United States Department of the Interior
National Park Service

National Register of Historic Places Multiple Property Documentation Form

This form is used for documenting property groups relating to one or several historic contexts. See instructions in National Register Bulletin *How to Complete the Multiple Property Documentation Form* (formerly 16B). Complete each item by entering the requested information.

___X____ New Submission ________ Amended Submission

A. Name of Multiple Property Listing

Metal Mining in Idaho (1860–1977)

B. Associated Historic Contexts

(Name each associated historic context, identifying theme, geographical area, and chronological period.)

Mining Idaho's History, Metal Mining in Idaho, 1860–1960: A Mining Context for Idaho.

C. Form Prepared by:

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telephone: (509) 638-0441 date: December 31, 2023, revised November 15, 2024

D. Certification

As the designated authority under the National Historic Preservation Act of 1966, as amended, I hereby certify that this documentation form meets the National Register documentation standards and sets forth requirements for the listing of related properties consistent with the National Register criteria. This submission meets the procedural and professional requirements set forth in 36 CFR 60 and the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation.

Tricia Canaday ______ Deputy SHPO ______ 7-31-25 Date

_Idaho State Historic Preservation Office________
State or Federal Agency or Tribal government

I hereby certify that this multiple property documentation form has been approved by the National Register as a basis for evaluating related properties for listing in the National Register.

________________________ Signature of the Keeper

________________________ Date of Action

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E. Statement of Historic Contexts

INTRODUCTION

This Multiple Property Document (MPD) provides contexts for the identification, evaluation, registration, and treatment of metal ore mining properties in the geographic area of the state of Idaho during the period 1860–1977. The MPD provides a comprehensive historical overview of mining activities and related technology. The MPD is intended to assist cultural resources professionals, landowners, land managers, and the public in identifying and evaluating mining-related properties based on eligibility criteria for listing in the National Register of Historic Places (NRHP).

This MPD was informed by and expands on a 2011 document created by the Idaho State Historical Society, with funding from the National Park Service (NPS), U.S. Department of the Interior. That document, *Mining Idaho's History: Metal Mining in Idaho, 1860–1960, A Mining Context for Idaho* by Kathryn L. McKay (edited by Elizabeth J. Cunningham) contains a mining context for the state, defines mining-related property types, outlines significance requirements for listing mining resources in the NRHP, and was the basis for this MPD.[1] Within this MPD, historical contexts through 1960 were adapted from *Mining Idaho's History*; throughout this MPD, those contexts are provided either as an edited summary or with original text used in blockquotes.

TEMPORAL CONTEXT (Periods of Significance)

Metal mining in all its phases remained the great driver of the Idaho economy until the early to mid-twentieth century. The industry contributed to and reflected the dramatic industrial and technological advances of the late nineteenth and twentieth centuries. Moreover, industrial metal mining in the state contributed to Idaho's growth, history, and legacy. The period of significance for this MPD includes the years 1860 to 1977; it is divided into three distinct periods.

Early Placer and Lode Mining, 1860–1880:

The period in which individuals and small-scale mining operations plied the waterways of Idaho in search of gold. By 1880, declining gold returns, combined with discoveries of rich silver and lead deposits in the Salmon River area, marked the beginning of the lead-silver boom.

Placer and Lode Mining, 1880–1930s:

The period in which lead, silver, zinc, and copper (base metals) rose in importance and kicked off large industrial mining in Idaho. Construction of railroad lines into the mining districts contributed to this boom.[2] The 1930s saw the rise of road building across the state, which led to a subsequent rise in truck transport of ores and perpetuated a decline in railroad transportation.

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[1] Kathryn L. McKay, *Mining Idaho's History: Metal Mining in Idaho, 1860–1960*, ed. Elizabeth J. Cunningham (Boise: Idaho State Historical Society, 2011).

[2] When use of the term "mining district" began in the 1850s, it referred to a geographical area with designated boundaries, rules, and regulations, as defined by the miners within that district. Most of the rules pertained to mining, such as size of claims, claim marking and recording, and the work needed to maintain a claim, but some rules covered civil matters and criminal punishments. After federal mining laws were passed in 1866 and 1872 establishing rules legislatively, the mining district came to be used as just a geographical reference (Western Mining History, "Definition of a Mining District," 2023, https://westernmininghistory.com/library/38194/page1/).

Lode Mining and the Rise of Strategic Metals Mining, 1930s–1977:
The period in which advances in lode mining of antimony, tungsten, cobalt, niobium (formerly columbium), tantalum, uranium, beryllium, molybdenum, and other newly discovered metals rose in importance, especially during World War II and after. Additionally, after the Sunshine Mine disaster in 1972, mining safety laws and regulations were implemented that significantly changed the metal mining industry.

INTRODUCTION TO IDAHO'S GEOLOGY

The diverse geology within the state of Idaho created a wealth of mineral resources that supported settlement and later a sizeable mining industry.

Geologic Provinces

Idaho contains nine geologic provinces. Provinces are distinctive regions that contain geologic features that formed during different time periods.[3] These are the Accreted Terrane, Basin and Range, Belt Supergroup, Challis Volcanics, Columbia River Plateau, Idaho Batholith, Owyhee Plateau, Snake River Plain, and Thrust Belt provinces (see Figure 1).

1. The Accreted Terrane province is located at the western edge of central Idaho. It comprises the Blue Mountains composite terrane, tectonic fragments, and their collision zone from the subduction of Pacific Ocean plates under North America. This geologic province features Paleozoic limestone on top of oceanic volcanic rock with Jurassic intrusions, which created the rugged, dramatic topography of Hells Canyon.[4]

2. The Basin and Range province is located in southeastern and in east-central Idaho and features north–south and northwest–southeast trending mountain ranges separated by the Snake River Plain. Formations include sedimentary basins of sandstone, conglomerate, and limestone.[5]

3. The Belt Supergroup province comprises four major units of sedimentary rocks deposited during the Mesoproterozoic period in an enormous rift basin. It includes parts of northern, central, and east-central Idaho. In northern Idaho, this province is the location of the substantial ore deposits of the Coeur d'Alene mining district.[6]

4. The Challis Volcanics province is located in central Idaho. It was created by volcanic activity, including eruptions of lavas that formed intrusive pink granite. This province is associated with the formation of key mineral deposits.[7]

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[3] Paul K. Link, et al., "Introduction," *Digital Geology of Idaho*, Idaho State University, ed. Dave Pearson, accessed September 20, 2023, https://www.isu.edu/digitalgeologyidaho/.
[4] Keegan Schmidt and Paul K. Link, "Accreted Terranes and the Salmon River Suture Zone," *Digital Geology of Idaho*, Idaho State University, ed. Dave Pearson, accessed September 20, 2023, https://www.isu.edu/digitalgeologyidaho/accreted-terranes/.
[5] Link, et al., "Introduction."
[6] Lori Tapanila and Paul K. Link, "Mesoproterozoic Belt Supergroup," *Digital Geology of Idaho*, Idaho State University, ed. Dave Pearson, accessed September 20, 2023, https://www.isu.edu/digitalgeologyidaho/belt/.
[7] Laura DeGrey-Ellis and Paul K. Link, "Eocene Challis Magmatism," *Digital Geology of Idaho*, Idaho State University, ed. Dave Pearson, accessed September 20, 2023, https://www.isu.edu/digitalgeologyidaho/challis-volcanic/.

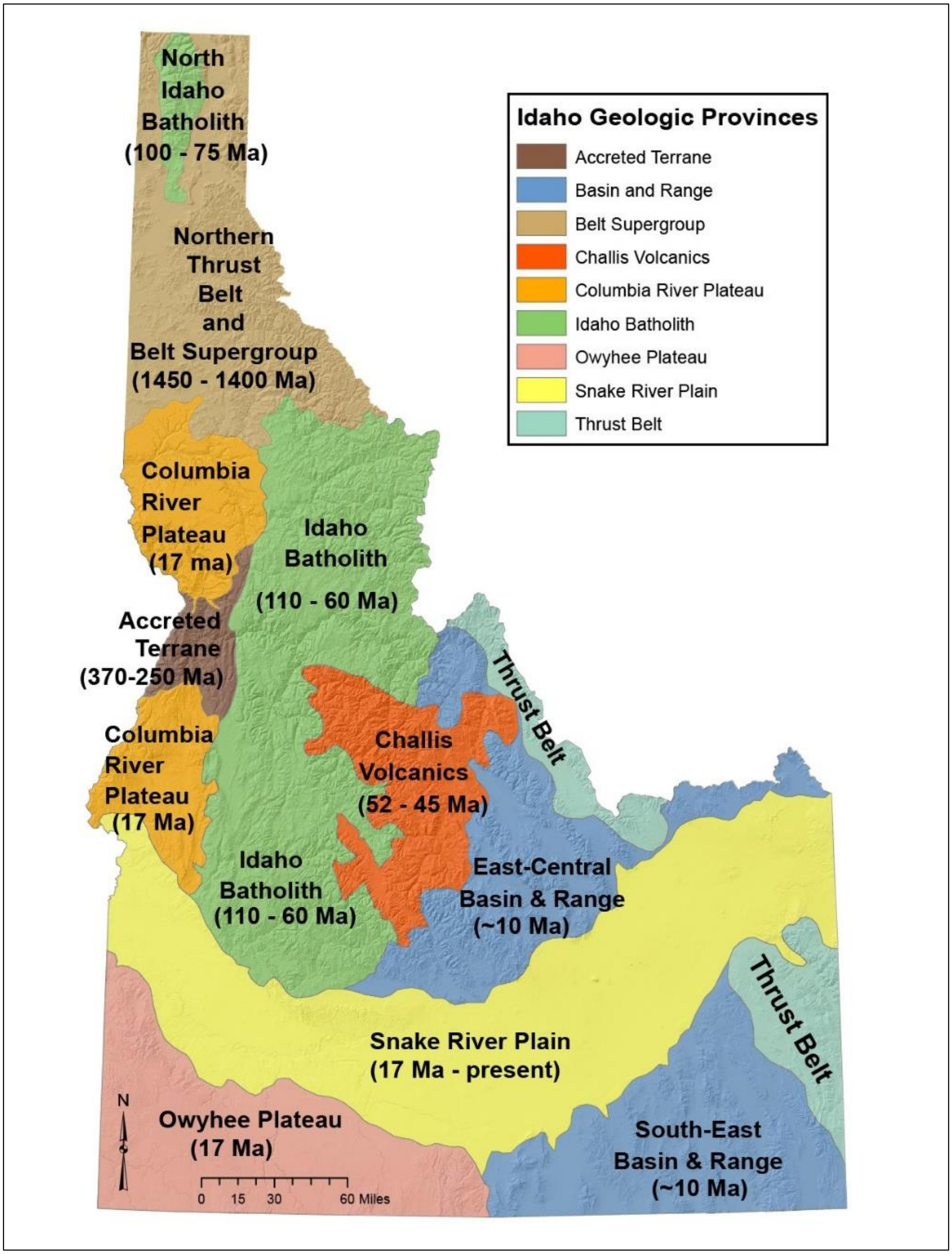

Figure 1. Geologic provinces of Idaho. Note: "Ma" means one-million years before the present time. Image courtesy of Digital Geology of Idaho, Idaho State University, Pocatello, Idaho, https://www.isu.edu/digitalgeologyidaho/.

5. The Columbia River Plateau province is located at the western edge of central Idaho, flanking to the north and south of the Accreted Terrane province. This province primarily features basaltic volcanic rock in vast plateaus.[8]

6. The Idaho Batholith province is an approximately 13,514-square-mile composite mass of felsic plutonic rocks, comprising mostly Cretaceous granite, granodiorite, and tonalite. The Idaho Batholith comprises the smaller Kaniksu Lobe in the Panhandle of northern Idaho, the Bitterroot Lobe in north-central Idaho, and the Atlanta Lobe in central Idaho. The Idaho Batholith contains numerous mining districts such as Skeleton Creek, Lime Creek, Rocky Bar, Neal, Pine, Volcano, Dixie, Featherville, and Roaring River.[9]

7. The Owyhee Plateau province is in the southwestern corner of Idaho. This region comprises felsic lava flows and tuffs and abuts the Snake River Plain on its northern edge.[10]

8. The Snake River Plain province comprises fractured basalt lava flows, rhyolite, and unconsolidated sediments with interbeds of sand, silt, clay, and a small amount of volcanic ash. Aquifers and springs are extensive in this province. The aptly named Treasure Valley, which was home to one of Idaho's richest gold deposits, stretches across the western end of the province, includes the lower Boise River basin, and extends south to the Snake River.[11]

9. The Thrust Belt province is a part of the Cretaceous Sevier-Laramide orogenic belt, a component of the North American Cordillera that spans North America. Three segments of this fold-thrust belt are exposed in Idaho: the northern fold-thrust belt in the Panhandle, the Idaho-Montana fold-thrust belt in central Idaho, and the Idaho-Wyoming-Utah fold-thrust belt in southeastern Idaho.[12]

Mineral Resources

Mineral resources in the United States fall into five sectors: construction materials (such as asbestos, cement, stone, and sand, etc.), fuels (oil shale, lignite, petroleum, and uranium, etc.), metals (which will be discussed below), nonmetals (feldspar, gemstones, limestone, and phosphates), and precious materials (diamonds and gold, silver, and platinum metals).[13]

This MPD focuses only on metal mining—including precious metals such as gold and silver—within Idaho's boundaries. Metals within Idaho's geographic borders include antimony, beryllium, cobalt, copper, lead,

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[8] Kristen Straub and Paul K. Link, "Columbia River Basalts," *Digital Geology of Idaho*, Idaho State University, ed. Dave Pearson, accessed September 20, 2023, https://www.isu.edu/digitalgeologyidaho/crb/.
[9] Laura DeGrey-Ellis, Myles Miller, and Paul K. Link, "Mesozoic Idaho Batholith," *Digital Geology of Idaho*, Idaho State University, ed. Dave Pearson, accessed September 20, 2023, https://www.isu.edu/digitalgeologyidaho/idaho-batholith/; and Earl H. Bennett, *The Geology and Mineral Deposits of Part of the Western Half of the Hailey 1°x2° Quadrangle, Idaho*, U.S. Geological Survey (USGS) Bulletin 2064-W (Washington, DC: USGS, U.S. Department of the Interior, 2001).
[10] Link, et al., "Introduction."
[11] Laura DeGrey-Ellis and Paul K. Link, "Snake River Plain Aquifer," *Digital Geology of Idaho*, Idaho State University, ed. Dave Pearson, accessed September 20, 2023, https://www.isu.edu/digitalgeologyidaho/srp-aquifer/.
[12] Paul K. Link and Laura DeGrey-Ellis, "Sevier-Laramide Fold-Thrust Belt," *Digital Geology of Idaho*, Idaho State University, ed. Dave Pearson, accessed September 20, 2023, https://www.isu.edu/digitalgeologyidaho/fold-thrust-belt/.
[13] Walter J. Bawiec and Lawrence L. Dee, *Historical Perspective of the Mineral Production of Idaho, with Comments on the Hailey 1°x2° Quadrangle, Idaho*, USGS Bulletin 2064-T (Denver, CO: USGS, U.S. Department of the Interior, last modified November 23, 2016), 1, https://pubs.usgs.gov/bul/b2064-t/.

molybdenum, thorium, tungsten, vanadium, zinc, gold, silver, and platinum.[14] Metallic minerals form in all geologic environments in small amounts; however, they are concentrated into rich deposits by igneous, hydrothermal, and erosional actions.

