

# Presentation to the Water Resources & Agriculture Review Committee Acid Mine Drainage: Challenges and Opportunities

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# Abandoned Mines

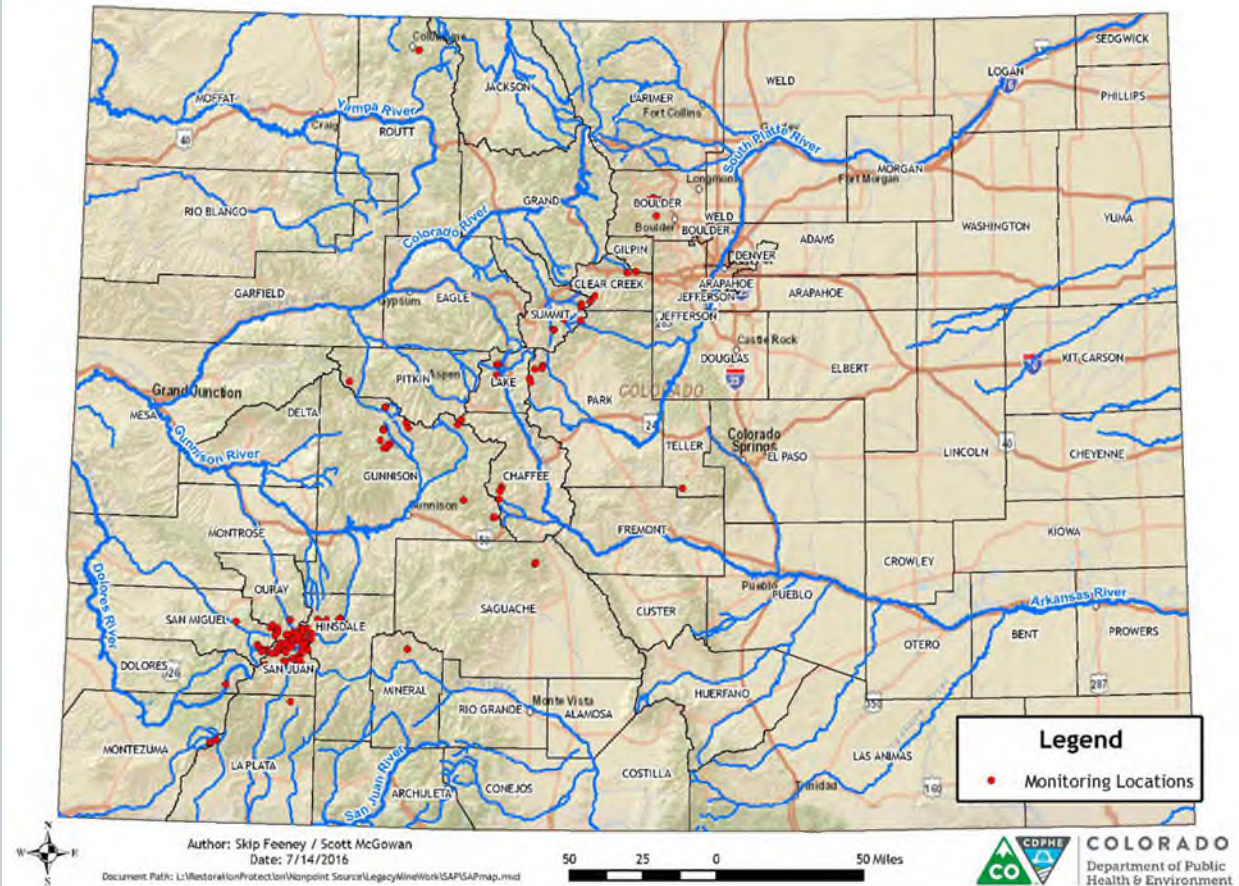
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- There are over 23,000 abandoned mines, on both public and private land.
- Draining mines may continually discharge high concentrations of pollutants.
- Perpetual treatment or long-term remedies are required.
- 1,800 miles of streams impaired due to acid mine drainage.

