



General Response Action – Ex Situ Treatment and Disposal

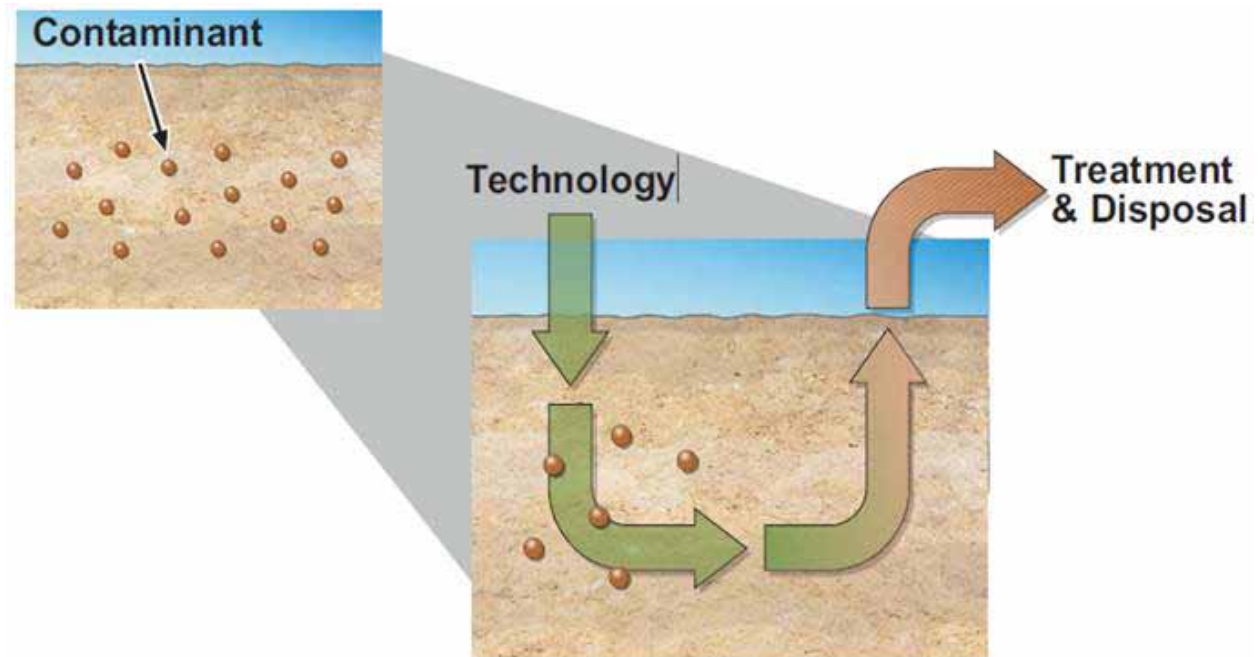
Presented by: T. A. DeBiase/J. R. Schneider

Location: Shilo Inn, Richland, Washington
Date: June 7, 2011

General Response Action – Ex Situ Treatment and Disposal

General Description

- Apply a treatment to excavated contaminated soil that degrades or immobilizes the contaminants
- Dispose of the treated soil



