

# **Decommissioning Challenges in the U. S. – Remediating Existing Legacy Sites and Avoiding New Ones**

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# Presentation Outline



- NRC's Decommissioning Responsibilities
- NRC's Current Decommissioning Universe
- Common Characteristics of Legacy Sites in the U.S.
- Factors that Increase Decommissioning Complexity and Cost
- Uranium Recovery Legacy Site Case Study
- Measures Taken to Prevent Legacy Sites
- Voluntary Industry Initiative
- Summary



# NRC's Decommissioning Responsibilities



- Regulatory oversight of decommissioning of civilian nuclear facilities
  - Power Reactors
  - Fuel Cycle Facilities
  - Materials Facilities
  - Uranium Recovery Facilities
- Regulatory framework development for preventing legacy sites



# NRC's Current Decommissioning Universe



- 10 power & 2 early demonstration reactors
- 11 test, training, & research reactors
- 22 complex materials sites
- 1 major fuel reprocessing facility
- 42 uranium recovery sites
  - Legacy sites
  - New facilities



# Common Characteristics of Legacy Sites in the U.S.



- Large volumes of low specific activity radioactively contaminated liquids
- Large volumes of long-lived radionuclides
- Large throughput
- Liquid processes
- Processes that involve large quantities of solid radioactive material stored outdoors



# Factors That Increase Decommissioning Complexity, Cost and Time

- Spills
- Groundwater and soil contamination
- Increased waste inventory
- Increased waste disposal costs
- Facility modifications
- Changes in authorized possession limits
- On-site disposal
- Use of unlined settling ponds
- Design and operating issues



