Mining: Reclamation and Water Protection
Modern v. Historic

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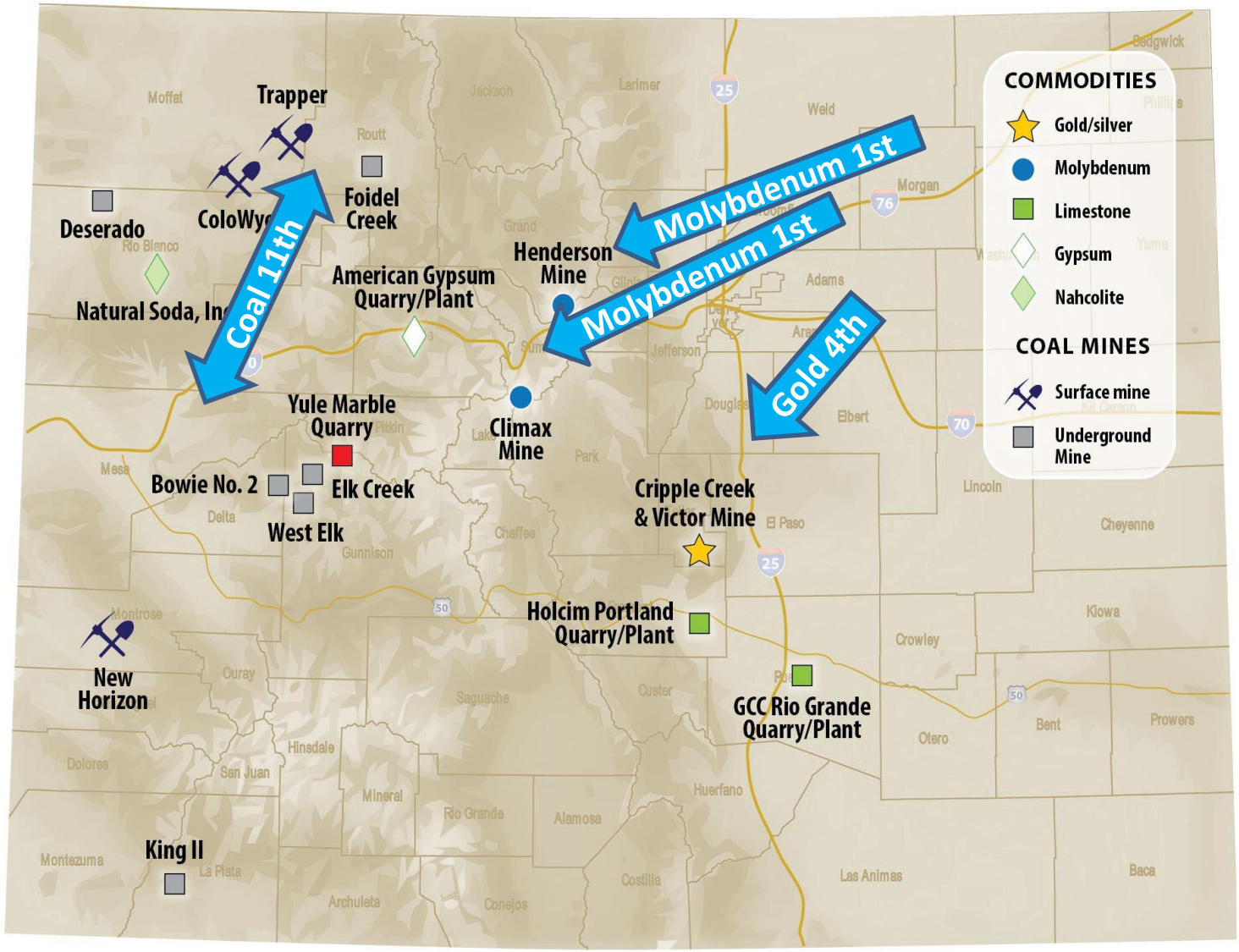
The Colorado Mining Association

- Founded 1876, incorporated 1897
- 1,000 members include producers of coal, metals, agricultural and industrial minerals
- More than 180 companies, including vendors, service providers and manufacturers

CMA
COLORADO MINING
ASSOCIATION

Mining Colorado's Heritage and its Future – Colorado Ranks



Molybdenum Chemical Uses

- Chemical Grade Oxide
  - –Catalysts for de-sulfurization in petroleum refining
  - –Smoke retardant for plastics and fibers
  - –Paint pigments
  - –CO detectors

Thin Film Applications

Photovoltaics (Solar Cells)

Flat Panel Displays

Metals and Materials in a Wind Turbine

Estimates for Vestas V90 3.0 MW turbine are approximate.