Like many places in the Western United States, gold was the first metal to be exploited in Idaho. Later, silver, lead-silver, zinc, and copper were mined.

The Four Types of Mining

Historically, mining development in Idaho progressed sequentially, with one type of mining following another, though some of these occurred simultaneously. The four types were:

1. Placer mining, primarily of gold. Over the millennia, as gold erodes out of solid rock, it is carried by the water of streams and creeks and settles below the surface placers (gravels or sand) on top of bedrock. Because gold is heavier than gravel and sand, it can be efficiently extracted by using water to wash away those waste minerals. Gold discoveries in any district usually began with prospectors panning in stream placers and moving to more advanced removal equipment if a find was substantial.

2. Lode mining of gold and silver. As miners followed streams seeking the source of the gold they had found in the placers, they discovered gold and silver deposits in lodes or veins within layers of rock. These discoveries triggered larger-scale hardrock mining activity. Extracting the precious metals required more personnel using heavy tools, explosives, and other equipment, then the ore would be processed by crushing, concentrating, and finally refining.

3. Base metal mining. During precious metal mining, byproducts such as lead, zinc, and copper were often uncovered and stockpiled. Changes in manufacturing, advancements in mining technology, and growth of transportation systems (railroads, then vehicular roadways) helped to facilitate large-scale lead-silver-zinc mining operations, and copper to a lesser degree. Idaho became a leading producer of lead, zinc, and silver in the twentieth century. Base metals were used in manufacturing. Lead was used to create batteries, cable coverings, ammunition, solder, lead-foil, ball bearings, pipes, and later was used in nuclear shielding, gasoline, and paint. Zinc was used as a coating to galvanize metals, in alloys such as brass, used heavily in the automobile industry, photography, lids for glass jars, and die-casting. Silver was not only a precious metal, used in jewelry and coinage, but—due to its properties of malleability, conductivity, and ductility—it was also used in industrial applications such as solder, brazing alloys, electrical connections, photography, electroplating, dentistry, wiring, and surgical plates. Copper was used in coinage, in the manufacture of brass, and for electrical, telegraph, and telephone wiring.[15]

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[14] Other metals that were not found in large enough deposits to be considered a mining resource in Idaho include aluminum, arsenic, bismuth, cadmium, chromium, iron ore, lithium, magnetite, manganese, mercury, nickel, tantalum, tin, titanium, and zirconium. Many of these minerals were located as co- or by-products to principal mining resources. In the case of many of the rare earth elements, also known as critical minerals, the present-day technology for processing and separation is yet to be cost effective (Bawiec and Dee, *Historical Perspective*, 6; and Virginia S. Gillerman, *Rare Earth Elements and Other Critical Metals in Idaho*, GeoNote 44, Idaho Geological Survey [Moscow: University of Idaho, 2011], 1−2).

[15] A. J. Teske, et al., *Idaho's Mineral Industry: The First Hundred Years*, Idaho Bureau of Mines and Geology Bulletin No. 18 (Moscow: Idaho Bureau of Mines and Geology, 1961), 6–7.

4. Mining of metals that lacked a market at the time, or did not attract interest until later, such as antimony, tungsten, cobalt, niobium, tantalum, thorium, and other metals. Some of these developed as a byproduct of an earlier stage operation, while others were mined independently.[16]

HISTORIC CONTEXT

From time immemorial, Indigenous peoples have occupied the lands in what would become the state of Idaho for homes and for seasonal hunting and gathering. In northern and central Idaho live Tribes of the Plateau cultural groups, including Kootenai, Kalispel, Coeur d'Alene, Palouse, and Nez Perce Tribes. Great Basin cultural groups, including the Shoshone, Bannock, and Northern Paiute Tribes, live in the southern part of Idaho. Interactions with groups and Tribes from the Great Plains culture area, including the Blackfoot, Cheyenne, Arapaho, and Lakota Sioux, influenced traditional lifeways.[17]

Non-Indigenous people first reached Idaho in 1805, when the Lewis and Clark Expedition traversed Nez Perce territory in what is now the central portion of the state. Although only briefly explored by Lewis and Clark, fur traders and trappers, missionaries, surveyors, prospectors, and settlers soon followed. Life for the region's Indigenous peoples was forever altered.

Fur traders and trappers from trading posts in Canada first began to arrive in the interior Northwest around 1809, establishing trading posts in Montana, Washington, and northern Idaho.[18] In 1818, the Hudson's Bay Company established a trading fort in southeastern Washington, and fur trappers ventured through central and southern Idaho, trapping beavers and other fur bearing animals, and clashing with Indigenous peoples. In southern Idaho, most early trading sites were transient shelters that were quickly abandoned until the construction of Fort Hall, in southeastern Idaho, and the original Fort Boise near present-day Parma, both built in 1834. These trading posts survived until changing fashions reduced the demand for furs, after which both were deserted in the mid-1850s.[19]

Missionaries also sought to establish a presence in Idaho. Among the Nez Perce Tribe, Eliza and Henry Spalding started a mission at Lapwai in 1836. Three years later, Asa and Sarah Smith started a mission at Kamiah. These missionaries worked to convert Tribal members to Christianity. The Spaldings taught acolytes to farm and raise livestock. Due to the growing numbers of non-Native people in the area, and the associated rising death rate among the Tribes from disease, hostilities rose between the missionaries and the Tribes. In response, by 1847, these missions were abandoned.[20]

Missionaries also established a presence in northern Idaho by the 1840s. In 1843, Jesuit missionary Father Pierre-Jean De Smet met the Coeur d'Alene Tribe while on a trip to central Washington. During the visit, Chief Twisted Earth told De Smet that his father, Chief Circling Raven, had foreseen the coming of the black-robed Jesuit missionaries many years prior and persuaded his people to welcome them. After spending a few days

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[16] Idaho State Historical Society (hereafter, ISHS), "Four Stages in Idaho's Mining Development," Idaho State Historical Society Reference Series No. 4, accessed October 16, 2024, https://history.idaho.gov/reference-series/; and McKay, *Mining Idaho's History*, 28.
[17] Deward E. Walker, Jr., *American Indians of Idaho* (Moscow: University of Idaho Press, 1971).
[18] P. Miller and B. Van Fossen, *Spokane House and its History* (Olympia: Washington State Parks and Recreation Department, 1978), 35; and Cort Conley, *Idaho for the Curious: A Guide* (Cambridge, ID: Backeddy Books, 1982), 680–81.
[19] Carlos A. Schwantes, *In Mountain Shadows: A History of Idaho* (Lincoln: University of Nebraska Press, 1991), 28, 33–34.
[20] Schwantes, *In Mountain Shadows*, 34–35.

with them, De Smet made several converts and promised to return. De Smet sent Father Nicholas Point and Brother Charles Huet to establish a mission among the Coeur d'Alenes.[21] After first constructing a mission near the eastern edge of Round Lake on the St. Joseph River (now the St. Joe), De Smet, due to flooding, moved the mission 20 miles northeast along a primary trail overlooking the Coeur d'Alene River. Construction was completed in 1853, and for twenty years, the mission served as a center of religious, agricultural, and economic importance to the Coeur d'Alene people. When the federal government created the Coeur d'Alene Reservation, the government excluded the mission site and removed most Indigenous families from the mission south to reservation lands. Through a series of presidential executive orders, the lands of the reservation were reduced a number of times.[22] Today, the Mission of the Sacred Heart is owned by the Coeur d'Alene Tribe, which considers it a sacred spiritual and cultural site.

While the federal government had authorized an occasional exploration of the Northwest region of the United States in the early 1830s, the following decade began a boom of survey by federal authorities that continued for 20 years.[23] Under the auspices of the U.S. Navy, one expedition explored Puget Sound and the Columbia, Snake, and Clearwater Rivers up to Lapwai. Another expedition was a group of U.S. Army engineers and map makers, known as the Corps of Topographical Engineers, under the command of John C. Frémont. In 1843, Frémont's team explored and mapped the Oregon Trail and the Great Basin across southern Idaho, Utah, and Nevada. The team's cartographer, Charles Preuss, completed a detailed and widely distributed map of the Oregon Trail.[24]

Emigrants from the East began utilizing the Oregon Trail around 1840. Pulled by the offer of homestead land under the Donation Land Claim Act of 1850 and the later Homestead Acts beginning in 1862, most headed west from Missouri to Oregon, California, and Washington, with many utilizing Preuss' map. While the Oregon Trail traversed southern Idaho's Snake River Plain, most travelers passed through Idaho with little thought of staying.[25]

One of the most notable expeditions in northern Idaho began in 1853, when the U.S. government authorized a company of U.S. Army engineers, led by Isaac I. Stevens, to find the best railroad route from the Mississippi River to the Pacific Ocean. John Mullan, an engineer on Stevens' field team, was tasked with locating possible routes for a military road across northern Idaho between the Missouri River at Fort Benton, Montana, and Fort Walla Walla, in Washington Territory on the Columbia River.[26] Between 1858 and 1863, Mullan and his team

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[21] Rodney Frey, "Coeur d'Alene (Schitsu'umsh)," University of Washington, American Indians of the Pacific Northwest Collection, accessed October 2, 2024, https://content.lib.washington.edu/aipnw/frey.html; Conley, *Idaho for the Curious*, 454.
[22] Conley, *Idaho for the Curious*, 454; Frey, "Coeur d'Alene (Schitsu'umsh)"; Anne L. Marshall, "Coeur d'Alene's Old Sacred Heart Mission," *SAH Archipedia*, Gabrielle Esperdy and Karen Kingsley, eds. (Charlottesville: University of Virginia Press, 2012), https://sah-archipedia.org/buildings/ID-01-055-0008.
[23] Schwantes, *In Mountain Shadows*, 44.
[24] Schwantes, *In Mountain Shadows*, 44; and Mary C. Rabbitt, *The United States Geological Survey: 1879–1989*, USGS Circular 1050 (Washington, DC: U.S. Government Printing Office, 1989), 5.
[25] Schwantes, *In Mountain Shadows*, 42–43.
[26] Jon Axline, "National Register of Historic Places (NRHP) Nomination form for the Point of Rocks Historic Transportation Corridor," 2009, on file at the Montana Department of Transportation, Helena; and Cort Sims, "NRHP Registration form for Mullan Road," 1990, on file at ISHS, Boise.

constructed the 624-mile-long road, which opened northern Idaho to exploration and settlement. By 1866, 20,000 people had traversed the route.[27]

From the late 1840s through about 1855, so-called gold rushes led to an influx of prospectors in California and other locations. As Kathryn L. McKay described in *Mining Idaho's History: Metal Mining in Idaho, 1860–1960, A Mining Context for Idaho*,

> The California gold rush began in 1848, attracting over two hundred thousand people from across North America and abroad. Fueled by widespread publications and newspaper advertisements, and an abundant and mobile labor force, people headed to California hoping for a better life. Experienced miners from states such as Georgia and North Carolina, and countries like Mexico, Cornwall, Wales, China, and other areas of the world shared their skills with thousands of inexperienced men. As production slowed, the miners looked to other areas for as yet undiscovered gold. Many went to Nevada, Colorado, and British Columbia.[28] As a result, the United States went from a minor gold producing nation in 1851 to a producer of nearly 45 percent of the total world output.[29]
>
> Many Americans enthusiastically joined gold rushes in the mid-1800s. A restless folk, they dreamed of easy riches, had little working capital, wanted to live with fewer restraints, or were fleeing difficult situations such as war-related destruction. Placer gold, easy to recognize and to extract without large investments of capital, started the early rushes. Miners moved from frontier to frontier as new discoveries of precious metals were made. They brought with them mining techniques and methods for organizing society. Miners established "island colonies," communities separated by undeveloped wilderness that participated in world systems of transportation, communications, and commerce. Thus, the remote mining camps of the West were closely linked to the urban centers of America, Europe, and Asia. The world system provided a market for raw materials, including metals, produced in the remote regions of western North America.[30]
>
> Prospectors and miners moved northward and eastward from California and spearheaded the development of the rest of the mountain West. A rush to eastern Washington (the Colville area) began in 1855 and soon spread to the Upper Fraser River of British Columbia, Canada. In California, by this time, the surface placers had been exhausted, and working the deep diggings required new methods and much capital. Soon the frontier expanded to Colorado (1859), Nevada

[27] Axline, "NRHP Nomination form for the Point of Rocks Historic Transportation Corridor"; Schwantes, *In Mountain Shadows*, 46; and Captain John C. Mullan, *Report on the Construction of a Military Road from Fort Walla-Walla to Fort Benton* (Washington, DC: Government Printing Office, 1863).
[28] Bawiec and Dee, *Historical Perspective*, 1.
[29] Randall E. Rohe, "The Geographical Impact of Placer Mining in the American West, 1848–1974" (PhD diss, University of Colorado, Boulder, 1978), 3, 16; and Rodman W. Paul, *Mining Frontiers of the Far West, 1848–1880* (New York: Holt, Rinehart, and Winston, 1963), 21.
[30] Donald L. Hardesty, *The Archaeology of Mining and Miners: A View from the Silver State*, Special Publication Series 6 (Ann Arbor, MI: Society for Historical Archaeology, 1988), 1.

> (1859), Idaho (1860), Montana (1861), and elsewhere. The rush to Idaho peaked in 1862 and 1863, with some twenty-five to thirty thousand people reaching the Boise Basin alone in 1863.[31]
>
> Many of the men who participated in the early 1860s placer rushes to today's Idaho were veteran miners from the old California camps; at the same time, inexperienced miners came in from Missouri and other areas, fleeing the devastation of the Civil War. Of these footloose, independent entrepreneurs, many were drifters, and all were people living under extremely unstable and volatile conditions as over and over again, inevitably, each new discovery led to a rush from established camps to the new diggings. Many moved around between camps in British Columbia, Idaho, and Montana.[32]
>
> The establishment of Fort Walla Walla in 1856 encouraged people to move in despite the resistance of [Indigenous Tribes][33] living in the area.[34]

Thousands of miners set out for gold rushes across the West.[35] It was the discovery of gold in the Clearwater Valley that helped to launch the development trajectory of the state of Idaho.[36]

Early Placer and Lode Mining, 1860–1880

The development of placer mining in Idaho (and elsewhere) is due to the environmental and geological conditions of the mining regions. Gold that occurs in hardrock deposits or veins is known as lodes. Over time, geological events and hydraulic forces—stream or glacial action—cause some of the gold to be freed from the lodes. This placer gold is carried by gravity and/or water and deposited in gravel terraces or benches above streams and in waterways such as creeks, rivers, and lakes. The process concentrates the gold, and because gold is heavy, it sifts down through a rocky or gravelly creek bed to the bedrock. These geological and environmental actions make placer gold available to panning, sluicing, hydraulic mining, and dredging.[37]

Placer mining was originally undertaken by a miner using a gold pan in a creek or river, in the same method as prospecting. Using this method, a miner could typically go through about a cubic yard of placer gravels each

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[31] William J. Trimble, *The Mining Advance into the Inland Empire* (Madison: Bulletin of the University of Wisconsin 638, 1914), 25–26; and Rohe, "Geographical Impact of Placer Mining," 19.