# Abandoned Mines

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Figure 1 - Draining Mines Water Quality Study Map



# Acid Mine Drainage

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- There are approximately 145 abandoned mines that discharge water.
- Discharges from abandoned mines are associated with pH, cadmium, zinc, copper and lead.
- In 2016 a study was undertaken to collect water quality samples from all 145 discharging mines.
- Data indicates the mines sampled in the study are less significant pollutant loaders than mines being addressed through the Superfund Program.

# Schwartzwalder Mine

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Schwartzwalder Mine, 1978

# Schwartzwalder Mine Overview

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<b>Type of Permit:</b>	112d-2 Designated Mining Operation
<b>Type of Mine:</b>	Underground
<b>Primary Commodity:</b>	Uranium
<b>Method of Mining:</b>	Room and pillar/shrink stope
<b>Permit Area:</b>	76.22 acres
<b>Surface/Minerals Owner:</b>	Colorado Legacy Land, LLC
<b>Post-mining Land Use:</b>	Wildlife Habitat
<b>Financial Warranty:</b>	\$7,674,022.00
<b>Status:</b>	Mining ceased in 2000; Permit was revoked in 2023

# General Location



# Schwartzwalder Mine Overview

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# Ralston Reservoir

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- Ralston Creek, a tributary of Clear Creek, begins in Gilpin County and flows eastward past the Schwartzwald Mine
- Ralston Creek is impounded below the mine, creating Ralston Reservoir.
- Ralston Reservoir is one of 3 terminal water storage facilities for Denver Water's collection system.
- The reservoir provides drinking water for residents of Denver and Arvada.



# Schwartzwalder Mine

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- Schwartzwalder deposit is the largest known vein type deposit of uranium in the U.S.
- Deposit first discovered in 1949 and uranium was mined intermittently from 1953 to 2000.
- Approximately 17M pounds of ore were extracted from the mine.
- Mining occurred underground and the mine workings extend 2,200 ft. below the ground surface.

# Water Treatment

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- As the mine workings were developed, groundwater began to flow into the mine creating a “mine pool”.
- Dewatering of the mine workings began sometime before 1960 and continued until 2000.
- Initially water pumped from the mine was discharged directly into Ralston Creek without any treatment.
- The first water treatment plant was constructed in 1983 to remove dissolved and suspended constituents from the mine effluent.

# Current Water Treatment Facility

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- The current WTP was constructed in 2018.
- Primary treatment includes reverse osmosis.
- Secondary treatment in the form of ion-exchange.
- Treated water is discharged into Ralston Creek at 200gpm.
- Constituents of concern: U and Mo



# Water Treatment

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Reverse Osmosis System

# Water Treatment

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Ion-Exchange System

# Current Status

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- Reclamation permit was revoked in December 2023.
- Financial warranty in the amount of \$7,274,022.00 was forfeited.
- Warranty will be used to treat water and complete surface reclamation.
- DRMS commenced water treatment operations on June 7, 2024.
- Water treatment is perpetual and this is the first water treatment plant operated by DRMS.