Vestas V90, Courtesy of Vestas Wind Systems A/S

- 335 tons of steel
- 4.7 tons of copper
- 13 tons of fiberglass
- 3 tons of aluminum
- 1,200 tons of reinforced concrete

Gold

- Used in a variety of products and industries including:
  - Currency and Jewelry
  - Medicine and dentistry
  - Scientific research
  - Computers and satellites
  - Cell phones, MP3 players, and automobile airbag control panels

Colorado ranks 4th

Mining Matters… when you work on a computer.

Silver

- Used in a variety of products:
  - Jewelry and currency
  - Photographic materials and electronics
  - Medical and dental care and research
  - Batteries, cutlery, mirrors
  - Solar panels

Is a by-product of gold, and is mined in Colorado!

Nahcolite – Pure Sodium Bicarbonate

- Colorado has only significant pure sodium bicarbonate reserves in U. S.
- Used in flue gas desulfurization – lowering power plant emissions
- Other uses, baking soda and toothpaste

Mined in Colorado!

Limestone

- Used as aggregate, and in cement and other building materials
- Used in industrial air filters to remove sulfur from exhaust gases
- Used in paint, paper, glass, plastic, and carpet production
- Used in water treatment and filtration
- Used in the construction of pads for wind towers

Mined in Colorado!

Reclamation and Environmental Protection at Modern Mines

- Social License To Operate – Protecting the Environment
- Mines depend on community support as mine life spans decades
- Protecting water essential wherever mining is conducted in Colorado
- Mines today operate under strict environmental safeguards at state and national level

