



U.S. DEPARTMENT OF
ENERGY

Legacy
Management

August 20–23, 2018
Grand Junction, Colorado

2018 Long-Term Stewardship Conference

U.S. Department of Energy Uranium Leasing Program Reclamation of Legacy Mine Sites

William L. Dam
U.S. Department of Energy (DOE)
Office of Legacy Management (LM)

Other Contributors

Ed Cotter

Navarro Research and Engineering, Inc.

Introduction

- The U.S. Department of Energy (DOE) Office of Legacy Management (LM), as successor agency to the U.S. Atomic Energy Commission (AEC), administers 31 uranium lease tracts located in southwestern Colorado through its Uranium Leasing Program
- **Mission:** Facilitate and support responsible life-cycle mining activities at DOE uranium lease tracts
- **Legacy:** Abandoned uranium mine sites were located on many of the DOE lease tracts as a result of the AEC's Mineral Leasing Program (circa 1948-1962)
- LM completed final reclamation at these sites in 2011 using standard reclamation technologies and innovative techniques



Reclamation Program Overview

- LM completed final reclamation activities at 182 separate mine sites
- Permanently closed 199 mine portals and openings
- Fabricated and installed 74 bat gates including 23 culverts bat-gate structures
- Permanently closed 19 shafts and 137 vent holes
- Backfilled pits and trenches with 144,800 cubic yards of material
- Recontoured 176,700 cubic yards of mine-waste-rock materials
- Permanently closed 259 exploration drill holes
- Cleaned up and disposed of trash and debris from 127 sites
- Reseeded approximately 185 acres of disturbed land with native species
- Total cost of reclamation was \$2,298,000

DOE Reclamation Strategy

- Eliminate physical hazards, such as mine openings and portals and severe vertical drop-offs and recontour mine sites to blend in with natural topography
- Redirect, or otherwise control, storm water to minimize potential for erosion
- Decrease potential for public's exposure to radiological materials



Radiological Concerns

- Scan mine site to identify bulk residual radiological materials (low-grade stockpiles or remnants of ore-storage pad)
- Bury residual radiological materials below grade as part of closure and backfilling activities
- Don't worry about cleaning up everything that has "count"
 - The risk-based potential health impacts normally do not warrant it



A Judgment Call

- Restrict reclamation activities to the originally disturbed area
 - If it hasn't been disturbed, don't disturb it
- Only reclaim those areas that can be improved



Mine Openings and Portal Closures

- Fabricate and install bat gates, including the use of culverts



Mine Openings and Portal Closures (continued)

- Construct masonry (concrete block or natural rock) bulkheads
- Use weather balloons and polyurethane foam for shaft closures



Site Recontouring

- Remove mine-waste-rock materials from drainages, as practicable, and minimize the potential for migration of materials
- Backfill existing pits and trenches
- Construct retention basins during site reclamation or use natural site features to collect and contain storm waters to support livestock and wildlife



Site Recontouring (continued)

- Divert major drainages away from closure sites, as appropriate
- Reduce slopes to less than 3 horizontal to 1 vertical, if practicable to provide natural, undulating surfaces
- Control dust—potential exposure to silica is of greater concern than exposure to radiological materials



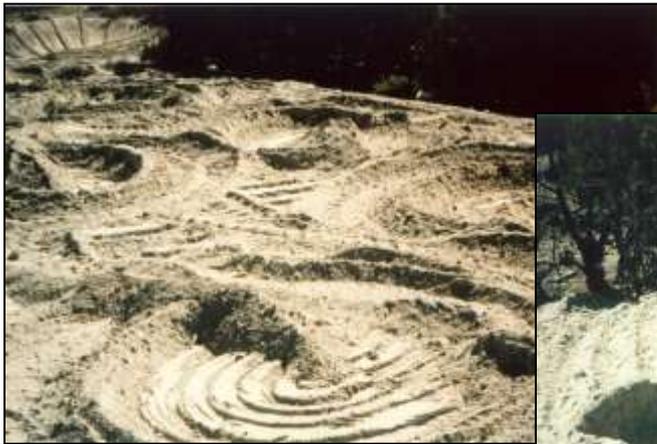
Site Revegetation

- Reuse sediments from area stock ponds for cover material
 - Even a thin veneer of material significantly enhances revegetation efforts



Site Revegetation (continued)

- Leave reclaimed surfaces rough—the rougher, the better
- “Pock” reclaimed surfaces, especially steeper slopes, to create mini-basins to control storm water and to minimize potential for erosion



Site Revegetation (continued)

- Pocked areas collect and contain water, soils, and seeds to enhance revegetation efforts
- Allow as much of the existing, natural vegetation to survive as practicable



Site Revegetation (continued)

- Reseed disturbed areas with a native-seeds mixture
- Use soil amendments and cover crops, as practicable, to enhance revegetation efforts



Conclusion

- Time is a valuable reclamation tool
- Allow Mother Nature to do her part
- LM offers a practical and cost-effective approach to mine site reclamation



Before



After

How To Contact Us

- U.S. Department of Energy
Office of Legacy Management
2597 Legacy Way
Grand Junction, Colorado 81503
- Russel Edge, Uranium Related Programs
 - (303) 410-4806
- William L. Dam, Uranium Leasing Program
 - (970) 248-6484
- Web site: <https://www.energy.gov/lm/services/property-management/uranium-leasing-program>