# Myths

about the

# Rock Creek Project

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The owners of the Rock Creek Mine have claimed publicly that the mine will protect water resources and the Cabinet Wilderness. They further claim that the citizens of Montana do not need to worry about future environmental problems and financial liability from the extraction and processing of the ore body. However, serious concerns about the validity of those claims have been raised by independent experts and staff of the U.S. Environmental Protection Agency in Denver, Colorado. In a state where tourism is based in large part on clean water and wilderness, can Montana afford to embark on a mining project with so many uncertainties about its environmental impact? The following information provides a summary of the myths perpetuated by the mine owners and the basis for concern about the mine's environmental performance.

## Myth 1:

### Water discharges from the Rock Creek Mine will not be acidic.

There is very limited information about the environmental behavior of mine wastes from the Rock Creek Project, but all indications are that acid drainage will develop, especially in the underground mine water and related seeps. The Troy Mine, which is being used as an environmental analogue, appears to have a lower chance of developing acid drainage.

*Ore* – Essentially all of the Rock Creek ore samples are predicted to be acid generating, while results from Troy Mine ore showed substantially less acid-generation potential.

*Waste Rock* – Almost half of the Rock Creek waste rock samples had results considered to be in the "uncertain" range for acid drainage development. The more specialized tests that would resolve the issue were never performed. No Troy waste rock samples were tested for their acid generating ability.

*Tailings* – Only one sample of Rock Creek tailings was tested for acid-generation potential. Although this sample showed a low potential to develop acid drainage, the ore, from which the tailings are derived, has a high acid drainage potential. Only three samples of Troy tailings were tested, and the results ranged from clearly acid generating to just above the uncertain range. No additional testing was performed.

The fact that the ore has high acid generation potential means that water in the underground mine will likely become acidic. During snow melt and after storms, water seeping through the workings during mining operation will become acidic. After water levels in the underground mine return to pre-mining levels (post-

operation), acidic metal-rich seeps will be able to leak from the underground mine and impact Rock Creek. Rock Creek is a high elevation mountain stream that has very little ability to counteract the acid waters. In such a stream, even low concentrations of metals will be toxic to fish.

# Myth #2:

## Rock Creek tailings will be inert.

Tailings are the crushed ore that remains after the copper and silver (in the case of the Rock Creek Project) have been extracted. The extraction process does not remove all the copper and silver and also leaves behind elevated concentrations of other toxic metals in the tailings. In order for the Rock Creek tailings to be "inert," they would have to be similar to beach sand in composition – that is, containing little else besides silica. Mine tailings are like beach sand in size only. In terms of chemical composition, the Rock Creek tailings will have higher concentrations of toxic metals such as antimony, arsenic, chromium, cobalt, copper, mercury, nickel, and zinc than the Troy tailings. Even with lower "source" concentrations, we know that Troy tailings drainage water contains high concentrations of copper (up to 2,700 µg/l), lead (up to 2,200 µg/l), silver (up to 23 µg/l), and zinc (2,800 µg/l). For Troy tailings discharge water to become suitable for aquatic life such as trout, it would need to be diluted by over 1,000 times.

Tailings drainage water from the Rock Creek Mine will seep into groundwater, where the addition of any arsenic will violate Montana standards. A Montana court recently revoked Rock Creek's water quality permit because the tailings would illegally discharge arsenic into the underlying aquifer. Surface water near the tailings are also at risk because the small mountain streams will not be able to supply enough water to dilute the toxic discharge. Long-term exposure of the stream to mine seeps will also coat stream sediment with metals that are toxic to macroinvertebrates, the aquatic bugs that form an important food source for trout.

<< Acid Mine Drainage

<< Troy Mine Tailings

# Myth # 3:

## The Troy Mine is a good environmental analogue for the Rock Creek Project, and no additional testing is needed.

There is no argument that the Troy Mine ore body is a decent geologic analogue for the Rock Creek deposit. It is not, however, a good environmental analogue. There are important physical and mineralogic differences between the Rock Creek and the Troy Mine deposits, including:

- Rock Creek ore has up to three times the sulfide content and therefore a higher potential for acid generation and metal leaching
- The Rock Creek ore body is up to three times thicker than the Troy ore body; therefore, more material with a higher sulfide content will be exposed and leached in the underground mine, and more tailings will be created
- The Rock Creek deposit is heavily fractured and jointed, possibly even more so than the Troy ore body. The fractures create conduits for contaminated drainage to reach groundwater and surface water and also can accelerate the formation of metal-rich drainage
- The Rock Creek ore is deeper than the Troy ore, indicating that more development rock will be produced.

A summary of some of the most important differences and their environmental significance is provided in the following table. These disparities, combined with the differences in acid generation and metal leaching potential discussed above, indicate that using the Spar Lake (Troy) deposit as an environmental analogue

for the Rock Creek deposit will underestimate the potential of the Rock Creek deposit to generate acidic and metal-rich drainage.