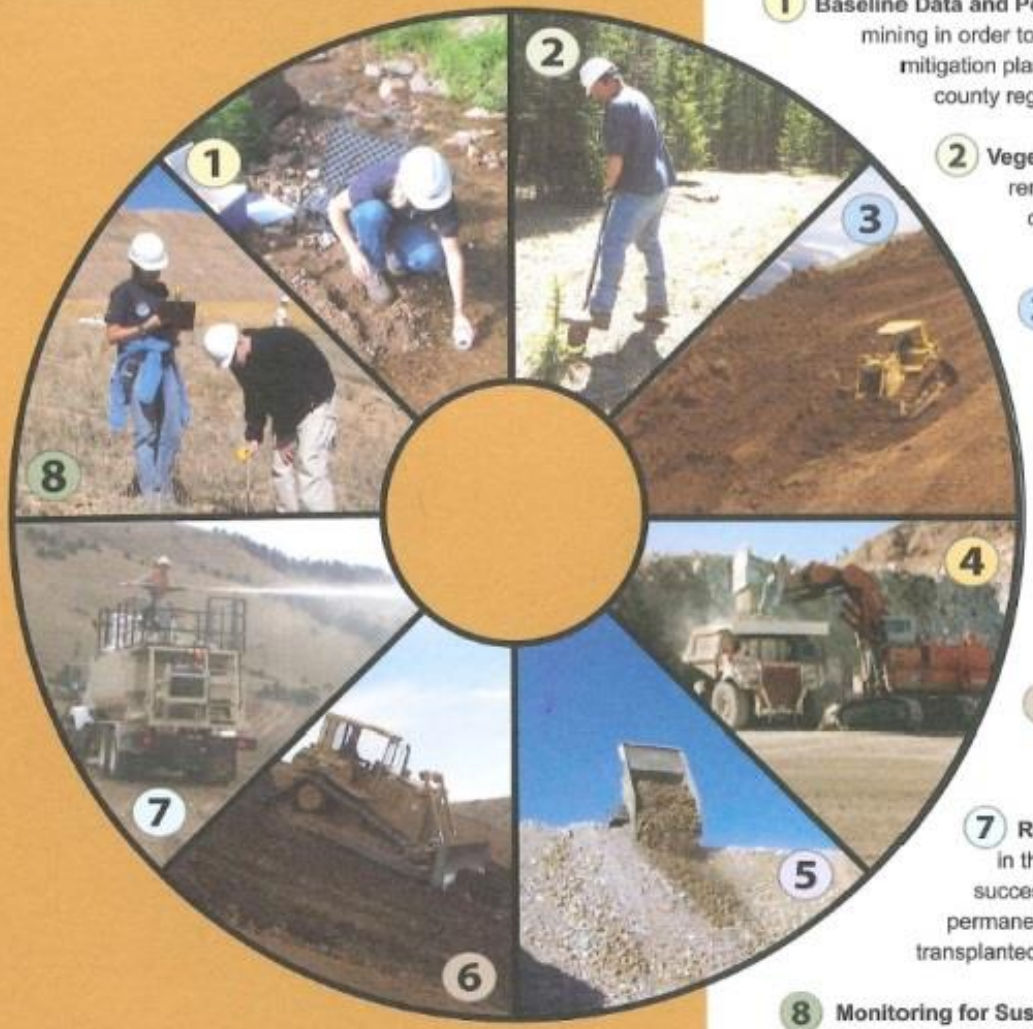
Modern Mining Laws and Regulation

- Unlike 19th century mines, today's modern mines are designed, built, operated, and closed under a robust system of laws, regulations, financial assurances, inspections, and reporting requirements to enforce accountability and compliance
  - Transparent processes, including public involvement and input, are required to secure permits and access—from exploration through mine closure
  - Post-mining reclamation and restoration is a requirement of modern mines, ensuring mined lands are reclaimed to specific performance standards to protect people, wildlife, land, water and air

Cripple Creek & Victor Gold Mining Company

The Mining Life Cycle

PO Box 191 • Victor, CO 80860 • Phone (719) 689-4044 • www.ccvgoldmining.com



1. **Baseline Data and Permitting:** Extensive environmental baseline data are collected prior to mining in order to evaluate potential impacts from mining. Mining, reclamation, and mitigation plans are reviewed and approved by the appropriate federal, state, and county regulatory agencies prior to initial mining activities.

2. **Vegetation Removal:** Based upon the approved plan, vegetation is removed from the area to be mined. At CC&V, a combination of logging, cutting, and stacking trees for firewood and transplanting smaller trees to reclaimed areas are used to conserve woody resources.

3. **Topsoil Handling:** Dozers, loaders, and trucks are used to collect salvageable topsoil for storage until it can be used for reclamation.

4. **Mining:** The mining process includes controlled blasting, hauling, crushing, leaching, processing, and beneficiation for the recovery of gold. CC&V operates around the clock and on every day of the year.

5. **Backfilling, Contouring, and Re-grading:** Overburden rock is placed either in engineered storage areas or used to backfill mined areas according to the approved reclamation plan and shaped to establish a stable post-mining slope.

6. **Topsoil Replacement:** After re-grading, salvaged topsoil is replaced, and fertilizers and other amendments are incorporated in order to prepare a suitable seedbed.

7. **Revegetation:** Newly resloped and topsoiled areas are seeded annually in the fall with a mix of grasses, forbs, and shrubs known to establish successfully in the Pikes Peak region. Following establishment of a permanent vegetative cover, seedlings from the trees in the permitted area are transplanted by hand, one at a time.

8. **Monitoring for Sustainability:** To ensure that a stable and productive post-mining land use has been reestablished, CC&V monitors and evaluates reclaimed areas for several years following the reclamation process.

NEWMONT NORTH AMERICA

Colorado Laws

Mines must safeguard the environment

- Colorado Mined Land Reclamation Act updated in the aftermath of Summitville mine abandonment in 1992
- Any mining company using chemical reagents must obtain approval of a environmental protection plan or EPP
- There have been no major incidents associated with modern mining operations since the laws were amended
- Coal mining subject to separate regulatory programs under state programs per the Surface Mining Control & Reclamation Act of 1977
- Clean Air Act, Clean Water Act, and other statutes or their state counterparts also apply


