

Rocky Flats Cleanup
Environmental Restoration



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Site Complexities

- Radionuclides in building materials (5/10; 13)
- Radionuclides in environmental media
- Co-mingled ground water plumes
- 650,000 cubic meters of radioactive waste
- 21 tons of weapons-grade plutonium
- 100 tons of Pu residues (no disposal path)
- Nearly 400 potentially contaminated sites
- Culture of strained relationships and community mistrust

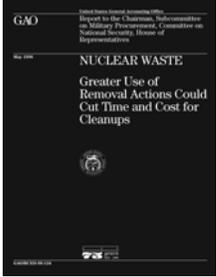
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Closure milestones

- **1989:** production ended; Site listed on NPL
- **1995:** estimated \$37 billion over 65 years
- **1996:** new contractor; new cleanup agreement
- **1996:** new closure date – 2010
- **2001:** new closure date - 2006
- **2005:** December - construction complete
- **2006:** September – Record of Decision
- **2007:** partial delisting; majority of site turned over to USFWS to create new Refuge

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GAO reports



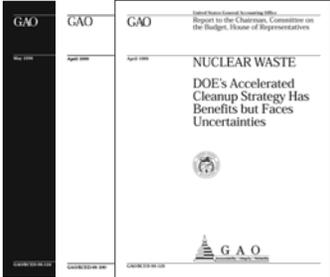
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GAO reports



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GAO reports



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GAO reports

GAO May 2006	GAO April 2006	GAO April 2006	GAO February 2006	Report to Congressional Committees NUCLEAR CLEANUP Progress Made at Rocky Flats, but Closure by 2006 Is Unlikely, and Costs May Increase
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GAO reports

GAO May 2006	GAO April 2006	GAO April 2006	GAO February 2006	GAO April 2006	Report to Congressional Committees NUCLEAR CLEANUP OF ROCKY FLATS DOE Can Use Lessons Learned to Improve Oversight of Other Sites' Cleanup Activities
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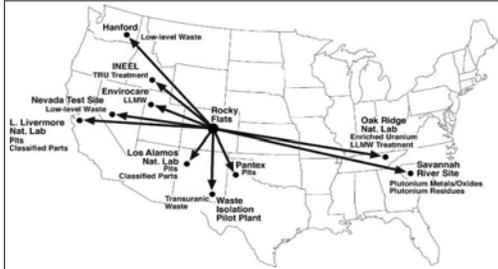
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Elements of Success

- Single site mission
- Closure vision with upfront land use assumptions
- Steady, reliable funding; supportive congressional delegation
- Community & worker acceptance of site closure
- Significant public involvement
- Appropriately-scoped performance-based contract
- Flexible cleanup agreement w/ accelerated decision-making
- Collaborative process among DOE/contractors & regulators
- Technological innovations
- Waste acceptance for a variety of waste streams

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Special Nuclear Material and Waste Shipping



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Regulatory Framework

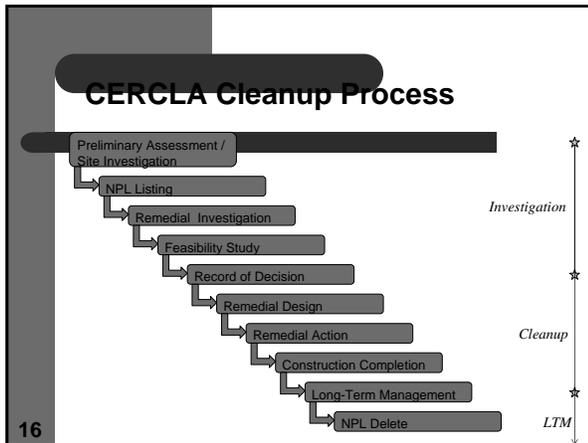
- Atomic Energy Act (AEA)
- Chemical Safety Information, Site Security and Fuels Regulatory Relief Act
- Clean Air Act (CAA)
- Clean Water Act (CWA)
- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or Superfund)
- Emergency Planning and Community Right-to-Know Act (EPCRA)
- Endangered Species Act (ESA)
- Energy Independence and Security Act (EISA)
- Energy Policy Act
- Federal Food, Drug, and Cosmetic Act (FFDCA)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
- Marine Protection, Research, and Sanctuaries Act (Ocean Dumping Act)
- National Environmental Policy Act (NEPA)
- National Technology Transfer and Advancement Act (NTTAA)
- Noise Control Act
- Nuclear Waste Policy Act (NWPA)
- Occupational Safety and Health Act (OSHA)
- Oil Pollution Act (OPA)
- Pollution Prevention Act (PPA)
- Resource Conservation and Recovery Act (RCRA)
- Safe Drinking Water Act (SDWA)
- Shore Protection Act (SPA)
- Toxic Substances Control Act (TSCA)

