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Reuse and the Benefit to Community Bunker Hill Mining and Metallurgical Complex Superfund Site

Introduction

The Coeur d'Alene Basin in northern Idaho is one of the largest historic mining districts in the world. Over 100 years of commercial mining, milling and smelting resulted in the widespread contamination of soil, sediment, groundwater and surface water in the area now known as the Bunker Hill Mining and Metallurgical Complex Superfund site. Extensive cooperation and collaboration among the U.S. Environmental Protection Agency (EPA), the Idaho Department of Environmental Quality (IDEQ), the Idaho Panhandle Health District (PHD), and other local and state agencies resulted in the cleanup and restoration of over 7,000 properties. The site's unique and comprehensive institutional control program (ICP) has enabled continued use and new development across the site – providing a framework in which regulatory agencies and the community can approach cleanups, manage risks, and address community and developer concerns. The ongoing, open communication and innovative thinking of site stakeholders has resulted in the remarkable transformation of this once-contaminated industrial site into a revitalized area built on a shared vision of a better future.

Superfund site restoration and reuse can revitalize local economies with jobs, new businesses, tax revenues and local spending. Cleanup may also take place while active land uses remain on site. Today, the site supports a wide range of commercial, industrial, public service, residential and recreational reuses. The site is now home to the Silver Mountain Resort, a year-round tourist destination that offers recreation opportunities – including skiing, golf, biking and an indoor water park – to locals and visitors. The Trail of the Coeur d'Alenes, a 72-mile scenic bike trail, passes through the site. Cleanup has also resulted in significant ecological benefits, including the restoration and revegetation of once-barren hillsides across the site. This case study explores the area's innovative cleanup and reuse, illustrating the beneficial effects of Superfund redevelopment.

Beneficial Effects

- **Businesses within the Bunker Hill Box (the Box) employ over 2,800 people, providing about \$105 million in annual employment income and generating an estimated \$346 million in annual sales.**
- **Site properties in the Box are currently valued at nearly \$282 million. They generate about \$4.4 million in annual property tax revenues.**
- **The taxes generated by the Silver Mountain Resort are key to funding barrier maintenance efforts.**
- **Cleanup has resulted in significant ecological benefits, including the revegetation of miles of once-barren hillsides and the restoration of once-contaminated farmland as healthy wetland habitat.**

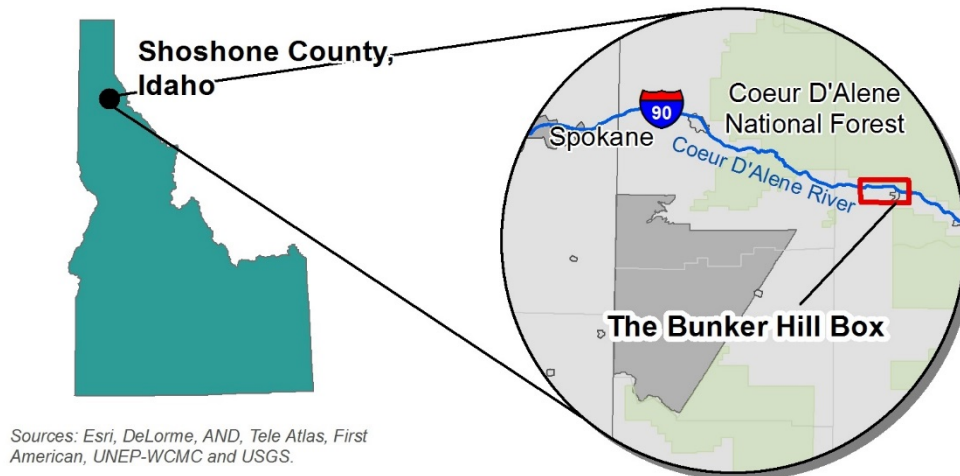


Figure 1. The location of the Bunker Hill Box within the Bunker Hill Mining and Metallurgical Complex Superfund site in Shoshone County, Idaho.

Site History

The site includes mining-contaminated areas in the Coeur d’Alene River corridor, adjacent floodplains, downstream water bodies, tributaries and fill areas as well as the 21-square-mile Bunker Hill Box (referred to as “the Box”), which surrounds the area of historic smelting operations (Figure 2). To manage the complex cleanup, EPA divided the site into three areas, or operable units (OUs). OU1 includes populated areas of the Box. OU2 includes non-populated areas of the Box. OU3 addresses mining-related contamination in the broader Coeur d’Alene Basin. This case study focuses on the cleanup and beneficial effects of redevelopment and continued use within the Box at OU1 and OU2. OU3 is also discussed.

The Box is located in a steep mountain valley in Shoshone County, Idaho, east of the city of Coeur d’Alene. Interstate 90 bisects the Box and parallels the South Fork of the Coeur d’Alene River. More than 7,000 people live in OU1 – it includes the cities of Kellogg, Wardner, Smelterville and Pinehurst as well as the unincorporated communities of Page, Ross Ranch, Elizabeth Park and Montgomery Gulch.