[32] Paul, *Mining Frontiers*, 40–42, 254; and Trimble, *Mining Advance*, 10.

[33] Many of the historical materials reviewed for this project use language that is no longer acceptable and may be degrading or offensive to Indigenous peoples. The authors of this MPD replaced such language throughout the quoted text of the context within brackets to acknowledge these changes. The authors acknowledge that much of the information in the context is from a western perspective and is thus incomplete and does not represent the fullness of Indigenous peoples' cultures or the voices of the living Indigenous peoples who have ancestral ties to and continue to live in the area.

[34] D. E. Livingston-Little, *Economic History of North Idaho, 1800–1900* (Los Angeles: *Journal of the West*, 1965), 47–49; Merle W. Wells, *Rush to Idaho*, Idaho Bureau of Mines and Geology Bulletin 19 (Moscow: Idaho Bureau of Mines and Geology, 1961), 2; Harold Albert York, "The History of the Placer Mining Era in the State of Idaho" (Master's thesis, University of Oregon, Eugene, 1939), 41; Trimble, *Mining Advance*, 203; Alvin M. Josephy, Jr., *The Nez Perce Indians and the Opening of the Northwest* (New Haven, CT: Yale University Press, 1965), 390–91; and Philip John Shenon and Roy P. Full, *An Evaluation Study of the Mineral Resources in the Lands Ceded to the United States by the Nez Perce Tribe of Indians on April 17, 1867*, 4 vols., *Nez Perce Tribe vs. United States of America*, Indian Claims Commission Docket 175–180, 9.

[35] McKay, *Mining Idaho's History*, 29; Michael Kowalewski, "Romancing the Gold Rush: The Literature of the California Frontier," *California History* 79, no. 2 (2000): 204.

[36] Merle W. Wells, "Idaho Military Posts and Camps," Idaho State Historical Society Reference Series No. 63 (1971), https://history.idaho.gov/reference-series/.

[37] McKay, *Mining Idaho's History*, 2–3, 6–7; and Yukon-Charley Rivers National Preserve, "What is Placer Gold Mining?," 2015, https://www.nps.gov/yuch/learn/historyculture/placer-mining.htm.

day, and unless the placers were very rich, it was difficult to earn enough to pay for the claim.[38] Early upgrades to the panning method were the rocker, sluice box, and long tom.

Figure 2. Miner using a rocker. Illustration by Henry Sandham in *The Century*. Courtesy of the Library of Congress, https://www.loc.gov/pictures/item/90713945/.

The rocker, or rocking cradle, was easily moved when needed, could process about three cubic yards of gravel a day, and could be operated with much less water than a sluice box (see Figure 2). The rocker could also process partially cemented gravel or clay, as the rocking motion broke up the clay and released the gold. The rocker consisted of a wood box with a hopper into which gravels were shoveled. A pierced metal sheet in the hopper retained the larger gravel, while the smaller material fell to the bottom. The bottom of the rocker was sloped and had a series of wood bars or riffles. The bottom was covered with material (such as burlap or carpet), which caught the fine flour gold and sands.[39]

The sluice, which needed a considerable amount of water and a steep enough gradient to operate efficiently, could handle ten cubic yards of gravel each day (see Figure 3). Sluices typically needed a ditch or a flume to redirect water to the sluice for washing the gravels. The sluice comprised a long sloping series of narrow wood troughs with riffles along its bottom and a carpet or material catch blanket at the low end. The sluice was typically supported atop legs or a timber trestle. As miners shoveled in gravels, water washed over them, and other miners removed rocks and other debris, cleared waste rock and sand, and used mercury to create an amalgam to catch the flour gold.[40]

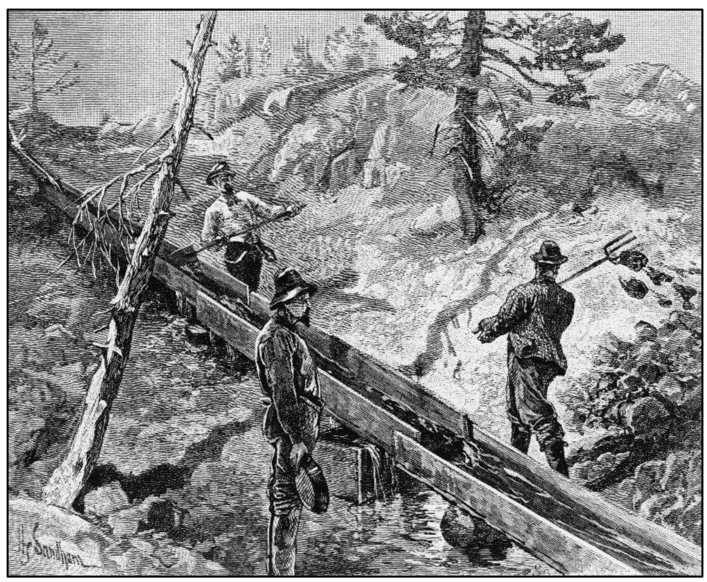

Figure 3. Miners working placers with a sluice. Illustration by Henry Sandham in *The Century*. Courtesy of the Library of Congress, https://www.loc.gov/pictures/item/90713942/.

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[38] Merle W. Wells, "Placer Mining Methods," Idaho State Historical Society Reference Series No. 99 (1964), https://history.idaho.gov/reference-series/; and McKay, *Mining Idaho's History*, 5–6.
[39] Wells, "Placer Mining Methods"; and McKay, *Mining Idaho's History*, 7–8.
[40] Wells, "Placer Mining Methods"; and McKay, *Mining Idaho's History*, 8–9.

Figure 4. Miners using a long tom. Illustration by M. Édouard Charton in *Le Tour du Monde: Nouveau Journal des Voyage*, 1862. Courtesy of the Bibliothèque Nationale de France, https://gallica.bnf.fr/ark:/12148/bpt6k34380v/f2.item.

The long tom was similar to a sluice, with a screen for separating out coarser gravels, but it was a much smaller contraption (see Figure 4). Like the rocker, the long tom had cleats along the bottom coated with mercury to catch flour gold. However, the long tom was thought to be more efficient than a rocker.[41]

Another placer mining method, known as hydraulicking or hydraulic mining, was used to mine lower grade bench gravels on hillsides and stream banks. Miners built holding ponds at an elevation above the area to be mined and filled them by redirecting water from a creek. Using tapered steel pipes or flumes and hoses with large nozzles, miners would release the water from the ponds into a penstock, and gravity would create high water pressure, which would be directed at hillsides to blast away soil down to bedrock. The dislodged material would then be shoveled into and run through sluices to capture gold on the mercury-coated riffles.[42] Massive tailings piles, sand, and gravel from some of these mining methods created long-lasting environmental issues requiring remediation.[43]

Miners also used draglines and dredges to mine placer gold. A dragline is an excavator with a bucket suspended from a long boom and controlled by cable wires and winches. The dragline picks up gravels in a relatively flat area, such as a creek or river bottom, and deposits them into sluices for processing. A dragline dredge was a floating barge that contained a wash plant—a trommel, sluices, and jigs—and a dragline, whose bucket picked up gravel and dumped it into the wash plant.[44]

A bucket-line dredge is a floating barge. It has digging buckets mounted to a chain; the buckets rotate around a ladder, which is mounted diagonally to the bow (front) of the dredge. The dredge includes a wash plant and/or sorting equipment inside, including a trommel and riffled sluices. Miners used mercury as a coating on the copper plates in the sluices to catch the flour gold. Waste handling devices at the stern (rear) of the dredge include a stacker for removing rocks and tail sluices for returning sand, small gravel, soil, and water back to the creek. A rock chute at the starboard side of the dredge drops large rocks that could damage the trommel off the side of the dredge into the pond below. A vertical anchoring device called a spud is attached at the stern of the dredge. When the dredge is operating, the spud is driven into the bottom of the dredge pond, and as the bucket line digs into the rocky material, the dredge is pulled back and forth in an arc on bow winch lines anchored to

41 Wells, "Placer Mining Methods"; and McKay, *Mining Idaho's History*, 8.
42 Wells, "Placer Mining Methods"; and McKay, *Mining Idaho's History*, 9–11.
43 Committee on Superfund Site Assessment and Remediation in the Coeur d'Alene River Basin, *Superfund and Mining Megasites: Lessons from the Coeur d'Alene River Basin* (Washington, DC: National Academies Press, 2005), 16.
44 Wells, "Placer Mining Methods"; and McKay, *Mining Idaho's History*, 12.

the shore. As the dredge pivots on the spud, rocks falling from the end of the stacker create “wind rows” or curved tailings piles.[45]

While small amounts of gold were found in Idaho prior to 1860, the discovery of placer gold in the Hoodoo area on the North Fork of the Clearwater River was the first major find of the precious metal in Idaho Territory. Elias Davidson Pierce, a trader with gold mining experience from the California gold rush, arrived in Walla Walla in Washington Territory in 1852. Although the 1855 treaty with the area’s Nez Perce Tribe barred non-Indigenous people from trespassing on Tribal lands, Pierce and other prospectors conducted surreptitious excursions deep into the Clearwater River drainages of Nez Perce territory, prospecting for and finding gold. Such trespassing was illegal, as they conducted these expeditions without permission of the Tribe or the Indian Agent. McKay wrote,

> Pierce and a group of prospectors secretly traveled to the North Fork of the Clearwater in August 1860, and they found gold at Oro Fino Creek. When this party returned to Walla Walla the next spring bearing gold dust, the great rush to the Clearwater began. Men and women poured into the region, at first mostly from Oregon and Washington, but soon from other parts of the United States as well as from Mexico, Canada, Europe, and elsewhere.[46]
>
> The initial mining in the Clearwater region—labor-intensive placering—required little start-up capital and equipment that miners could build themselves. Groups of two to four men generally worked the claims. They used rockers extensively because of their effectiveness even when the water supply was limited. Long toms and sluice boxes became practical if there was plenty of water and the gradient was steep enough to allow for the easy removal of tailings. Ditches and dams, and particularly hydraulic mining operations, required larger cooperative ventures and much capital to succeed. All of these methods were wasteful in varying degrees, with low gold recovery rates, even after several reworkings of the gravel. Many miners did not reach bedrock, where the richest ground lay. In fact, the tailings from sluice boxes often covered valuable beds of gravel.[47]
>
> Settlers soon established the trading town of Lewiston at the confluence of the Snake and Clearwater rivers, in flagrant violation of the treaty with the Nez Perce. By July 1861, some twenty-five hundred miners were working in the area, with several thousand more scattered throughout the region. Prospectors continued to push up the Clearwater and its tributaries. When

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[45] Wells, “Placer Mining Methods”; McKay, *Mining Idaho’s History*, 12; Robin Grayson, “Bucket-Line Gold Dredges: A Review of World Techniques,” *World Placer Journal* 8 (2008): 3, https://www.researchgate.net/publication/202236459_Bucket-line_gold_dredges_-_a_review_of_world_techniques; and Billy Reed, Yankee Fork Gold Dredge Association Manager, interview by the author, Yankee Fork Dredge, Stanley, ID, September 9, 2020.
[46] Leonard J. Arrington, *History of Idaho* (Moscow: University of Idaho Press, 1994), 1:183–84, 186; James Lawrence Onderdonk, *Idaho, Fact and Statistics Concerning Its Mining, Farming, Stock-raising, Lumbering and Other Resources and Industries* (San Francisco: A. L. Bancroft and Co., 1885), 34; Wallace W. Elliott, *History of Idaho Territory, Showing Its Resources and Advantages* (San Francisco: Wallace W. Elliott Co., 1884), 64–65; Schwantes, *In Mountain Shadows*, 49–51; Wells, *Rush to Idaho*, 2–3; and William S. Schiach, John M. Hendersen, and Harry B. Averill, *An Illustrated History of North Idaho Embracing Nez Perces, Idaho, Latah, and Shoshone Counties, State of Idaho* (Chicago: Western Historical Publishing, 1903), 19–20. The encroachment of thousands of miners on the Nez Perce lands took an enormous toll on Indigenous peoples’ way of life.
[47] York, “Placer Mining Era,” 182.

> Idaho Territory was created in 1863, Lewiston was named territorial capital even though it was located within the Nez Perce Reservation.[48]

In 1861, a particularly rich find in Florence created a rush that drew over 15,000 miners to the area. Those miners squatted on Tribal land and began mining.[49] McKay explained,

> Miners believed that they would find a much richer, central deposit of gold ore near the Clearwater region. With the coming of warm weather in the spring of 1861, prospectors fanned out over the region to look for gold. Prospectors soon found rich deposits in Elk City on the South Fork of the Clearwater River, 125 miles south of Pierce. Gold was first discovered in the Florence basin, also known as the "Salmon River mines," in August of 1861. The discovery of these fabulously rich placer grounds received international attention by the following spring, and thousands of men laboriously made their way to this remote part of north-central Idaho with hopes of striking it rich. This was the kind of mining district men dreamt about: a place where small groups of miners could recover thousands of dollars in just a short time.
>
> Since the discovery of this district happened so late in the season, it took until the summer of 1862 to realize how extensive or deep the deposits really were. The boom was short lived because the rich ground turned out to be shallow and not very extensive, and the earliest arrivals had already claimed all the high paying ground. In fact, many people could not even "make their grub," so by fall 1863, the boom at Florence had ended.[50]

Early miners lived spartan lifestyles in rough, quickly built shelters. Over time, living conditions improved. As McKay noted,

> In the 1860s, miners lived at first under trees, among rocks, or in other protected spots. Some groups brought tents with them. The first houses were small log cabins with wood shake roofs covered with dirt and with dirt or hide floors. The beds were piles of pine needles or fir boughs, and boxes served as tables, chairs, and cupboards. A fireplace both provided heat and cooked meals. Miners seldom left their cabins locked; travelers could enter and make a meal and stay overnight if needed.[51]
>
> Many miners working in remote mountain districts would come out for the winter and stay in nearby towns. Placer miners who stayed in the mining district during the winters kept busy with tasks such as making sluices, whipsawing lumber, building flumes, and digging ditches. Idaho's placer mining settlements of the 1860s all looked somewhat similar despite being separated

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[48] Sherwin Barton, Bruce Stoddard, and Austin Milhollin, *An Evaluation of the Gold Mined Before April 17, 1867, from the Nez Perce Indian Reservation as Established by the Treaty of June 11, 1855, and of the Occupancy Use of the Reservation as it was Related to the Mining Activity* (Salt Lake City: Indian Claims Commission, Docket 180-A, 1957), 1:17; and Josephy, *Nez Perce Indians*, 396–403.

[49] McKay, *Mining Idaho's History*, 30–31; Schwantes, *In Mountain Shadows*, 49–50; Bill London and Charlie Powell, *Natural Wonders of Idaho: A Guide to Parks, Preserves, and Open Spaces* (Castine, ME: Country Roads Press, 1994), 62; and Rich Wandschneider, "Nez Perce Treaties & Reservations: 1855 to Present," Josephy Library of Western History and Culture, accessed September 2, 2023, https://library.josephy.org/nez-perce-treaties-exhibit/.

[50] *Washington Statesman*, December 6, 1861; Trimble, *Mining Advance*, 206; and Shenon and Full, *Evaluation Study*, 145.