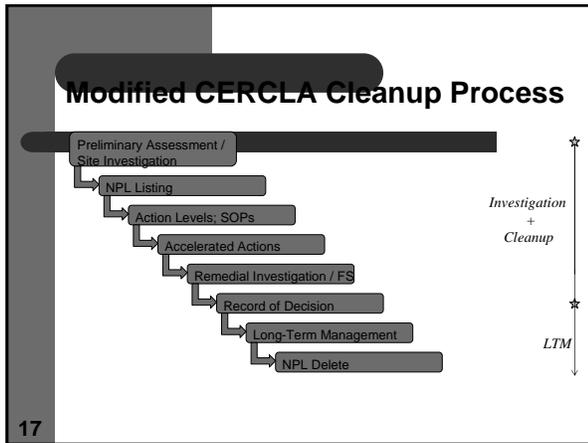
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Regulatory Framework

- State regulations:
 - Radiation Control
 - Solid Waste Disposal
 - Air Pollution Prevention
 - Water Quality Control
 - Hazardous Waste Regulations (RCRA)

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Regulatory Agreements 

- **Compliance Agreement - 1986**
 - Allowed regulation of radioactive & hazardous waste
- **Agreement in Principle (AIP) – 1989**
- **Interagency Agreement (IAG) - 1991**
 - 178 IHSSs in 16 Operable Units
 - Rigid schedule with detailed milestones
 - Treatability studies and characterization reports

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Regulatory Agreements:

Federal Facilities Compliance Act (1992)

1. Removed federal government's sovereign immunity
2. Required DOE to inventory mixed waste
3. Required DOE to develop cleanup plans

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Regulatory Agreements 

Rocky Flats Cleanup Agreement (RFCA)

- Timeframe: 1996 – 2007
- Intended to guide active remediation
- Adaptive regulatory structure
- Perform cleanup under “interim removal actions”
- Action Levels triggered remediation
- Consultative process
- In-the-field decisions



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2003 Radionuclide Soil Action Levels

Input from:

- Actinide Migration Evaluation (AME) study
- Stakeholder Focus Group
- RSALs Oversight Panel
- RSALs Working Group (1999 – 2002)

- Task 1 - Regulatory analysis
- Task 2 - Computer modeling
- Task 3 - RSAL calculations
- Task 4 - New scientific information
- Task 5 - Determining cleanup levels at other sites

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RSALs Task 3: Calculation of RSALs

Wildlife Refuge Worker

Radionuclide	Percentile	RSALs (pCi/g) at Selected Target Risks		
		10 ⁻⁴	10 ⁻⁵	10 ⁻⁶
Am-241	10 th	904	90	9
	5 th	760	76	7.6
	1 st	560	56	5.6
	Point estimate	514	51	5.1
Pu-239	10 th	1,472	147	14.7
	5 th	1,160	116	11.6
	1 st	737	74	7.4
	Point estimate	670	67	6.7

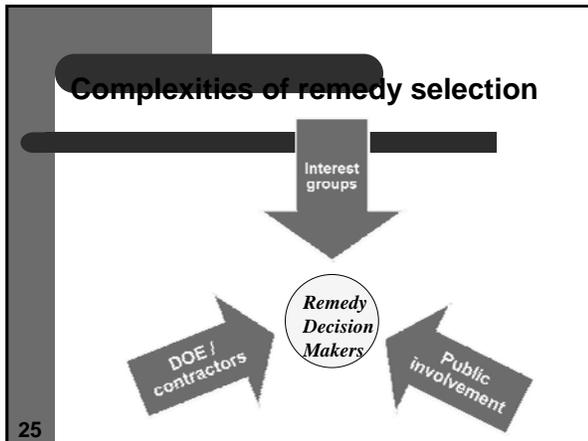
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Applying RSALs during Cleanup

Remediation at the 903 Pod



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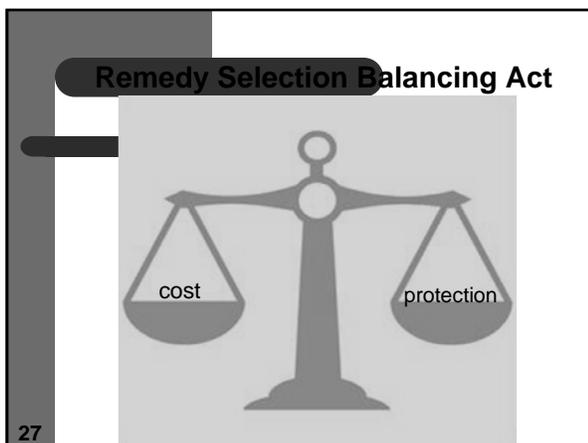


Applying RSALs During Cleanup

CERCLA Nine Criteria:

Category	Criteria
Threshold criteria	1. Overall protection of human health and the environment
	2. Compliance with applicable or relevant and appropriate requirements (ARARs)
Balancing criteria	3. Long-term effectiveness and permanence
	4. Reduction in toxicity, mobility, or volume through treatment
	5. Short-term effectiveness
	6. Implementability
	7. Cost
Modifying criteria	8. State acceptance
	9. Community acceptance

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Rocky Flats Site today



Average Residual Pu Contamination:

- Refuge = 1.1 pCi/g
- DOE = 2.3 pCi/g

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Legacy



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