



Environmental Management & Planning

Client
Environmental Protection
Agency

Location
Idaho, USA

Bunker Hill Superfund Site Wetlands, Idaho



- Provided complete range of environmental services for restoration of 21 square miles of land mined for over 100 years
- Designed a soil stabilization program that included check dam installations and application of soil amendments using innovative aerial application techniques on a difficult landscape
- Site studies, combined with adaptive management, resulted in continual refinement of seed mixes and other prescriptive elements to respond to hillside performance

The Bunker Hill Mining and Metallurgical Complex Superfund site, located 40 miles east of Coeur d'Alene in the Idaho Panhandle, encompasses 21 square miles of a steeply sloped valley actively mined for lead, silver, and zinc for over 100 years. The South Fork of the Coeur d'Alene River courses through the site. Ore processing and smelting activities were also conducted from the early 1900s to 1981. Facilities included a 230-acre tailings impoundment; a 450,000-square-foot lead smelter; a phosphate fertilizer plant; a 490,000-square-foot electrolytic zinc plant; three sulfuric acid plants; a water treatment plant for acid mine drainage; and a 170-acre floodplain contaminated with mine tailings, deforested and severely eroded hillsides, and contaminated surface water runoff from several site tributaries. Heavy metal contamination from smelter air emissions, tailings deposits, and acid mine drainage is widespread across the site.

Since 1994, CH2M HILL has been an important EPA contractor for remedial investigations, feasibility studies, remedial design, and technical assistance during remedial action implementation for this \$100 million environmental cleanup. CH2M HILL's responsibilities cover the breadth of environmental services from sampling, data management, determining nature and extent of contamination, feasibility evaluations, remedial design, cost estimating, and services during demolition and construction. In addition, CH2M HILL assists EPA with overall program management, community relations, long-term planning, value engineering, evaluation of contracting strategies, and negotiation support with other project stakeholders.

To prevent further erosion from the hillside environment, CH2M HILL designed a slope stabilization program that included erosion-control structures and revegetation. Check dams were constructed in major gullies and on terraces that are currently contributing to runoff and gully formation in the fall of 1998. During and following check dam installation, specially-designed revegetation prescriptions were applied to over 1,000 acres lying in portions of six watersheds. Revegetation prescriptions were based on field studies that evaluated different amendments, various tackifiers, 15 different herbaceous plant species, and six different shrub species.

All hillside surfaces were limed prior to seeding. Subsequent to liming, soil amendment on the hillsides consisted of various combinations of seed, tackifier, mulch, organic and inorganic fertilization, and biosolids



applications. Plant species were chosen based on field performance and included drought and acid-tolerant species and nitrogen-fixing species as well as species that could become rapidly established. The application of lime and most of the seeding used innovative aerial-based hydroseeding using Sikorski helicopters, more widely known for their use in fighting wildfires. Using adaptive management as a basis for the program, treatments were phased over 5 years, beginning with the stabilization of gullies. The final phase involved the planting of woody species. At each point along the way, hillsides performance guided new decision-making.

The Smeltonville Flats floodplain is about 200 acres in size and about half of this are now wetland environments. One photo shows the floodplain in 1996 prior to tailings removal, regrading, and topsoil placement. The second shows a portion of the floodplain in 2000 with naturally regenerated wetland species, including cattails, rushes, sedges, spike rushes, and other wetland plants. Grading was based on modeled groundwater elevations and a natural high-quality topsoil was used to topdress the site and give it a source of nutrients and seed. Other seed entered the area from flooding. No artificial planting of herbaceous species occurred, allowing nature to do the job and saving the EPA about \$900 thousand. Elk are using the area now extensively as winter range and waterfowl are beginning to use open water areas.