Reclamation Examples
Toe Berm Work
Highway 67 Relocation

Final Results

Robinson Tailings Storage Facility

Innovative Reclamation - Use of Municipal Biosolids

- Municipal biosolids are composted on site for used as a soil amendment
- Received state and national reclamation awards for the reclamation on the Robinson Tailings Storage Facility and the public-private partnership that led to this program

Robinson Tailings Storage Facility

Reclamation Results

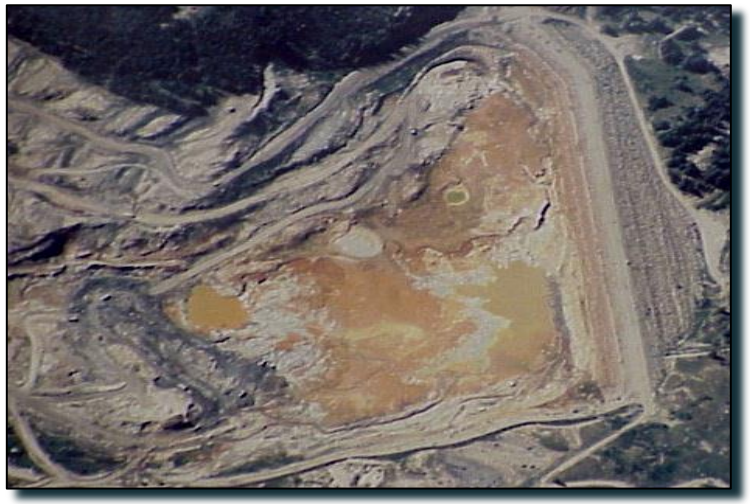
Reservoir and Trout Pond
Formerly Tailings Pond

Eagle Park Reservoir

BEFORE

- Eagle Park Reservoir was operated as a tailings impoundment in the 1960s
- In 1994, Climax entered into an agreement with Vail Associates to sell the facility for water storage
- Water used for snowmaking
- Tailings were removed from the reservoir between 1994 and 1996
- Reclamation Award Colorado Division of Minerals and Geology in 1998

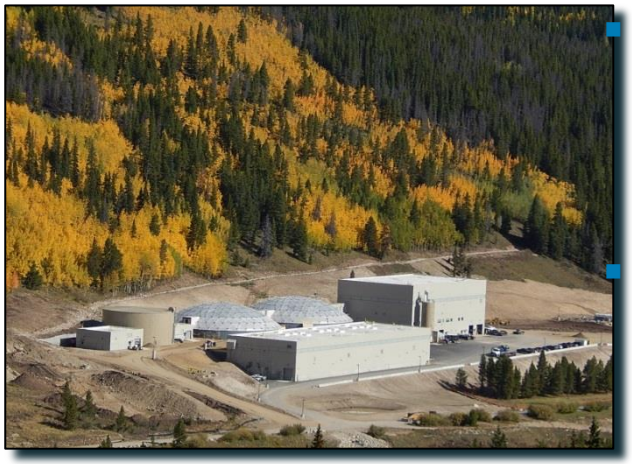
AFTER



URAD

- URAD is a property that operated prior to the discovery of Henderson Mine
- Reclaimed in the 1970s during the development of the Henderson Mine

Climax and Henderson Water Treatment



Climax

- Water treatment infrastructure built since 2006 includes two state-of-the-art plants
- Capable of treating 14,000 gpm

Henderson

- URAD Water Treatment Plant, built in 1997, treats underground water for delivery into West Fork of Clear Creek

Assistance in Reclamation of Abandoned Mine Lands

AML Cleanup Projects
Private Sector Funding

Company funding recently helped with the reclamation and revegetation of the Saints John mine and mill, a historic and abandoned site near its Colorado operations.

The Saints John reclamation project included the evacuation and removal of 23,000 cubic yards of tailings, such as those shown here near a historic structure.

Photographs show views of Saints John before (left) and after tailings removal and revegetation.