[51] Byron Defenbach, *Idaho: The Place and Its People* (Chicago and New York: American Historical Society, Inc., 1933), 309; York, "Placer Mining Era," 196–97; Cecil Dryden, *The Clearwater of Idaho* (New York: Carlton Press, 1972), 97–98; James H. Hawley, *History of Idaho, the Gem of the Mountains*, 4 vols. (Chicago: S. J. Clarke Pub. Co., 1920), 119.

physically. Typically, the camps were located as close as possible to the mining operations, often alongside and parallel to a stream with placer deposits. The buildings were generally laid out at first along one long main street. Dwellings ranged from brush huts to canvas tents to log structures. Business buildings often had wooden false fronts and eventually lap siding. Many of Idaho's earliest placer camps, such as Old Florence, Rocky Bar, Centerville, and Murray, disappeared when later gold processing obliterated the ground on which they stood.[52]

Some of the placer mining camps established in the 1860s never moved from small-scale hand methods into extensive capital-intensive lode mining. Others never developed into productive mining districts. For example, the Hoodoo mining district on the headwaters of the Palouse River had small production over the years, but many of the area settlers found ranching, farming, and logging endeavors to be more profitable than mining.[53]

Conditions at lode mines differed from placer settlements. Small lode mines were, by nature, labor intensive and often provided a varied work experience to the employees, owners, or lessees. Lode miners might work for an existing mining operation that hired employees, locate their own claim and develop it, work as contract miners, or buy an existing claim and begin mining. Miners at small-scale lode mines generally had partners in order to share capital expenses, reduce labor costs, have help with jobs that one man could not do alone, and enjoy the companionship. The job requiring the least skill was tramming out the ore (pushing the ore cars). Mucking or shoveling was next, but during hard times, such as the 1930s, skilled miners worked as muckers if nothing else was available. In small mines the men sharpened their own drills and refurbished other tools, but the larger mines had blacksmiths and tool tenders. The hoist operator worked at the headframe at the top of the shaft, and the top lander removed cars of ore and waste from the cage, pushing each to its appropriate destination and loading materials into the cage. Other jobs included replenishing underground supplies, grading the surface around the shafts, lowering material into the shaft, raising ore, constructing surface buildings, sawing lumber, logging, serving as watchmen, working as stationary engineers, and excavating prospect pits.[54]

Large mining and milling companies established company towns near Idaho's isolated mines, mills, and smelters that employed many workers. Ostensibly organized simply to provide needed services to employees, they also created a company-imposed social order. The settlement patterns of these planned towns reflected a fairly rigid class structure. They included company-owned facilities such as a general store, hospital, school, hotel, boardinghouse, bunkhouses, and private dwellings. The company stores and boardinghouses were often run by the mine superintendent. Boarding houses, typically occupied by single men, provided each employee with a small room and hot meals in a common dining area. Some employee quarters were quite large.[55]

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[52] Randall E. Rohe, "The Geography and Material Culture of the Western Mining Town," *Material Culture* 16 (Fall 1984): 100, 104.
[53] A. H. Koschmann and M. H. Bergendahl, *Principal Gold Producing Districts of the United States*, USGS Professional Paper #610 (Washington, DC: U.S. Government Printing Office, 1968), 133–34.
[54] Ronald C. Brown, *Hard-Rock Miners: The Intermountain West, 1860–1920* (College Station: Texas A&M University Press, 1979), 70, 72–73; and Otis E. Young, Jr., *Western Mining* (Norman: University of Oklahoma Press, 1970), 165.
[55] Patricia Hart and Ivar Nelson, *Mining Town: The Photographic Record of T. N. Barnard and Nellie Stockbridge from the Coeur d'Alenes* (Seattle: University of Washington Press, 1984), 46-47; Donald L. Hardesty, "Power and the Industrial: Mining Community

Upon discovery of a new mining area, miners organized and created a mining district. The miners met to elect officers, adopt laws and regulations, and file paperwork to record claims. Each miner had their own operation, sometimes with partners, and had equal say in district concerns.[56] McKay wrote,

> The administrative unit known as a mining district defined the political, legal, economic, and social activity of the area during the historic period. Miners created mining districts to serve as ad hoc official units of administration. Many had relatively well-defined boundaries, although they tended to be somewhat fluid as conditions changed over the years. These boundaries have legal, political, social, technological, and environmental meaning. The mining district may include a settlement network that defines a regional community, a legal organization that regulates mining claims, and distinctive geological characteristics and ore deposits. It is sometimes appropriate to use historic mining districts to define National Register historic districts, if this is practical (some are quite large), particularly when the historic context ties in well with this boundary. In other cases, selecting boundaries based on topography, such as watersheds, may be more practical.[57]
>
> Idaho mining camps of the 1800s maintained law and order by miners' meetings and by electing a Justice of the Peace, a deputy sheriff, and a recorder. Disputes between conflicting claimants of mining ground were settled by a miners' meeting, where witnesses were introduced, and a majority vote determined the verdict. This local method of resolving disputes was especially important in the 1860s gold rush, because until May of 1863, the seat of government for the area that is now Idaho was at Olympia, four hundred miles to the west. Some early communities, such as Florence, Elk City, and Lewiston, formed vigilance committees to deal with criminals.[58]

The flood of miners and establishment of mining operations altered the traditional hunting, fishing, and gathering lands of Idaho's Indigenous peoples. Skirmishes and battles between settlers or troops and Indigenous peoples became more frequent as the federal government stepped in to protect miners and settlers. Gold within the boundaries of the Nez Perce Tribe's treaty lands led the government to install Fort Lapwai, east of Lewiston, in 1862. The territorial government drafted a new treaty the following year, as they sought to open these valuable mineral lands to mining. The new Lapwai Treaty reduced the reservation lands from about 7.5 million acres to around 750,000 acres.[59] Additionally, as McKay wrote,

> Florence, Elk City, and other mining areas no longer lay within the reservation boundaries. All of the bands of the Nez Perce were required to move onto the new reservation within one year of

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in the American West," in A. Bernard Knapp, Vincent C. Pigott and Eugenia W. Herbert, *Social Approaches to the Industrial Past: The Archaeology and Anthropology of Mining* (London: H. B. Routledge, 1998), 88; and James B. Allen, *The Company Town in the American West* (Norman: University of Oklahoma Press, 1966), 80, 92.

[56] Teske, et al., *Idaho's Mineral Industry*, 11.

[57] Donald L. Hardesty and Barbara J. Little, *Assessing Site Significance, A Guide for Archaeologists and Historians* (Walnut Creek, CA: Alta Mira Press, 2000), 106, 137.

[58] Wells, *Rush to Idaho*, 20, 28; Hawley, *History of Idaho*, 116, 120, 122; and Trimble, *Mining Advance*, 379.

[59] McKay, *Mining Idaho's History*, 29–31; Nez Perce Tribe, "History," 2018, https://nezperce.org/about/history/; Schwantes, *In Mountain Shadows*, 50–53; and Wells, "Idaho Military Posts and Camps."

> ratification. In exchange, the tribe was to receive $265,000 for the land, be reimbursed for improvements on relinquished lands, and be paid the money promised by the 1855 treaty.[60]

The Lapwai Treaty is often referred to by some members of the Tribe as the "Liars Treaty" or the "Steal Treaty," as it reduced Tribal lands by 90 percent and reneged on the original agreement.[61]

Throughout the 1860s, additional discoveries of gold created mining booms in other regions of Idaho. In the spring of 1862, a gold discovery in the Salmon River drew 10,000 prospectors by summer. When the easy gold was depleted, miners moved south into Warren, and then into the Boise Basin. McKay noted,

> During the summer of 1862, many men left Florence to try their luck in new gold fields. Men moving out from Florence in search of rich new strikes discovered many of these new districts—notably Warren, the Boise Basin, and Bannack, Montana. James Warren and a party of prospectors discovered the diggings, later known as Warren, in the spring of 1862. The placers there proved deeper and much more extensive than those at Florence. Within two months, over two thousand people had reached the area, including many from Florence.[62]
>
> By the summer of 1862, discouraged miners leaving Florence had many possible destinations to choose from, including Warren to the south; Cariboo in British Columbia; Powder and John Day rivers in eastern Oregon; and Bannack, Montana. But the biggest discovery of all in the Pacific Northwest came in August 1862, when prospectors fanning out from Florence discovered extraordinarily rich and extensive placer deposits in southern Idaho: the Boise Basin, one of the state's most important early 1860s discoveries.[63]

George Grimes and a group of prospectors discovered the rich placer deposits and numerous quartz lode deposits in the Boise Basin, about 25 miles northeast of Boise. Miners established several profitable mining towns and districts, including Idaho City, Moore Creek, Centerville, Quartzburg, Pioneerville, and Grimes Pass in southcentral Idaho.[64] McKay wrote,

> The Boise Basin placer deposits were located in a sink about fifteen miles in diameter. In the early years, miners worked the rich and shallow gravels found in many of the streambeds. For a short time, Idaho City in the Boise Basin was the largest community in the Pacific Northwest, outranking even Portland. The important trading center of Boise was founded in 1863 to serve the nearby mines, and the Boise Valley soon attracted settlers. A year later Boise would replace Lewiston as territorial capital.[65]

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[60] Josephy, *Nez Perce Indians*, 398–99, 420, 423, 429–30; Schiach, Henderson, and Averill, *Illustrated History of North Idaho*, 388; Elliott, *History of Idaho Territory*, 156; and Trimble, *Mining Advance*, 205.
[61] Wandschneider, "Nez Perce Treaties & Reservations."
[62] Jeffrey Michael Fee, "A Dragon in the Eagle's Land: Chinese in an Idaho Wilderness, Warren Mining District, ca. 1870–1900" (Master's thesis, University of Idaho, Moscow, 1991), 17.
[63] Merle Wells, *Boise: An Illustrated History* (Woodland Hills, CA: Windsor Publications, 1982), 17–18; Clyde P. Ross, *Mining History of South-Central Idaho*, USGS (Moscow: Idaho Bureau of Mines and Geology, 1963), 5; and Merle W. Wells and Arthur A. Hart, *Idaho, Gem of the Mountains* (Northridge, CA: Windsor Publications, 1985), 38.
[64] McKay, *Mining Idaho's History*, 29; and Schwantes, *In Mountain Shadows*, 52.
[65] Wells, *Boise*, 17–18.

As enterprising individuals made their way into the region to prospect or work in the mines, others set up shop to cater to the commercial needs of the expanding populations. The first settlements in the region owed their existence to the mining industry. During the initial placer-mining era, small settlements consisted of little more than tent cities and tended to cluster around the gold diggings to provide miners with supplies.[66] Soon, an influx of non-Indigenous people worked to supply agricultural and timber products to the mines, operate the necessary transportation systems, and caused a corresponding rise of small communities.[67] The rise in non-Indigenous population altered the region's Tribes and their lifeways. McKay noted,

> Southern Idaho was the traditional homeland of the Boise and Bruneau Shoshone, particularly the drainages of the Snake, Bruneau, and Boise rivers. [Indigenous] resistance did not slow prospectors and miners down for long. The miners severely damaged the environment of the upland traditional areas. Mining altered or destroyed fisheries, riparian vegetation, game habitat, and meadowlands. Hostilities continued until 1867, when the U.S. government established a reservation at Fort Hall.

Later, in 1872, the federal government reduced the original 1.8 million acres of the Fort Hall Reservation to 1.2 million acres due to a survey error, and later reduced it to 544,000 acres through government legislation, encroachment, and allotments.[68]

While the influx of miners ravaged the lives of many Indigenous peoples, the year 1863 proved pivotal for soon-to-be Idaho. That year, the federal government constructed a new Fort Boise on the Oregon Trail near the road into the Boise Basin and Owyhee gold fields. Also in 1863, the U.S. Congress carved the Idaho Territory out of Washington Territory, which included portions of present-day Montana and Wyoming.[69] By that time, 30,000 people were mining in the Boise Basin, and looking for additional opportunities.[70] McKay noted,

> Miners and prospectors spread out from the Boise Basin to other parts of southern Idaho. In addition to more placer deposits, they also discovered gold and silver lode mines, which led to the establishment of new mining districts in the Owyhees, South Boise (Rocky Bar), Atlanta, and other places. The Owyhee mines were second only to Nevada's Comstock Lode in silver output after 1863. Rushes to other areas in the 1860s, such as Montana, British Columbia, and Nevada, also drew restless miners away from the southern Idaho mines.
>
> As miners fanned out over a vast geographical region in the 1860s, some came together briefly at particular camps and then moved on. For example, Ralph Bledsoe—a prospector, miner, and merchant—mined in the California gold fields in 1850, and in Oregon in 1854, before arriving in Idaho where he worked as a merchant in Elk City in 1861, participated in the rush to Florence, worked the first pan of dirt in the Placerville area of the Boise Basin, and in 1870 had a claim on

[66] Richard G. Magnuson, *Coeur d'Alene Diary: The First Ten Years of Hardrock Mining in North Idaho* (Portland, OR: Metropolitan Press, 1968), 16.
[67] Idaho Agricultural Experiment Station, *The Farming Business in Idaho* (Moscow: University of Idaho, 1927), 15.
[68] Shoshone-Bannock Tribes, "Culture and History," 2023, https://www.sbtribes.com/about/.
[69] Schwantes, *In Mountain Shadows*, 58–63.
[70] McKay, *Mining Idaho's History*, 29; and Schwantes, *In Mountain Shadows*, 52.

> the Snake River near the Twin Falls. The community of miners as a whole persisted, evolving its own traditions that transcended the experience of any single camp.[71]

Like the many miners who followed successive gold rushes across the western United States, Chinese immigrants also made their way to Idaho mines in the early 1860s. McKay explained,

> Chinese miners played a significant role in Idaho's placer gold districts from the late 1860s until approximately 1890. They reached areas such as Orofino, the Snake River, Boise Basin, and the South Fork of the Clearwater early on. Euroamerican miners generally admitted Chinese to a particular mining camp by a majority vote. They were glad to have buyers for their placer claims; merchants and others had a new market; and the Chinese provided a relatively low-cost but hard-working labor force. The Chinese typically purchased, leased, or paid royalties on the claims of Euroamerican miners who were abandoning a district, and then through hard work, frugal living, and persistence were able to make wages or better from the high-graded grounds.[72]
>
> Many early mining districts had laws that excluded Chinese miners. At least one district with a chronic labor shortage, Cariboo Mountain, welcomed Chinese miners from the very beginning, and Euroamericans and Chinese sluiced and hydraulicked adjacent claims in those years [when] most placers were active. On the other hand, the Coeur d'Alene area mines, more repressive than any others in Idaho, completely banned the Chinese.[73]
>
> In 1864, the Idaho territorial legislature passed a law that allowed Chinese to work in Idaho mines but required them to pay a monthly tax of $4 per person. Half of the taxes collected went to the territory, the other half to the county in which the taxpayer lived. When the Idaho tax increased to $5 per month in 1866, this had little effect on Chinese immigration to the territory due to a similar tax set at $1 higher in California. The Idaho legislature declared this law unconstitutional in 1870.[74]

Some mining districts in Idaho opened camps to the Chinese despite exclusionary policies. Chinese miners leased claims from district members and reworked placer deposits, tailings, and waste rock.[75] McKay wrote,

> Idaho's Chinese miners almost always worked placer deposits, not lode mines, perhaps because few wanted to invest in heavy equipment and because Chinese, Mexicans, and African Americans were traditionally excluded from lode mines. Euroamerican lode miners saw the

[71] A. Bernard Knapp, "Social Approaches to the Archaeology and Anthropology of Mining," in Knapp, Piggott, and Herbert, *Social Approaches to the Industrial Past*, 5; Ronald L. James, *Ruins of a World: Chinese Gold Milling at the Mon-Tung Site in the Snake River Canyon* (n.p.: U.S. Bureau of Land Management, Idaho Cultural Resource Series 4, 1995), 10–11; and Kathryn L. McKay, *Gold for the Taking: Historical Overview of the Florence Mining District, Idaho County, Idaho* (n.p.: U.S. Forest Service, Northern Region, 1998), 260–61.
[72] Darby Campbell Stapp, "The Historic Ethnography of a Chinese Mining Community in Idaho" (PhD diss., University of Pennsylvania, Philadelphia, 1990), 58.
[73] "Gold Mines of Cariboo Mountain," *Idaho Yesterdays* 19 (Winter 1976): 13; and Priscilla Wegars, "The History and Archaeology of the Chinese in Northern Idaho" (PhD diss., University of Idaho, Moscow, 1991), 138.
[74] Hubert Howe Bancroft, *History of Washington, Idaho and Montana, 1845-1889* (San Francisco: The History Co., 1890), 427; Mark Wyman, "Mining Law in Idaho," *Idaho Yesterdays* 25 (Spring 1981): 16; and Liping Zhu, *A Chinaman's Chance: The Chinese on the Rocky Mountain Mining Frontier* (Niwot: University Press of Colorado, 1997), 48.
[75] Kate O'Brien Reed, "NRHP Nomination form for Chinese Sites in the Warren Mining District" (Washington, DC: National Park Service, 1990), E-1; and Teske, et al., *Idaho's Mineral Industry*, 13.

