect human health and the environment
- At SRS we are the federal regulator over the cleanup of hazardous waste sites
- We work with Department of Energy as the lead and South Carolina as a co-regulator
- We work to get SRS CLEANED UP!

EPA SRS Team

- Jon Richards – RPM & FFA Manager
- Jana Dawson – RPM
- Brianne Martin – RPM
- Technical Support: TechLaw & EPA's Tech Support
- - Community Involvement Leader

EPA SRS Team Support

- Hydrogeologists (Bei Huang)
- Risk Assessor (Adam Friedman)
- Radiation Risks (Jon Richards)
- Attorney (Damian Yemma)
- TechLaw – Regional Oversight Contract
  - Document Review, Field Oversight, Meeting Support

Overview

- Introduce EPA
- Origin of Superfund
- How Superfund applies to SRS
- EPA's involvement in SRS remediation program

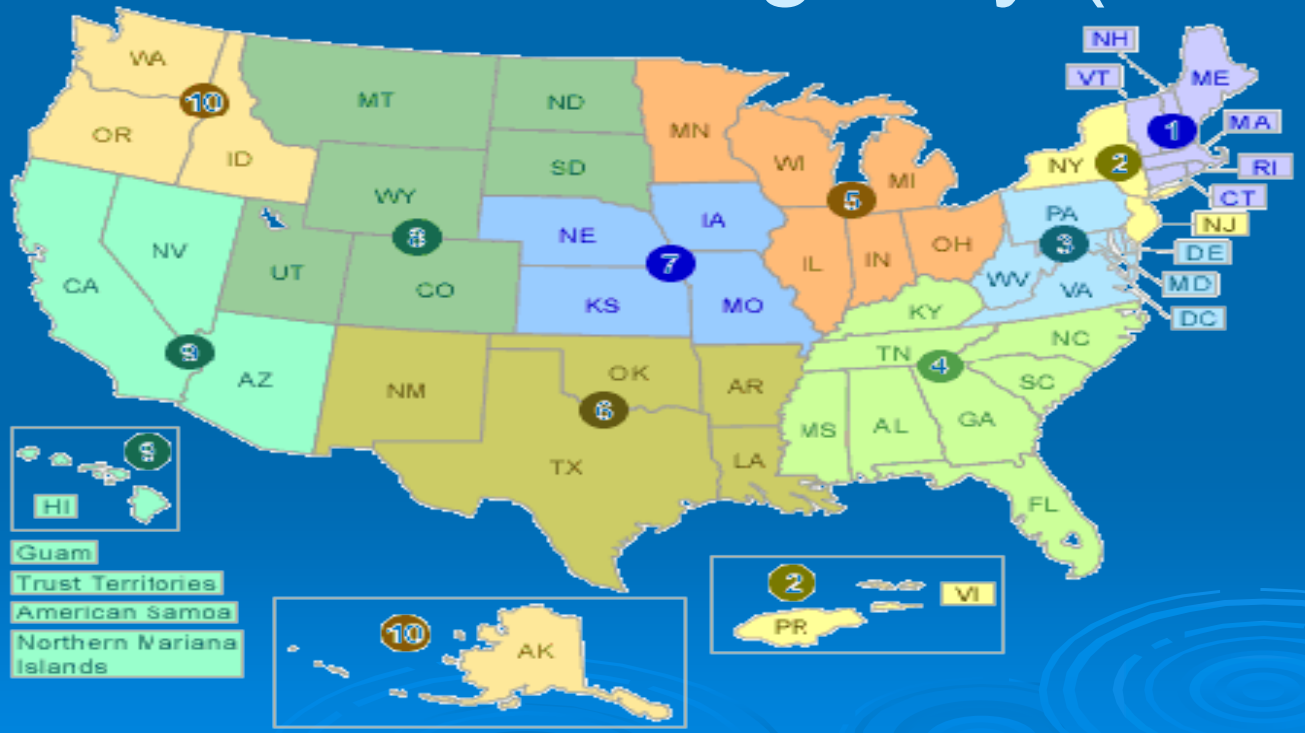
United States Environmental Protection Agency (EPA)

mission:

To protect human health and the environment

- Independent agency formed in 1970
- Congress writes environmental laws
- EPA writes regulations to implement laws
- EPA enforces regulations
- EPA sets national standards

United States Environmental Protection Agency (EPA)



Origins of Superfund

CERCLA: Comprehensive Environmental Response Compensation and Liability Act (Superfund)

Became law in 1980

Amended in 1986

Origins of Superfund

- "Reactive" law, addressing previously contaminated sites

- Established in response to disasters like Love Canal, NY and Valley of the Drums, KY

CERCLA

CERCLA provides authority for the federal government to respond to releases or threatened releases of hazardous substances

National Contingency Plan

- National Contingency Plan (NCP) is the set of implementing regulations – “rules”
- Procedures for conducting CERCLA response actions
- Establishes the risk level that triggers clean up action

