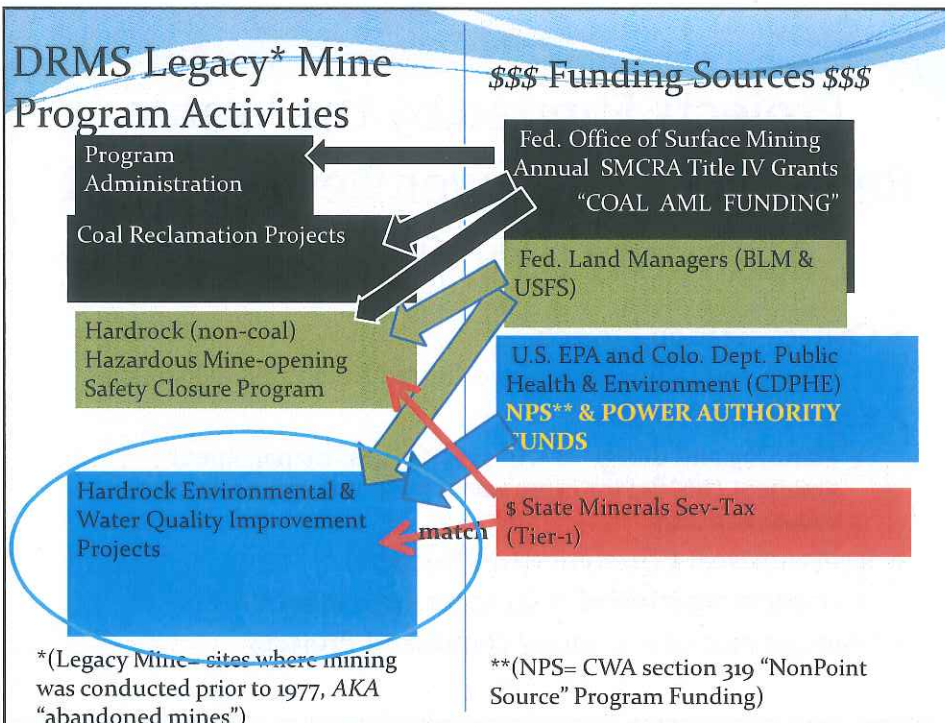


# Water Quality Improvement Projects at Legacy Hardrock Mine Sites

Water Resources Review Committee  
September 15, 2015



## 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

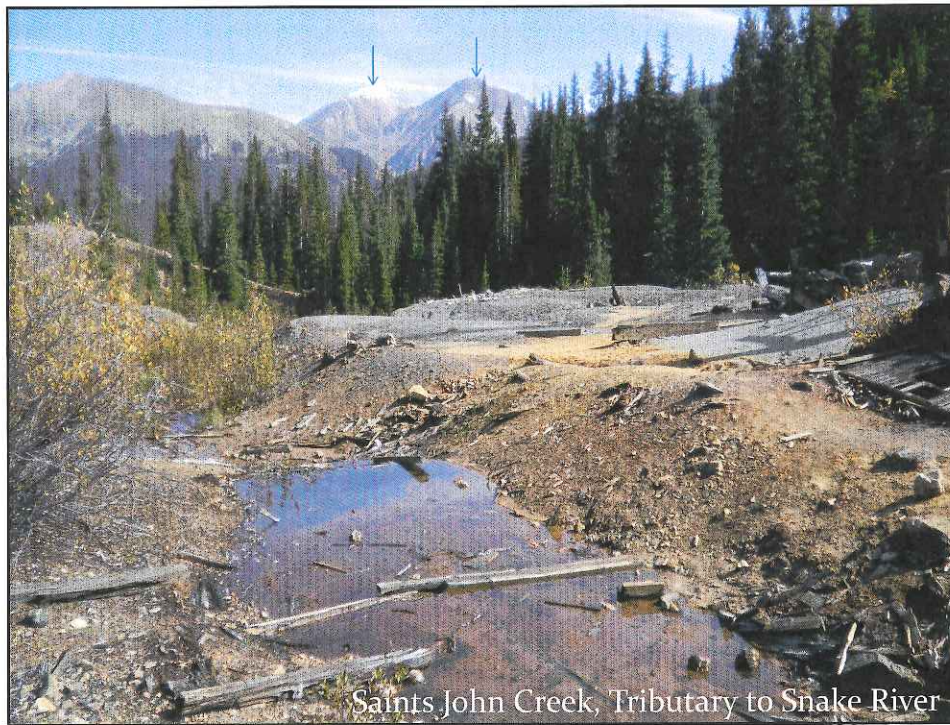
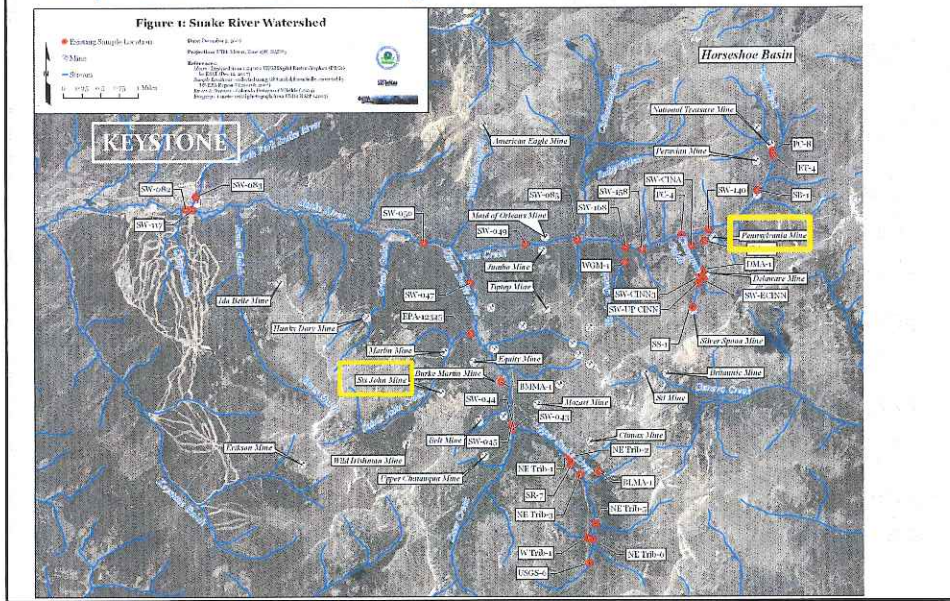
- Mary Murphy Mine/Golf Tunnel bulkhead (Chaffee)
- London Mine tailings reclamation (Park)
- London Butte Mine waste rock and tailings reclamation (Park)
- Hough Mine waste rock and tailings reclamation (Hinsdale)
- Red & Bonita Mine bulkhead (San Juan)
- Pennsylvania Mine bulkhead (Summit)
- Bullion 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)                   | ▪ Carbonero Bulkhead investigation* (San Miguel)  |
| ▪ Rico-Argentine Mine underground rehabilitation and investigation (Dolores) | ▪ 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