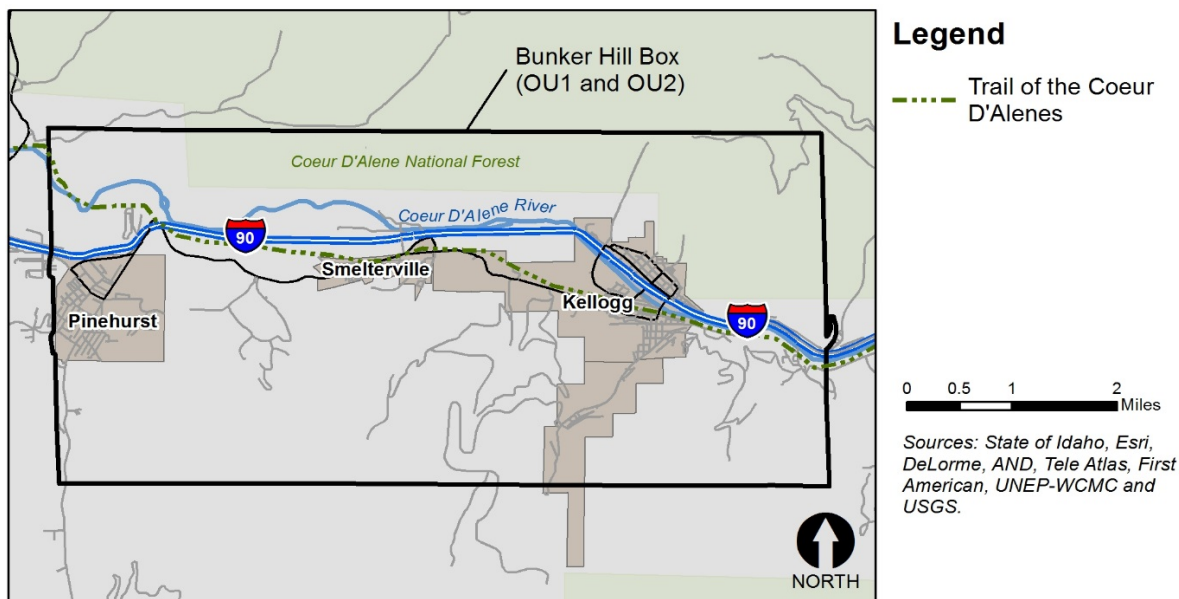


Figure 2. The Bunker Hill Box in Shoshone County, Idaho.

Commercial mining for lead, zinc, silver and other metals began in the Silver Valley in 1883. Over 100 years of commercial mining, milling and smelting contaminated soil, sediment, groundwater and surface water with metals. Tailings – generated by the milling of ore, waste rock and air emissions from smelter operations – served as the primary source of contamination at the site. Tailings were frequently used as fill for residential and commercial construction projects. Spillage from railroad operations also contributed to contamination. In total, mining activities resulted in the distribution of more than 100 million tons of contaminated materials across tens of thousands of acres.

Until as late as 1968, mining operations included the disposal of tailings into the South Fork of the Coeur d’Alene River and its tributaries. These wastes have spread through more than 160 miles of the Coeur d’Alene and Spokane rivers, lakes and floodplains. Over time, groundwater also became contaminated.

Ore processing facilities in Kellogg and Smelterville impacted air quality and other media through air emissions. In September 1973, a fire destroyed the baghouse and the primary emissions control for the lead smelter. The smelter continued production without emissions controls, emitting up to 160 tons per month of particulates. The smelter emissions and deposition of fine, high-lead particulates in the air, dust and soil exposed people – particularly children – to dangerous levels of lead. At that time, blood lead levels in local children were some of the highest levels ever measured in the country. While EPA initiated emergency response actions in 1974, blood lead levels in area children remained elevated until the smelter closed in 1981. Since the late 1980s, mining and milling activities have decreased significantly; however, several active mining operations remain in the Silver Valley. Today, mines extract metals with a higher efficiency and operate under state and federal environmental laws that greatly reduce potential environmental impacts.

Site Cleanup

EPA added the site to the Superfund program’s National Priorities List (NPL) in 1983. Residential, community and smelter-area cleanups have been ongoing since then. EPA, the IDEQ and the PHD have been working at the site since the mid-1980s to remove lead-contaminated soil and gravel from residential properties, churches, schools, parks, businesses and rights-of-way. Cleanup is ongoing. This section describes cleanup activities across different parts of the site.



Figure 3. The Bunker Hill Smelter in 1925.

Image source citation: PG 8-X737b, Barnard-Stockbridge Collection, University of Idaho Library Special Collections and Archives.



Figure 4. Miners working at the Bunker Hill outcrop in Kellogg.

Image source citation: PG 8-X024, Barnard-Stockbridge Collection, University of Idaho Library Special Collections and Archives.

OU1 Cleanup

OU1 was the area of greatest concern for human health exposure from smelter emissions, fugitive dust and mine waste. In 1985, the State of Idaho started a Lead Health Intervention Program. Its goal is to minimize blood lead levels in children through health education, parental awareness and biological monitoring. The PHD administers the program, which includes educational and outreach activities, a vacuum loan program, and annual blood lead testing of children living on site. With the closure of the smelter and other major industrial operations in the early 1980s, Superfund cleanup work, and the PHD's health intervention services, blood lead levels in children have decreased significantly and are now similar to the national average.