CERCLA at Federal Facilities

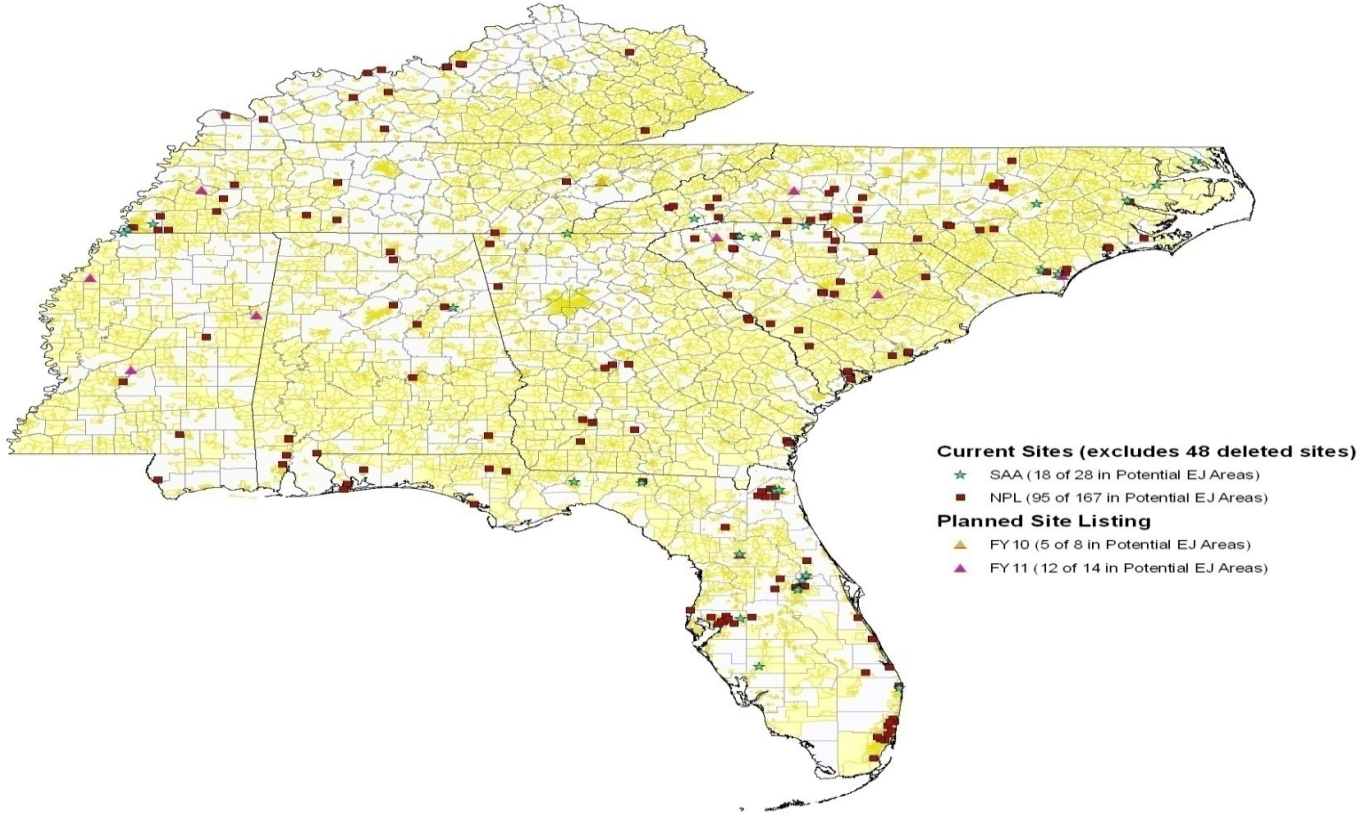
Executive Order 12580 (1987):

- Delegates to DOE and DoD the responsibility to implement certain provisions of CERCLA
- Makes DOE and DoD the “lead agency”
- Federal facilities must follow policies and procedures as spelled out in the NCP
- EPA either concurs with remedies proposed by lead agencies or picks another appropriate remedy

CERCLA at Federal Facilities

Federal Facilities (DoE, DoD, etc.) are subject to CERCLA requirements similar to private entities

National Priorities List



Department of Energy Facilities in EPA Region 4

- Savannah River Site – South Carolina
- Paducah Gaseous Diffusion Plant - Kentucky
- Oak Ridge Reservation – Tennessee
- Closed: Pinellas Plant – FL (RCRA FDEP lead)

Savannah River Site

- Added to the Superfund National Priorities List – December 1989

- SRS required to have a Federal Facilities Agreement (agreement with State &EPA)

Federal Statutes for Cleanup of Federal Facilities

- CERCLA
- RCRA
- Oil Pollution Control Act
- Safe Drinking Water Act
- Clean Water Act
- Clean Air Act

SRS - Federal Facility Agreement
August 1993

Three party agreement (DOE, EPA, SCHEC)

- Governs investigation and remediation program
- Roles and responsibilities of each party
- Schedules and deadlines
- Enforceable milestones, penalties
- Procedures to working together
- Dispute resolution

EPA's Role

- Oversight of remedial actions at SRS
- Ensure adherence to the NCP, CERCLA, FFA, guidance
- Technical and procedural assistance
- Information, guidance, training

Investigation Process

- Begins with site discovery
- Investigate the site
- Soil, sediment, groundwater, air, & surface water sampling
- A Risk Assessment determines the danger the to the public
- We decide how to clean up the site

