

CASE STUDY

Central City/Clear Creek Superfund Site National Tunnel Discharge Gilpin County, Colorado

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**Prepared by
The Interstate Technology & Regulatory Council
Mining Waste Team**

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**CENTRAL CITY/CLEAR CREEK SUPERFUND SITE,
NATIONAL TUNNEL DISCHARGE, GILPIN COUNTY, COLORADO**

1. SITE INFORMATION

1.1 Contacts

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1.2 Name, Location, and Description

Added to the National Priorities List in 1983, the Clear Creek/Central City Superfund Site consists of several mine waste piles, draining adits, and impacted groundwater bodies scattered over roughly 400 square miles. Historic mining resulted in a watershed contaminated with heavy metals, significantly impacting aquatic life and potentially threatening human health.

www.epa.gov/region8/superfund/co/ccclearcreek

2. REMEDIAL ACTION AND TECHNOLOGIES

To ensure protection of human health and to reestablish a viable brown trout population, several remedial actions have been performed. Waste piles have been subject to actions including stabilization, capping, off-site disposal, and diversion of run-on water. In many cases, acid mine drainages have been collected and piped to reduce the potential for human contact. In a joint project with the Colorado School of Mines, EPA, CDPHE, and Penn State are testing various passive systems for treating the water from the National Tunnel and mine-influenced water from a central Pennsylvania Stream. These systems are known as “sulfate-reducing bioreactors.” Within enclosed containers or tanks, mine water is run through carbon substrates to compare multiple carbon substrates including chitin complex, wood mulch, corn stover, and ethanol that enhance bacterial reactions that treat the water and reduce metal concentrations. The pilot testing will continue through 2009.

Following the pilot test, a full-size passive system will be designed and constructed for the National Tunnel water. As these solutions require the installation of engineered wetlands or water treatment systems, institutional controls will be required for the property or properties selected for the final installation(s). These solutions also treat water discharged from the adit and will require continued operation until the flow is eliminated.

3. PERFORMANCE

Barrel test operated at 6 gpd to achieve a residence time of 1.5 days (Table 3-1).

Table 3-1. Cleanup concentrations(Modified from <http://www.jrwbioremediation.com/pdf/BlackHawkDataHandout-1.pdf>)

Contaminant	Influent (mg/L)	Cleanup goal (mg/L)	Ethanol	Wood + hay	Corn stover + wood	Chitin complex
Acid	5.0–6.0	6.5–8.5	6.11	6.71	6.58	6.98
Aluminum	0.1–1.0	0.1				
Iron	37.5	< 1.0	50.0	20.6	0.26	0.001
Manganese	20.3	<1.0	50.7	10.9	12.4	2.0
Copper	0.02	<0.01	<0.0009	0.003	0.003	0.002
Zinc	6.51	<0.1	0.033	0.006	<0.0006	0.009

4. COSTS

The capital and operating costs are variable and will be compared to a bench-scale test conducted by Penn State University. The cost of treatment during the Pennsylvania bench-scale study was estimated to be \$0.002 per gallon treated.

5. REGULATORY CHALLENGES

None.

6. STAKEHOLDER CHALLENGES

Placement of the barrels in an area not readily viewable by the public was requested, so the system was constructed in Clear Creek under a vehicle bridge.

7. OTHER CHALLENGES AND LESSONS LEARNED

It is difficult to design and operate a barrel study pilot test in extreme winter conditions that will approximate full-scale conditions.

8. REFERENCES

No information available.