EPA selected a long-term cleanup plan for OU1 contamination in 1991 and updated the remedy in 2012. Its primary goal was to reduce children's intake of lead from soil and dust. Cleanup included remediation of all residential yards, commercial properties and rights-of-way with lead concentrations above cleanup goals, control of dust and stabilization and capping of contaminated soil in the Box, and the ICP to maintain protective barriers and ensure the compatibility of future uses with the remedy. It also included drainage improvements and cleaning the interiors of affected homes.

Funding from two settlements help EPA pay for cleanup actions in the Box and the Basin. Over 7,000 properties have been cleaned up across the site (OU1, OU2 and OU3). To date, about 99 percent of impacted residential and commercial properties sitewide have been remediated.

OU2 Cleanup

EPA selected a cleanup plan to address OU2 contamination in 1992 and later updated the remedy several times. OU2 includes areas in the Box that were non-populated, nonresidential areas as of 1992. They include the former industrial complex and Mine Operations Area in Kellogg, Smelterville Flats (the floodplain of the South Fork of the Coeur d'Alene River in the western half of OU2), hillsides, creeks and gulches, the Central Impoundment Area, and the Bunker Hill Mine and associated acid mine drainage. Cleanup of these areas included source removals, surface capping, creek reconstruction, demolition of abandoned milling and processing facilities, engineered closures for waste consolidated on site, revegetation efforts, and treatment of contaminated water collected from various site sources. It also included drainage improvements to protect the remedy from flooding, groundwater treatment and institutional controls.



Figure 5. Demolition of the Bunker Hill lead smelter stack in 1996. *Image source: Idaho PHD.*



Figure 6. Property cleanup in the Box. *Image source: Idaho PHD.*



Figure 7. The site's Central Treatment Plant captures and treats mine drainage from the Bunker Hill Mine.

Each day, 2 million gallons of mine drainage continues to discharge from the opening of the Bunker Hill Mine, which is located on a hill directly above the town of Kellogg. EPA currently operates the Central Treatment Plant to capture and treat the mine drainage. The Central Impoundment Area is another prominent remedial feature in Kellogg, and is located next to the Central Treatment Plant. This large capped impoundment area contains site-related wastes. It is one of the few remaining flat pieces of property left in the area – the town hopes to reuse the area in the future. Looking forward, planning is underway to capture impacted groundwater that flows through the Central Impoundment Area and pump it back up to the Central Treatment Plant for treatment.

OU3 Cleanup

EPA selected a cleanup plan to address OU3 contamination in 2002 and updated the remedy in 2012. OU3 consists of mining-impacted areas in the Coeur d'Alene Basin outside of OU1 and OU2. These areas include the floodplain and river corridor of the Coeur d'Alene River (including Coeur d'Alene Lake) and the Spokane River, and areas where mine wastes were used for road building or for fill and building construction. OU3 cleanup activities include the provision of lead health information and intervention programs for residents and recreational users, cleanups of residential properties, alternate drinking water sources for residences using impacted drinking water sources and the implementation of institutional controls in 1997. Cleanup has also included excavation and consolidation of waste rock, tailings and floodplain sediments, capping, regrading and revegetation of tailings and waste rock areas, stream and riparian stabilization actions, and groundwater treatment. Three regional repositories were put in place at OU3 to contain site-related wastes.

The PHD's Institutional Controls Program – The “Champion” of Site Redevelopment

In 1987, the city of Kellogg began to pursue redevelopment opportunities for cleaned-up parts of the site. However, getting liability protections for developers was a complex and often lengthy process. To address this, in 1995, the PHD partnered with federal and local agencies to create the ICP, which works through existing local administrative procedures and programs. Tailored to meet community needs and address challenges posed by the site, the ICP helps convince local lenders to fund redevelopment projects. It also plays a major role in protecting public health. The sections below discuss the ICP in greater detail.

Public Education and Outreach

Due the extent of soil contamination across the large site, it was not feasible to remove all of the material. Across much of the developed parts of the Box, barriers placed over contaminated soil protect people from exposure to materials below. These barriers include clean soil and vegetation as well as asphalt and gravel. With help from EPA, the PHD and IDEQ, Silver Valley communities have learned to manage site-related risks. Through the ICP, the PHD educates local communities and visitors about the risks associated with site-related contamination – specifically lead – and how to safely enjoy the natural environment. Together, the PHD and IDEQ publish educational materials for children, including coloring pages, games and instructions, about how to follow the “Three Cs” – Keep Clean, Eat Clean and Play Clean. The PHD also shares information with school groups and posts signs at trailheads, boat launches and other recreational locations to educate visitors about health precautions as well as the area's history. Posters and brochures are also posted along waterways and in local stores to reach people who spend time outdoors.



Figure 8. Cover of an educational activity book for children developed by the PHD and IDEQ.

Community Assistance with Construction Projects and Barrier Maintenance

The PHD provides support and resources to area communities to help homeowners comply with the ICP. For example, the PHD provides clean gravel, soil, asphalt patches and asphalt sealant to help people maintain the barriers on their property. If a homeowner needs to excavate impacted soil, the PHD provides loaner trailers for hauling the soil to one of the site's soil repositories. Community members can dispose of impacted soil at site repositories at no cost. The ICP also regulates and provides assistance for all construction projects within designated boundaries - no homes or businesses are built on site without ICP involvement. Effective management and tracking of this large and comprehensive institutional control system is key to its success. Together, the PHD, contractors and community members work together to ensure that all construction work complies with the program - the ICP compliance rate is 99 percent. The program works because everyone recognizes its importance for the continued protection of public health and the area's economic prosperity.

