

Headquarters U.S. Air Force

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



**Federal Remediation
Technologies Roundtable**

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RACER™ Overview

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



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Background: Development History

- **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**



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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**



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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**



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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**



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What doesn't it do?

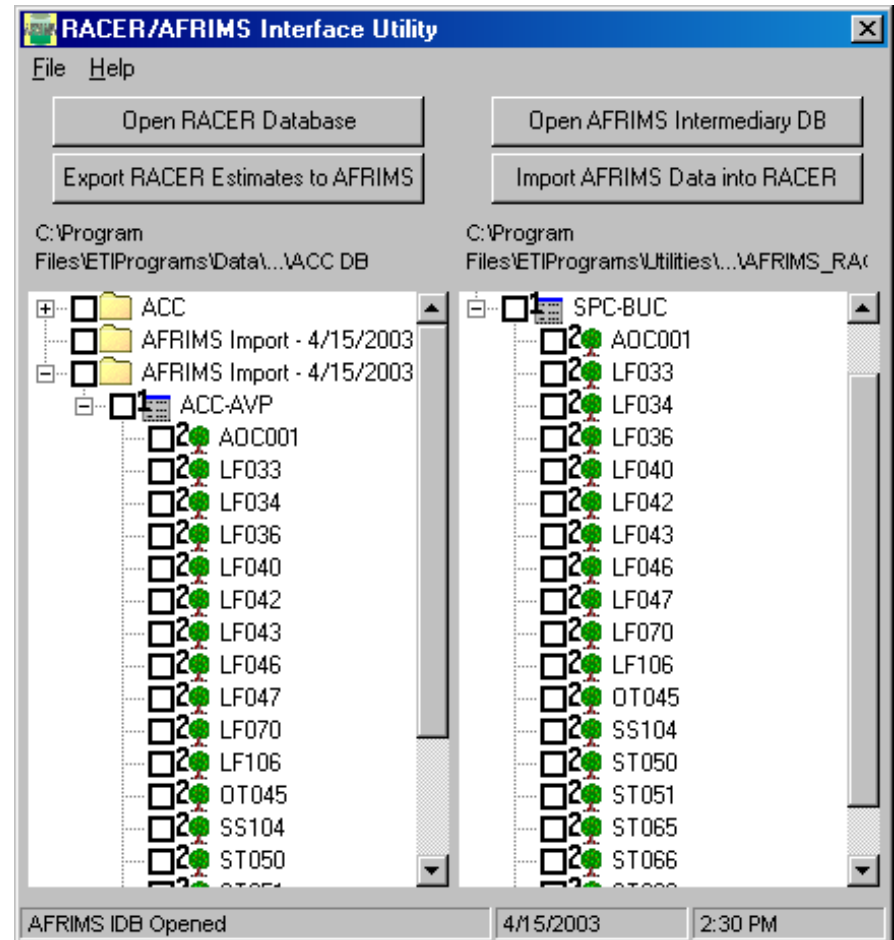
- **Does not estimate emerging technologies consistently and repeatable due to the lack of background information regarding the technologies**
- **Not designed for projects that deviate substantially from normal engineering practices**
- **Not designed for use as a scheduling tool**
- **Does not distinguish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



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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

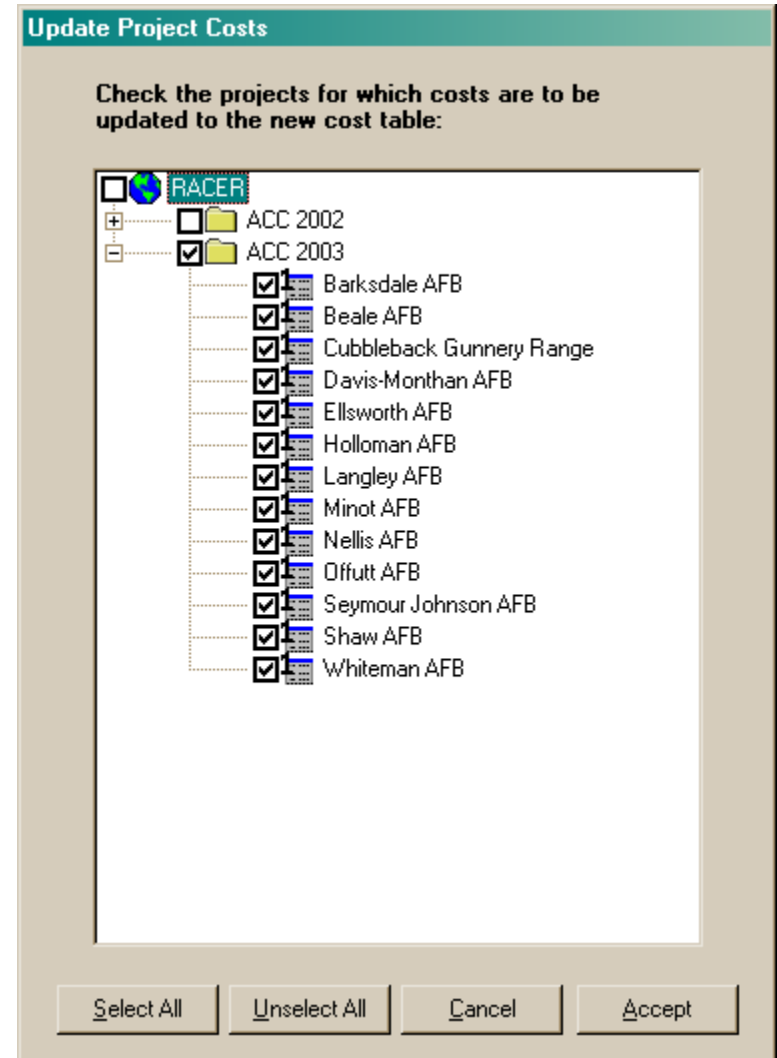




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How is it tied to CFO-liabilities reporting? (cont)

- Helps establish audit trail
 - **RACER™** includes fields for documenting basis and assumptions
 - **RACER™** provides a repository for archiving CTC estimates
- Facilitates annual updating for CTC estimates
 - Automatically applies new cost data to prior year estimates





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Future Outlook

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



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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**



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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



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Dept of Energy

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Dept of Energy Models

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- **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**



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Backup

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RACER™ 2003 Cost Models

Backup

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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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RACER™ 2003 Cost Models (cont.) Backup

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
OE 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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- **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.

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DOE Backup

- **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, wrecking 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.



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- **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.