

Management and Practice of Environmental Remediation and Facility Disposition

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OUTLINE

- I. Management System
- II. Environmental Remediation & Facility
Disposition Practices
- III. Discussion

I. Management System

- Planning
 - Policy
 - Strategy
- Execution
 - Request for Proposal
 - Preliminary Site Visit
 - Proposal Review and Selection
 - Operation and Monitoring

I. Management System - continue

- Closeout
 - Performance Evaluation
 - Lessons Learned
 - Document Archive
- Case Study

Policy

- Drivers – enforce the action
- End-State – determine clean-up level
- Baseline – define project quantitatively

Driver

- Regulation
 - Federal, State, Local/Tribal
 - Act, Executive Order, Agency Order, Regional Ordinance
 - CERCLA, RCRA, NEPA, EIA, ARAR, TBC
- Organizational (e.g., administrative close out)
- Contractual (e.g., site operating contracts)

End-State

- Unrestricted use
 - Industrial
 - Commercial
 - Residential
- Restricted use
 - Industrial
 - Natural Reserve
 - Maintain Current Ownership
- Ceased use
 - Mothballed
 - In-situ Disposition

Baseline

- Quantitatively plan the scope, cost, schedule, and technical requirement for a defined project
- Establish criteria for measuring the status of resources and the progress of a project

Strategy

- Critical Decision (CD) – Initiated by Office of Engineering and Construction Management of the U.S. Department of Energy (DOE)
- CD consists of five phases in project life cycle development (see Figure 1)