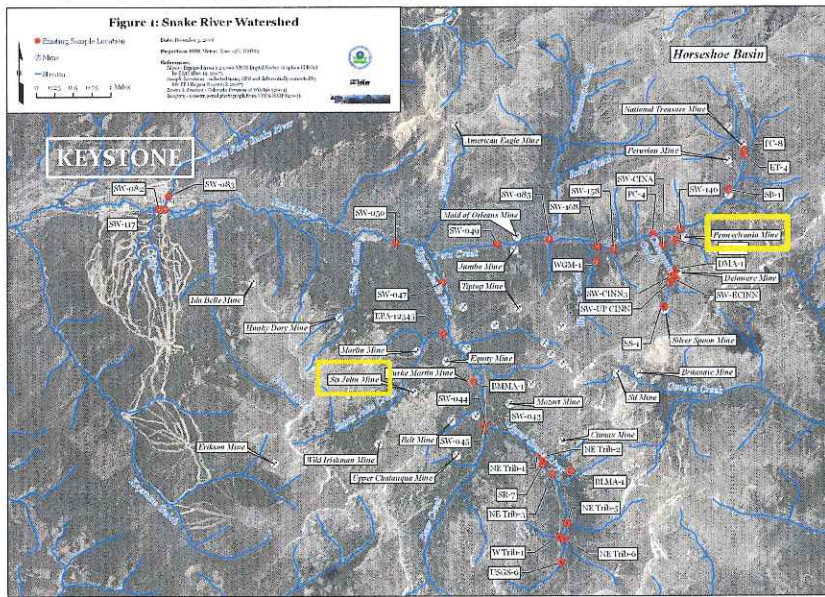




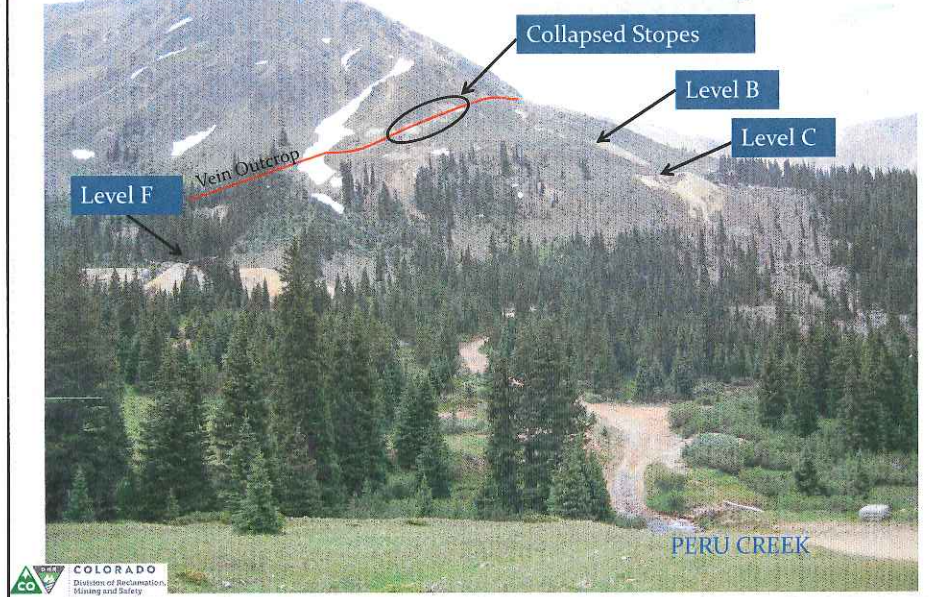
## Saints John Project

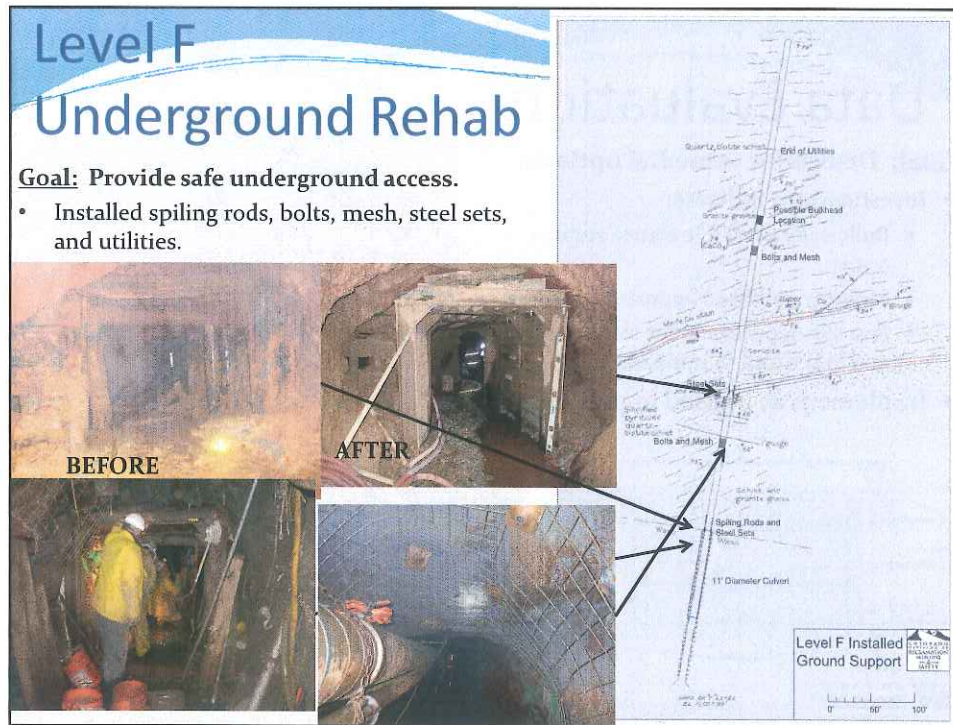
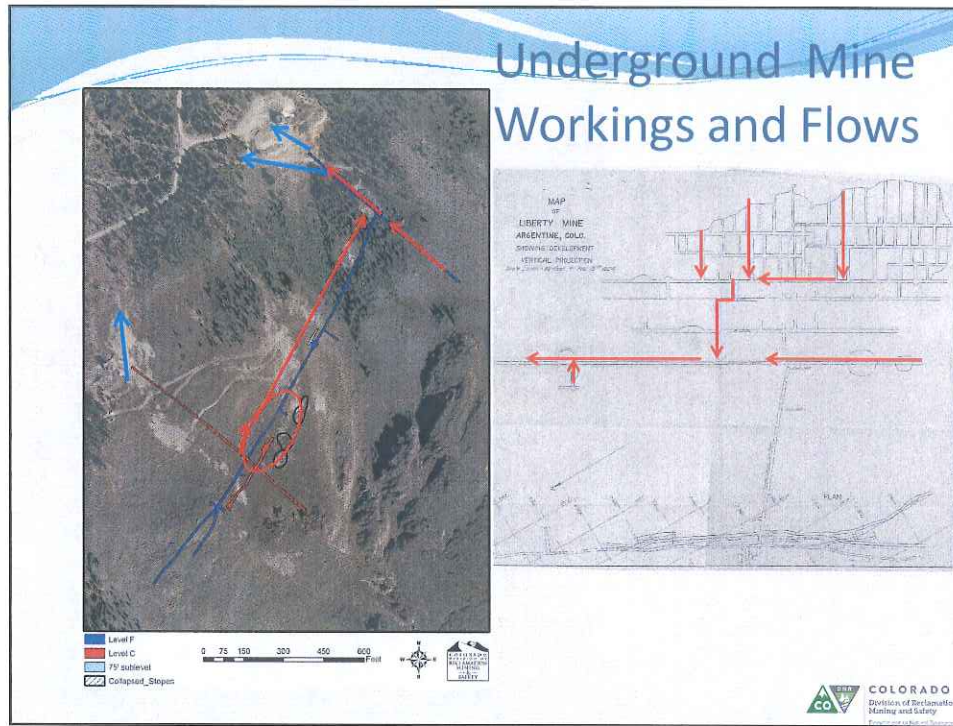
- Approximately 18,000 cubic yards of tailings excavated and consolidated in upland repository, ~ \$200k
- Wetland Re-vegetation completed in 2013; approximately 20,000 wetland plantings, ~\$70,000.
- **LEVERAGED FUNDING** - project funded by CWRPDA, Freeport McMoRan contributions, and NPS program funds.