Groundwater Sampling

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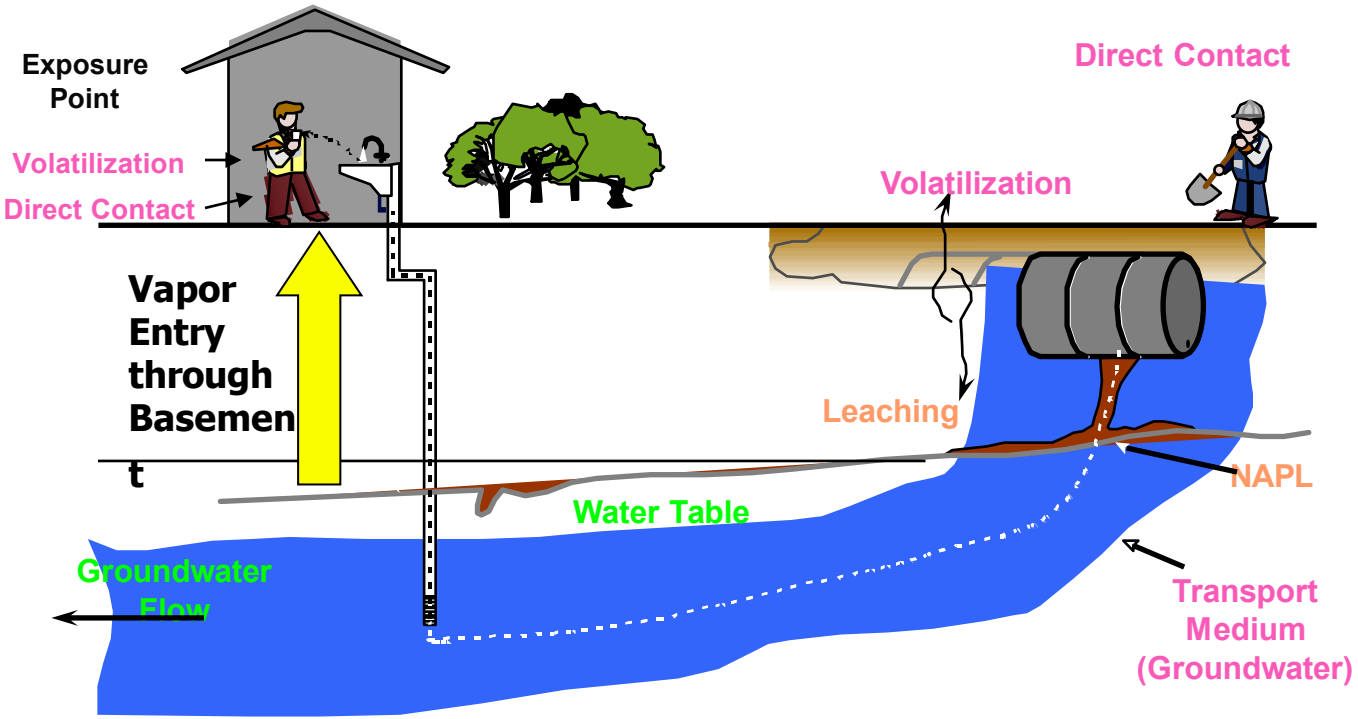
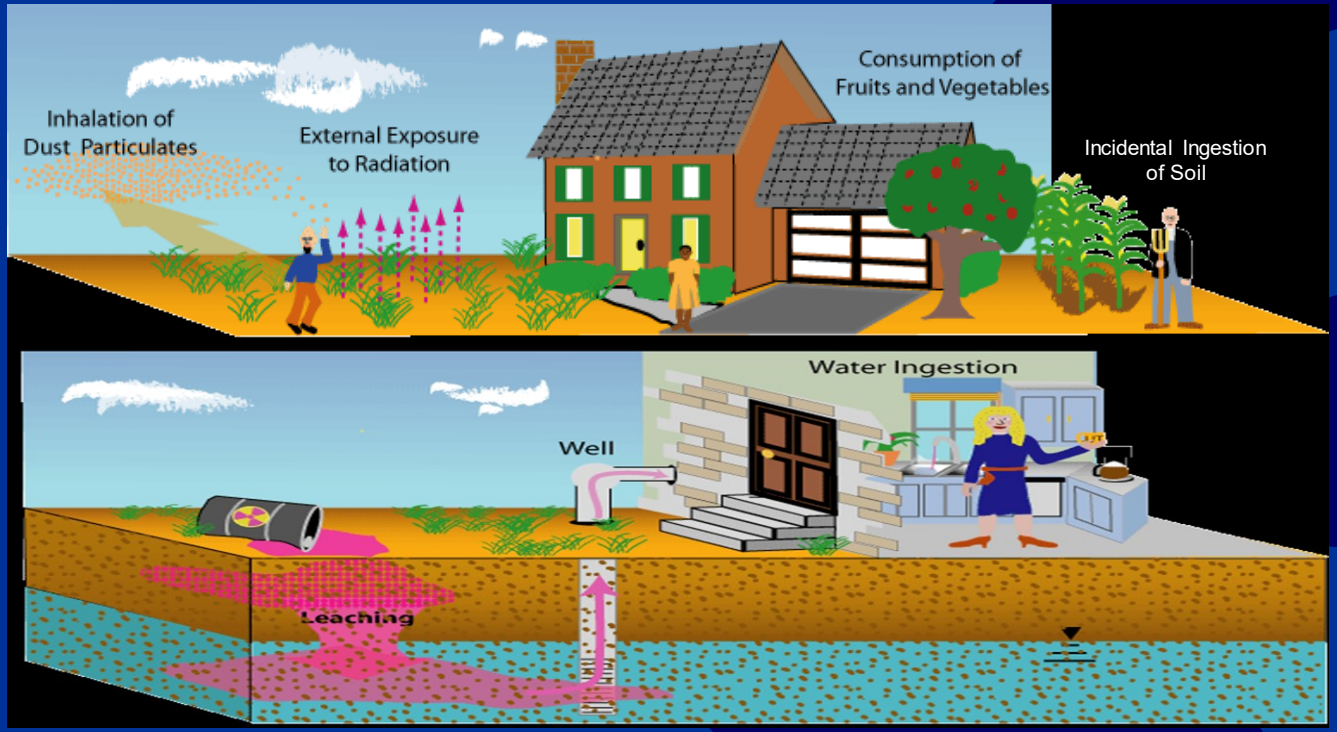
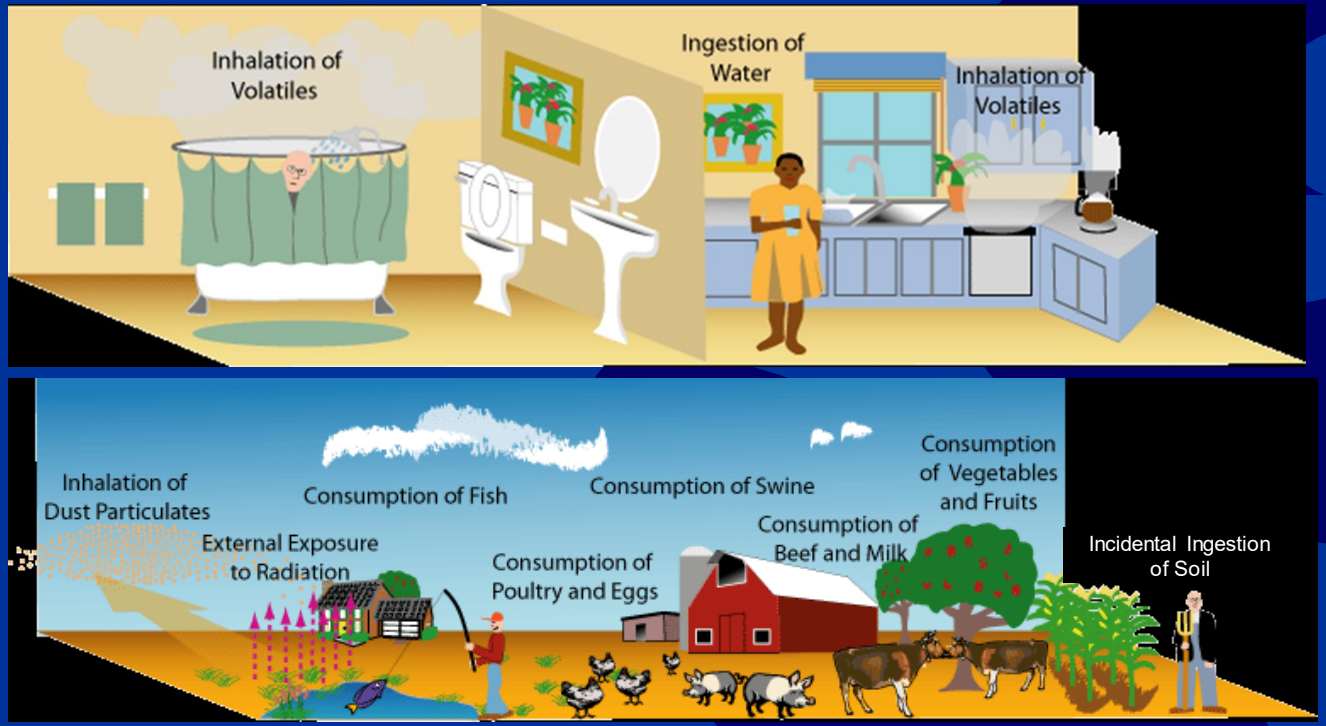
How people can be impacted