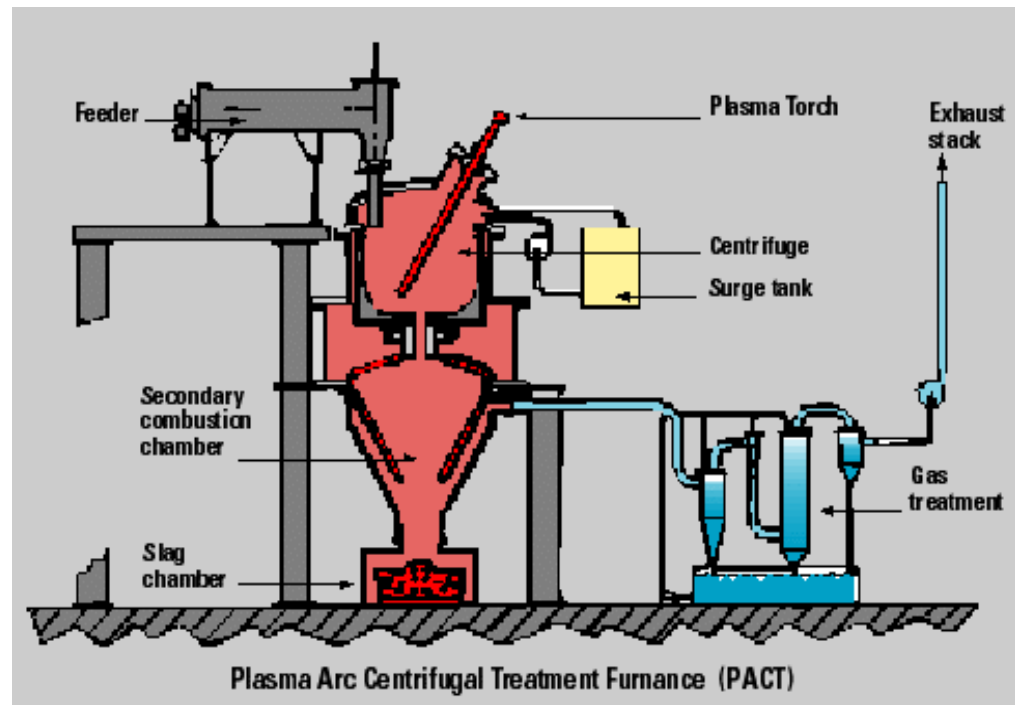
Technology – Ex Situ Vitrification

General Description

- Apply electrical energy to melt and convert contaminated soil into glass
- Organic contaminants are destroyed; heavy metals and radionuclides are retained in the melt and immobilized in resulting product

Potential Contaminants:

- All



Plasma Arc Centrifugal Treatment Furnace (Retech Systems LLC)

Technology – Ex Situ Vitrification

State of Development

- Tests, demonstrations, and commercial operations of the technology have been conducted, but generally with high level waste

Limitations/Development Needs

- Energy intensive
- Large materials (e.g., cobbles) must be screened out of soil to be treated
- Contaminant and vitrification materials interaction must be well-understood
- Technology has complex equipment requirements and challenging implementation

Lab Testing Only	Field Testing Only	Limited Field Application	Remediation Ready (limited application)	Remediation Ready
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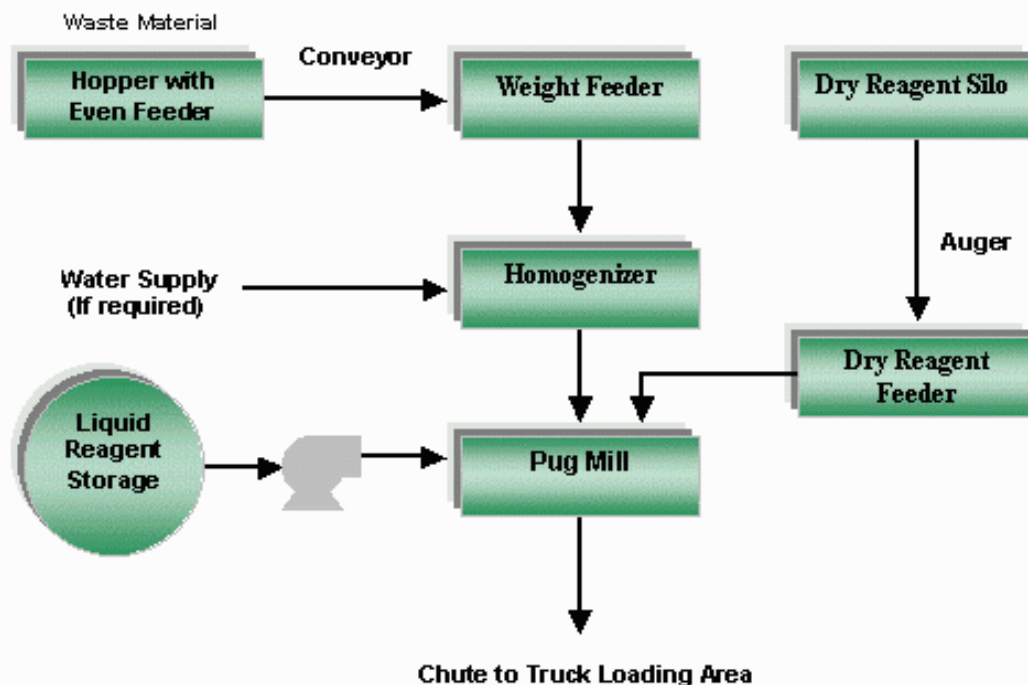
Technology – Solidification/Stabilization