# Hardrock Mine Water-Quality Improvement Projects-Penn Mine



# Pennsylvania Mine Project



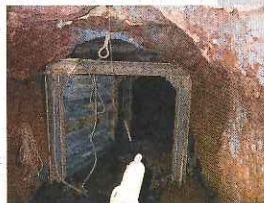
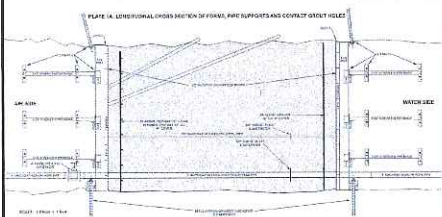
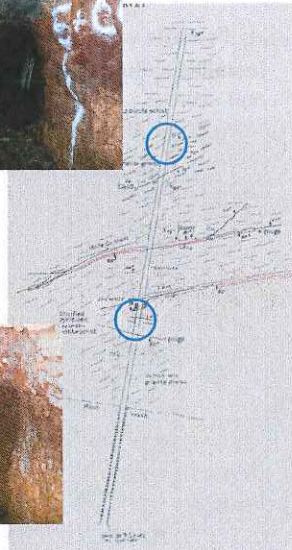


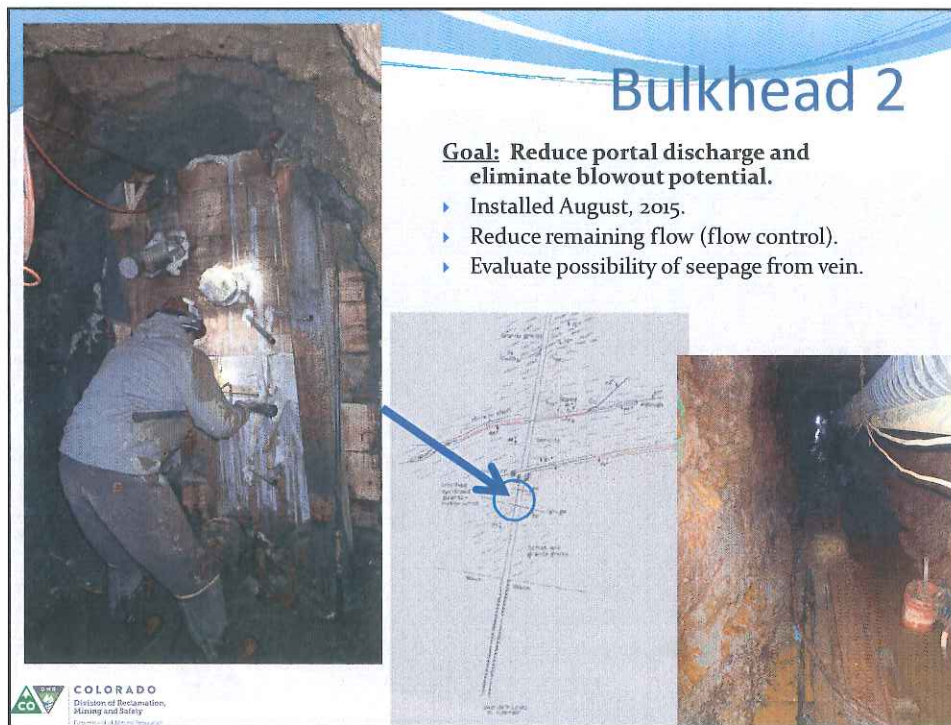
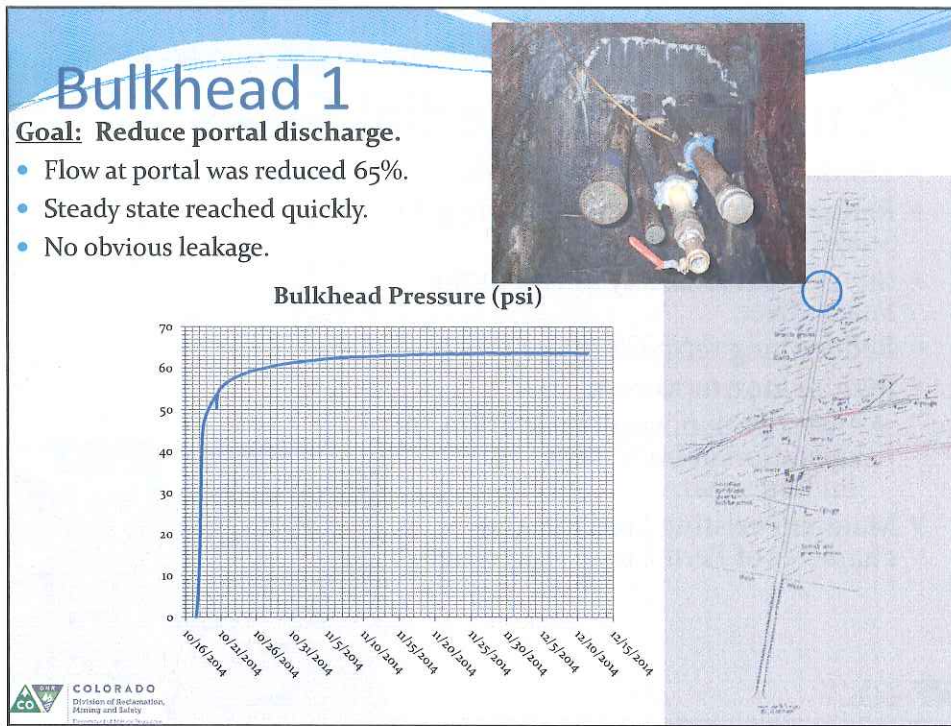