Critical Decision

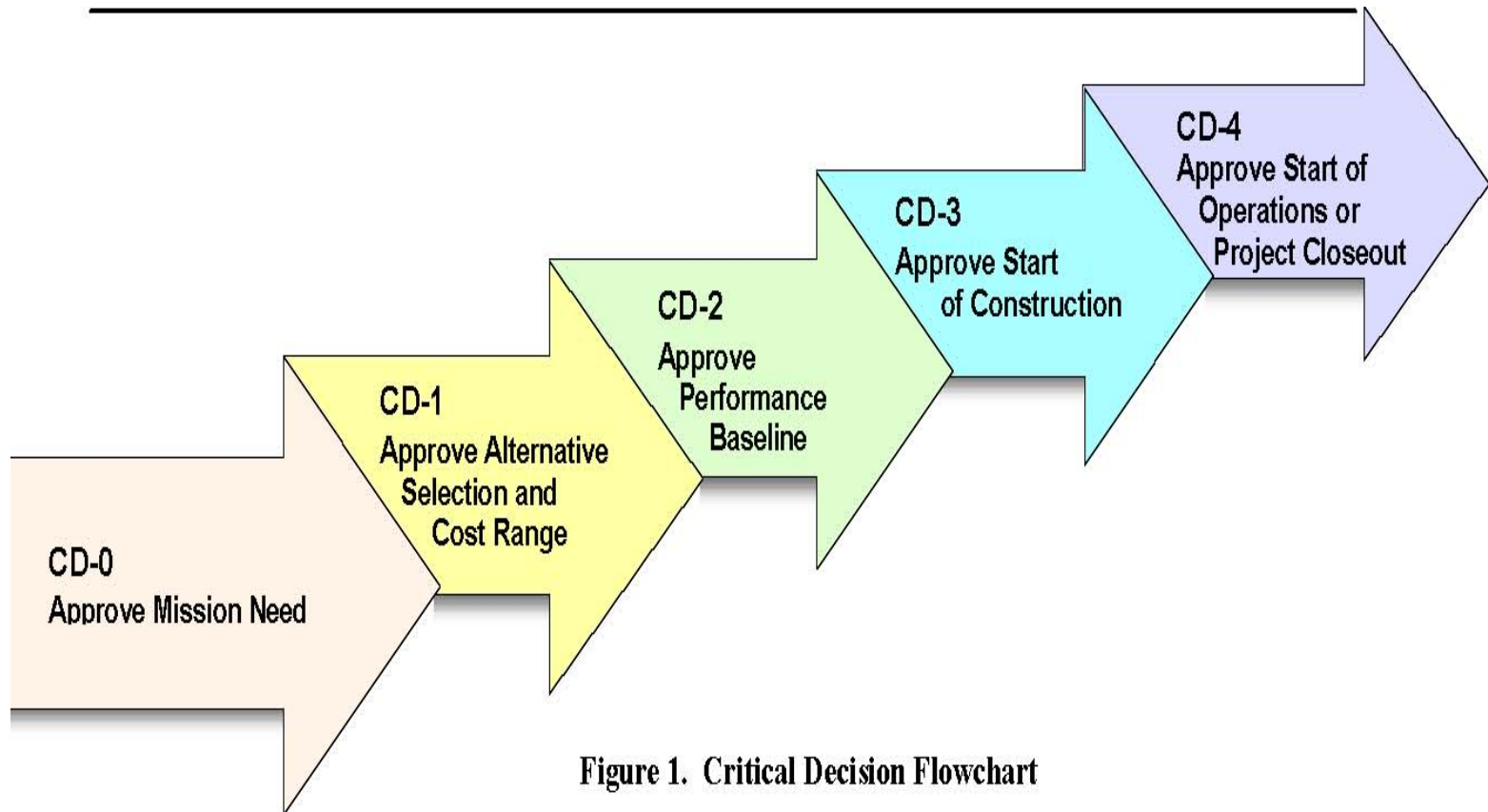


Figure 1. Critical Decision Flowchart

Critical Decision

- Critical Decision-0, Approve Mission Need
- Critical Decision-1, Approve Alternative Selection and Cost Range
- Critical Decision-2, Approve Performance Baseline
- Critical Decision-3, Approve Start of Construction
- Critical Decision-4, Approve Start of Operations or Project Closeout.

CD-0 Key Milestones/Activities

- Mission Need Statement
- Program Requirements Document
- Establish Project Team
- Preliminary Environmental Strategy
- Technical Organizational Interfaces
- Integration with other projects and activities
- Mission need independent project review if required

CD-0 Key Milestones/Activities - continue

- Preliminary Acquisition Strategy
- Preliminary Project data sheet for design with special procurement disclosure
- Minimum technical and functional requirements
- Preacquisition development plan
- Total Project Cost and schedule ranges
- Technology development issues

CD-1 Key Milestones/Activities

- Define project objectives
- Establish existing facilities baselines
- Establish initial budgets
- Review design alternatives
- Identify project codes, standards, and procedures
- Evaluate alternative site locations
- Establish technical and functional requirements
- Establish project baseline ranges
- Perform safety and operability reviews

CD-1 Key Milestones/Activities - continue

- Verify performance criteria
- Perform life cycle cost analysis
- Prepare project Risk Management Plan
- Identify and control interfaces
- Prepare Conceptual Design Report
- Prepare Acquisition Strategy
- Source Selection Plan or Business Clearances
- Project Data Sheet for Design
(Undersecretary/Administrator validated)
- Preliminary Hazard Analysis Report

CD-1 Key Milestones/Activities - continue

- Preliminary Project Execution Plan (PEP)
- Design/funding estimate
- Preliminary baseline ranges (cost, schedule)
- Undersecretary/Administrator develops Project Engineering and Design funding pool
- Project expectations summary
- Statements of Work for anticipated contractors
- Systems Engineering Management Plan
- Plan of action for those activities to be performed before Critical Decision-1

CD-2 Key Milestones/Activities

- Review and verify Integrated Project Team organization and skills and finalize the Team Execution Plan
- Assess the Earned Value Management System
- Initiate performance reporting
- Prepare project data sheet for construction
- Perform a Preliminary Design Review
- Implement trending program
- Develop project specifications, drawings, procurement packages, and construction packages
- Finalize permit requirements
- Approve safety documents (e.g., Preliminary Safety Analysis Report)

CD-2 Key Milestones/Activities - continue

- Budget and Congressional authorization and appropriations enacted
- Update PEP
- Commit critical equipment, requisitions
- Perform process hazards review
- Project site selection
- Update scope, cost, and schedule (performance) baselines
- Execution Readiness Independent Review
- Mission need verification

