Water Quality Improvement Projects at Legacy Hardrock Mine Sites

NWCOG Water Committee
October 21, 2015
**DRMS Legacy Mine Program Activities**

- Program Administration
- Coal Reclamation Projects
- Hardrock (non-coal) Hazardous Mine-opening Safety Closure Program
- Hardrock Environmental & Water Quality Improvement Projects

*(Legacy Mine– sites where mining was conducted prior to 1977, AKA “abandoned mines”)*

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**$Funding Sources$$**

- Fed. Office of Surface Mining Annual SMCRA Title IV Grants
- “COAL AML FUNDING”
- Fed. Land Managers (BLM & USFS)
- U.S. EPA and Colo. Dept. Public Health & Environment (CDPHE)
- NPS** & POWER AUTHORITY FUNDS
- $ State Minerals Sev-Tax (Tier-1)

**(NPS= CWA section 319 “NonPoint Source” Program Funding)**
Water Resources and Power Development Authority Grants

- **2013 ($914,000)**: Inspection, Engineering and Implementation of Best Management Practices at High Priority sites.
- **2013 ($166,000)**: Long Term Maintenance of Previously Completed Nonpoint Source Projects.
- **2014 ($1,000,000)**: Implementation of Best Management Practices at High Priority sites.
- **2015 ($800,000)**: Implementation of Best Management Practices at High Priority sites.
Projects Funded by the Water Resources and Power Development Authority (PA), 2011 - 2013

- Characterization Projects
  - Water and tailings samples collected from impaired streams

- Engineering Projects
  - Planning and design of site-specific best management practices (BMPs) for mine waste rock, tailings, and water-source controls

- Reclamation Construction Projects
  - Implementation of Non water-treatment BMPs

- Maintenance of previously completed Projects
Recent Nonpoint Source and Water Quality Improvement Projects

• Mary Murphy Mine/Golf Tunnel bulkhead (Chaffee)
• London Mine tailings reclamation (Park)
• London Butte Mine waste rock and tailings reclamation (Park)
• Hough Mine waste rock and tailings reclamation (Hinsdale)
• Red & Bonita Mine bulkhead (San Juan)
• Pennsylvania Mine bulkhead (Summit)
• Bullion King Mine waste rock (San Juan)
Projects underway to investigate, characterize and develop final reclamation designs include:

- Waldorf/Santiago Mine on Leavenworth Creek (Clear Creek)
- Rico–Argentine Mine underground rehabilitation and investigation (Dolores)
- Uncompahgre Mine Reclamation Project (Ouray)
- Carbonero Bulkhead investigation* (San Miguel)
- Rico–Argentine Mine waste-rock project (Lake)
- Gertrude-Venture Mine waste-rock project (Lake)
- Uncompahgre Mine Reclamation Project (Ouray)
- Perigo Mine drainage investigation* (Gilpin)

*(may be delayed-technical review period)
Hardrock Mine Water-Quality Improvement Projects-Saints John
Saints John Creek, Tributary to Snake River
Saints John Project

- Approximately 18,000 cubic yards of tailings excavated and consolidated in upland repository, ~$200k
- Wetland Re-vegetation completed in 2013; approximately 20,000 wetland plantings, ~$70,000.

**LEVERAGED FUNDING** - project funded by CWRPDA, Freeport McMoRan contributions, and NPS program funds.
Underground Mine Workings and Flows
Level F
Underground Rehab

Goal: Provide safe underground access.

- Installed spiling rods, bolts, mesh, steel sets, and utilities.
F Level

Pretty Good Water

Very Bad water

Underground water sampling locations
**Data Evaluation**

**Goal:** Determine remedial options.

- Investigations indicate:
  - Bulkheads are viable source control option.
  - Multiple bulkhead approach.
  - Possible opportunity for inflow reduction on Level C and in mine treatment.

- Implement as phased approach.
Goal: Reduce portal discharge.

- Flow at portal was reduced 65%.
- Steady state reached quickly.
- No obvious leakage.

Bulkhead Pressure (psi)
**Goal:** Reduce portal discharge and eliminate blowout potential.

- Installed August, 2015.
- Reduce remaining flow (flow control).
- Evaluate possibility of seepage from vein.
Penn Mine Remedial Goals

- Eliminate portal blowout events.
- Reduce/eliminate chronic loading to Snake River.
- Increase survivability of fish in the Snake River.
- Reduce long term O&M.
- Reduce long term cost:
  - Investigation, implementation and operation of bulkheads ~ $2 million so far.
- Maintain existing land use and character of Peru Creek Watershed.
Thank You!