## Data Evaluation

**Goal:** Determine remedial options.

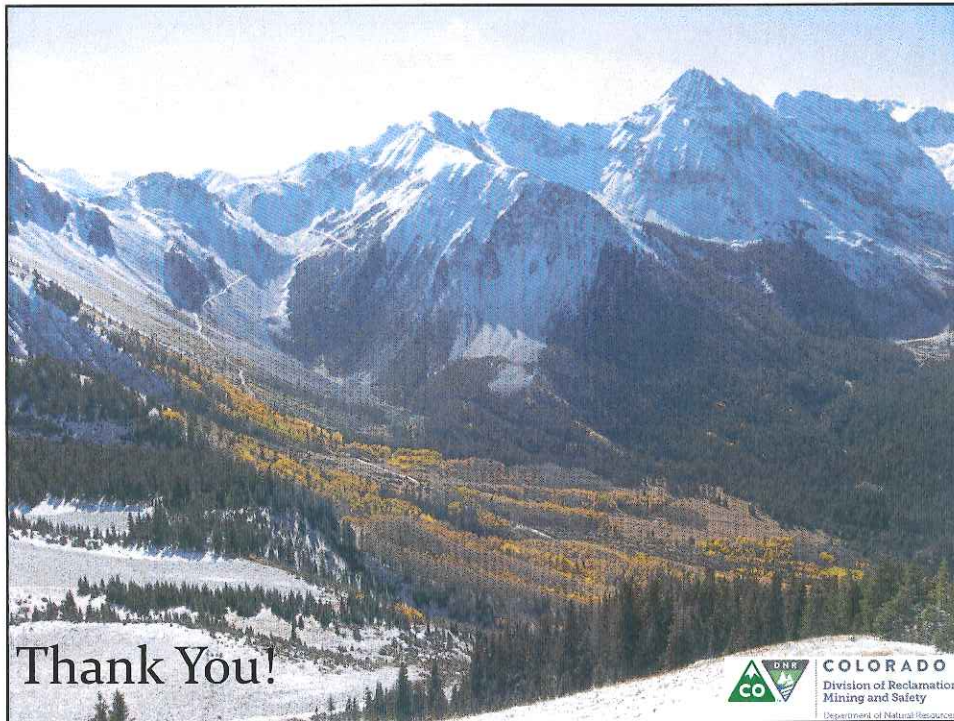
- Investigations indicate:
  - Bulkheads are viable source control option.
  - Multiple bulkhead approach.
  - Possible opportunity for inflow reduction on Level C and in mine treatment.
- Implement as phased approach.





## 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!