CD-2 Key Milestones/Activities - continue

- Detailed schedules and cost estimates
- Authority/Responsibility matrix
- Performance metrics
- Staffing plans
- Technical risk analysis report
- Technology development output
- Assess Value Management/Engineering status
- Complete design model
- Conduct Independent Cost Review/Independent Cost Estimates and Independent Project Review
- Prepare Critical Decision-2 package
- Conduct technical innovations evaluation

CD-3 Key Milestones/Activities

- Finalize field support plan
- Review Safety Action Plan
- Perform final design review
- Prepare definitive cost estimate
- Prepare detailed resource-loaded schedule with measurable milestones
- Prepare equipment and material requisitions

CD-3 Key Milestones/Activities - continue

- Obtain approval to initiate construction activities
- Complete procurements of materials and equipment
- Perform procurements and construction
- Start systems completion
- Work off punch list items
- Develop Turnover and Startup Plan
- Prepare Operating and Maintenance Manuals
- Execution Readiness External Independent Review

CD-4 Key Milestones/Activities

- Startup testing
- Prepare intent to occupy and occupancy checklist
- Initiate document and project closeout process
- Completion of procurement and construction
- Perform systems completion testing
- Verify performance criteria
- Prepare lessons learned report

CD-4 Key Milestones/Activities - continue

- Perform readiness self-assessment
- Approve for acceptance
- Prepare and complete as-built drawings, if required
- Verify readiness to initiate operations
- Support DOE's Operational Readiness Review (ORR) activities, if applicable
- Prepare project completion report
- Complete financial closeout
- Hold satisfaction meeting

Tailored Critical Decisions

- CDs may be approved simultaneously for project with low complexity, it should be noted in mission need statement
- Environmental restoration and facility disposition are driven by CERCLA and RCRA, due to statutory time limits, potential fines, extensive documentation requirements, the critical decisions and thresholds for these two project types may be considerably different from those of the system project model

Environmental Restoration Project

Critical Decisions

- Critical Decision-1, Approve Alternative Selection and Cost Range
- Critical Decision-0, Approve Mission Need
- Critical Decision-2/3, Approve Performance Baseline and Authorization to Implement
- Critical Decision-4, Approve Start of Operations or Project

Facility Disposition Project Critical Decisions

- Critical Decision-0, Approve Mission Need
- Critical Decision-1/2, Approve Alternative Selection and Performance Baseline
- Critical Decision-3, Approve Start of Construction
- Critical Decision-4, Approve Start of Operations or Project Closeout

Execution

Request for Proposal

- Public Announcement
- Preliminary Proposal
- Full Proposal

Preliminary Site Visit

- Security & Safety
- Non-disclosure Agreement

Proposal Review and Selection

- Source Selection Official
- Technical Evaluation Committee

Operation and Monitoring

- Milestone
- Cost

Closeout

Performance Evaluation

- Technical Evaluation Committee
- Award-plus contract

Lessons Learned

- Project Owner
- Contractor

Document Archive

- Planning to Closeout

Case Study

Slides Presentation

II. Environmental Remediation & Facility Disposition Practices

- Landfill Remediation
- Re-Industrialization
- Natural Reserve
- In-situ Disposition

Coakley Landfill – Site Description

- Coakley Landfill site is privately owned and located in Greenland and North Hampton, New Hampshire. The site is a 92-acre parcel of land that was operated by several municipalities. The landfill area encompasses 27 acres in the southern portion of the site. The site accepted municipal and industrial wastes from the Portsmouth area between 1972 and 1982. Incinerator residue was also accepted from the incineration recovery plant for the Refuse to Energy Project between 1982 and 1985.

Threats and Contaminants

- On-site groundwater is contaminated with arsenic, phenol, and methyl ethyl ketones; off-site groundwater is contaminated with heavy metals including arsenic, chromium, and lead, and volatile organic compounds (VOCs) including benzene and methyl ethyl ketones. On-site soil and sediments are contaminated with arsenic and lead. Stream sediments contain contaminants such as arsenic and VOCs. Leachate contamination at the site includes VOCs, tetrahydrofuran, and ketones. Metals and VOCs were detected in nearby wetlands. Potential use of the groundwater as a water supply is the main threat to human health.