Chinese as cheap competition for jobs and generally prevented Chinese from working in underground mines (sometimes, however, Chinese men did work on the surface in jobs such as dumping ore cars, breaking ore, and surface excavation).[76]

Chinese miners assimilated with the dominant Euroamerican society more in terms of housing. They generally lived in small, crowded dwellings, either cabins they purchased from Euroamericans or ones they built (log cabins, walled canvas tents on dugout platforms, or huts with brush, mud, or cobble walls). In China, the principles of feng shui determined the arrangement of residences based on spiritual and physiographic elements. For example, traditional Chinese residences always opened to the south. These principles may have influenced the selection and layout of some Chinese residential sites in Idaho.[77] Chinese living in the United States generally maintained their traditional diet and methods of food preparation. Some Chinese had commercial gardens in or near mining camps, such as Warren and Pierce, and used cookware imported from their homeland to cook with.[78]

Like many Euroamericans, the Chinese who immigrated to the United States generally were not experienced miners. They, therefore, readily adopted Euroamerican tools such as shovels, picks, pans, rockers, sluice boxes, and hydraulic equipment. Most worked in groups of ten to fifteen people, all partners in a claim. They also worked with Euroamerican miners as partners or employees. Their wages were lower than the prevailing rates, generally about one to two dollars per day.[79]

Chinese sometimes favored rockers over more efficient washing devices because rockers were cheap and portable. The Chinese became accomplished hydraulic miners, although in some places they were assigned unskilled tasks such as carrying away large boulders. They were very skilled in designing and managing water systems due to their earlier experience with irrigated agriculture in their native Guangdong. Where possible, they used "China pumps" and wing dams (L-shaped coffer dams) to divert the courses of rivers and creeks. Their work methods were generally labor intensive and meticulous. In Warren, for example, Euroamerican men worked the hillside placer claims, where there was plenty of water and space for dumping tailings. The Chinese, however, were relegated to the flatter meadows, where water and dumping grounds were more of a challenge and where a deep overburden had to be removed before the gold-bearing gravel could be worked.[80]

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[76] Wegars, "Chinese in Northern Idaho," 133–34, 136.
[77] Stapp, "Chinese Mining Community," 101, 121; and Jeffrey M. LaLande, "Sojourners in the Oregon Siskiyous, Adaptation and Acculturation of the Chinese Miners in the Applegate Valley, ca. 1855–1900" (Master's thesis, Oregon State University, Corvallis, 1981), 250, 259, 267, 278, 295, 298–300, 304.
[78] Robert F. G. Spier, "Food Habits of Nineteenth Century California Chinese," *California Historical Society Quarterly* 37 (1958): 79–80; Fee, "Dragon in the Eagle's Land," 65, 69; and Zhu, *Chinaman's Chance*, 103.
[79] Zhu, *Chinaman's Chance*, 59, 106, 122; and Wegars, "Chinese in Northern Idaho," 135.
[80] Jeffrey M. LaLande, "Sojourners in Search of Gold: Hydraulic Mining Techniques of the Chinese on the Oregon Frontier," *Industrial Archaeology* 11, no. 1 (1985): 31, 39–40; Fern Coble Trull, "The History of the Chinese in Idaho from 1864–1910" (Master's thesis, University of Oregon, Eugene, 1946), 67; LaLande, "Sojourners in the Oregon Siskiyous," 323–24; M. Alfreda Elsensohn, *Idaho Chinese Lore* (Caldwell, ID: Caxton Printers, Ltd., 1970), 187; Randall E. Rohe, "Hydraulicking in the American West, The Development and Diffusion of a Mining Technique," *Montana: The Magazine of Western History* 35 (Spring 1985): 27; and Zhu, *Chinaman's Chance*, 106.

> Chinese miners who moved into declining or abandoned mining districts slowed the decline of population and production, put more gold into circulation, and increased the tax base. They provided a market for Euroamerican miners who wanted to leave a district and a low-cost, hard-working labor pool for those who remained.
>
> Close to 50 percent of the Chinese in the West in 1868, or about fifteen thousand people, were estimated to be miners. In Idaho, the Warren mining district in 1872 had twelve hundred Chinese in the camp; by 1880, the ratio of Chinese to Euroamericans among the general population was higher in Idaho than in any other state or territory in the United States.
>
> Their numbers declined in the 1880s, and by 1890, only about two thousand Chinese still lived in Idaho. The Chinese left Idaho's mining districts in the late nineteenth century because of continued declining values of placer deposits and legal restrictions that prevented them from becoming citizens or from owning mining ground. Those who left generally returned to China or settled in large American coastal cities.[81]

While the mining revenues of Chinese miners is largely unknown, revenues were tracked in Idaho's early gold mining districts. McKay noted,

> While it is nearly impossible to determine the value of the gold taken from the early 1860s placer districts, most of the prospectors and miners who labored hard in the gold fields made little more than wages. Miners had to deduct from their gross production the expenses of travel, prospecting, stripping the claim, water conveyance, labor and supplies, and living expenses. In Florence and Pierce, for instance, miners realized a profit on only about 12 percent of the total gold produced.[82]
>
> Idaho's mines produced 19 percent of the United States gold production during the Civil War. Gold from Idaho, thus, helped finance the war and increased the currency in circulation. Between 1860 and 1869, some twenty thousand miners extracted about $57 million in minerals from the territory, mostly gold and silver. About half of this came from placer deposits and the rest from lode deposits.[83] The following figures (in millions) give some idea of the relative production of gold in Idaho's mining districts between 1860 and 1866 (see Table 1):

[81] Samuel L. Couch, "Topophilia and Chinese Miners: Place Attachment in North Central Idaho" (PhD diss., University of Idaho, Moscow, 1996), 209–10; Wegars, "Chinese in Northern Idaho," 29; Randall E. Rohe, "After the Gold Rush: Chinese Mining in the Far West, 1850–1890," *Montana: The Magazine of Western History* 32 (Fall 1982): 12; Fee, "Dragon in the Eagle's Land," 19; August Constantino Bolino, "An Economic History of Idaho Territory" (PhD diss., Saint Louis University, St. Louis, MO, 1957), 57; Paul, *Mining Frontiers*, 144; McKay, *Gold for the Taking*, 92; Stapp, "Chinese Mining Community," 61; and Ronald L. James, "Why No Chinamen are Found in Twin Falls," *Idaho Yesterdays* 36, no. 4 (1993): 21–22.

[82] Sherwin Barton, Bruce Stoddard, and Austin Milhollin, *Royalties and Gold Production Costs on the Nez Perce Indian Reservation, 1860–1867* (prepared for U.S. Department of Justice, Indian Claims Section, Boise, ID, 1958), 47; and Wells, *Rush to Idaho*, 18.

[83] ISHS, "Idaho's Gold Production," Idaho State Historical Society Reference Series No. 5, accessed October 16, 2024, https://history.idaho.gov/reference-series/; and Arrington, *History of Idaho*, 1:231.

Table 1. Value of gold production in Idaho's mining districts, 1860–1866, in millions of dollars.[84]

Boise Basin	24
Florence	9.6
Warren	6.0
Silver City	4.0
Elk City	3.6
Pierce	3.4
South Boise, Atlanta	0.8
Salmon River bars	0.8
Clearwater Station	0.6

Revenues from Idaho's early mining operations were seen as heralding a good future for the industry, and new discoveries continued to excite miners and investors. In northern Idaho, although reports of gold deposits near present-day Mullan occurred as early as 1866, the majority of the region's prospecting activity around that time was happening to the south in the St. Joe River basin, along its tributaries.[85] Discoveries continued across Idaho, especially in the central and southeastern parts of the state. As McKay wrote,

> Leesburg in Lemhi County was discovered in 1866 by a group of miners coming over from Montana. Despite difficulties due to boulders and large rocks in the placer deposits and the need for extensive ditch and drainage systems, these mines were paying fairly well by 1868, and the relatively high wages had attracted a few thousand people to the area. As prospectors fanned out over central Idaho, they made more discoveries at Stanley, Yankee Fork, Bay Horse, Clayton and other areas. The service community of Salmon was founded to serve these areas.[86]

Rising revenues from mining in Idaho led to additional changes that facilitated mining across the area. In 1868, the final boundaries of the Idaho Territory were decided.[87] That same year, after the signing of the Fort Bridger Treaty, the Shoshone and Bannock Tribes were relocated onto the reservation at Fort Hall.[88] Miners and other non-Indigenous people took advantage of the changes and flooded into the area.

Idaho's initial placer mining boom began slowing by the late 1860s. Issues with lack of transportation, reliable labor, inaccessible camps, and high operational costs challenged many operations. Some mines and early stamp mills failed.[89] Despite the slow down, new finds in central and southeastern Idaho, helped maintain the industry. As McKay noted,

> Placers along the Snake River near Shoshone Falls were known as early as 1855, but they were not worked extensively until about 1869, a low-water year that allowed systematic prospecting of the channel. Gold was found in many other stretches of the river the following year, leading to an

[84] Merrill D. Beal and Merle W. Wells, *History of Idaho* (New York: Lewis Historical Publishing Co., 1959), 1:298.
[85] Magnuson, *Coeur d'Alene Diary*, 7, 10.
[86] Merle W. Wells, *Gold Camps & Silver Cities*, Bulletin 22 (n.p.: Idaho Bureau of Mines and Geology, 1963), 67, 72; J. B. Umpleby, *Geology and Ore Deposits of Lemhi County, Idaho*, (Washington, DC: USGS Bulletin 528, 1913), 20; and Amy C. Earls, et al., *Leesburg Historic Mining District, Lemhi County, Idaho, A Cultural Resource Investigation* (Reno, NV: Mariah Associates, Inc., 1993), 15–16, 18, 257, 351–52.
[87] Schwantes, *In Mountain Shadows*, 58–63.
[88] Shoshone-Bannock Tribes, "Culture and History."
[89] Teske, et al., *Idaho's Mineral Industry*, 14.

> influx of miners. These placers were advantageously located near the stage road connecting Kelton, Utah, with Boise. Small communities were established along sixty miles of the river, and many Chinese moved in to work the deposits. Some mining of widely scattered alluvial deposits was also done farther downstream in Hells Canyon. As much as 100,000 ounces of fine gold may have been recovered from the Snake River.[90]
>
> Both Chinese and Euroamerican miners worked the bars of the Salmon River during the 1870s and 1880s. Production in most of Idaho's placer mining districts was on the decline by the end of the 1860s. Most of the Boise Basin miners, for example, had left for other gold fields in Idaho or moved on to new finds in Montana and Nevada. In 1870, the population of Boise Basin was approximately thirty-five hundred, of which nearly half were Chinese. Despite new discoveries at Loon Creek and Cariboo Mountain between 1866 and 1870, and those to the north in the late 1870s, placer mining in Idaho otherwise continued to decline in the 1870s, especially after the failure of the Bank of California in 1875 led to a nationwide depression.[91]
>
> Idaho's last placer gold rushes of the 1860s, to Loon Creek on the Middle Fork of the Salmon River in 1869, and to Cariboo Mountain in eastern Idaho in 1870, temporarily reversed the trend of miners leaving Idaho's mining districts. Due to its remote location and short seasons, large-scale lode mining at Cariboo was unfeasible, but the district produced gold for a relatively long time because of its deeply buried placers.[92]

Lode or hardrock mining began about the same time as placer mining in Idaho; however, due to the expense and complex nature of lode mining—locating the vein, tunneling underground, extraction of the ores, sorting, crushing, and then concentrating the ore (also called ore beneficiation)—placer mining remained the primary gold mining method in early Idaho mining communities. Although practiced in small instances during this time period (1860–1880), large capital investments in equpment and labor were necessary to develop a major lode mine. Lode miners tunneled into mountains to reach gold-bearing veins, usually in quartz, and then removed the ore. They did so by drilling into the rock face by hand or, after 1869, via pneumatic (compressed-air powered) drill. The holes were then filled with black powder or, after 1868, dynamite, then blasted, and finally, the loose material (muck) hauled out of the tunnel for processing.[93] McKay explained,

> Lode mining could rarely be conducted by an individual, independent miner. Even the relatively capital-intensive methods of placer mining such as hydraulicking and dredges did not require the capital investment nor the advanced technology that lode miners had to provide from the beginning. Since lode mine development and production were not as seasonal as placer mining (which was brought to a halt when creeks ran low on water), and since it often took long-term planning and investment to succeed, lode mining helped establish stable and permanent settlements in Idaho.

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[90] Wells, *Gold Camps & Silver Cities*, 88–89, 91–92; James, *Ruins of a World*, 3–4, 6–8, 11; W. W. Staley, *Gold in Idaho*, Idaho Bureau of Mines and Geology Pamphlet 68 (1946), 30; and T. Egleston, *The Treatment of Fine Gold in the Sands of the Snake River, Idaho* (New York: American Institute of Mining Engineers, 1890), 5–7, 11.
[91] Elizabeth M. Smith, *History of the Boise National Forest, 1905–1976* (Boise: Idaho State Historical Society, 1983), 11; and Arrington, *History of Idaho*, 1:291.
[92] Wells, *Gold Camps & Silver Cities*, 99, 102.
[93] Teske, et al., *Idaho's Mineral Industry*, 12–13; and Koehler S. Stout, *Mining Methods & Equipment* (Chicago: Maclean Hunter Publishing Company, 1989), https://archive.org/details/isbn_0929531051/mode/2up.

