



Section 319

NONPOINT SOURCE PROGRAM SUCCESS STORY

Colorado

London Extension Mine Drainage Treatment Project Removes Heavy Metals

Waterbody Improved

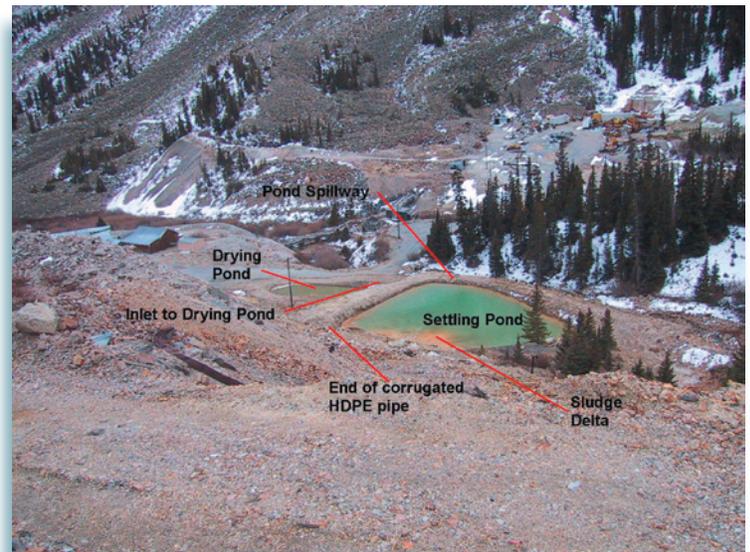
South Mosquito Creek, in central Colorado, has been plagued for years by toxic metals from an abandoned gold mine. A drainage treatment system was constructed to increase the pH of the water and reduce heavy metal concentrations. The treatment system has reduced zinc levels in the creek to below the chronic toxicity level, on average meeting water quality standards and achieving part of the total maximum daily load (TMDL).

Problem

The London Extension Tunnel, a historic gold mining site, is the largest single source of metals contamination to the Mosquito Creek watershed (located 3 miles east of the Continental Divide). Although the streams in the watershed are classified as cold water aquatic class 1, widespread metals contamination has severely depleted aquatic life in Mosquito Creek and essentially eliminated it in South Mosquito Creek. Further compounding the metals problem are the elevation (approximately 11,600 feet) and severe winter weather, which limit accessibility to the site. In 1998 Mosquito Creek was placed on the state's 303(d) list as impaired by zinc, lead, and cadmium, and South Mosquito Creek was listed as impaired by zinc, cadmium, iron, and manganese. A TMDL was established for both segments with zinc as the controlling parameter.

Project Highlights

In 1997 the London Extension Tunnel mine drainage treatment system was constructed to address heavy metal contamination in surrounding watersheds. Acidic drainage is collected in the mine and conveyed to a tank, where cement kiln dust is added. After the acidic drainage mixes with the kiln dust, the water flows to a settling pond outside the mine. The low-cost, low-maintenance system successfully uses cement kiln dust as a cost-effective neutralizing agent in place of other commercially available neutralizing agents.



The mine drainage treatment system mixes kiln dust with acidic runoff to increase the pH of the drainage water. Once a pH of between 9.5 and 10 is achieved, metals are precipitated out in a settling pond and the clean water is returned to the creek.

When the effluent pH is maintained at between 9.5 and 10.0, the system removes more than 99.8 percent of the heavy metals.

Few best management practices (BMPs) were available that could be applied to this site. Aside from the use of neutralizing agents, the only other BMP that could have been effective is hydrologic controls within the mine workings. However, rotting timbers at several locations near the mine entrance made the

entrances unstable and prevented the safe installation of hydrologic controls within the mine workings.

Results

Since the construction of the mine drainage treatment system, monitoring samples show significant decreases in zinc concentrations. Zinc levels in South Mosquito Creek are below the chronic toxicity level and on average meet water quality standards. Additional verification will be required to confirm that the creek is in full compliance with water quality standards.

The treatment system removes approximately 50 percent of the zinc in the drainage, about 26 pounds of zinc per day, and averages a total metal removal of almost 47 pounds per day. On a yearly basis, approximately 8.5 tons of metals that formerly entered South Mosquito Creek are now captured by the treatment system.

Additional investigation and remediation will be required for the main stem Mosquito Creek to attain water quality standards. Since the TMDL includes both segments, goals for Mosquito Creek will need to be attained to meet the

overall TMDL. However, the project demonstrates achievement of part of the overall TMDL goal, and South Mosquito Creek should now be able to support a brook trout fishery.

Partners and Funding

The following partners were involved in this project and provided funding, in-kind services, and technical assistance:

- Colorado Department of Natural Resources, Division of Minerals and Geology (\$21,376)
- Colorado Department of Public Health and Environment, Water Quality Control Division (\$53,118 in section 319 funds)
- London Mine Limited Liability Company (landowner) (\$16,661)
- Colorado School of Mines (\$9,240)

Construction costs for the treatment system were around \$100,000, and the cost of system operation and maintenance is estimated to be \$10,000 annually, plus labor costs. To date EPA section 319 funding has provided \$53,118 for the London Extension Tunnel mine drainage treatment project. With matching funds, the total amount spent was \$100,395.



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