Cleanup Approach

- Removal and Remedial Actions (involving source control and management of migration).
- In 1989, North Hampton extended a municipal water supply line to residents who had been obtaining their water from 13 private wells contaminated with VOCs. The State set up a residential well monitoring program with an early warning system to detect any groundwater contamination in the area.

Source Control

- State conducted an investigation from 1986 to 1987. The goals of the field work were to characterize the hydrogeologic conditions at the site.
- Based on the results of the study, a cleanup remedy was selected in a June 1990 Record of Decision (ROD) that included consolidating approximately 2,000 cubic yards of wetland sediments; consolidating approximately 30,000 cubic yards of on-site solid waste; fencing and capping the landfill; collecting and treating landfill gases by thermal destruction; extracting groundwater and treating it with a combination of chemical, biological, and physical processes; and establishing long-term monitoring and institutional controls.

Source Control - continue

- A Consent Decree was issued in 1992 by which 30 parties agreed to design, construct, and operate the source control remedy. A second Consent Decree was issued in 1999 whereby 28 parties agreed to implement the remedy for management of groundwater.
- Construction of the cap was completed during the summer of 1998. Passive collection and venting of landfill gases was allowed through the issuance of an Explanation of Significant Differences (ESD) in 1996. Another ESD was issued in 1999 which documented the determination that leachate collection and treatment was not needed.

Ground Water Migration

- The EPA began a study in 1990 of the migration of contaminants into off-site groundwater and the ecological effects of the site contamination on adjacent wetlands. In the fall of 1994, a groundwater remedy was documented in a second ROD that included imposing institutional controls to prevent the use of contaminated groundwater, allowing groundwater to clean itself through natural attenuation, and long-term monitoring. Negotiations with the potentially responsible parties to undertake the off-site groundwater remedy were successfully completed in 1998 and the parties are presently conducting environmental monitoring and attempting to implement the required institutional controls.

Current Site Status

- An Explanation of Significant Differences was issued by EPA in September 1999, to eliminate a portion of the original remedy which called for a pump and treatment system for the landfill leachate. This 1999 decision was based on the fact that groundwater monitoring data obtained for about three years with the impermeable cap in-place indicated that natural attenuation would reach clean up levels in groundwater at about the same time as active treatment. Landfill gas and groundwater monitoring are continuing on a routine basis. Institutional controls to prevent the use of contaminated groundwater are currently being implemented.



Final Landfill Cap at Coakley Lanfill Site

Davis (GSR) Landfill – Site Description

- The 58-acre Davis (GSR) Landfill site includes a 21-acre inactive landfill located in the Towns of Glocester and Smithfield, RI. Between 1974 and 1976, the landfill, which was privately owned and licensed by the State to accept municipal wastes, accepted wastes from Glocester, Smithfield, Warwick, and Providence. In 1978, the State declined to renew the landfill's license because the facility had violated numerous rules and regulations for operating solid waste management facilities. Numerous legal actions to close the landfill ensued, and the State Supreme Court ruled in favor of the State in 1982, at which time the landfill became inactive. However, the landfill was never properly capped or stabilized. The State found both surface water and groundwater contamination on-site. Approximately 200 residents who use private water wells live within a 1-mile radius; there are approximately 4,700 people within a 3-mile radius using private wells.

Threats and Contaminants

- On-site groundwater, surface water, and sediments are contaminated with low levels of VOCs, such as vinyl chloride and benzene, polycyclic aromatic hydrocarbons, and heavy metals including manganese, arsenic, and lead. Surface water and sediments are contaminated with the pesticides, chlordane and dichlorodiphenyl trichloroethane (DDT).