How People Can be Impacted from Radiation Releases



How People Can be Impacted from Radiation Releases



EPA's Role

EPA and SCDHEC concurrence required:

- Select of remedies (Record of Decision)
- Implement remedies
- Operate remedies
- Determine success of remedies

Involvement – early & often –

- Process leading up to selecting remedies
- Designing and installing remedies
- Monitoring and evaluating effectiveness of remedies

EPA Decision Process:

Remedial Project Manager level

- EPA RPM involved in remedial process === via the Core Team and Scoping process
  - Collaborate sampling and monitoring plans
  - Conduct site visits and inspections, field oversight
  - Review data
  - Review documents
  - Comment on documents and resolving issues
  - Ensure adherence to NCP, EPA guidance
  - Participate in meetings, teleconferences, team work
  - Consider public input
- EPA RPM integral in identifying preferred remedy(ies)

EPA Decision Process:
EPA Management Level

- EPA Management and EPA HQ:
  - consider proposed remedies
  - ensure national consistency and adherence to NCP, national guidance
  - ensure that plan has State concurrence
  - give approval to proceed with Proposed Plan
- EPA RPM represents the SRS Core Team's decisions

EPA Decision Process:
Superfund Division Director

- Proposed Plan issued to the public by DOE (approved by EPA and SCDHEC)
- DOE writes the Record of Decision, considering public comments (core team participation)
- DOE signs the Record of Decision
- EPA signs the ROD
- SCDHEC signs the ROD

EPA Involvement Continues

- Ensure remedy is:
  - designed and constructed according to plan
  - achieving the objectives outlined in the ROD
  - protective of human health & environment
- Regular effectiveness monitoring
- 5 Year Remedy Reviews
  - EPA management and HQ involved in findings, and follow-up to 5-year reviews

Three Party Decisions

- Decision Documents “belong” to DOE, SCDHEC and EPA
- EPA must sign a ROD for it to be final per the requirements of the NCP

Collaboration

- Team work approach employed to ensure meeting all FFA requirements while streamlining and accelerating process
  - Core Team (EPA/SCDHEC/DOE)
  - Scoping meetings (Core Team+Contractors)
  - Design teams – special topics
- Requires dedication and commitment from each of the three parties

Current Activities and Projects

- FFA commitments
- High Level Waste Tanks
- D Area (coal ash & gw)
- C Area (groundwater)
- P Area (groundwater)
- T Area (TNX groundwater)
- R Area (groundwater)
- A Area Units (vapor extraction)
- LLWD Facility (E Area)
- Lower Three Runs/PAR Pond
- Steel Creek–Dunbarton Bay
- CMP Pits (groundwater)
- G Area Oil Seepage Basin
- 5 year remedy reviews (ongoing)
- Field oversight
- CAB

Savannah River Site

- Cleanup activities were initiated under a RCRA permit in 1985
- Final NPL listing 11/21/89
- FFA effective 8/16/93
- 310 square miles (198,737 acres)
- 515 waste units
- 99 Operable Units

