NONPOINT SOURCE SUCCESS STORY

New Mexico

Cleaning Up Cold Springs Creek

Waterbody Improved

Pollution from past mining activities at the Royal John Mine in Grant County led the New Mexico Environment Department (NMED) to add Cold Springs Creek to the list of impaired waters in 2012. The U.S. Forest Service, in conjunction with NMED, removed lead and cadmium pollution sources from the creek by moving historic mine tailings and waste rock away from the stream banks into a secure underground repository. Samples of these metals downstream of the mine went from elevated levels prior to reclamation to non-detectable levels after. As a result, NMED removed cadmium as a cause of water quality impairment in the 2022–2024 Integrated Report; data indicate that the lead impairment could be removed in the next reporting cycle.

Problem

Mining activities dating from 1916 to 1969 at the Royal John Mine and Mill site in southern New Mexico polluted Cold Springs Creek, a tributary to Hot Springs Creek and the Mimbres River (Figure 1). The approximately 2,000-acre mine site contained numerous adits, cuts, and waste rock piles from the historical mining operations. Mine tailings were piled on both the banks and the channel of the creek, at the on-site mill, and at a depository about a half mile downstream. Water quality samples collected in 2009 detected elevated levels of lead and cadmium. NMED listed Cold Springs Creek as impaired on the 2012 Integrated Report due to these metals interfering with the Cold Water Aquatic Life designated use. Portions of the upper watershed burned during the 2013 Silver Fire, which exacerbated erosion during intense summer rains. Site investigation by the U.S. Forest Service in 2014 and consultants in 2016 included conducting soil, sediment, and waste rock sampling, which showed elevated levels of lead and other heavy metals (aluminum, arsenic, cadmium, copper, iron, manganese, and zinc). These pollutants posed a significant threat to aquatic life and human health based on NMED soil screening levels and the potential for transport from the site via surface water runoff.

Story Highlights

In 2018 the Forest Service hired the Engineering Remediation Resources Group, Inc. (ERRG) to remediate the Royal John mine and mill site. The goal was to reduce the potential for exposure of chemicals of concern in the waste materials and surface water.

Figure 1. The historical Royal John Mine affected Cold Springs Creek in southern New Mexico.

Crews moved the waste rock and tailings into an on-site consolidation cell on Forest Service land called the Cowboy Flat Repository. The Forest Service aimed to meet the NMED Industrial Soil Screening Levels rather than the more stringent residential levels, given that the site had background levels of naturally occurring lead and was not planned for residential uses. On-the-ground cleanup activities began in earnest in March 2019. The first steps included clearing access roads at the mine and clearing and stockpiling the topsoil at the repository. The crews constructed silt fences to prevent the tailings from washing into the creek during construction. A new temporary road was constructed to access the tailings that had been piped downstream in the 1920s. Heavy equipment transported the mine and mill waste to the repository,

Figure 2. Mine waste was buried under a vegetated earthen cap at the Cowboy Flat Repository.

Figure 3. An NMED staff member collects samples from Cold Springs Creek, after reclamation.

where it was buried under an earthen cap with a silty clay layer and the topsoil to support native plants. This cap was designed to keep the underlying waste material mostly dry and minimize contaminant transport. A total of 24,476 cubic yards of contaminated mill tailings were removed from the banks of Cold Springs Creek. An additional 22,070 cubic yards of waste rock with elevated lead levels were removed from other areas of the mine. The waste materials were buried safely in Cowboy Flat Repository, thus greatly reducing the risk of exposure to hazardous materials (Figure 2). Some of the mine adits were sealed off completely; other adits were identified as important habitat for bats and were closed off with bat-friendly grates.

Table 1. Water quality data: Cold Springs Creek (2009–2021).

Date	Lead (mg/L)	Cadmium (mg/L)
03/23/2009	0.012	0.001
07/20/2009	0.017586	0.002213
08/24/2009	0.015	0.002
11/17/2009	0.014	0.002
June 2013	Silver Fire	
10/22/2014	0.016	0.001
May 2019	Reclamation in progress	
06/05/2019	0.019	Nondetect
06/05/2019	0.011	Nondetect
09/17/2020	0.002	Nondetect
10/21/2021	Nondetect	Nondetect

Note: mg/L= milligrams per liter

Results

NMED staff sampled Cold Springs Creek for metals downstream of the Royal John Mine before and after reclamation (Figure 3; Table 1). After reclamation, samples from 2019 and 2020 showed a decrease in lead, and no cadmium was detected. In 2021, both cadmium and lead levels were below detection. Therefore, the NMED Surface Water Quality Bureau (SWQB) removed cadmium as a cause of water quality impairment in the 2022–2024 Integrated Report. Based on current data trends, it appears likely that the lead impairment could also be removed in the next reporting cycle.

Partners and Funding

The primary partners on the cleanup of Royal John Mine and Cold Springs Creek were the Forest Service Regional Office, Gila National Forest, and their contractor, ERRG. The Forest Service funded the restoration effort ($1,642,459 total). NMED's SWQB and Ground Water Quality Bureau (GWQB) staff provided comments, guidance, and inspection during the planning and reclamation process through the Mining Environmental Compliance Section of GWQB. Staff from the SWQB conducted the water quality monitoring.

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