The PHD maintains an electronic database that stores sampling data and cleanup information on residential and commercial properties within the ICP boundaries. When a person calls for permission to start work on a construction project, the PHD looks up sampling information for the area to identify precautions and/or cleanup that may be needed. If additional sampling is needed, the PHD performs the sampling at no cost to the property owner. The agency also provides contractor certification programs to ensure workers are thoroughly trained and familiar with program requirements.

ICP cleanups are funded by federal, state and potentially responsible party (PRP) funds. As part of a site settlement, the PRPs set aside a trust to help fund ICP implementation and barrier maintenance efforts.

Bunker Hill ICP Serves as a Model for Other Contaminated Sites

The PHD's ICP as an excellent example of a comprehensive, multi-faceted ICP that can be applied to other contaminated sites in the United States as well as abroad. In 2015, after learning of the Bunker Hill site and the ICP, representatives from the New South Wales Environment Protection Authority and Lake Macquarie City Council from Boolaroo in New South Wales, Australia, visited the site. The group was hoping to learn lessons from site cleanup and development to apply at the Pasmenco Cockle Creek Lead Smelter site in Australia. The group met with EPA, IDEQ and the PHD and saw firsthand the ICP's importance to the entire process. The group then developed recommendations for improved management of the cleanup of the Pasmenco site.

Site Infrastructure Improvements – Remedy Protection and Redevelopment

Adequate infrastructure is a necessity when trying to attract new businesses and development to an area. At the Bunker Hill site, strong infrastructure is also vital for the protection of the remedy and public health. The integration of infrastructure improvements and remedial work at the site has increased the appeal of the area for potential developers and synergized resource efficiency. For example, in Kellogg, the city's aging sewer system was showing signs of deterioration. Impacted groundwater seeped through cracks in old sewer pipes, making its way to the wastewater treatment system. The system was not designed to treat contaminated groundwater and could not handle the additional load. In response, the local sewer district placed a moratorium on new sewer connections, which in turn limited development in the area. Seeking a solution, the city applied for and won the largest rural development grant ever awarded in Idaho. The city and the PHD worked together on the project to replace the sewer system within the framework of the ICP. The sewer district lifted the moratorium on new sewer connections in 2016. Today, the city's sewer system meets current community needs and can support future development projects.



Figure 9. Utility and road infrastructure project underway in September 2017.

Adequate utilities and roads are also key to attracting new development. Faced with the need to update underground utilities and repave local roads, the city of Kellogg worked with EPA and the PHD on a phased approach to the infrastructure update that would save time and money and protect human health. The approach involves removing the old asphalt and associated impacted soil, installing new underground utilities, and then placing a new asphalt barrier on top. The work is being done in sections to limit potential exposure risks, and in accordance with ICP requirements. The incorporation of infrastructure upgrades with the installation of the new asphalt resulted in a decrease of overall project costs by 20 percent. This phased approach is being implemented sitewide.

Maximizing Limited Flat Land – Government Gulch Development

EPA, the city and the PHD have developed a creative waste management approach that facilitates redevelopment at another part of the site. Government Gulch, the former location of the Bunker Hill zinc plant, phosphoric fertilizer plant and other former industrial operations, is one of the few remaining potentially developable pieces of property within the Bunker Hill Box. The vacant state-owned property is not on the tax rolls. Without improvements, it could not be developed. Specifically, with the slope of the land too steep to support buildings, fill would be needed to level the surface. The city came up with a plan to facilitate the area's development. EPA and the PHD reviewed and approved the plan, allowing flexibility in remedy design to allow the use of impacted asphalt and soil from the site's infrastructure improvement projects, and impacted soil from other site areas, as fill at Government Gulch. The plan includes grading and compacting the fill and covering the area with a clean barrier and/or asphalt. It also includes rerouting stormwater in the area.

The reuse of the impacted asphalt and soil saves money on fill costs and helps set the stage for future development. Waste materials generated by the infrastructure project and other cleanup projects would typically be placed in one of the site's waste repositories. Space in the repositories is finite; when they are full, they must be closed and replaced by new repositories. The use of the material at Government Gulch saves space at the repositories, prolonging their lifespans. This project shows how parties can work together to integrate remedy and reuse considerations at Superfund sites and other contaminated lands. The city now receives regular inquiries from organizations interested in the Government Gulch property.

Beneficial Effects

The site's cleanup protects public health and the environment and has enabled the successful and safe redevelopment of properties sitewide. Businesses on site bolster the local economy and help generate local and state tax revenues. The sections below describe the specific beneficial effects provided by businesses at the site. Table 1 summarizes the beneficial effects associated with businesses and properties within the Bunker Hill Box.



Figure 10. Improvements underway at Government Gulch.



Figure 11. One of the OU3 waste repositories.

Table 1. Site Business and Property Information for the Bunker Hill Box (2016/2017)^a

	Businesses	Employees	Annual Employee Income ^b	Annual Sales ^b	Assessed Value Land/Improvement ^b	Property Tax
Total	289	2,869	\$105 million	\$346 million	\$282 million	\$4.4 million
^a See Technical Appendix.						
^b Values are rounded to the nearest million.						