General Description

- Eliminates or minimizes the mobility of contaminants by physical or chemical means.
- Contaminants are physically bound or enclosed within a stabilized mass, or chemical reactions are induced between the stabilizing agent and contaminants to reduce their mobility

Potential Contaminants:

- U, Tc-99, Cr(VI)



Ex Situ Solidification/Stabilization Process (<http://www.frtr.gov/>)

Technology – Solidification/Stabilization

State of Development

- Field demonstrations and full-scale applications have been completed for mobile and semi-mobile contaminants

Limitations/Development Needs

- Long-term effectiveness is dependent on final waste form to sustain reduction in contaminant mobility
- Mixtures of contaminants with varying characteristics and heterogeneous soils require more complex solidification/stabilization formulations and treatment trains

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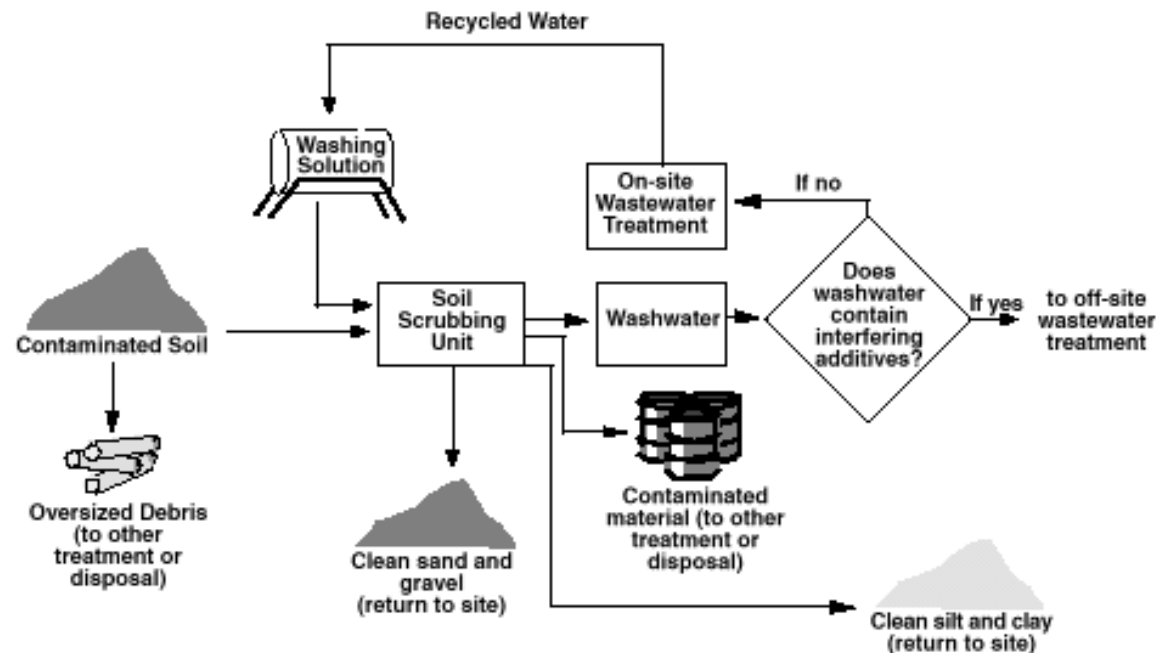
Technology – Soil Washing

General Description

- Water-based technology where excavated soils are scrubbed to remove contaminants
- Process removes contaminant from soil by dissolving or suspending the contaminants in the wash solution or by concentrating them by particle size

Potential Contaminants:

- U, Tc-99, I-129, nitrate, CCl_4



Generic Soil Washing Process (<http://www.p2pays.org/>)

Technology – Soil Washing

State of Development

- Technology has been demonstrated; driven by binding process between the contaminants and soil particles (adsorbed or precipitated)
- Pilot tests conducted at 100 Area at Hanford, with moderate mass reduction

Limitations/Development Needs

- Mixtures of contaminants with varying characteristics and heterogeneous soils require complex soil washing formulations and treatment trains
- Some of the contaminants at Hanford appear to be strongly bound to the surfaces of all particle sizes, which require more aggressive approaches to be effective