- Freeport-McMoRan has committed $5 million toward AML cleanup projects in areas near its Colorado operations
- Notable projects include the Saints John Mine near Montezuma and the London Mine near Fairplay

Doctor Mine – West Fork Clear Creek

- In 2006, Climax Molybdenum sponsored the Upper Clear Creek Watershed Foundation in initial funding for reclamation at the Doctor Mine
- U.S. Forest Service and USDA supported company participation
- A second reclamation effort conducted by Trout Unlimited was funded through Freeport-McMoRan in 2013

Millsap Creek Tailings Project - Victor

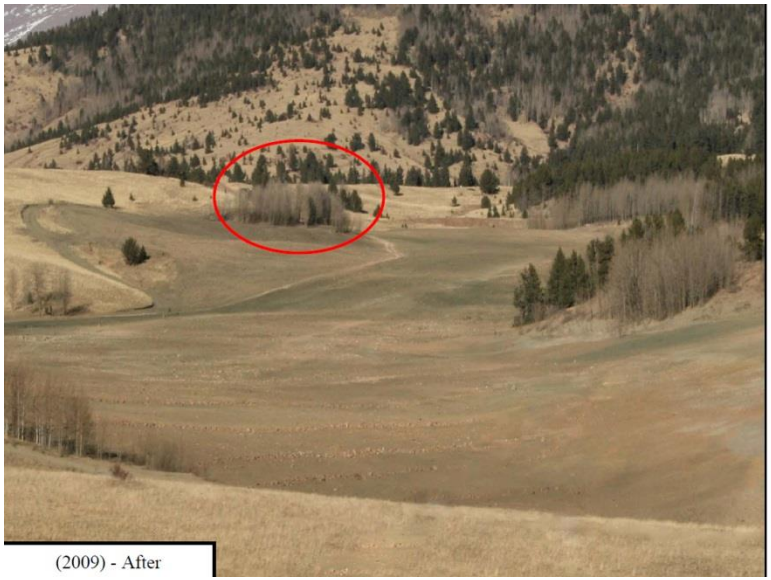
Millsap Creek

- Tailings resulted from turn of century mining
- Impacted irrigation systems of ranchers, downstream users
- DRMS, CC & V, BLM and others collaborated

Unique Public Private Sector Collaboration

Millsap Creek – Before Reclamation

After



GOLD KING MINE SPILL AUGUST 5
& EPA ACTIONS

Animas River Spill

- Caused by EPA contractor during a planned remediation effort
- This level of spill is unprecedented in Colorado history
- Animas River was closed to recreation, irrigation and other uses
- Water has been deemed safe for drinking-water treatment, agriculture and recreation, and the river has been re-opened to the public
- Resulted in federal investigation and report

BUREAU OF RECLAMATION REPORT

Gold King Spill was preventable, independent study concludes

- Absence of “an understanding that water impounded behind a blocked mine opening can create hydraulic forces.”
- “Little appreciation for the engineering complexity of some abandoned mine projects that often require, but do not receive, a significant level of expertise.”
- Excavation caused the breach
- Had drilling from above occurred to test water levels, “the blowout would not have occurred.”

Additional Findings – More Expertise needed in assessing risks

- Inactive, historic or abandoned sites present unknown risks and conditions
- Gold King operations began in late 1800s through 1923; much activity took place prior to the era of modern regulation
- Government report found “uncontrolled release at Gold King was the result of a series of events spanning several decades.”
- Government actions included an “inadequately designed closure of the mine portal in 2009 and a misinterpretation of the groundwater conditions when reopening the mine portal.”

The Aftermath – Questions about the need for Good Samaritan legislation

- Modern mining companies can bring 21st century expertise to aid cleanups but Congress must pass legislation to remove disincentives
- Industry, states and conservation groups are hampered by Clean Water Act (CWA), the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), and the Resource Recovery & Conservation Act (RCRA) which imposes perpetual, unlimited liability on any person conducting activities on site
- Some govt. officials stated they could not construct water treatment plant on Gold King site without fear of potential liability
- Good Samaritan becomes liable for all discharges and must meet CWA effluent and water quality standards, even if actions improve water quality
- Good Samaritan could become liable for clean up to Superfund standards under CERCLA

Good Samaritan Legislative History

- Industry has long supported Good Samaritan legislation
- National Academy of Sciences urged Congress to approve legislative changes that "would promote voluntary clean up" … [and] … "minimize company liabilities."
- Western Governors Association also supports.
- Will it happen? Industry and the private sector have the expertise, but legislation must pass Congress on a stand-alone basis, without delay.
- *Issue of Abandoned Mine Clean up is a national issue requiring federal legislation*

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