Remedial Action Cost Engineering and Requirements System - *RACER™*

Federal Remediation Technologies Roundtable

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RACER™ Overview

- Background
- RACER™
- TankRACER
- DOE Models
- Future

Integrity - Service - Excellence
System originally developed in 1991 under Air Force (HQ AFCESA) funding for estimating environmental remediation projects to support the budget
- PC-based
- Uses patented methodology for estimating program costs
- Estimates are location-specific
- Uses current multi-agency pricing data -- researched and updated annually to ensure accuracy
Why do we use it?

To accurately estimate program costs for all phases of remediation

- To develop environmental restoration Cost to Complete (CTC) estimates for the DoD Services budget
- Evaluate/compare Remediation Technologies and Scenarios
- Select Site Investigation Methods
- Plan Remediation Efforts
- Estimates to Support Regulatory Negotiation and/or Pre-Construction Activities
How does it work?

• Select the desired models from a list of available technologies
• Define the required parameters in the selected technology
• Tailors the estimate by verifying and editing secondary parameters
• Calculates quantities for each technology
• Localizes unit costs for materials, equipment, and labor
• Adjusts unit prices for safety and productivity losses
• Applies markups to account for indirect costs
What does it do?

- Full lifecycle costs for:
  - Hazardous wastes
    - CERCLA & RCRA
  - Petroleum releases
  - Radioactive facility decontamination and demolition
  - Ordnance Removal and Clean-up
    - Operational Ranges
    - Other than Operational Ranges
What doesn’t it do?

- Does not estimate emerging technologies consistently and repeatable due to the lack of background information regarding the technologies
- Not designed for projects that deviate substantially from normal engineering practices
- Not designed for use as a scheduling tool
- Does not distinguish between different seasons (weather) and effect on the engineering solution
How is it tied to CFO-liabilities reporting?

• The AF CFO-liabilities report is generated from AFRIMS
  • AFRIMS data is used to create RACER™ estimates
• Provides auditable, traceability records
How is it tied to CFO-liabilities reporting? (cont)

• Helps establish audit trail
  • \textit{RACER}™ includes fields for documenting basis and assumptions
  • \textit{RACER}™ provides a repository for archiving CTC estimates
• Facilitates annual updating for CTC estimates
  • Automatically applies new cost data to prior year estimates
Future Outlook

- Munitions Response modules
  - Integrate the Military Munitions Response Protocol
  - Chemical Hazards Model
- Continual feedback and incorporation of real project/site costs
TankRACER™

- Patented Cost Estimating Tool
- Uses Parametric Methodology
- Based on Generic Engineering Solutions from numerous past projects
- Has over 100 cost models
- User can create an accurate estimate using defaults, or you can create a more specific estimate by changing system defaults

Integrity - Service - Excellence
New in TankRACER™

- Tank RACER™ Database updated to 2003 unit costs
  - Choice of Cost tables to use
  - Importing/Exporting Information
- New Comment Field
- Auto Update Project Costs (Prior Year Costs)
- Ability to see date of database using
- Phytoremediation Technology
- New Professional Management Percentage Template
- New cost summary report (folder level)
- Markup report
Dept of Energy Models

- Removal of Attached Contaminated Materials Model
- Removal of Unattached, Bulk, Stored Contaminated Materials Model
- D&D Size Reduction Technology Model
- Conduit, Pipe, and Ductwork Demolition Model
- Radiological Waste Contaminated Building Demolition Model
- Demolition of Specialty Process Equipment Model
# RACER™ 2003 Cost Models

## Containment
- Capping
- In-situ Biodegradation (Saturated Zone)
- Permeable Barriers
- Slurry Walls
- Storage Tank Installation
- UST Closure / Removal

## Demolition
- Demolition, Buildings
- Demolition, Catch Basins/Manholes
- Demolition, Curbs
- Demolition, Fencing
- Demolition, Pavements
- Demolition, Pipes
- Demolition, Sidewalks

## Discharge
- Discharge to POTW
- Infiltration Gallery
- Injection Wells

## Disposal
- Off-site Transportation and Waste Disposal
- Residual Waste Management

## Documentation
- Administrative Record
- Five-Year Review
- Restoration Advisory Board
- Site Close-Out Documentation

## Ordnance
- Archives Search Report
- OE Removal Action
- OE Site Characterization & Removal Assessment
- OE Sifting
- Ordnance & Explosive Institutional Controls
- Ordnance & Explosive Monitoring
- UXO Active Range Clearance Planning
- UXO Active Target Clearance

## Radioactive
- Contaminated Building Materials
- D & D Sampling and Analysis
- Final Status Survey
- In-situ Vitrification
- Site Characterization Survey
- Surface Decontamination

## Remediation Support
- Bulk Material Storage
- D & D Sampling and Analysis
- Decontamination Facilities
- Groundwater Monitoring Well
- Miscellaneous Field Installation Monitoring
- Natural Attenuation
- Ordnance & Explosive Institutional Controls
- Ordnance & Explosive Monitoring
- Professional Labor Management
- Remedial Design
- Residual Waste Management
- Trenching/Piping
- User Defined Estimate

## Removal
- Asbestos Removal
- Contaminated Building Materials
- Drum Staging
- Excavation
- Free Product Removal
- French Drain
- Groundwater Extraction Wells
- Residual Waste Management
- Special Well Drilling & Installation
- Surface Decontamination
- Transportation
- UST Closure / Removal