**Table 1. Comparison of geologic and mineralogic features that make Rock Creek deposit more likely to have water quality problems than the Troy Mine.**

| Specific Feature | Spar Lake (Troy) Deposit | Rock Creek Deposit | Environmental Concern |
|---|---|---|---|
| Size of Ore Body | 64 million tons | 143.8 million tons | More tailings & waste rock |
| Pyrite | 0.1–0.3% | 0.0–0.8% | More acid drainage |
| Ore Zone Sulfide Content | 0–80 ft thick<br>0.3–1% | 4–285 ft thick<br>1–3% | More metal-rich leachate |
| Presence of Neutralizing Rocks | calcite in pyrite and ore zones | 1995/1998 EISs: calcite present in all zones | Percentages and availability unknown—need more information |
| Whole Rock Metal Concentrations in Ore | 6,780 ppm Copper;<br>45 ppm Silver;<br>12 ppm Zinc | 7,040 ppm Copper;<br>54 ppm Silver;<br>26 ppm Zinc | Higher concentrations of toxic metals in underground mine water and seeps |
| Whole Rock Metal Concentrations in Tailings | 733 ppm Copper;<br>6 ppm Silver;<br>14 ppm Zinc | 1,030 ppm Copper;<br>11 ppm Silver;<br>24 ppm Zinc | Higher concentrations of toxic metals in tailings and related seeps |

*Sources: Balla, 2000; 1995 and 1998 Rock Creek EISs.*

# Myth # 4:

## No impacts have occurred from the Troy Mine.

Even if the Rock Creek Mine behaves similarly to the Troy Mine, current data from the Troy Mine indicate that its environmental performance has not been stellar and could be demonstrably worse if more environmental sampling was conducted.

- As noted above, drainage water from the Troy tailings contains elevated total concentrations of copper, lead, silver, and zinc that would need to be diluted by more than 1,000 times to support a naturally reproducing cold water fishery.
- The few samples taken from Troy mine drainage water show that copper concentrations and acidity are highest in the early spring. This results from snowmelt that flushes metal salts from fractures and fissures located in or above the mine. Because samples were only collected every few months, even higher copper concentrations and acidity are likely to be measured if samples are collected more frequently. According to EPA (comments from June 2000), "The toxic levels of copper…shown in Troy underground water…may get even worse in May and June." These results show that we don't yet know the impact of the Troy Mine on water resources and that more frequent sampling of the Troy Mine should be performed, especially around early snowmelt and summer storm events.

# Myth # 5:

## Discharges from the Rock Creek Mine will not need perpetual treatment.

Mines that don't require long-term care and maintenance are those with low acid drainage and contaminant leaching potential that are located far from groundwater and surface water resources. None of these conditions are present at the Rock Creek Mine. Two generations of Environmental Impact Statements (EIS) and the Record of Decision (ROD) for the Rock Creek Mine discuss the need for long-term care and treatment:

- Adits would be sealed after mining ceased to prevent discharge to surface waters; however, it is uncertain where outflow from the mine would discharge. Excess mine water would continue to be treated until it met state discharge standards. Groundwater would be monitored for several decades for all action alternatives (1995 EIS, pg. 4-36, 4-37).
- Eventually the mine adits would be plugged and mine water would be collected in the underground workings. If there is outflow of mine adit water, perpetual treatment might be required prior to discharge to the Clark Fork River (2001 EIS, pg. 4-59).
- Water treatment of mine water and tailings seepage will continue as long as necessary until each water source meets appropriate water quality standards or limits without treatment. Bonding will cover water treatment in perpetuity. (2003 ROD, pg. 7)

It is clear from these statements, and from the mine plan itself, that perpetual treatment of underground water is expected and must be planned for financially by the mining company. Having a legacy contaminated site underneath a wilderness area that requires perpetual treatment will place a financial and environmental burden on future Montana generations.

## Summary and Next Steps

All indications are that the proposed Rock Creek Mine represents a serious, long term risk to water quality. Although additional information has been presented that confirms the disturbing results from earlier work, additional testing on ore, tailings, and waste rock samples should be performed.

EPA (2000) stated, "We still do not understand why additional geochemical testing has not been…carried out on the 121 diamond drill cores…drilled on the Rock Creek deposit." In addition, more sampling of Troy mine pool and surrounding surface water should be conducted. This additional testing should be completed, and the results analyzed by independent experts prior to issuance of a waste water discharge permit by the state of Montana.

## About the Author

Ann Maest is an aqueous geochemist and Vice President of Buka Environmental in Boulder, Colorado. She has over 20 years of research and professional experience. Ann received her PhD in Geochemistry and Water Resources from Princeton University. She worked for the U.S. Geological Survey for six years, where she conducted research on the fate and transport of metals and metalloids in surface water and groundwater. Ann specializes in the geochemistry and fate and transport of metals and other constituents at hardrock mines in the U.S. and Latin America. She has extensive experience evaluating acid drainage and metal leaching potential at mine sites and their impact on receiving waters and has also conducted policy studies related to hard rock mining. Her clients include state and federal agencies, U.S. Tribes, the International Finance Corporation and other international banks. She has been elected to serve on three National Academy of Science committees concerning minerals research and mining policy issues.