> In some districts the sources of the gold proved difficult to find, but in others, such as Rocky Bar, Silver City, or parts of the Boise Basin, the important lodes were identified fairly early on. The silver-bearing veins in the Silver City area, rated as Idaho's most important find of 1863, had grown into the state's highest producing lode mines by 1869; in the following decade the Atlanta and Yankee Fork districts numbered among the most productive. In these early years, primarily due to the lack of railroads and of efficient milling for processing the complex base ores, the productive lode mines chose to work the higher paying precious metal deposits instead.[94]
>
> Early placer miners generally did not organize labor unions because small groups of owners could work the deposits efficiently. Lode mines, however, often required hundreds of employees who worked for absentee owners. Miners at the Comstock Lode in Nevada organized a union in 1863 and spread the concept throughout the mining West. In 1867, a few months after the Comstock union experienced some success, miners in Idaho's Silver City organized their own union. As managers implemented wage reductions, employees responded by forming unions and organizing strikes. Wage and hour concerns dominated western mining unions.[95]

In most of Idaho's mining districts, miners' greatest difficulty was finding efficient and cost-effective methods of ore beneficiation.[96] Processing required milling or crushing the rock into powder, to release the gold, and then separating out the precious metal. McKay wrote,

> Ore beneficiation upgrades the value of precious metals extracted from the earth. It separates the gangue [waste rock], or worthless minerals, from the valuable ones in an ore. There are two stages: crushing and classifying, and concentration: classification sorts the ore by size; concentration reduces the volume of the ore and increases its metallic content. The machinery that accomplishes these two stages is usually housed in the same mill or ore-processing building. As mills relied on gravity feed to move the crushed rock through its various parts, they were located, whenever possible, on hillsides downslope from the mine portal. The roofline followed the same downhill gradient as the entire building, which was built on a stepped foundation. The machinery required plentiful water for washing the crushed rock, so mills were always located near a dependable water source or access to water.[97]

The process of ore benefication began with sorting. McKay wrote,

> First, miners broke the ore with sledges. When sorting happened underground, some of the waste rock went immediately to fill the stope [the mined shaft]. Alternatively, when the separation of ore occurred above ground, it could be done in a sorting ground either on a stationary table or on a belt conveyor or other moving surface, where the waste rock ended up in a dump pile.[98]

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[94] Hiram T. French, *History of Idaho: A Narrative Account of Its Progress, Its People and Its Principal Interests* (Chicago: Lewis Publishing Co., 1914), 37; ISHS, *Idaho, An Illustrated History* (Boise: Idaho State Historical Society, 1976), 46; and Ross, *Mining History of South-Central Idaho*, 7.

[95] Merle W. Wells, "The Western Federation of Miners," *Journal of the West* 12 (January 1973): 19; Brown, *Hard-Rock Miners*, 145; and Wells, *Gold Camps & Silver Cities*, 41.

[96] McKay, *Mining Idaho's History*, 82–83.

[97] McKay, *Mining Idaho's History*, 19.

[98] Robert Peele, *Mining Engineers' Handbook* (New York: John Wiley & Sons, 1918), 15.

> Hand sorting constituted the earliest form of concentration. Rich ore could be hand sorted and then shipped directly to a large-scale smelter, often located outside the area. Most ores, however, required additional concentrating to reduce shipping charges. Precious minerals were not terribly bulky, but ores bearing base metals such as lead, copper, and zinc were, so many isolated districts needed railroads to transport ore in order for base metal mines to become producers.[99] The various reduction methods always began with the mechanical crushing and grinding of the ore.[100]
>
> After sorting, ore destined for treatment in a mill would be crushed and ground to a uniform size by one or several pieces of machinery, either in the mine, in a building near the mill, or at the top level of the mill. The fineness of the crushing depended on the particle size needed in the rest of the milling process. The simplest method was crushing rock in a hand mortar; this prohibitively slow and labor-intensive process, however, was done only in the early stages of a rich mine's development. In the early years, crushers were primarily arrastras and stamp mills, and to a lesser degree Chilean mills.[101]

Milling with arrastras or stamp mills was slow and challenging. While arrastras could be assembled easily at remote mines and were inexpensive to operate, they could only process small amounts of ore at a time.[102] As McKay described it,

> The least costly device for crushing quartz was the arrastra, built almost entirely of local materials. The technique, brought north from Mexico, required low capital and overhead investments, and only one or two operators. As a result, many arrastras were operating in Idaho by 1864. An arrastra consisted of an eight- to twenty-foot circular stone-lined pit that held mercury, water, and crushed ore. Pairs or quads of 150–200-pound drag stones of any fine-grained igneous rock that burrs rather than polishes with continued use were loosely hung from the horizontal beam(s). A wooden post in the center had one or two beams set horizontally on the pivot. If animal-powered, the end of one beam had a harness for a horse or mule; if water-powered, the center post was attached to gears turned by a water wheel. The arrastra was shallowly filled with ore broken into walnut-sized pieces. When the ore had been ground to the size of medium sand grains, water and mercury were added before further grinding. The addition of more water sent the mixture, by then a thin pulp or slime, out through one or more outlet troughs, where it would be panned, run through a sluice, or screened. The arrastra operator collected amalgam from the arrastra floor and retorted it to separate the gold from the mercury. Then the gold was cast into ingots. The operator generally dismantled the arrastra after processing the ore to recover any gold that had seeped through. Some miners earned additional money by leasing their arrastras at either a fixed rate or, more commonly, for a percentage of the gold recovered.[103]

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[99] Robert L. Romig, "The South Boise Quartz Mines, 1863-1892, A Study in Western Mining Industry and Finance" (Master's thesis, University of California, Berkeley, 1959), 4.
[100] McKay, *Mining Idaho's History*, 21.
[101] McKay, *Mining Idaho's History*, 21.
[102] Teske, et al., *Idaho's Mineral Industry*, 13.
[103] Roger E. Kelly and Marsha C. S. Kelly, "Arrastras, Unique Western Historic Milling Sites," *Historical Archaeology* 17, no. 1 (1983): 85–86; A. W. Fahrenwald, *The Recovery of Gold from Its Ores* (Moscow: Idaho Bureau of Mines and Geology Pamphlet 37, 1932), 9; and McKay, *Mining Idaho's History*, 21.

> Arrastras crushed a low tonnage of ores at any one time, so they usually required relatively high-grade ore. Over the decades small-scale operations without much capital continued to use arrastras, which in later years might be powered by gasoline engines or even electricity. Since the amalgamation process seldom achieved more than 70 percent recovery, tailings piles from arrastras (and stamp mills) were often profitably re-treated later by cyanidation or flotation.[104]
>
> In the early days Idaho miners also used a variant of the arrastra, the Chilean roller mill, which could be operated by animal or water power, and instead of drag stones used large stone or cast-iron wheels set on edge that revolved around a horizontal axle and crushed the ore. The Chilean roller mill generally held up better than an arrastra because the drag stones wore out in roughly six to eight weeks and the floors in approximately six months with continuous use.[105] At each stage of size reduction, grizzlies (grates), vibrating screens, trommels (cylindrical screens), or classifiers sorted the ore for size to ensure a uniform size fed to the mill, returning the oversize back to the crushers and allowing the fines to be carried by water to the concentrators.[106]

Stamp mills were a faster method of milling ore, but they could be expensive to purchase and have delivered to mines in rugged locations. Additionally, due to few good transportation routes in Idaho at the time, it could be difficult to deliver ore fast enough to a mill site to keep the stamp mill operating. As McKay wrote,

> Many miners, dissatisfied with the slow workings of an arrastra, substituted a stamp mill to crush their ore. The stamp mill, a more complicated and heavy piece of machinery, could not be built locally but had to be shipped in from outside, generally from Chicago or San Francisco. Stamp mills were readily transportable over wagon roads, relatively easy to erect and to operate, and were repairable. The number of stamps determined the milling capacity: a two-stamp mill was considered the equivalent of one arrastra. Stamp mills required steam power and, thus, much fuel to operate. The great expense resulted in the formation of mining companies to finance mills.
>
> Rock breakers—most commonly a jaw crusher or a gyratory crusher located near the top level of the mill—below the ore bin, smashed the ore into pieces about the size of apples before it was fed to the stamps. Each stamp consisted of a vertical steel stem with an iron focit or shoe on the bottom that was lifted by a cam and dropped onto coarsely crushed ore. The stamps, which averaged five to seven hundred pounds each, raised and dropped approximately one foot onto the die with every turning of a horizontal shaft, falling with a loud bang approximately sixty times a minute. A heavy iron trough, called the battery, ran around and under the shoes of the stamps, enclosing them all. The blows of the stamps caused the water covering the ore and the die to explode, discharging the ore in a pulverized slurry, which then passed through sluice boxes or flowed over inclined tables that had an amalgam plate (a copper plate coated with mercury) to catch the gold. The gold was then extracted from the amalgam by retorting or distillation, as in an arrastra. If the ore contained silver sulphides, it underwent an additional roasting before or

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[104] Kelly and Kelly, "Arrastras," 85–86.
[105] Young, *Western Mining*, 69–72; Kelly and Kelly, "Arrastras," 86–87; and Robert Gresham Bailey, *River of No Return (the Great Salmon River of Idaho)* (Lewiston, ID: Bailey-Blake Printing Co., 1983), 204.
[106] McKay, *Mining Idaho's History*, 21.

> after going through the stamps.[107] Rock breakers and stamp mills were the industry standard throughout the second half of the nineteenth century.[108]

After milling, the crushed and concentrated ore needed to be processed to recover the valuable metal from the waste rock. There were three methods used to accomplish this recovery process: amalgamation, chemical methods, and smelting.[109]

> The recovery processes tried in Idaho for various kinds of ore included: stamp milling combined with mercury amalgamation for gold ore; Freiberg and Washoe processes[110] (with or without roasting) for silver ore; blast furnace smelting for lead-silver and copper ores; and, among others, cyanidation, flotation, chlorination and leaching.[111]
>
> The amalgamation process[112] collected free-milling gold particles relatively easily, using devices such as copper plates or tables covered with a thin film of mercury to separate the gold from rock containing no ore. Free-milling gold made up most of the ore in Idaho's early mining days, so most of the milling occurred in stamp mills combined with straight amalgamation. Gold bullion resulting from this amalgamation process was sent to an assay office or to the mint.
>
> As the ore became more base with depth, the milling process expanded to include table concentration and cyanidation in order to recover more of the values. Much of this milling-grade ore ended up in stopes and on waste rock dumps; some of which was later reworked at a profit.[113]
>
> More complex refractory ores[114] generally required additional crushing and grinding, [then] chemical processes such as cyanidation or flotation to concentrate them, and [finally] smelting of the resulting concentrates. Smelting heated the ore in the presence of fluxes in order to chemically separate the metals and the waste rock. The matte[115] resulting from the smelting process was then shipped to other plants for refining either into bullion suitable for commercial exchange or into metals or alloys for industrial use.[116] Smelters accepted high-grade ore directly

[107] T. A. Rickard, *The Stamp Milling of Gold Ores* (New York: Engineering and Mining Journal, 1903), 1–2; Hardesty, *Archaeology of Mining and Miners*, 41; Arrington, *History of Idaho*, 1:252; and Young, *Western Mining*, 198.
[108] McKay, *Mining Idaho's History*, 22.
[109] McKay, *Mining Idaho's History*, 20.
[110] The Freiberg beneficiation method combines roasting and amalgamation, using complex machinery. The Washoe process ground silver ores in tubs or pans, with added mercury, or other chemicals (McKay, *Mining Idaho's History*, 126, 130).
[111] ISHS, "Recovery Processes for Idaho Ores," Idaho State Historical Society Reference Series No. 380 (1966), https://history.idaho.gov/reference-series/.
[112] Amalgamation refers to the process of adding mercury to pulverized ore, where it bonds with the gold and silver, forming an amalgam. The amalgam is then heated to vaporize the mercury, leaving the precious metal behind.
[113] Thomas Varley, et al., *A Preliminary Report on the Mining Districts of Idaho* (Washington, DC: U.S. Bureau of Mines Bulletin 166, 1919), 4.
[114] Refractory ores are those ores that resist the action of chemical reagents and required roasting to complete the process (McKay, *Mining Idaho's History*, 128).
[115] Matte is the metallic mixture that results from smelting sulphide ores (McKay, *Mining Idaho's History*, 127).
[116] McKay notes, "Gold-silver ores that were difficult to treat were found in the Boise Basin, Atlanta, the Owyhees, Seafoam and Greyhound (Custer County), and many districts in central Idaho. Idaho's silver-lead-zinc ores come primarily from the Coeur d'Alenes in Shoshone County and the Wood River district in Blaine County. Additional sources were the Lakeview and Blacktail districts in Bonner County and the Clark Fork district in Bannock County. The rich ore from these mines was treated at small local

> from a mine or concentrates from a mill. Smelters generally operated as independent corporations that bought ore from several producers or as part of an integrated system of mine, mill, and smelter.
>
> Each mine owner had to determine the most efficient and cost-effective method of concentrating and recovering the values from his or her particular ores. The characteristics of the ore, available materials, and power sources combined to produce idiosyncratic milling processes that reflected local conditions. With each new technological development, the amount of skilled labor required for each ton of ore processed tended to decline. Custom mills were sometimes established in districts where no single mine supplied enough ore to support a separate mill of its own. The mineralization in any given area was generally similar, so the types of ore mined and the milling and concentrating processes best suited to the ores were also likely to be similar. General similarities in the mineralization in types of ore mined in any given area meant that the milling and concentrating processes best suited to those ores were also likely to be essentially the same. These independent mills bought the ore at a price based on the assay value and then sold the concentrates to a smelter.[117] The new recovery processes of cyanidation and flotation allowed mining companies in the twentieth century to rework old mill tailings and to recover metal from low-grade deposits in waste rock dumps.[118]

Some local mill owners resorted to a widespread practice of price gouging the mines and only processing the best high-grade ore, also known as high-grading. This practice led to widespread failure to pay miners wages and, by 1867, led to miners in the Owyhee District organizing a union. The failures of a few lode mines in Elmore and Owyhee Counties in 1866 and 1867 discouraged miners from lode mining.[119] McKay wrote,

> Profitable development of lode mines depended on a number of factors, including the richness of the deposits, the technical difficulties of recovering the metals from the ore, the distance to the nearest shipping point, the topography, and the climate. Mine managers, especially in the early years, failed to test the ore's quality and extent before installing a mill, and sometimes they sank great amounts of capital into processes that did not work on their ores. Many mistakenly assumed that rich values extended to great depths, as they did on the Comstock silver lode in Nevada, but this was not the case with most Idaho properties. Other contributing development problems included the inability to consolidate claims into mines of reasonable operating size, mines that operated long after they should have shut down, or those properties that were hurt by title litigation, stock manipulation, or absentee ownership. During the 1860s and 1870s, lode mine superintendents generally tried to meet all costs from current production. This, along with a system of compensating superintendents with a percentage of production, led to high-grading or working only the richest parts of mines.[120]

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smelters or at the large Bunker Hill smelter in Kellogg (built 1917), or it was sorted and hauled out by wagon and then shipped by railroad to distant smelters." Varley, et al., *Mining Districts of Idaho*, 4; and USGS, *Mineral and Water Resources of Idaho*, Idaho Bureau of Mines and Geology Special Report 1 (1964), 181–82

[117] McKay, *Mining Idaho's History*, 20–21.

[118] Valerie Rodman, "Modeling as a Preservation Planning Tool in Western Gold and Silver Mining Districts" (Master's thesis, University of Nevada, Reno, 1985), 54.