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## Site Work & Utilities
- Access Roads
- Cleanup and Landscaping
- Clear and Grub
- Fencing
- Load and Haul
- Overhead Electrical Distribution
- Parking Lots
- Resurfacing Roadways/Parking Lots
- Sanitary Sewer
- Sprinkler System
- Storm Sewer
- Water Storage Tanks

## Studies
- Archives Search Report
- Corrective Measures Study
- Feasibility Study
- Final Status Survey
- Groundwater Monitoring Well Monitoring
- OER Site Characterization & Removal Assessment
- Petroleum UST Site Assessment
- Preliminary Assessment
- Professional Labor Management
- RCRA Facility Investigation
- Remedial Investigation
- Site Characterization Survey
- Site Inspection
- Special Well Drilling & Installation
- User Defined Estimate

## Treatment
- Advanced Oxidation Processes
- Air Sparged Hydrocyclone
- Air Sparging
- Air Stripping
- Bioslurping
- Bioventing
- Carbon Adsorption (Gas)
- Carbon Adsorption (Liquid)
- Coagulation/Flocculation
- Dewatering (Sludge)
- Ex-situ Bioreactors
- Ex-situ Land Farming
- Ex-situ Solidification/Stabilization
- Ex-situ Vapor Extraction
- Heat Enhanced Vapor Extraction
- In-situ Biodegradation (Saturated Zone)
- In-situ Land Farming
- In-situ Solidification
- Low Level Rad Soil Treatment
- Media Filtration
- Metals Precipitation
- Neutralization
- Off-site Transportation and Thermal Treatment
- Oil/Water Separation
- On-site Incineration
- On-site Low Temp. Thermal Desorption

## Treatment (cont.)
- Passive Water Treatment
- Phytoremediation
- Soil Flushing
- Soil Vapor Extraction
- Soil Washing
- Solvent Extraction
- Thermal & Catalytic Oxidation

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**Integrity - Service - Excellence**
- **Removal of Attached Contaminated Materials Model**: The actual work to dismantle and/or remove hazardous materials and components such as electrical wires and components, contaminated instrumentation and controls, building insulation, filters, and other attached material and components. The contractor is responsible for calculating amount of waste generated as a result of these dismantling and removal activities, and the packaging, loading, hauling and disposal of these waste.

- **Removal of Unattached, Bulk, Stored Contaminated Materials Model**: The Removal of Unattached Hazardous Materials technology estimates the costs for the packing, transfer, and removal of unattached hazardous materials and staged waste. This technology addresses the removal costs of hazardous materials in the form of contaminated liquids (draining and/or pumping of contaminated water, oil, sodium, fuel, and other fluid), solids (i.e., chemicals, process materials, filters, or other solids designated as hazardous), and sludges that were utilized or stored at the facility. This technology also includes costs for containers that are required to ship hazardous materials. Transportation and disposal costs should be calculated using the Residual Waste Management technology.

- **D&D Size Reduction Technology Model**: The actual work to reduce materials in volume after having been removed from the facility. Direct work shall include planning the work, daily pre-evolution briefing, donning and doffing personal protective equipment, obtaining and employing hand held power and manual equipment, size reducing operations such as crushing (compacting and super-compacting), thermal cutting, mechanical cutting, other size reduction technologies, and monitoring personnel for radiological and hazardous exposure. The model will not contain the cost of obtaining size reduction technologies unless they are portable and could be leased.
Conduit, Pipe, and Ductwork Demolition Model: The actual work to remove radiologically contaminated building systems including electrical conduit, compressed and breathing air, plumbing and process piping, and HVAC ductwork and filter plenums. Direct work shall include planning the work, daily pre-evolution briefing, donning and doffing personal protective equipment, obtaining and employing hand held power and manual equipment, actual removal of systems, erecting and removing equipment to get to the work such as ladders and scaffolding, monitoring personnel for radiological and hazardous exposure. The model shall not include asbestos removal or draining of process piping systems.

Radiological Waste Contaminated Building Demolition Model: Demolition of radiologically contaminated building using explosives, tripping, shearing, and or using mechanical means such as bull dozer, wreaking balls, a combination of these or other means that are appropriate. Model will identify the applicable techniques or methods for demolition and consider type of building (single, multistory, high bay, etc.), Type and extent of contaminant and contamination, and building material of construction (concrete, reinforced concrete, aluminum siding, corrugated steel, wood, masonry, or combination of these materials). Calculation will show amount of waste generated and loading and hauling of demolished materials. Additionally, the cost estimate should show the costs associated with each technique or equipment utilized. Direct work would include planning the work, daily pre-evolution briefing, donning and doffing personal protective equipment, obtaining and employing hand held power and manual equipment, actual removal of systems, erecting and removing equipment to get to the work such as ladders and scaffolding, monitoring personnel for radiological and hazardous exposure.
Demolition of Specialty Process Equipment Model: Dismantlement, removal, or demolition of radiologically contaminated specialty process equipment such as bridge crane, trolley, pipe racks, pumps, compressors, glove box, tanks, heat exchangers, permanent and attached monitoring and sampling devices, or other treatment equipment (i.e. ion exchange, GAC columns, aerators, etc.). Model will include calculating the amount of waste generated and the loading and hauling of these specialty equipment and components for packaging or disposal. Model will show the techniques or equipment to use to dismantle, remove, or demolish the specialty process equipment taking into consideration the material for construction and geometry of the specialty equipment. Direct work would include planning the work, daily pre-evolution briefing, donning and doffing personal protective equipment, obtaining and employing hand held power and manual equipment, actual removal of systems, erecting and removing equipment to get to the work such as ladders and scaffolding, monitoring personnel for radiological and hazardous exposure.