Cleanup Approach

- The site has been addressed in a long-term remedial phase focusing on cleanup of the entire site.
- EPA completed a Remedial Investigation at this former municipal landfill in the Fall of 1994. EPA's investigations revealed that groundwater had levels of manganese and arsenic that migrated beyond the boundaries of the landfill. There was some indication that future risk to human health could occur, if persons were to drink the groundwater beneath the landfill immediately adjacent to the waste boundary, over a 70 year lifetime.
- In September 1997, EPA announced its decision that no further cleanup action was needed at the site. EPA and the State agreed to continue to monitor the site for any potential future risks, and revisit the no action decision if conditions at the site changed. To date, no changes in the site conditions have been reported.

Current Site Status

- After public hearings and receiving public comment in the Fall of 1997, EPA issued a Record of Decision (ROD) recommending that monitoring of residential wells in the nearby vicinity of the site continue on an annual schedule, and that no further remedial action was to be taken at the site. In August 1999, the site was deleted from the National Priorities List (NPL).

Current Site Status - continue

- Since 1999, EPA and the State have conducted five rounds of residential well testing near the site and found no site-related contamination in private residential wells located downgradient from the site. Several tested residential wells in the adjacent watershed had inorganic compounds, such as arsenic and lead, detected in excess of the Maximum Contaminant Levels for drinking water quality. These inorganics are believed to be naturally occurring and not related to the site.

Current Site Status - continue

- The testing results have been provided to the Rhode Island Department of Health, which distributes the results to the home owners and can apply policies the Department uses in other areas of the State with elevated naturally occurring inorganics. In September 2002, EPA issued a discretionary Five-Year Review report which determined that the No Action decision in the 1997 ROD remained protective of human health and the environment. No additional Five-Year Reviews are planned for this site in a future, and no future cleanup actions at the site are anticipated.

Ashtabula – Site Description

- The RMI Extrusion Plant (RMI) is privately owned 26-acre site in the city of Ashtabula, Ohio. The subcontracted work performed for DOE included extrusion of depleted uranium, and of slightly enriched uranium ingots into rods or tubes. RMI holds a Nuclear Regulatory Commission (NRC) license and a Resource Conservation Recovery Act of 1976 (RCRA) permit to store mixed wastes, granted by the EPA.

Threats and Contaminants

- RMI is the geographic center of the Fields Brook NPL Site, for which the Agency for Toxic Substances and Disease Registry (ATSDR) released a completed public health assessment on November 7, 1986. In the original public health assessment, ATSDR concluded that portions of Fields Brook and its tributaries were contaminated with toxic chemicals, and that exposure to contaminants by way of absorption through skin or through ingestion may present an unnecessary health risk to young children.

Current Site Status

- The Closure Project was completed in 2006 and 42 acres have been returned by DOE to the owner for unrestricted industrial reuse.



An aerial photo of the Ashtabula Site in Ohio taken in 2000 before cleanup had begun



An aerial photo of the Ashtabula Site in 2006 after cleanup had been completed

Rocky Flats – Site Description

- From 1951 until 1989 the Rocky Flats Plant manufactured the trigger mechanism for nearly every nuclear weapon in the United States. The manufacturing processes resulted in radiological and hazardous material contamination; including plutonium, uranium, beryllium and hazardous chemical compounds, that were released into the air, ground and water surrounding the plant.

Rocky Flats Restoration

- In 1991 DOE began restoration of the site which included clean up of six waste pits, soil and groundwater remediation, waste treatment and disposal, demolition of over 300 buildings, and ecological restoration of 900 acres of the site.

Site Current Status

- In 2005, DOE certified the environmental cleanup work at the former Rocky Flats site complete. The 10-year environmental cleanup of the site cost approximately \$7 billion and finished more than 50 years ahead of initial forecasts and for nearly \$30 billion less than estimated in 1994. Since 2005, DOE has worked to finalize regulatory requirements and prepare to transfer the site to Fish and Wildlife Services (FWS).

Site Current Status

- In 2005, the FWS announced a comprehensive conservation plan and associated environmental impact statement for the refuge that creates a management framework for the next 15 years. Pursuant to the plan, public use will increase gradually over the 15-year life of the plan, as resources become available.

