Natural and Accelerated Bioremediation Research Principal Investigators' Meeting

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Oak Ridge Operations

- Y-12 Plant
- Oak Ridge National Laboratory
- East Tennessee Technology Park
- Paducah Gaseous Diffusion Plant
- Portsmouth Gaseous Diffusion Plant

Geology

Fractured, Steeply Dipping Bedrock

Karst Formations

Limestone, Dolomite

Low-Permeability Soil (Clay, Shale)

Metals and Rad Contaminants of Concern

- Y-12 - Uranium, Mercury
- ORNL - Cesium, Cobalt
- ETTP - Uranium
- PAD - Technetium
- PORTS - Technetium

Contaminant Level

Y-12	Hg - 7700 ppm soil; 400ppt water
ORNL	U - 1,000 pCi/g
ETTP	U - 10,000 pCi/g
Paducah	Tc - 4500 pCi/L
Portsmouth	Tc - 3000 pCi/L

Clean-Up Levels for Metals and Rads

- Y-12 — Hg - 10 ppm soil; 51 ppt water
- ORNL — U - 300 pCi/g
- ETTP — U - 100 pCi/g

- Paducah Tc - 900 pCi/L
- Portsmouth Tc - 3790 pCi/L

Primary Problem Areas

Y-12

UEFPC East End VOC Plume
Mercury in Soil and Water
Bear Creek Valley S3 Ponds

ORNL

Tritium Trenches
Cs/Co/U in soil and water
Solid Waste Storage Areas

Primary Problem Areas (continued)

ETTP

Burial Grounds

Soils Under and Around Buildings

PAD

Tc99 in Soil and Groundwater

U/PCB Burial Ground

PORTS

Quad I & II - TCE

Remediation Approaches

Y-12

- Pump and Treat
- Bioremediation
- Mercury Sorbents
- In Situ Grouting for Mercury
- Stabilization
- Alternatives to Low Temperature
- Thermal Desorption
- Reactive Barriers

ORNL

- In Situ Treatment
- Hydrologic Isolation
- Limited Excavation

Remediation Approaches (continued)

ETTP

- Pump and Treat
- Excavation
- Natural Attenuation

Remediation Approaches (continued)

PAD

- Pump and Treat
- Reactive Barrier
- Soil Heating
- Oxidation
- Electro-osmosis

PORTS

- Pump and Treat
- Soil Heating
- Oxidation
- Phytoremediation/Bioremediation
- Limited Excavation

End Use Assumptions

Y-12

Ongoing mission within a reduced footprint; cleanup for controlled industrial use

Cleanup for unrestricted industrial use outside the footprint

Monitoring and institutional controls for burial grounds

ORNL

Ongoing mission within main plant area; cleanup for controlled industrial use

Cleanup for unrestricted industrial use outside lab area

Monitoring and institutional controls for burial grounds

End Use Assumptions (continued)

ETTP

Industrial Park; cleanup to unrestricted industrial use

PAD

Ongoing enrichment operations

Cleanup for controlled industrial use inside fence

Cleanup for recreational use outside fence

PORTS

Cleanup for controlled industrial use inside fence

Cleanup for recreational use outside fence

ORO Remediation End-State

Hydraulic isolation of burial grounds
Waste excavation/consolidation in EMWMF
Reactive barriers
Limited groundwater collection/treatment
Monitored natural attenuation
Long-term monitoring
Land use control

Long-Term Stewardship Needs

Cap design and maintenance
Trench design and maintenance
Reactive barrier design and maintenance
Long-term performance assessments
Long-term monitoring and verification