EPA ID: SC1890008989

Acct #: 04W2OX00

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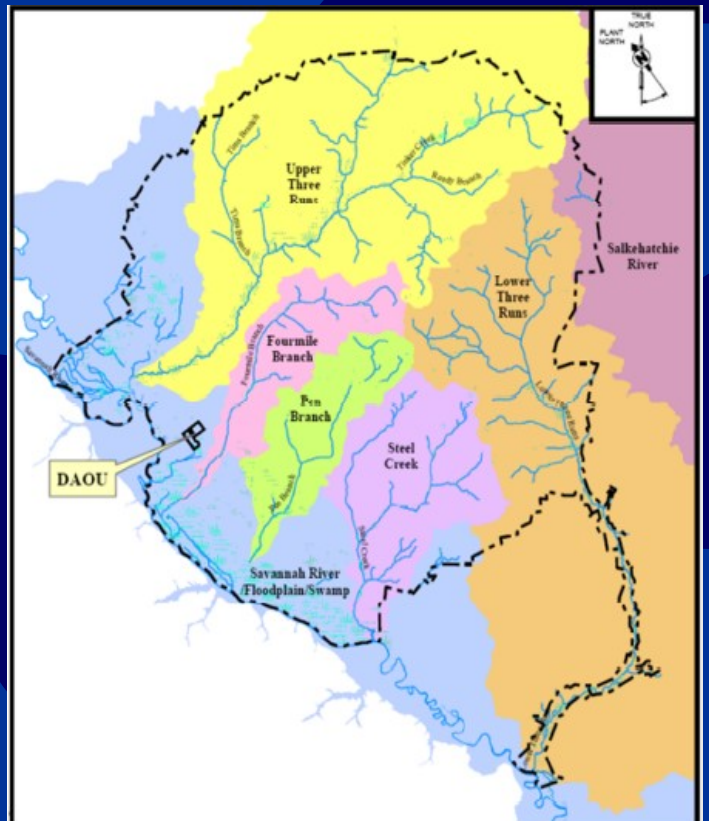
SRS Site Description

- 310 square mile DOE Facility
  - » Near Savannah River and Aiken, South Carolina and Augusta, Georgia
- Section 120 of CERCLA
  - » EPA, DOE and SCDHEC coordinate remedial activities
- LTR Operable Unit is in the southeastern portion of the Savannah River Site



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SRS
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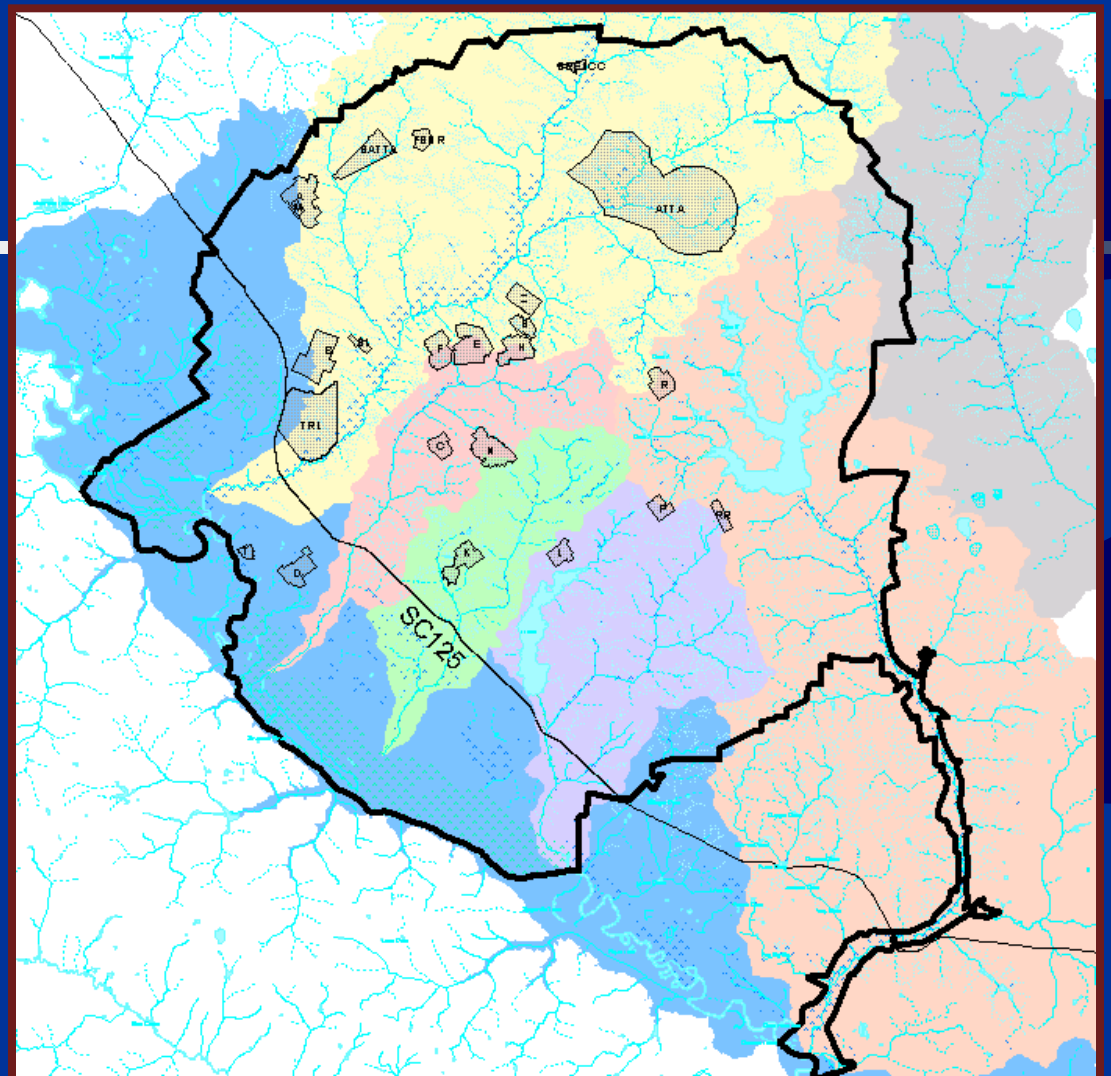
Watersheds

First Final ROD on any IOU



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LTR Background and History

- The LTR IOU and its associated watershed are in the southeastern portion of the Savannah River Site
- LTR is a large blackwater stream that originates in the northeast portion of SRS and follows a southerly direction for 24.5 miles to the Savannah River and is considered “waters of the state”
- LTR watershed drains 180 square miles and includes two SRS Operable Units: P-Area Operable Unit including P Reactor and R-Area Operable Unit including R Reactor
- Remedial actions for source units at RAOU and PAOU have been completed.