Site Current Status

- The cleanup activities were completed in 2006. DOE will retain approximately 1,300 acres in the center of the site for long-term surveillance and maintenance. This area is protected by physical and institutional controls and contains surface and groundwater monitoring equipment, four groundwater treatment systems, and two closed landfills.

Site Current Status

- In May 2007, the U.S. Environmental Protection Agency completed regulatory certification and released the lands for unrestricted use as a National Wildlife Refuge.



An aerial photo of the Rocky Flats Site located in Colorado taken before cleanup had begun



An aerial photo of the Rocky Flats Site located in Colorado taken in 2006 after cleanup had been completed



The last building comes down at the Rocky Flats



Seeding the original landfill at the Rocky Flats

Re-Industrialization at ETTP

Mission

- Accelerate cleanup of the East Tennessee Technology Park (ETTP) Heritage Center by making underutilized assets (e.g., buildings, land, equipment) available to the commercial sector for economic development and developing a self-sustaining industrial complex at ETTP.

Background

- The Reindustrialization Program began in 1996 as a means to accelerate cleanup of ETTP; cleanup was accomplished by:
 - reducing utility and surveillance/maintenance costs
 - utilizing underutilized assets to leverage private sector companies to perform mission-related cleanup work.
- At Program inception leasing real property was the only available tool.
- The 10 CFR 770 legislation provided DOE with a tool to move the program to the next step – title transfer of real property to the private sector.
- Transfer of real property advances the Heritage Center vision of becoming a private sector industrial park.

Partners

Development of the West End of Oak Ridge is

Supported by Many Organizations including:

Anderson County – Roane County – City of Oak
Ridge

Community Reuse Organization of East
Tennessee – Rarity Ridge

State of Tennessee – Tennessee Valley Authority -
U.S. Department of Energy



Six former office buildings totaling ~ 283,000 square feet of space at ETTP have been transferred to the Community Reuse Organization of East Tennessee. These efforts have helped diversify the regional economy by endorsing private sector investment and creating new jobs.



Before re-Industrialization had begun



After re-Industrialization had been completed:

- Productive reuse of former plant
- Sustainable private industrial park
- Compatible with nearby commercial and residential development

Ceased Use

- Mothballed
- In-situ Disposal



Deactivated and Mothballed Facility
End-State is Clean Closed – leaving
contaminants below approved limits