Silver Mountain Resort

The Bunker Hill Company owned the site's first ski resort. During the decline in mining in 1984, the city of Kellogg took over the ski area. In 1996, developer Eagle Crest Partners, a resort-management subsidiary of Oregon's Jeld-Wen, identified the area as an attractive investment opportunity. Several factors attracted the developer to the area – the site is located next to Interstate 90, it is only an hour from a major airport, and the price was right. Existing ski resort infrastructure also made the site an ideal location for a new and improved tourist destination. The site already boasted the longest gondola run in North America – 3.1 miles from Kellogg to the Silver Mountain ski area.

However, the developer was initially concerned about purchasing and developing on a Superfund site. The site's ICP addressed these concerns and Eagle Crest Partners purchased the property in 1996. The new owners started resort development and refurbishment of existing infrastructure in 2004, and completed construction of a water park in 2008 and a golf course in 2010. The PHD worked with the new owners throughout construction to answer questions, address concerns and make sure all work was permitted and in compliance with ICP requirements. According to the resort's marketing and events manager, the importance of ICP implementation was one of the biggest lessons learned during the development process. He also emphasized the importance of ensuring that all construction contractors were familiar with ICP requirements.

Today, Silver Mountain Resort – a year-round destination offering a wide range of recreation opportunities to locals and visitors of all ages – is located on site. In addition to skiing, snowboarding and snow tubing, the resort includes the Morning Star Lodge, Galena Ridge Golf Course, miles of bike trails and Silver Rapids, Idaho's largest indoor water park. Morning Star Lodge is one of the region's premier vacation rental and resort condominium developments. The ski resort includes 73 trails and a snow tubing park; it covers 1,600 acres of terrain on two mountains. Silver Mountain Bike Park is the #1-ranked bike park in the northwest.



Figure 12. Sign at the entrance of the Silver Mountain Resort.



Figure 13. The base of the Silver Mountain Resort gondola.



Figure 14. Entrance to the Morning Star Lodge.

restoration, the area was one of the most contaminated parts of the site. Extensive coordination between EPA, the PHD and the developer made the area's cleanup and reuse possible. The developer built the golf course in accordance with ICP requirements, ensuring the safety of workers as well as future recreational users. Cleanup included the removal of impacted soil and bringing in clean soil for the golf greens. Today, the nine-hole golf course provides locals and visitors with a popular recreational amenity. Since the course's completion, several homes have been built nearby, adding value to the area and generating local property taxes.

The resort is also active in the community. It co-hosts the "Lead Man" triathlon each year. About 200 to 300 competitors ski, bike and run across the site. All funds raised are donated to local charities. Many resort staff are also part of local community groups and charity events.

The resort also highlights the site's history and cleanup via signs installed at the top of the mountain and along trails. The interior of the Morning Star Lodge is decorated with historical photographs of miners and local mining activities.

Today, Silver Mountain Resort is an important economic, cultural and recreational hub. About 170,000 people visit the resort each year. The resort employs about 275 people, generating an estimated \$5.5 million in annual employment income. In 2016, its sales revenues exceeded \$20 million.



Figure 15. One of the many Silver Mountain Resort lodging options.



Figure 16. View of the Galena Ridge Golf Course.

"We have to focus on the positives of being a Superfund site. While it has not been without challenges, we came together as a unique community and seized the opportunity to turn our area around and promote the positives. We have a beautiful area to call home, enjoy the outdoor lifestyle and build the economy around."

– Colleen Rossen, Director, Historic Silver Valley Chamber of Commerce



Figure 17. Examples of Silver Mountain Resort amenities.

Smelterville Flats

Cleanup directly facilitated the redevelopment of an area known as Smelterville Flats. It was once vacant and highly impacted by site-related contamination. The community saw its potential and was determined to return it to productive use. However, the flat, open area lacked essential stormwater controls. The community approached EPA and requested that the remedy include a stormwater ditch to help address flood mitigation and runoff. EPA agreed, incorporating the South Ditch as part of the remedial design. Today, Smelterville Flats is home to a Walmart Supercenter, an O-Reilly Auto Parts store and the Silver Leaf apartment complex. The Silver Valley Office of the U.S. Forest Service Coeur d'Alene River Ranger District also operates within the Smelterville Flats area. Together, the Forest Service Office, auto parts store and Walmart employ 159 people, contributing about \$3 million in estimated annual employment income. In 2016, their combined sales were nearly \$24 million.

Shoshone County Medical Center

Shoshone County Medical Center was built on site in 1958. By the early 2000s, the facility was outdated and in need of significant updates. The Center pursued financing for new construction at the same location through the U.S. Department of Housing and Urban Development's (HUD's) 242 program. It was the first facility west of Mississippi to access the program to fund construction of a medical facility. While the Center was familiar with the site's history and the ICP, HUD had significant concerns about funding a project on a Superfund site and rejected the Center's initial application. The PHD and the Center worked with HUD to explain how the ICP works. Thanks to those efforts and to the comprehensive nature of the ICP, HUD agreed to finance the project.

The Center worked with EPA and the PHD to make sure the new medical center would be compliant with the ICP. Cleanup addressed hot spots of soil contamination and clean fill was used to raise the ground surface for construction. The fill and a large paved parking area serve as a barrier between the facility and impacted soil. Construction of the new facility included stormwater controls. The Center worked with the state and EPA to install a stormwater overflow bypass pipe under the road adjacent to the facility. The large diameter pipe is designed to handle a 100-year flood event. This stormwater control measure helps prevent flooding, which in turn protects the integrity of the remedy.