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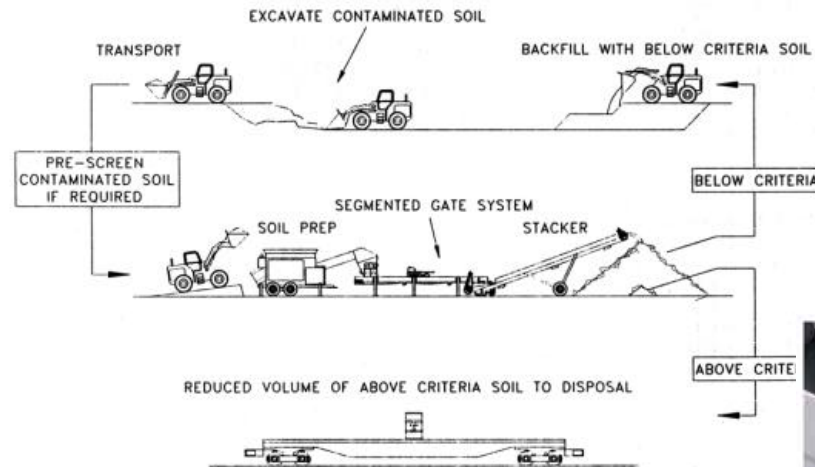
Technology – Soil Sorting/Screening

General Description

- Clean soil fractions are separated from the contaminated based upon radioactive energy emissions from the soil
- Soil passes under an array of radiation detectors that are used to determine the radioactivity present. Soil exceeding defined criteria is mechanically separated from the clean soil

Potential Contaminants:

- U, I-129



Segmented Gate System (<http://www.clu-in.org/>)



Technology – Soil Sorting/Screening

State of Development

- Fully functional prototype has been developed and deployed
- Effective for gamma-emitting radionuclides, possibly beta-emitters

Limitations/Development Needs

- Site-specific testing of soils would be required
- Hanford soils will need pre-screening (remove large cobbles and boulders) to make amendable to processing on a conveyor at 1-2 inches thick
- Technology works better when contaminant is present at higher activity levels and heterogeneously distributed

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Technology – Disposal: Backfill Treated Soil

General Description

- Backfill is natural or engineered material that is used to fill in voids left after excavation efforts
- Treated soil meeting specification can be used as backfill

Potential Contaminants:

- All



Soil Distribution over Site in Preparation for Backfill and Compaction

Technology – Disposal: Backfill Treated Soil

State of Development

- Fully mature technology that is a well-proven, highly effective approach for restoring site surface conditions
- Backfilling of soils have been extensively used in remediation projects where soil excavation was conducted

Limitations/Development Needs

- Backfill must meet the specifications established for the restoration of the site

Lab Testing Only	Field Testing Only	Limited Field Application	Remediation Ready (limited application)	Remediation Ready
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Technology – Disposal: On-site Landfill

General Description

- Waste and material generated during remediation activities are disposed of within the site boundaries
- Disposal of excavated soil at onsite engineered landfill [Environmental Restoration Disposal Facility (ERDF)]

Potential Contaminants:

- All



The Environmental Restoration Disposal Facility (ERDF)

Technology – Disposal: On-site Landfill

State of Development

- On-site disposal of waste is a fully mature technology
- On-site waste disposal in the ERDF is a common practice at Hanford. The ERDF continues to provide an effective on-site disposal option for waste.

Limitations/Development Needs

- Limits on waste volumes and contaminant concentrations and radioactivity must be considered
- Current on-site disposal availability must be evaluated to determine capacity and waste acceptability

Lab Testing Only	Field Testing Only	Limited Field Application	Remediation Ready (limited application)	Remediation Ready
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Technology – Disposal: Off-site Landfill/Repository

General Description

- Waste and material generated during remediation activities are disposed of off-site, outside the site boundaries
- Required for contaminated soil that onsite disposal is not acceptable or adequate

Potential Contaminants:

- All



Energy Solutions Clive Utah Facility (<http://www.energysolutions.com>)

Technology – Disposal: Off-site Landfill/Repository

State of Development

- Off-site disposal of waste is a fully mature technology

Limitations/Development Needs

- Landfill limits on waste volumes and contaminant concentrations and radioactivity must be considered
- Significant transportation would be required to move waste off-site

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