In-Situ Disposition

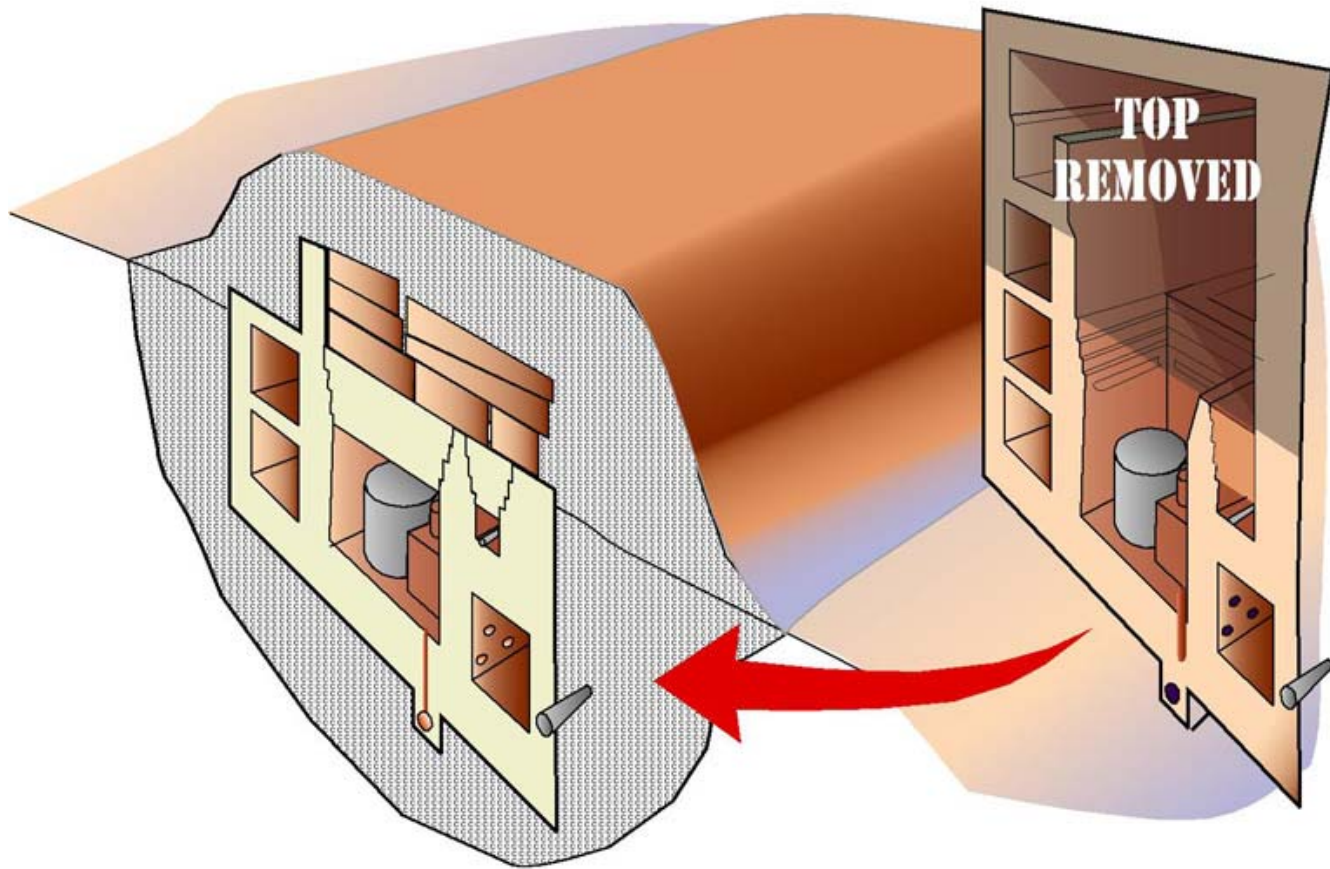
- In-situ disposition will leave some levels of fixed contamination and equipment in place
- Largest sources remain at site
- Contaminated above grade equipment will be removed
- Below grade spaces, drains and equipment will be grouted in place
- Structure will be sealed to prevent intrusion by humans and animals



Before In-Situ Disposition had begun



After In-Situ Disposition had been completed



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Entombment Cover System

III. Discussion

- National Academy of Sciences (NAS) Recommendations on D&D
- Selection of Assessment Tools
- Roles of R&D
- Property Management
- Cost v.s End-State
- Key Concerns
- Priority Concerns
- Communication
- Business/Market Opportunity

National Academy of Sciences Recommendations on D&D

- Characterization
- Decontamination of equipment & facilities
- Remote intelligent systems
- End-state definition

Selection of Assessment Tool

- Risk assessment
 - Safety
 - Environmental
 - Project
 - Program
- Qualitative vs Quantitative

Roles of R&D

- R&D can develop advanced technology & technical practice to reduce the cost, schedule, and risk – should we wait?
- Joint effort with public, commercial, academic, and foreign experts to meet technology needs - where is the leverage point?

Real Property v.s. Personal Property

- Real Property is tied to the land; Includes open land, buildings, fences, building appurtenances, other improvements
- Personal Property is portable and not tied to the land; Includes materials, equipment, the contents of containers or truck beds, privately owned materials

Release of Real Property

- Facilities and to private properties that are being prepared for release are subject to the requirements of Section 120(h) of the Comprehensive Environmental Response CERCLA, as amended, concerning hazardous substances; and
- To any other applicable Federal, State, and local requirements.

Cost v.s. End-State

- Clean-up level: $10(-6) - 10(-9)$
- Cost level: $10(6) - 10(9)$
- Compromise

Key Concerns

- When
- Where
- Who
- Why
- How

Priority Concerns

- Safety
- Safety
- Safety

Communication

- Transparent
- Coordination
- Documentation
- Private v.s. Government

Business/Market Opportunity

- Domestic
- International