Figure 18. The Smelterville Walmart store.



Figure 19. Silver Leaf Apartments at Smelterville Flats.



Figure 20. Silver Valley Office of the U.S. Forest Service.

The new Shoshone County Medical Center opened in February 2005. The facility is the only critical-access hospital in the Silver Valley. In addition to providing important medical services, the Center is also a vital part of community activities. Its hosts an annual Kids Health Fair, hosts blood drives and flu clinics, and partners with the PHD to help provide blood lead level screenings. In September 2017, 600 people participated in the Kids Health Fair and the Center donated 250 coats to area children in need. The Center provides \$1.2 million a year in services to community members who cannot pay for healthcare services. It also provides \$5.3 million in estimated annual employment income and generated \$18 million in patient care revenue in 2016.

Excelsior Cycle

This full-service bicycle shop was attracted to the area by the Trail of the Coeur d'Alenes and Silver Mountain Resort. The shop caters to outdoor enthusiasts who enjoy resort amenities and the biking trails. In 2016, it generated about \$143,000 in sales.

North Idaho College Silver Valley Center

This college branch includes the Idaho Adult Education Center. The Center provides instruction in math, language arts, social studies and science to help prepare adult students to complete their general education diplomas and for college success. The Center also offers workforce training in health professions and emergency services, business, computers, and trades such as mine safety and welding. It generates nearly \$270,000 in annual employment income.

Radio Brewing

This craft beer brewery and restaurant was the first brewery to open in Kellogg. The owners celebrate their love of beer and old-time radio by theming beers after their favorite radio programs from the 1920s through the 1950s. The business also hosts community fundraisers. In 2016, it generated nearly \$17 million in sales.

Panhandle Health District

The PHD operates its Departments of Environmental Health, Clinical Services and the ICP out of its on-site facility on Wildcat Way. The PHD also operates its Women, Infants and Children (WIC) program at the on-site location, providing a supplemental nutrition program to area women and children. Together, these departments employ 7 people and generate about \$260,000 in annual employment income.



Figure 21. The Shoshone County Medical Center.



Figure 22. Examples of site businesses in Kellogg: Excelsior Cycle, North Idaho College Silver Valley Center and Radio Brewing.

Dave Smith Motors

This auto sales and service business is one of the largest employers in the Silver Valley, and reportedly one of the world's largest auto dealers. It offers new and used vehicles for sale and includes a tire dealership, body shop, service center and window tinting services. The company also provides continuing education opportunities for employees. Sitewide, its different departments employ 616 people, contributing an estimated \$31.5 million in annual employment income. In 2016, sales reached nearly \$72 million.

The Bean and Hill Street Depot

These two family-owned businesses are located next to each other in Kellogg. The Bean is a coffee and ice cream bar that also offers snacks and sandwiches. The Hill Street Depot is a full-service restaurant and sports bar. The two businesses employ three people and generate an estimated \$270,000 in combined annual sales revenues.

Stein's Family Foods

This grocery store in Kellogg includes a deli, bakery, liquor store and mail services. It provides an estimated \$711,000 in annual employment income. In 2016, business sales exceeded \$6.6 million.

Bandz USA

This Smelterville company makes superabsorbent materials for the disposable products market. The company is dedicated to efficient and sustainable manufacturing practices, and strives to use materials derived from renewable natural resources and that support recycling. In 2016, the business generated about \$2.1 million in employment income and \$5.7 million in sales revenues.

Redevelopment Funds Remedy Upkeep and Maintenance

The site's barrier system – clean soil, paved roads, parking lots, trails – prevents potential exposures to impacted soil. The ability of local governments to maintain barrier components is key to the continued protectiveness of the remedy and the protection of public health. While settlements with PRPs cover some of those costs, site communities must also cover some of the costs. Site localities rely on tax revenues to help pay for barrier upkeep and maintenance. Taxes paid by Silver Mountain Resort provide some of these revenues. The city of Kellogg also imposes a 3.5 percent "optional tax" to fund the continued maintenance of city roads.



Figure 23. Examples of industrial and commercial use at the site.

"Community leaders in the Silver Valley have known from very early on that the long-term success of the cleanup would depend on economic revitalization. The establishment and acceptance of the ICP is a key factor in not only protecting the remedy but ensuring the economic development future of the Silver Valley communities."

– Andy Helkey, PHD ICP Program Manager

Cleanup and Redevelopment Equals Jobs and Community Revitalization

In the early 1980s, Shoshone County was one of Idaho's three most prosperous counties. Following the decline of mining, the county's population decreased by 28 percent in the late 1980s and continued to decline in the decades that followed. By 2003, Shoshone County was the third-poorest county in the state.¹ Economic conditions in site communities resulted in some of the highest unemployment rates in Idaho, peaking at 21 percent in February 1991.² Today, thanks to cleanup, the resiliency of site communities and the tireless economic development efforts of local governments, the area's future is looking bright. As of August 2017, the unemployment rate in Shoshone County was down to 4.5 percent, in line with national averages.³

Redevelopment projects such as Silver Mountain Resort have attracted people to the area. New arrivals invest in homes and start businesses, bolstering the economy. With limited developable land in the area, newcomers often purchase and renovate older homes, improving many older neighborhoods and raising property values. Cleanup has also provided direct economic benefits. The Coeur d'Alene Trust estimates that site cleanup efforts provide about 400 jobs during each construction season. According to a 2011 Idaho Rural Partnership Community Review Study, those cleanup-related jobs generate about \$33 million a year in employment income. Contractors also spend money in the community, share their skills with the local workforce and sometimes settle in the area.