# Uranium Recovery Legacy Site Case Study



Before



After



# **NRC Uranium Recovery Sites in Decommissioning**



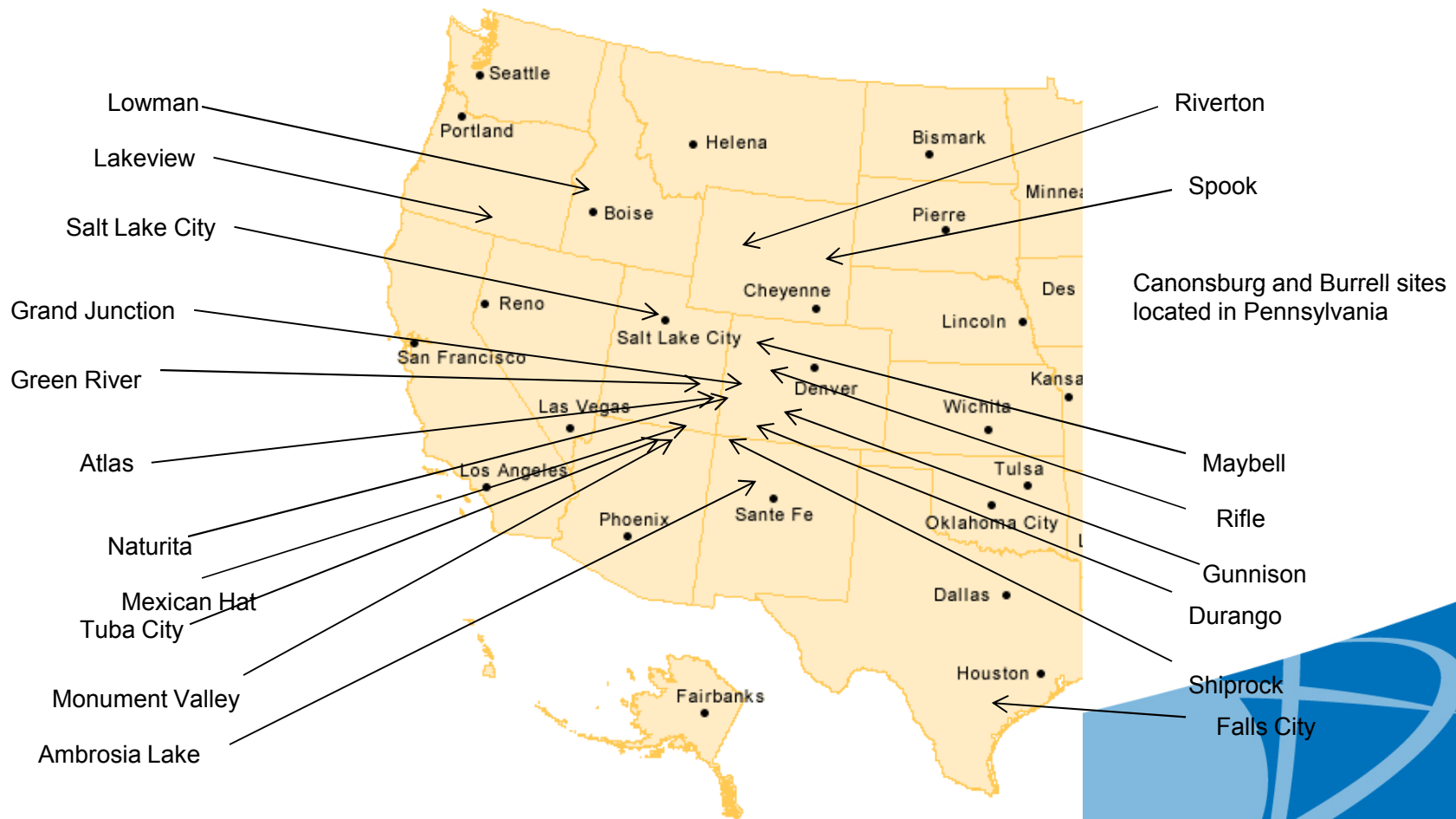
**42 Uranium Recovery sites**

- **38 Inactive conventional mills**
  - 33 in decommissioning status**
  - 5 Completed decommissioning**  
**(Licensed for long term stewardship)**
- **4 Active ISRs – partial decommissioning**

