

Green Remediation Focus

Minimizing the environmental footprint of site cleanup

A Profile in Using Green Remediation Strategies

Additional profiles available at www.clu-in.org/greenremediation

Upper Arkansas River
Leadville, Colorado

Former Superfund

Cleanup Objectives: Address heavy metals contamination, including cadmium, copper, lead, manganese, and zinc, caused by past mining activities along an 11-mile stretch of the Upper Arkansas River.

Green Remediation Strategy: The focus of the strategy included treating soil by applying 100 dry tons (pellets) of biosolids to each of 20 target acres along an 11-mile stretch of the Upper Arkansas River:

- Mixed biosolids with lime to reduce soil acidity, supporting increased plant viability and metal insolubility.
- Seeded native plants and quick-growing ryegrass.
- Added compost and wood material as additional plant nutrients.
- Added wood chips to reduce nitrogen (nutrient) leaching.
- Covered amended soil with native hay to promote plant growth and seeding.

Site Assessment: No site assessment work needed, removal only site.

Results:

Land & Ecosystems Protection

- Revegetated denuded acreages.
- Reduced concentrations/bioavailability of zinc and other metals through bioremediation, phytoremediation processes, and solubility reduction.
- Neutralized soil to levels supporting healthier ecosystems.
- Reduced soil erosion, river channel degradation, and property loss.
- Re-established communities of native plants, such as white yarrow and tufted hairgrass.

Property End Use: Agriculture and recreation

Site has been archived.



Due to the fluctuating water table and acidic conditions, Zn and Pb form soluble salts and wick to the surface of soil along the river during dry seasons. These conditions cause a metal salt crust to form on surface soil, with Zn concentrations as high as 90,000 mg/kg.



Biosolids from the Denver metropolitan area were applied at a rate of approximately 100 dry tons/acre and mixed with similar amounts of lime. Amendments were tilled into the soil to a depth of 12 inches.



Varying amounts of woody material were mixed with the biosolids to achieve soil amendments favoring different native plant communities.



October 2008 site visits showed healthy revegetation throughout soil amended areas.



Following 10 years of growth, grasses installed in amended soil demonstrated a large root mass.



Most biosolids/lime amended stream sides now exhibit 100% vegetative cover.

Update: July 2024

Upper Arkansas River

<http://clu-in.org/greenremediation/profiles/upperarkansasriver>



United States Environmental Protection Agency
Office of Solid Waste and Emergency Response (5202P)

For more information:
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