[119] McKay, *Mining Idaho's History*, 36; and Teske, et al., *Idaho's Mineral Industry*, 13–16.

[120] Wells, *Gold Camps & Silver Cities*, 11, 85; and Beal and Wells, *History of Idaho*, 1:420.

> Through 1870, the production of gold from the Boise Basin's placers and lodes far exceeded those from any other district. For two decades, most of Idaho's miners worked in southern Idaho.[121] The U.S. government built a branch assay office in Boise in 1870–1871. This reflected the importance that mining had attained by that time in the territory as well as federal encouragement of mining in the territory. Miners welcomed the facility because its location within the territory made it easier for them to sell their gold bullion.[122]

Beginning around 1870, there was widespread use of the hydraulic mining method. As investment capitol flowed into mining operations, companies began using high-pressure water from hydraulic monitors to undermine gravel banks and wash gold-bearing material into sluices, which recovered the gold.[123]

> Hydraulicking entailed aiming water under pressure against stream banks and hillsides, knocking down large volumes of gravel, dirt, sand, and boulders to expose and wash the gold-bearing material beneath the surface, and direct it through sluice boxes or bedrock channels. As a result productivity rose from the three yards washed by rocker or ten yards washed with a sluice box to five hundred yards a day that hydraulicking accomplished. Hydraulic mining greatly reduced the cost of handling gravel per ton, but this level of efficiency came at a price. It required a relatively large capital outlay, consolidation of claims, plentiful water, and terrain with hills to give enough fall to the water to create high pressures. Men who had mined in California generally brought hydraulicking to other mining areas, often within a few years of the discovery of gold. In Idaho both Euroamerican and Chinese miners quickly adopted hydraulicking. However, mining districts without much water, such as Owyhee, or with mostly flat ground, such as Florence, relied instead on sluicing to work their placer deposits.[124]

In 1870, Dudley B. Varney and Sylvester Jordan made discovery claims on Jordan Creek with a group of miners brought in from Loon Creek. Soon, the miners organized the Yankee Fork Mining District, and five mining companies prepared to file patents for claims.[125]

In 1872, President Ulysses S. Grant signed the General Mining Act of 1872 into law to promote mining and its development in the United States. The Act allowed U.S. citizens to prospect, mine, sell, establish a mill site, and to purchase mineral deposits (by patent) on federal lands that were open to mineral entry. Additionally, the industry was not required to pay royalty payments for minerals mined from public lands, fund the cleanup of polluted abandoned mines, nor subjected to later environmental standards to protect water quality, agriculture, wildlife, or fish from the toxins.[126]

The 1870s saw a mix of mining successes and failures. McKay noted,

> The Silver City union experienced only limited success in increasing the prevailing wage. The union also tried to get regular paydays instead of having to wait until a mine began producing to

[121] Ross, *Mining History of South-Central Idaho*, 5; and Wells and Hart, *Idaho, Gem of the Mountains*, 38.
[122] Wells, *Boise*, 17–18.
[123] Teske, et al., *Idaho's Mineral Industry*, 12.
[124] Rohe, "Hydraulicking in the American West," 19, 28–29, 34; and LaLande, "Sojourners in the Oregon Siskiyous," 332–33.
[125] ISHS, "Site Report – Yankee Fork-Robinson Bar," Idaho State Historical Society Reference Series No. 204 (revised January 1993), https://history.idaho.gov/reference-series/.
[126] Bureau of Land Management (BLM), "About Mining and Minerals," accessed October 16, 2024, https://www.blm.gov/programs/energy-and-minerals/mining-and-minerals/about.

> receive back pay. A strike in 1872 in Silver City resulted in the firing of an unpopular mine superintendent, and another strike in 1873 led to the banning of Chinese from surface work at the mines. This union became one of the most active outside of the Comstock union.[127]
>
> The Panic of 1873 slowed mining efforts in Idaho appreciably for several years, and the failure of the Bank of California two years later badly hurt even the highly productive mines in the Silver City area. Since the San Francisco exchange carried the stock of some of the area's rich mines in the area, these Owyhee investments crashed. This discouraged investments in Idaho's mines for the rest of the decade.[128]

Yet discoveries continued to be made across the state. In 1873, miner John Morrison found a rich gold claim near the Jordan Creek confluence with the Yankee Fork.[129] Word of Morrison's find spread through the nearby mining communities. In 1875, William A. Norton discovered a high-grade vein, later named the Charles Dickens mine. These, combined with word of the General Custer claim of James Baxter, E. M. Dodge, and Morgan McKeim, led to a mining boom in the Yankee Fork drainage of the Salmon River.[130] The influx of miners into the area allowed for the 1877–1878 establishment of Bonanza City and Custer City.[131]

Repeated influxes of miners into reservation lands and traditional areas used by the Tribes led to increased hostilities in Idaho. McKay wrote,

> In 1877, a few weeks before the deadline for all Nez Perce bands to move onto the Nez Perce Reservation, a few young Nez Perce men killed some Salmon River settlers in retribution for past wrongs and captured a freight wagon headed for Florence. After a series of battles, about eight hundred Nez Perce left the area and began a long flight across Idaho and Montana. Forced to surrender that fall, many were exiled to Kansas and then Oklahoma and were not allowed to return to the Pacific Northwest until 1885, when they were moved onto the Colville Reservation in north-central Washington. The conclusion of the Nez Perce War of l877 was seen by Euroamerican miners as the end of the Nez Perce challenge to their right to mine in north-central Idaho.[132]

The miners in central Idaho may have believed that issues with Indigenous populations had been resolved and they could mine with impunity; however, they were soon proven wrong. In 1877, some

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[127] Wells, "Western Federation of Miners," 19; Teske, et al., *Idaho's Mineral Industry*, 14; Richard E. Lingenfelter, *The Hard-Rock Miners: A History of the Mining Labor Movement in the American West, 1863-1893* (Berkeley: University of California Press, 1974), 79–81, 118–19; Janene Caywood, Theodore Catton, and David Putnam, *Comprehensive Historical Overview and Results of Archaeological Test Excavation at Selected Historical Mining Sites on Florida Mountain, Owyhee County, Idaho* (prepared for CH2M Hill, Corvallis, OR, 1993), 35.

[128] Romig, "South Boise Quartz Mines," 75.

[129] Howard A. Packard, *Gold Dredge on the Yankee Fork* (Great Falls, MT: Yankee Fork Publishing Co., 1983), 1; and Caselle L. Wood, "Appendix E – Yankee Fork Historical Timeline," Salmon-Challis National Forest, South Zone Fish Program, U.S. Department of Agriculture (November 2011), 6, https://www.usbr.gov/pn/fcrps/ce/idaho/uppersalmon/yf/Appendix%20E%20-%20Historical.pdf.

[130] ISHS, "Site Report – Yankee Fork-Robinson Bar," 3–4; and Wood, "Appendix E – Yankee Fork Historical Timeline," 6.

[131] Wood, "Appendix E – Yankee Fork Historical Timeline," 1.

[132] Schwantes, *In Mountain Shadows*, 73–74; Beal and Wells, *History of Idaho*, 1:458–59. McKay noted, "in 1957, the Nez Perce tribe filed a claim against the United States to recover compensation for the land and gold royalty rights lost in Washington, Idaho, and Oregon, as a result of violations of treaties signed through 1867. In 1960, the Indian Claims Commission awarded the tribe $7.65 million" (*Idaho Daily Statesman*, August 6, 1961).

members of the Bannock and Paiute Tribes grew increasingly frustrated by the federal government's failure to abide by the treaty, including ecroachment onto Tribal lands by non-Indigenous people and lack of pledged provisions. The Tribal members left the Fort Hall Reservation and raided some settlements along the Snake River. In May 1878, the U.S. military responded, and a fight commenced that resulted in the death of Chief Buffalo Horn, the Bannock leader of the group. By August that same year, some of the surviving Tribal members surrendered and returned to the reservation, where the government applied additional restrictions on the Tribe.[133]

The Tribal members who did not return to the reservation joined up with the Sheepeaters, a band of the Western Shoshone Tribe from the Columbia Plateau and Snake River Plain. Through July and August 1879, military forces fought with the Indigenous group in the rugged mountains of central Idaho (in the present-day Salmon-Challis National Forest). By September, the Sheepeater War was over, and the Indigenous peoples were removed to Fort Hall.[134] In northern Idaho, after President Grant's executive order created the Coeur d'Alene Indian Reservation in the mid-1870s, most Indigenous families were moved south, away from the nascent mining operations. One of the outcomes of the end of armed conflict with Idaho's Indigenous peoples in the central and southern parts of the state and the creation of the reservation in the north was the opening of productive new mining areas.[135]

Some major discoveries around this time began the change in focus of mining in Idaho. In 1878, silver was discovered at Vienna, on the Upper Salmon, and Sawtooth City, south of present-day Stanley. In 1879, lead-silver was discovered in central Idaho on the East Fork of the Salmon River, in the Mackay and Alder Creek area, Sheep Creek, Seafoam, and on Greyhound Ridge.[136] That same year, Andrew J. Prichard discovered gold in a tributary creek of the North Fork of the Coeur d'Alene River. These discoveries initiated new interest in the Wood River and Coeur d'Alene regions of Idaho and led to the mining of lead-silver there, which would become the principal mined ore in Idaho.[137]

Placer and Lode Mining, 1880–1930s

After the initial discovery of lead-silver in central Idaho, additional exploration for base metal deposits began in earnest across the state.[138] McKay wrote,

> As of 1880, Idaho's gold and silver lode mines, except for some very rich properties in the Silver City area, had not been profitably developed. Discoveries of silver-lead and silver-lead-zinc deposits along Wood River and in the Coeur d'Alenes in 1880 and 1884 redeemed the reputation of Idaho's lode mines and soon revolutionized Idaho's mining industry.[139]

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[133] Camilla Richardson, "1878 Bannock War and Chief Buffalo Horn," 2023, https://www.intermountainhistories.org/items/show/412.
[134] Andy McGinnis, "Blood in the Salmon River Mountains: Sheepeater War," 2023, https://www.intermountainhistories.org/items/show/180.
[135] Coeur d'Alene Tribe, "Native Names Project," accessed October 9, 2020, https://gis.cdatribe-sn.gov/arcgisportal/apps/webappviewer/index.html; Marshall, "Coeur d'Alene's Old Sacred Heart Mission"; and Teske, et al., *Idaho's Mineral Industry*, 15.
[136] McKay, *Mining Idaho's History*, 114.
[137] Teske, et al., *Idaho's Mineral Industry*, 15; McKay, *Mining Idaho's History*, 114; and Frederick Leslie Ransome and Frank Cathcart Calkins, *The Geology and Ore Deposits of the Coeur d'Alene District, Idaho*, USGS (Washington DC: Government Printing Office, 1908), 78.
[138] Teske, et al., *Idaho's Mineral Industry*, 15.
[139] Romig, "South Boise Quartz Mines," 94.

> The leading producer of lead since 1889 has been Shoshone County, followed by Blaine County with its significant lead production. Most lead-bearing ore contains some zinc. Very little zinc was recovered prior to 1905, however, because there was no market for it (in fact, smelters imposed a penalty on ores with a high concentration of zinc).[140]
>
> Lode mining in Idaho finally took off after 1880, when improved management, rail transportation, and technology for processing lead-silver ores enabled many companies to work their claims profitably. The coming of railroads to Idaho allowed base ore concentrates to be hauled to faraway smelters for processing. Some of the older gold mines that had been high-graded since the late 1860s became efficient producers. At this time, however, interest in lead-silver properties stimulated mining, which in the 1880s caused the revival of some older lode mines and the development of new ones. The Wood River district began production in 1884, the same year that lead ore was first discovered in the Coeur d'Alenes.[141]
>
> After about 1884, miners had discovered most of the major free-milling gold and silver deposits that are known today, so subsequent gold rushes in Idaho were often misguided.[142] Around the turn of the century, for example, well-publicized discoveries in the Buffalo Hump and Thunder Mountain mining districts brought many people into these remote areas of north-central Idaho and generally increased activity in the surrounding areas for a few years. As it turned out, however, the mines' potential turned out to be wildly exaggerated.[143]

Andrew J. Prichard's discovery of gold in a tributary creek of the North Fork of the Coeur d'Alene River was initially kept quiet. However, after he established a claim on the creek that would be named for him, word spread, leading to a placer gold rush to the Coeur d'Alenes. Prichard continued to prospect in the area and established a number of claims around Murray. By 1884, additional claims for placer deposits were filed near Murray, and the gold rush was in full swing. That same year, a discovery near the town of Eagle, located at the junction of Eagle and Prichard Creeks, caused the town to boom. After richer placers were discovered farther up Prichard Creek, in the Dream, Buckskin, and Alder gulches, the center of population shifted to the new town of Murray. The rich claims in Dream Gulch produced coarse gold with some nuggets that weighed just over two pounds.[144] Placer mining became widespread that year, with prospectors locating rich deposits in the hillsides above Mullan and Wallace.[145] The towns that grew up around these diggings were mainly tent cities that supported the miners with supplies.[146]

In May 1884, Almeda Seymour and John Carton discovered the first lead-silver mine—the Tiger—in northern Idaho, near what would become the mining town of Burke. In September 1884, True and Dennis Blake discovered the Yankee Lode and four adjacent claims, which would later become the Sunshine Mine; they later

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[140] Charles R. Hubbard, *A Survey of the Mineral Resources of Idaho*, Idaho Bureau of Mines and Geology Pamphlet 105 (1955), 33; Clyde P. Ross, *A Graphic History of Metal Mining in Idaho*, USGS, Contributions to Economic Geology 821-A (1930), 4; and USGS, *Mineral and Water Resources of Idaho*, 182.
[141] Beal and Wells, *History of Idaho*, 1:367, 570, 575; and Ross, *Mining History of South-Central Idaho*, 7–8.
[142] Wells, *Gold Camps & Silver Cities*, 132.
[143] Arrington, *History of Idaho*, 1:449–50.
[144] McKay, *Mining Idaho's History*, 33; and Ransome and Calkins, *Geology and Ore Deposits*, 78.
[145] Magnuson, *Coeur d'Alene Diary*, 11–12; and Ben Davenport, "History of Mining in Idaho," accessed October 16, 2024, http://mineidaho.com/education/history/.
[146] Magnuson, *Coeur d'Alene Diary*, 16.

patented their group of claims as the Yankee Boy Group in 1909.[147] In 1885, in Milo Gulch, Phil O'Rourke and Noah B. Kellogg's discovery of a massive lead ore and silver deposit that became the Bunker Hill Mine, and Con Sullivan and Jacob Goetz' discovery across the gulch that would become the huge Sullivan Mine, changed the mining focus in the Coeur d'Alenes from gold to lead, silver, and zinc. From that time forward, the region quickly became prized for its abundant lead, silver, and zinc.[148] As McKay noted,

> After a decline in activity [in the Owyhee mines] in the 1870s, production revived in the early 1880s with the discovery of lead-silver ores in Blaine County. The mines of the Coeur d'Alenes became major producers after the mid-1880s. This district in northern Idaho has had a huge impact on the state's economy. The exceedingly rich lode deposits in northern Idaho have made Idaho the leading state in silver production in the United States, and the Sunshine Mine the top single producer of silver.[149]

By 1885, lead-silver mines were established on Canyon Creek, including the Tiger, Poorman, and Colonel W. R. Wallace's Ore-or-no-go claim at Burke, which would later become part of the Hecla Mine. However, early development of mines was slow due to difficulties in transportation. Ore was hauled from the mines by wagons, then loaded onto steamships, which transported the ore across Lake Coeur d'Alene to a rail terminal on the western shore. Then the ore was loaded onto Northern Pacific Railway (NP) trains and shipped by rail to Spokane and on to Helena, Montana, for processing. In 1887, the Coeur d'Alene Railway and Navigation Company completed a line to Burke and began transporting ore to Kellogg.[150]

It was during this time that outside investors began to take notice of nascent but successful mining companies in Idaho. McKay explained the process over time,

> Lode mining required heavy machinery, extensive tunneling and timbering, and mills and other above-ground buildings, among them machine and assay shops, company stores, bunkhouses, cookhouses, and dwellings, for successful operation. Such extensive operations necessitated large investments of capital and corporate methods. When a prospector located a good gold vein, he might option to sell the property outright for cash or trade, or he might speculate on its worth and accept, in lieu of cash, an interest in the corporation organized to develop and operate the property. Profits from placer operations financed some lode mines; the sale of stock to the public, often with the help of a professional promoter or broker, financed others. In only a few cases, such as the Charles Dickens Mine in Yankee Fork in the 1870s, did rich surface deposits meet the heavy expenses of developing a major mine and allow the miner to develop without having to sell or bring in outside capital. In many cases, profits were made by the selling of mining company stock to promote the mines rather than by the production of ore.[151]

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[147] H. W. Schulze, "A Brief History of the Sunshine Mine Operations," *The Coeur d'Alene Mining District in 1963, Pamphlet 133* (Moscow: Idaho Bureau of Mines and Geology, 1963), 65−68.