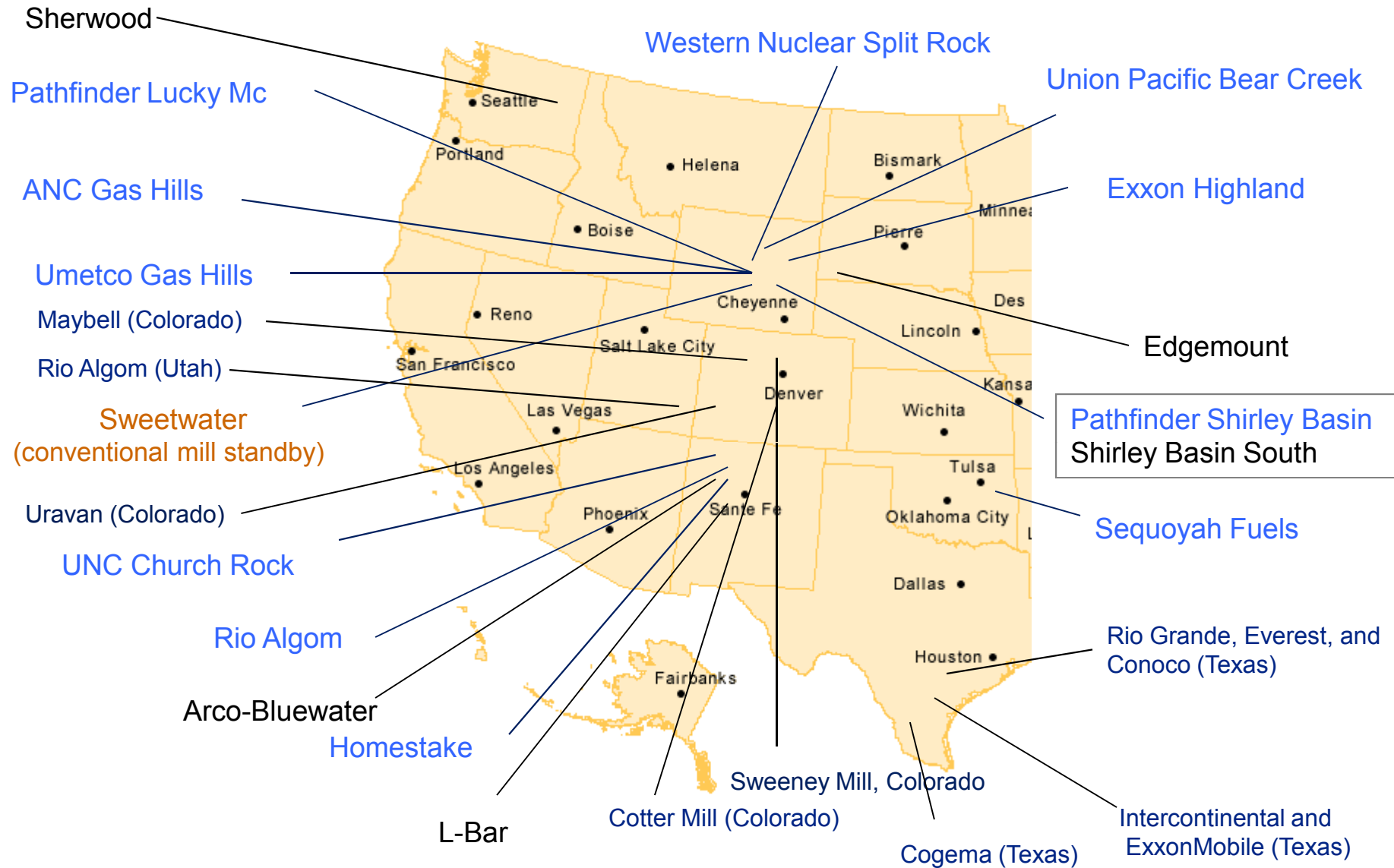




# Title I Uranium Recovery Sites



# Title II Uranium Recovery Sites in Decommissioning



# Historical Perspective on Regulatory Oversight :

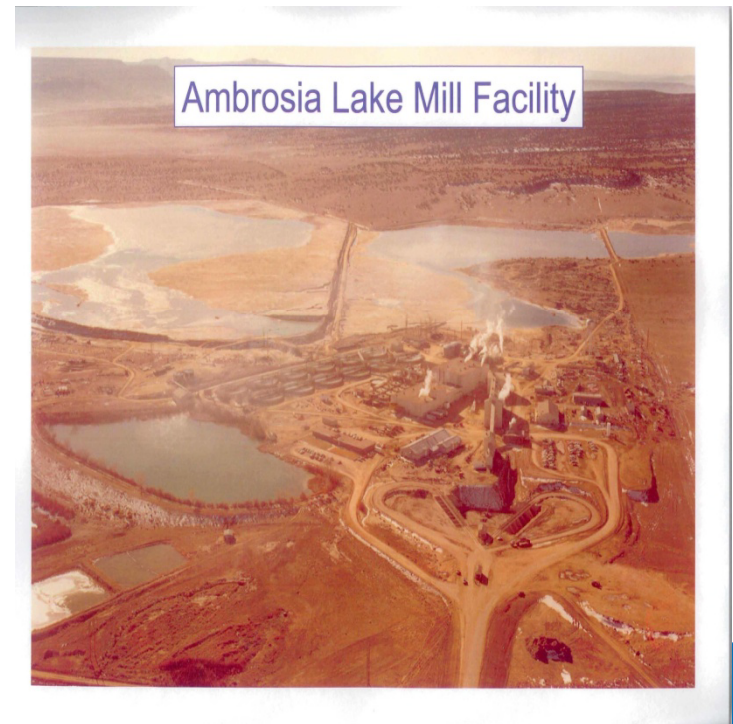


- Milling activities peaked in the 1950's to 70's
- Law governing uranium mill tailings (Uranium Mill Tailings Radiation Control Act) – 1978
- Standards promulgated in 1983
- Regulations promulgated in 1985 (no ground water), amended 1987
- Regulatory framework finalized after the peak of milling



# Uranium Recovery Decommissioning Lessons Learned

- Adequate financial assurance to prevent orphaned sites
- Groundwater contamination = Time + \$ (€, £)
- Site Characterization, groundwater flow and transport modeling key
- Long-term stewardship confirms long-term performance
- Established regulatory framework essential to prevent legacy sites



# Measures Taken to Prevent Legacy Sites



- Standards and regulations for mill tailings sites (1980's)
  - Defined requirements for decommissioning existing and new uranium recovery mills (mining not included)
- General requirements for decommissioning of nuclear Facilities (1988)
  - Includes requirements for financial assurance
- Timeliness requirements for decommissioning (1994)
  - Establishes time frames for starting and completing decommissioning



# Measures Taken to Prevent Legacy Sites (cont.)



- License Termination Rule (1997)
  - Applicants required to describe how design and procedures for operation would minimize contamination and facilitate decommissioning
- Decommissioning Planning Rule ( 2011)
  - Licensees establish operational practices to minimize contamination and perform reasonable subsurface radiological surveys
- Prompt Remediation Rulemaking (?)
  - Effort underway



# Voluntary Industry Initiative

## Nuclear Energy Institute – Industry Ground Water Protection Initiative (07-07)

- ACTION 1: Improve management of situations involving inadvertent radiological releases that get into ground water
- ACTION 2: Improve communication with external stakeholders to enhance trust and confidence ...





# Summary:



- NRC has a long history of overseeing the remediation of legacy sites
- The characteristics and issues that lead to legacy sites are well understood
- Measures have been taken to address these characteristics and issues
- NRC and licensees continue to evaluate other measures to avoid legacy sites



# Decommissioning References



- **Uranium Recovery:**
  - U.S. NRC implementing regulations – 10 CFR Part 40, Appendix A
  - U.S. EPA standards for Uranium Recovery – 40 CFR192
- **Other Facilities**
  - U.S. NRC regulations – 10 CFR Part 20, Subpart E
  - NUREG-1700 – Standard Review Plan for Evaluating Nuclear Power Reactor License Termination Plans
  - NUREG-1757 – Consolidated NMSS Decommissioning Guidance
  - NUREG-1575 – Multi-Agency Radiation Survey & Site Assessment Manual
  - NUREG-1549 – Decision Methods for Dose Assessments

# Website Information



U.S. NRC – [www.nrc.gov](http://www.nrc.gov)

U.S. EPA – [www.epa.gov](http://www.epa.gov)