# London Mine

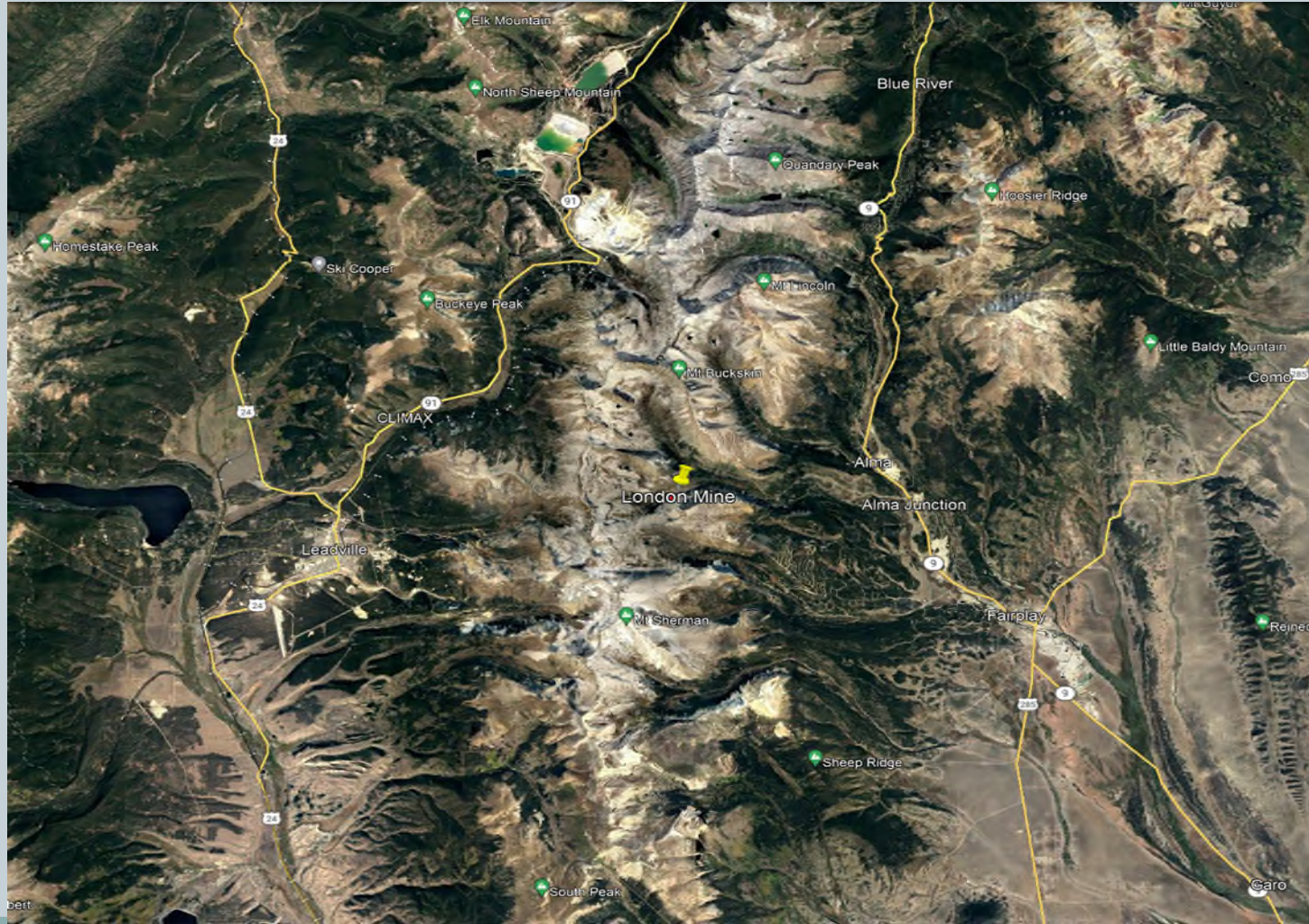
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# General Location

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# London Mine

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- Mining occurred from 1874-1940's
- Produced gold, silver, lead and zinc
- Acid mine drainage discharges into South Mosquito Creek
- Prior to 2017 the discharge did not meet receiving stream standards
- ~40lbs of zinc and cadmium were discharged from the mine on a daily basis