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Lower 3 Runs Integrated Operable Unit

- LTR IOU is divided into three subunits (Upper, Middle, and Lower)
- The Upper portion of the LTR IOU contains:
  - a 2,640-acre impoundment (PAR Pond)
  - several smaller ponds (pre-cooler ponds)
  - canal systems; P-Area Discharge Canal, R-Area Discharge Canal and the Old R-Area Discharge Canal (Joyce Branch)

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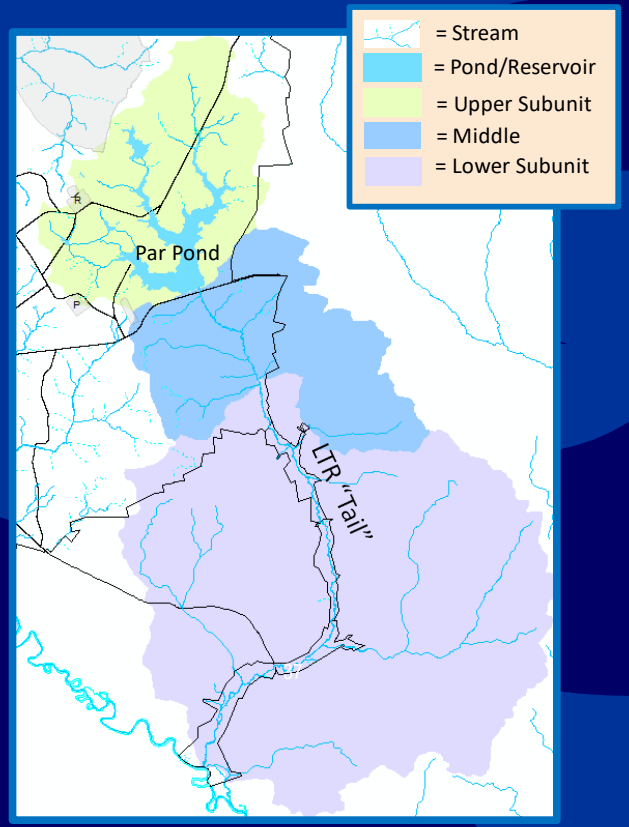
Lower Three Runs Watershed

- LTR is a large blackwater stream
- The watershed contains
  - R-Reactor
  - P-Reactor (portion of)
  - PAR Pond
  - Sub-cooler ponds/canal system
  - LTR is considered “waters of the state”



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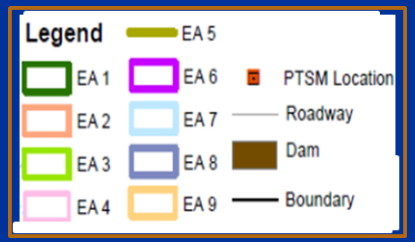
Previous Response Actions – Upper, Middle and Lower Subunits

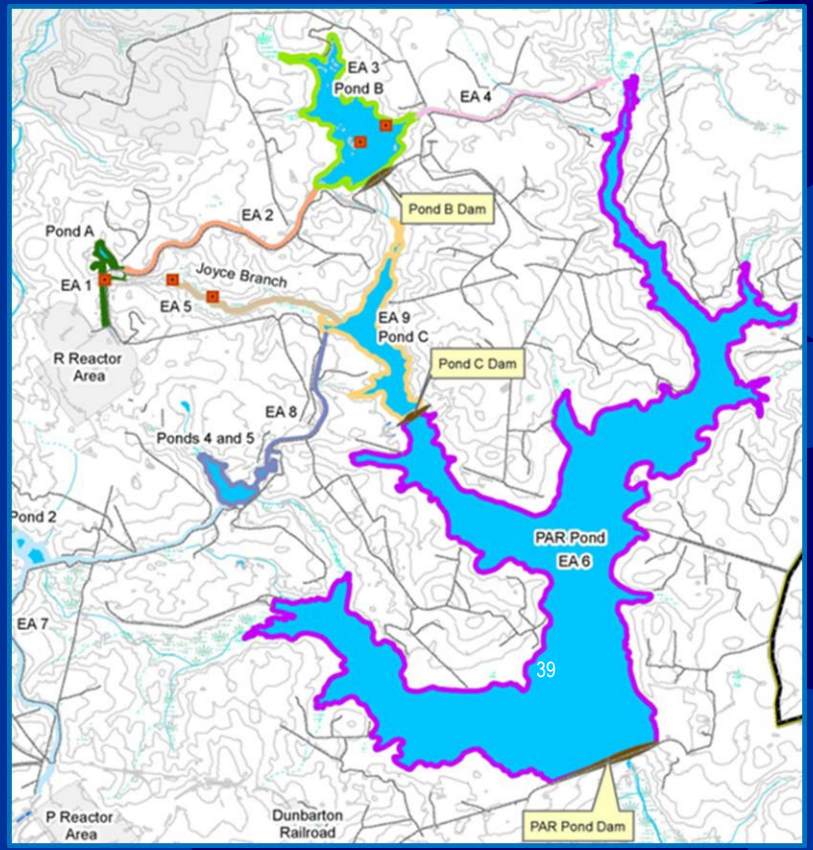
- 1995 IROD on PAR Pond – specified a water level for the pond to shield radioactive sediments
- Time Critical Removal Action - Excavation of contaminated soil/sediment in hot spot locations – Cs-137
  - Based on possible trespasser scenario
- Explanation of Significant Difference to the 1995 PAR Pond IROD – Engineering and Institutional Controls – LUCs added to "tail" section (stream after the dam)