The extensive cleanup of residential properties across the site has enabled thousands of residents to remain in their homes. Thanks to those efforts and the ICP, children can play in their yards and residents can grow raised-bed gardens. Through the efforts of the PHD, EPA and IDEQ, site residents understand potential risks associated with lead exposure in the environment and take the necessary precautions to protect themselves. Today, landscaped yards and well-maintained homes line neighborhood streets.

"There are many great examples of redevelopment at the Bunker Hill Superfund site. It's important to acknowledge that none of this would have happened without the great support we've received from our state and local partners, as well as the communities of the Silver Valley. Taxpayers, the local mining industry and the federal government have all contributed to the success of this monumental cleanup."

– Ed Moreen, EPA Remedial Project Manager

Ecological Restoration – Hillsides and Wetlands

Cleanup has also resulted in significant ecological benefits, including the successful revegetation of hillsides and the conversion of nearly 400 acres of agricultural land into thriving wetland habitat.

Hillside Restoration Success

Prior to cleanup, people described barren hillsides in the Box as resembling ground zero of a bomb blast. Heavy metals deposited on the hillsides and sulfur dioxide emissions from smelting and refining operations resulted in a

¹ <https://labor.idaho.gov/publications/lmi/pubs/ShoshoneProfile.pdf>.

² https://www.google.com/publicdata/explore?ds=z1ebjgk2654c1_&ctype=l&strail=false&bcs=d&nselm=h&met_y=unemployment_rate&fdim_y=seasonality:U&scale_y=lin&ind_y=false&rdim=country&idim=county:CN1607900000000&ifdim=country&hl=en&dl=en&ind=false.

³ <https://data.bls.gov/map/MapToolServlet>.

toxic and acidic environment where no plant life could grow. Establishing vegetation on steep hillsides was crucial to minimizing runoff, which washed mining wastes down into the streams, rivers, floodplains and towns below.

Sulfur dioxide emissions from the smelter meant that bare-root seedlings did not survive transplantation onto the hillsides. In 1972, the Bunker Hill Company hired a forester to help revegetate the areas. The company knew that they would have to transplant established, containerized plants for them to survive. The costs associated with building and operating a greenhouse in northern Idaho posed a challenge, one that the forester addressed with a unique solution. The warm temperatures, high humidity and optimal carbon dioxide levels inside a former mine made the perfect plant nursery. GTE Sylvania developed special lights for use in the mine, enabling the growth of 200,000 seedlings, twice a year. The forester hired local high-school students to plant the established seedlings on the hillsides; by late 1981, they had planted 2.8 million seedlings across more than 5,000 acres. The roots of the established seedlings were long enough to extend through the acidic surface soil, enabling them to take root in the more-favorable soil below. The trees had a survival rate of over 90 percent.

While early vegetation efforts were a good start, much work remained. In 1994, EPA and the State of Idaho took over the work. Between 1996 and 2002, hillside vegetation efforts included planting of more tree seedlings, trees and shrubs, and aerial application of lime and hydroseed using helicopters. Plant species were chosen based on field performance and included drought and acid-tolerant species, nitrogen-fixing species and species that establish rapidly. As of 2014, vegetation had been fully established at all but a few isolated, rocky sites. The use of native plants and trees helped create habitat for wildlife and pollinators. A wide range of wildlife has returned to these areas as a direct result of the cleanup. In addition to environmental benefits, the landscape has become more scenic and aesthetically pleasing, enhancing economic prospects for Idaho's Silver Valley.



Figure 24. Hillside restoration efforts, 1993 to 2014.

Wetland Conversion

About 25 miles west of the hillsides remedial area and downstream along the Coeur d'Alene River, once-contaminated farmland has been converted to a healthy wetland habitat. Soil and sediment throughout the floodplains of the lower Coeur d'Alene River Basin (OU3) are contaminated with lead washed downstream from Upper Basin mining disposal activities. Lead-contaminated sediments in the floodplains have adversely impacted wildlife. In April 2006, EPA used settlement funds to purchase a perpetual conservation easement that allowed for remediation and restoration of a functional wetland. EPA worked with the U.S. Fish and Wildlife Service and Ducks Unlimited on a cleanup and pilot study project to establish clean feeding habitat for migratory and resident swans, ducks, and other wetland bird species in the Lower Basin. EPA's remedial action established nearly 400 acres of clean waterfowl feeding habitat, followed by additional restoration work by the Coeur d'Alene Basin Natural Resource Trustees. The area's cleanup and restoration reduced waterfowl exposure to toxic levels of heavy metals; monitoring data show that the remediated and restored habitat is attracting some of the highest levels of waterfowl usage, waterfowl feeding and waterfowl diversity in the Coeur d'Alene River Basin. EPA and project stakeholders completed the remediation effort in 2011. Restoration efforts continued for several more years to provide attractive waterfowl habitat at the location.