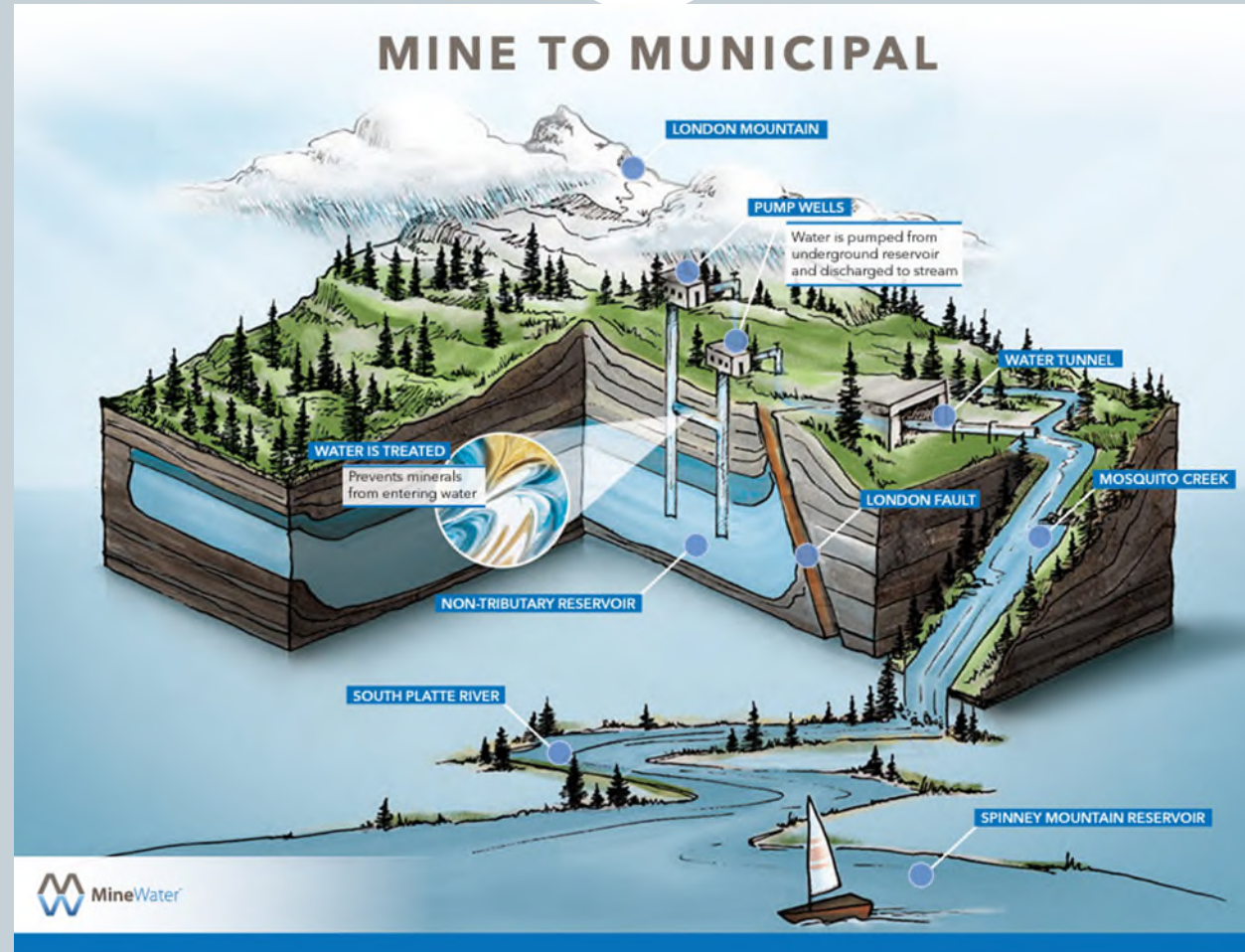
# London Mine

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- In 2016, MineWater LLC purchased the property and entered into a Consent Agreement with CDPHE to bring the mine discharge into compliance.
- A series of deep wells are used to pump and divert water before it flows through the mine workings.
- In 2018, City of Aurora purchased 1,411 acre feet of water from the London Mine.

# London Mine

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# London Mine

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- Provided non-tributary water to Colorado's growing Front Range.
- Improves the health of the ecosystem within South Mosquito creek and its tributaries.
- Avoids trans-basin diversions.
- Potentially serve as a model for the numerous other mines which discharge acid mine drainage.

# London Mine

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# London Mine Overview

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<b>Type of Permit:</b>	110 Designated Mining Operation
<b>Type of Mine:</b>	Surface
<b>Primary Commodity:</b>	Gold, Silver
<b>Method of Mining:</b>	Reprocessing with X-Ray Fluorescence Sorter
<b>Permit Area:</b>	9.9 acres
<b>Surface / Minerals Owner:</b>	Mine Water LLC
<b>Post-mining Land Use:</b>	Industrial/Commercial, Rangeland
<b>Financial Warranty:</b>	\$184,500.00
<b>Status:</b>	Active (not currently processing)

# Questions?

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**COLORADO**

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