LTR IOU – Upper Subunit

- The Record of Decision (ROD) scope involves the Upper Subunit (above Par Pond dam)

- Upper Subunit is divided into nine Exposure Areas (EA)





LTR OU RI

- Almost 300 sediment samples were taken using a transect system across water bodies and partially guided by fly over gamma data
- Over 100 surface water samples were collected
- Fish tissue samples collected throughout the waterbodies on an annual basis
- COCs were identified in :
  - » Sediment/soil – Cs-137 and Co-60 (radioactive isotopes)
  - » fish tissue – Cs-137 and Hg

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Simplified Onsite Worker CSM

Cs-137,
Co-60

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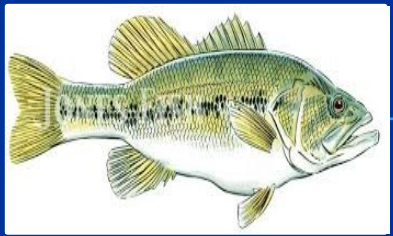
Simplified Fisherperson CSM

Cs-137, Hg



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Remedial Action Objectives

- Protect IOU onsite workers from exposure to Cs-137 and Co-60 in sediment/soil that exceed 1E-06 risk threshold or background levels. The primary exposure route of concern is the external radiation pathway.
  - » Conservative assumption that onsite workers will come into direct contact with sediment
- Protect the recreational fisherperson from exposure to Cs-137 and mercury in fish tissue. The primary route of exposure is the ingestion of fish pathway.
  - » Conservative assumption that recreational fisherperson will gain access to the site and catch and ingest fish

Remedial Alternatives Considered

- **Alternative A-1 – No Action**
- **Alternative A-2 – Monitored Natural Recovery and Land Use Controls**
  - LUCs limit access to the entire Upper subunit and Monitored Natural Recovery (MNR) to monitor decay of Cs-137.
  - Includes engineering controls (signs, gates, guards, guns) and institutional controls (deed restrictions, worker protective programs) to limit inadvertent human exposure "No Trespassing" signs at access points and "No Unauthorized Fishing" signs at approaches to surface water bodies (Ponds B, C, and PAR) with fishable fish populations
  - Periodic sampling to monitor decay of Cs-137
- **Alternative A-3 – In Situ Capping on PTSM Sediment/Soil (including consideration of a hybrid cap)**

  - Placement of a barrier (cap) for physical isolation of PTSM in subaqueous/floodplain sediment/soil at EA1, EA3 and EA5; caps are generally constructed of sand and/or gravel
  - A more complex cap design could include the addition of an amendment for sequestration of Cs-137 to reduce bioavailability

Remedial Alternatives Considered

- **Alternative A-5 – Excavation, Treatment, and Offsite Disposal of Sediment/soil**
  - Applicable to EA1, EA3, and EA5 for localized areas of sediment/soil in water bodies/floodplain sediment/soil and dredging of sediment/soil from deeper ponds (EA3)
  - Significant mobilization required to transport and launch the barge; no infrastructure to support large vessels at EA3
- **Alternative A-6 – Maintain Water in Ponds**
  - Consists of maintaining dam structures to sustain water levels. Minimizes access and limits exposure to submerged, contaminated sediment/soil within ponds (natural "cap")
  - Applicable to EA3, EA6, and EA9 that contain infrastructure to retain water at consistent water levels.
  - Water provides shielding to submerged contamination and prevents exposure to receptors
  - Dam structures act as sedimentation barriers to prevent contaminant mobilization
  - Inspections and maintenance of the water retaining structures would be required

Summary of the RGs

Media	RCOC	Units	IOU Onsite Worker RGO	Recreational Fisherman RGO	SRS BKGRD 95th %tile	2X SRS BKGRD 95th %tile	SRS BKGRD Max	IOU BKGRD Max	Most Likely RGO
Sediment/ Soil	Cesium-137 (+D)	pCi/g	0.144	NA	0.34	*0.68*	3.3	0.623	0.68
	Cobalt-60	pCi/g	*0.0295*	NA	NA	NA	NA	0.011	0.0295
Fish Tissue	Cesium-137 (+D)	pCi/g	NA	*0.0544*	NA	NA	NA	0.488	0.0544
	Mercury	mg/kg	NA	*0.154*	NA	NA	NA	0.24	0.154

The **IOU onsite worker scenario** is based on the most likely human receptor for the Upper Subunit, an SRS worker/researcher

- exposure assumptions: 20 years, 150 days/year, 8 hours/day (no shielding considered)

The **hypothetical recreational fisherman scenario** was used to evaluate the ingestion of fish

- exposure assumptions: 26 years, 350 days/year, 54 g/day

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Comparison of Alternatives Against CERCLA Evaluation Criteria - 1

Criterion	Alternative A-1 No Action	Alternative A-2 MNR and LUCs	Alternative A-3 Capping of PTSM Sediment/soil	Alternative A-5 Excavation/Treatment of Sediment/Soil	Alternative A-6 Maintain Water in Ponds
Overall Protection of Human Health and the Environment					
Protection of Human Health	Not protective	Protective.	Protective.	Protective.	Protective.
Protection of the Environment	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable
Compliance with ARARs					
Chemical-specific	Not preferred.	None identified.	None identified.	None identified.	None identified.
Action-specific	Not preferred.	None identified.	None identified.	Yes	None identified.
Location-specific	Not preferred.	None identified.	Yes	Yes	Yes
Long-Term Effectiveness and Permanence					
Magnitude of Residual Risks	Not applicable.	Effective in reducing risk of exposure to contaminated media by controlling exposure.	Effective in reducing risk of exposure to contaminated media by breaking exposure pathway.	Effective in reducing risk of exposure to contaminated media by removal of PTSM at specific locations.	Effective in reducing risk of exposure to contaminated media by breaking exposure pathway.
Adequacy of Controls	Not adequate	Adequate	Adequate	Adequate	Adequate
Permanence	Not permanent	Permanent	Permanent	Permanent	Permanent
Estimated Time Frame to Reach RG*	290-180 years	290-180 years	290-260 years	225-220 years	260-200 years
Reduction of Toxicity, Mobility, or Volume Through Treatment					
Treatment Process	None	None	Treatment	Treatment	None
Degree of Expected Reduction in Toxicity, Mobility, or Volume	None	None	The use of an amendment in the cap will reduce the mobility of the PTSM sediment/soil.	The use of a drying agent will reduce mobilization during transportation and disposal.	None