Figure 25. Examples of wildlife that have returned to the site following cleanup. Image source: Idaho PHD.

Recreational Use – Trail of the Coeur d'Alenes

During peak mining operations, railroads were a key mode of transportation in northern Idaho. Rail lines were often built on beds of mining waste rock and tailings, resulting in widespread soil contamination along their length. Cleanup of a former rail line in 2004 resulted in the creation of the Trail of the Coeur d'Alenes, a 72-mile paved bike trail spanning the Idaho Panhandle between Mullan and Plummer, Idaho. A partnership between the Coeur d'Alene Tribe, the Union Pacific Railroad, EPA and the State of Idaho made the trail possible. Trail pavement acts as a barrier between any remaining soil contamination and trail users. The bike trail begins in the Silver Valley, borders Silver Mountain Resort's south parking lot, continues along the Coeur d'Alene River, extends past Lake Coeur d'Alene and heads through rolling farmland to Plummer. Twenty developed trailheads provide entry points, including one near Silver Mountain, and there are 17 scenic waysides along the route for picnicking. The Rails to Trails Conservancy named it one of the 25 top trails in the nation in 2012. It attracts visitors from all over the world – about 120,000 people ride bikes on the trail each year.

In addition to recreation opportunities provided by Silver Mountain Resort and the Trail of the Coeur d'Alenes, the site offers a wide range of other recreational amenities, including remediated playgrounds in restored residential areas and fishing, boating and hiking.

Property Values and Tax Revenues

The Box includes over 4,000 properties, many of which are in residential and commercial use. On-site properties help generate property tax revenues that support local government and public services. Today, site properties in the Box have a combined value of nearly \$282 million. In 2016, those site properties generated an estimated \$4.4 million in total property tax revenues. On-site businesses that produce retail sales and services also generate tax revenues through the collection of sales taxes, which support state and local governments.⁴



Figure 26. Cyclists enjoying the Trail of the Coeur d'Alenes as it passes through the site.



Figure 27. Community park in Kellogg.

⁴ The sales tax rate for the state of Idaho is 6 percent. Shoshone County has no additional sales tax. For more information, visit the Idaho State Tax Commission website at <https://tax.idaho.gov/i-1023.cfm>.

Future Site Use

Economic stability and vitality are top priorities for site communities. Local government officials and residents continue to work together to support site development efforts and attract new investment to the area. Looking forward, several innovative site projects are underway. Renovation of the Old Lincoln Building, a historic building in downtown Kellogg, will result in a new apartment complex. Development of the Government Gulch area is underway; when completed, it will provide ample space for new businesses. These businesses will employ residents and restore properties to the tax rolls, generating revenues for local governments. In turn, those tax dollars will be used to help maintain the site's barrier systems. Shoshone County and site municipalities are also working together on grant applications for floodplain improvement projects. Once improved, these areas could provide additional developable land.



Figure 28. Efforts underway to restore the Old Lincoln Building will turn it into an apartment building.

Local government planning is also underway to further improve area infrastructure and attract new business interests. Shoshone County Commissioners have developed a multi-pronged approach to meet these goals, including the installation of broadband Internet service in the area, expansion of Shoshone County Airport and improvement of labor force training opportunities. Thanks to local efforts and state and federal funding, the high-speed Internet infrastructure project is nearly completed. Local government officials recently approved the airport expansion master plan – the airport will grow to two-and-a-half times its current size and include space for several businesses. Local governments are also strengthening technical education opportunities by partnering with area industries and businesses to provide hands-on job training.

After years of people moving away and long periods of economic uncertainty, these dynamics are changing in the Silver Valley. The number of building permits for new construction have increased, people and businesses are moving to the area, and property values have gone up. Looking forward, EPA will continue to work with stakeholders to support protective reuses and continued uses, and ensure the long-term stewardship of the remedy, while local stakeholders will continue to work with partners to further revitalize the economy.



Figure 29. View of the Silver Mountain Resort and the Kellogg skyline.

Conclusion

The successes at the Bunker Hill Mining and Metallurgical Complex Superfund site are an example of what can happen when stakeholders commit to a holistic approach to cleanup, the protection of public health and the environment as well as economic revitalization of an area. The site's comprehensive ICP and the community's commitment to its implementation has been a primary driver enabling the continued use and new development happening at the site. The ICP facilitates safe site redevelopment, the new development provides community-wide benefits, and associated tax revenues fund the long-term maintenance of the site's complex barrier system.

Extensive collaboration and cooperation among state and federal agencies, site communities, local governments and developers has also contributed significantly to site's successful cleanup and revitalization. Today, the area provides a wide range of employment and housing options as well as recreational and public service amenities. In 2017, the Box supported about 290 active businesses. Those businesses employ over 2,800 people, contributing about \$105 million in estimated annual employment income. In 2016, estimated sales for businesses in the Box reached nearly \$346 million. The cleanup and redevelopment of the Bunker Hill Superfund site illustrates what can happen when future site use is considered early in the cleanup process, and when stakeholders commit to developing a shared vision for a safe and economically sustainable future.

*For more information about EPA's Superfund Redevelopment Initiative (SRI), visit:
<https://www.epa.gov/superfund-redevelopment-initiative>.*