Comparison of Alternatives Against CERCLA Evaluation Criteria - 2

Criterion	Alternative A-1 No Action	Alternative A-2 MNR and LUCs	Alternative A-3 Capping of PTSM Sediment/soil	Alternative A-5 Excavation of PTSM Sediment/Soil	Alternative A-6 Maintain Water in Ponds
Short-Term Effectiveness					
Risk to Remedial Workers	Not applicable; no remedial action involved.	None	Worker exposure to contaminated sediment/soil will be minimal as the cap will be installed from a barge or vessel from the surface of the water. An onsite disposal area.	Worker exposure to contaminated sediment/soil may be significant due to dewatering, staging, and transportation of excavated sediment/soil to an onsite disposal area.	None
Risk to Community	Not applicable; no remedial action involved.	None	Risk to the community would be mitigated by the use of a silt curtain during cap construction to control sediment/soil migration.	Risk to the community from sediment/soil migration would be mitigated by the use of a silt curtain during excavation.	Continued maintenance of the dam protects the community by preventing migration of contaminated sediment/soil.
Risk to Environment	Not applicable; no remedial action involved.	None	None	Disturbance would be limited to area of PTSM	None
Estimated Time Frame to Achieve RAOs*	Readily Implementable	8 months	18-24 months	12-16 months	4 months
Implementability					
Availability of materials, equipment, and skilled labor	No implementation	Readily implemented	Readily implemented	Readily implemented	Readily implemented
Ability to construct and operate remedial technology	Not Applicable	Readily available. No specialized materials, equipment or labor required.	Availability of specialized equipment/contractors and mobilization of a barge may be difficult.	Readily available. No specialized materials, equipment or labor required.	Readily available. No specialized materials, equipment or labor required.
Ability to obtain permits/approvals from Agencies	Not Applicable	Not Applicable	Not Applicable	Readily implemented.	Not Applicable
Ease of undertaking additional actions	Compatible	Compatible	Compatible	Compatible	Compatible

Comparison of Alternatives Against CERCLA Evaluation Criteria - 3

Criterion	Alternative A-1 No Action	Alternative A-2 MNR and LUCs	Alternative A-3 Capping of PTSM Sediment/soil	Alternative A-5 Excavation of PTSM Sediment/Soil	Alternative A-6 Maintain Water in Ponds
Cost					
Total Present-Worth Costs	$0	$17M for entire Upper subunit	EA1 - $417 EA1 EA3 - $2.7M EA5 - $805	EA1 - $486 K EA3 - $2M EA5 - $796 K	EA3 - $2.1 M EA6 - $2.8 M EA9 - $591 K
State Support/Agency Acceptance	Not preferred.	USEPA and SCDHEC support Alternative A-2 for the entire Upper subunit (EA1 thru EA9).	Not preferred.	EPA and SCDHEC Alternative A-5 for EA1.	EPA and SCDHEC support Alternative A-6 for EA3 and EA6.
Community Acceptance	This criterion will be completed following public review.	This criterion will be completed following public review.	This criterion will be completed following public review.	This criterion will be completed following public review.	This criterion will be completed following public review.

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Selected Alternative

Exposure Area	A-2: MNR and LUCs	A-5: Excavation of PTSM Sediment/ Soil	A-6: Maintain Water in Ponds
EA1: Pond A – Including R Discharge Canal	√	√	
EA2: Canal from Pond A to Pond B	√		
EA3: Pond B – Including canal to Pond C	√		√
EA4: Canal from Pond B to North Arm of PAR Pond	√		
EA5: Joyce Branch (Old Discharge Canal)	√		
EA6: PAR Pond	√		√
EA7: Canal from P-Area to Ponds 4 and 5 – Including Pond 2	√		
EA8: Ponds 4 and 5 – Including canal to Pond C	√		
EA9: Pond C	√		

Selected Alternative (continued)

The preferred alternatives for the Upper Subunit of the LTR IOU include:

- **Alternative A-2 LUCs with MNR is the preferred alternative for the entire Upper Subunit (EA1 thru EA9)**
  - Entire Upper Subunit (EA1 thru EA9) Total Present-Worth Cost $17,321,141
  - MNR, Access Controls, Inspections, 5-yr remedy reviews
  - Will include more robust LUCs at EA5
- **Alternative A-5 Excavation of PTSM Sediment/Soil is the preferred alternative in EA1 (Pond A – Including R Discharge Canal)**
  - EA1 Total Present-Worth Cost $485,986
- **Alternative A-6 Maintain Water in Ponds is the preferred alternative for EA3 (Pond B) and EA6 (PAR Pond)**
  - EA3 Capital and Present Worth O&M Costs $2,082,616
  - EA6 Capital and Present Worth O&M Costs $2,835,922
  - Dam Maintenance is included for a period of 50 years
- **Total Present-Worth Cost for Alternative A-2, A-5 and A-6 $23,316,841**

The Cleanup at SRS

- It's been going on since the 1980s
- It will continue another 30+ years
- SRS employees 1000's of people
- Cleanup involves not just radiation and chemicals
  - There is office work, maintenance, etc.
- Jobs that require college and jobs that require only high school
- All require a clean record

How Can I Get Information?

- EPA Website – www.epa.gov/superfund
- SRS Website – www.srs.gov
- EPA Community Involvement Coordinator for SRS
  - Angela Miller (404) 562-9073

Questions

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