[148] Katherine G. Aiken, *Idaho's Bunker Hill: The Rise and Fall of a Great Mining Company, 1885–1981* (Norman: University of Oklahoma Press, 2005), 3–5; John Fahey, *Hecla: A Century of Western Mining* (Seattle: University of Washington Press, 1990), 4–5; and Ransome and Calkins, *Geology and Ore Deposits*, 79−80.

[149] Hubbard, *Mineral Resources of Idaho*, 50; and McKay, *Mining Idaho's History*, 37.

[150] Ransome and Calkins, *Geology and Ore Deposits*, 79; and The Diggings, "Tiger-Poorman Mine, Burke, Idaho," accessed October 16, 2024, https://thediggings.com/mines/usgs10105998.

[151] Wells and Hart, *Idaho, Gem of the Mountains*, 41; ISHS, *Idaho, An Illustrated History*, 67–68.

> Companies of stockholders or large corporations generally bought out individual miners or partnerships. Absentee ownership by large companies became more common, and mining expertise became more and more critical to success as the industry developed. As mining engineers with formal training challenged the dominance of experienced amateurs, individual small operators became outmoded in many areas, and most who stayed in the business focused on earning wages rather than finding wealth through rich strikes. The mining districts were linked in a national and international transportation, communications, demographic, and economic network. Capital came to Idaho's lode mines from the east, from other western states, and from England. The largest single American investment in Idaho occurred when Simon G. Reed of Portland purchased the Bunker Hill property in 1887, reportedly for over $700,000.[152]

It was pivotal changes in transportation and milling in the late 1800s that pushed production, investment, and industrial development in the Coeur d'Alene mining district into its dominant position in the industry. At that time, both the NP and the Oregon Railway and Navigation Company constructed rail lines into the mining district. Additionally, most of the large mines in the region built concentrating mills on their properties. The mill at the Bunker Hill and Sullivan Mines was built in 1891 and could process 500 tons of ore a day.[153] In Wood River, as the Union Pacific was building its mainline through the Snake River Valley, they constructed a branch line to Hailey and Ketchum to transport Wood River ores. As Idaho's Bureau of Mines and Geology noted,

> The transformation that came over Idaho in the decade after 1880—new railways, new cities, new farmlands, and new people by the tens of thousands—is associated to a considerable degree with the new opportunities in mining.[154]
>
> Between 1860 and 1901, the British dominated European investment in mines west of the Rockies. The arrival of railroads in the mid-1880s resulted in a significant expansion of British investment in Idaho's mines.[155]

British financiers invested heavily in the Rocky Bar, Atlanta, Silver City, and Bonanza mining districts.[156] However, not all persons from foreign lands were as welcome as the British. McKay expounded on changes at the federal level made toward the Chinese:

> Congress passed the Chinese Exclusion Act in 1882, the first of several national restrictions on Chinese immigration that were not fully repealed until 1943. So, Chinese wishing to enter the United States after 1882 had to cross the borders from Mexico and Canada illegally. This act, combined with a depressed national economy and the willingness of Chinese to work for lower wages than Euroamericans would accept, led to the formation of anti-Chinese societies

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[152] August C. Bolino, "The Role of Mining in the Economic Development of Idaho Territory," *Oregon Historical Quarterly* 59 (June 1958): 129, 132; and Richard H. Peterson, "Simeon Gannett Reed and the Bunker Hill and Sullivan: The Frustrations of a Mining Investor," *Idaho Yesterdays* 23 (Fall 1979): 3.
[153] Ransome and Calkins, *Geology and Ore Deposits*, 80; and Teske, et al., *Idaho's Mineral Industry*, 15.
[154] Teske, et al., *Idaho's Mineral Industry*, 15.
[155] Clark C. Spence, *British Investments and the American Mining Frontier, 1860–1901* (Moscow: University of Idaho Press, 1995), 2, 9; Romig, "South Boise Quartz Mines," 53; Wells, *Gold Camps & Silver Cities*, 97; and William Turrentine Jackson, "British Capital in Northwest Mines," *Pacific Northwest Quarterly* 47 (July 1956): 75, 78, 82, 84–85. Bolino ("Role of Mining," 131) reports that the best British investment in Idaho was the purchase of the Minnie Moore Mine on Wood River in 1884.
[156] Teske, et al., *Idaho's Mineral Industry*, 15.

> throughout the West. Euroamerican hostility to the Chinese took the forms of violence and of challenges to the legal status of the Chinese. One of the worst incidents of violence in Idaho occurred in 1887, when Euroamericans killed over thirty Chinese miners on the Snake River in an unprovoked attack.[157]
>
> Euroamericans sometimes "jumped" Chinese claims—took possession of a claim without paying for it. Some Chinese responded by hiring Euroamerican men to jump their claims back for them or to assert ownership of the property. The most important civil case involving the jumping of Chinese claims resulted from an Elk City case. In 1887, four Euroamerican men ejected Chinese leaseholders from their claim. In the resulting court case, the district court judge ruled that Chinese could not acquire mining claims under U.S. mining laws. This decision may have led some Chinese to leave the state, but others simply leased the ground and water rights from Euroamerican owners. In 1897, the legislature restricted mining activity to U.S. citizens or those who had declared their intent to become citizens.[158]

Other advancements in the 1880s were the expansion of additional mining districts in the south-central part of the state and the revitalization of old districts there. The new districts were the Nicholia in the Beaverhead Mountains, the Mineral Hill and Warm Springs near Hailey, the Little Wood east of Hailey, the Bayhorse in Custer County, and the Gibbonsville, Mineral Hill, and Yellowjacket in Lemhi County. Most of these districts mined lead-silver ore, with some mining gold and some finding small amounts of copper.[159]

Another development in the 1880s was the rise in popularity of miners' unions. McKay described some of the groups' fights for better working conditions and pay:

> Two miners' unions were organized in the Wood River area in the early 1880s with a combined membership of about 450. In 1884, they succeeded in holding wages at $4 a day. A year later this union held the longest strike ever in the history of western mining, but when it ended the mining companies in the area all cut wages.[160] Following these organized efforts to improve conditions in Silver City and Wood River, Idaho's organized miners regrouped and took their struggles to the Coeur d'Alenes. The rapid rise of large-scale mining escalated the conflict between workers and owners in the Coeur d'Alene mines. The nature of mining was changing due to new technology such as the introduction of mechanized drills around 1887 and the working of lower-grade base metal deposits using more mechanized equipment and fewer skilled workers. Many miners were reduced to doing unskilled work and were paid less than drillers. Mine owners took control of hiring practices, pace of work, and wages.[161]

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[157] John Wunder, "The Courts and the Chinese in Frontier Idaho," *Idaho Yesterdays* 25 (Spring 1981): 24, 27; Melvin D. Wikoff, "Chinese in the Idaho County Gold Fields, 1864–1933" (Master's thesis, Texas A&M University, College Station, 1972), 165, 170, 175–76, 179; Arrington, *History of Idaho*, 1:267–68; Wegars, "Chinese in Northern Idaho," 33–36; Zhu, *Chinaman's Chance*, 4, 101; and Wyman, "Mining Law in Idaho," 16.
[158] Elsensohn, *Idaho Chinese Lore*, 37; Wunder, "Courts and the Chinese," 30–32; Stapp, "Chinese Mining Community," 365; Zhu, *Chinaman's Chance*, 101; and Wyman, "Mining Law in Idaho," 16.
[159] Ross, *Mining History of South-Central Idaho*, 7–8.
[160] Lingenfelter, *Hard-Rock Miners*, 171, 176.
[161] Katherine G. Aiken, "Mining in the Coeur d'Alenes," in *Idaho and the American West* (Boise: Idaho Humanities Council, 1994), 16. Aiken noted that drillers were usually referred to as miners, while other workers were muckers (Katherine Aiken, personal communication September 20, 2024).

> In the 1890s, Silver City miners formed a local of the Western Federation of Miners and bargained over issues such as wages, length of work day, and safe working conditions.[162]

By 1888, placer mining near Murray and Delta, in northern Idaho, declined as the placers began to play out. To get to placer gold from the bench gravels, miners installed a pipeline for hydraulic mining near Murray. By 1904, a hydraulic elevator and a dredge operated in Prichard Creek about mile below Murray near Delta.[163] McKay noted,

> By 1888, the production of gold in Idaho lagged far behind lead and silver in value. However, some gold and copper producing lode mining districts, such as the Seven Devils district in Adams County and the Blackbird and Indian Creek districts in Lemhi County, opened in the 1890s.[164]

In 1890, Idaho became a state, thus giving the "mining commonwealth" a bigger voice in national issues, such as the battle for free coinage of silver or bimetallism. As one of the leading silver states in the country, Idaho used its new influence to drive politics in the state.[165]

Changes in mining technology played a role in increasing production in the mines. McKay described some of the new equipment:

> Jaw and gyratory crushers and reduction gyratories, cone crushers, and rollers prepared ore for the grinding mill; these began to replace stamp mills by the late 1800s. By 1910, ball, rod, or tube mills had become the standard fine grinding mills because they produced the slimes (smaller particles) required by cyanidation and flotation. At each stage of size reduction, grizzlies (grates), vibrating screens, trommels (cylindrical screens), or classifiers sorted the ore for size to ensure a uniform size fed to the mill, returning the oversize back to the crushers and allowing the fines to be carried by water to the concentrators.[166]

By 1891, approximately 40 developed mines operated in the Coeur d'Alene mining district. That year, 13 concentrating mills there processed 2,000 tons of ore per day. In 1890 alone, $10 million worth of ore had reportedly been removed from the mining district.[167] However, change was on the horizon. As McKay described,

> A financial panic in 1893 brought an end to the mining prosperity of the 1880s. The nationwide depression caused railroads to go into receivership, mines to shut down, and banks and businesses to go bankrupt. Idaho's highly productive lode mines in the Coeur d'Alenes curtailed operations, and mines in Custer County closed down.[168]

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[162] Wells, "Western Federation of Miners," 19; Teske, et al., *Idaho's Mineral Industry*, 14; Lingenfelter, *Hard-Rock Miners*, 79–81, 118–19; and Caywood, Catton, and Putnam, *Comprehensive Historical Overview*, 35.
[163] Ransome and Calkins, *Geology and Ore Deposits*, 80.
[164] Beal and Wells, *History of Idaho*, 1:367, 570, 575; and Ross, *Mining History of South-Central Idaho*, 7–8.
[165] Schwantes, *In Mountain Shadows*, 58–63; and Teske, et al., *Idaho's Mineral Industry*, 16.
[166] Kelly and Kelly, "Arrastras," 85–86; and Fahrenwald, *Recovery of Gold from Its Ores*, 9.
[167] Robert Wayne Smith, *The Coeur d'Alene Mining War of 1892* (Corvallis: Oregon State College, 1960), 8; and Victoria E. Mitchell, *History of Selected Mines in the Pine Creek Area, Shoshone, County, Idaho* (Moscow: Idaho Geological Survey, 2000), 1.
[168] Arrington, *History of Idaho*, 1:449–50.

> As more and more countries went off the silver standard, declining silver prices cut production in Wood River in 1888, and the price collapse of 1893 proved disastrous for several of Idaho's major mining districts. The new Populist Party, formed in Idaho in 1892, supported free and unlimited coinage of silver. Idaho did not climb out of the 1890s depression until late in the decade when conditions grew more favorable: when gold was discovered in the Yukon, new methods of processing precious metals began to yield more gold, and the onset of the Spanish-American War stimulated some businesses.[169]
>
> Many of the gold and silver lode mines developed in Idaho were neither extensive nor more than a few hundred feet deep. The main method of ore treatment used at the turn of the century—crushing the ore in stamp mills followed by plate amalgamation—resulted in the recovery of only about 50 or 60 percent of the gold. Many of these mines shut down in the 1890s or early 1900s once the oxidized ore or the richer shoots were exhausted or as a result of financial instability due to the panic of 1907. With the development of better milling processes that could treat complex sulphide ores, some mines reopened. Atlanta, for example, did not have an effective recovery process until 1932. In the twentieth century some of Idaho's lode mines, particularly those with shallow overburden, introduced surface mining in the form of glory holes and open pits. Two mining methods, open pit and underground, were sometimes combined in the same location.[170]

The financial crisis and reduced prices for silver hit miners hard. Additionally, railroad companies in the mining areas raised freight rates across Idaho. In response, the miners in the Coeur d'Alenes went on strike. McKay wrote,

> The miners in the Coeur d'Alene mining district organized a union [the Miners' Union of the Coeur d'Alenes] in the late 1880s.[171] Three years later, the mine owners formed a Mine Owners Association (MOA). Citing increasing freight rates and declining metal prices, the owners shut down the region's major mines in 1892 after the workers refused to accept a reduction in pay. This put about two thousand people out of work. When the mines reopened, the owners announced reduced wages and brought in non-union workers. The lengthy, bitter controversy ended with workers dynamiting an abandoned mill [the Frisco Mill]. Federal troops were called in, and martial law ruled in the Coeur d'Alenes for four months. Some six hundred union men suspected of participating in the uprising were held in an outdoor prison known as a bullpen. At the end, the mines operated on the owners' terms, but the unions had not been broken, even though union men were blacklisted throughout the West.[172]
>
> The 1892 labor struggle in the Coeur d'Alenes, combined with wage cuts and enthusiasm over the new Populist Party, resulted in the creation of the Western Federation of Miners. The militant

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[169] ISHS, *Idaho, An Illustrated History,* 113; and Arrington, *History of Idaho,* 1:458.
[170] John C. Reed, *Early and Recent Mining Activity in North-Central Idaho* (n.p.: Idaho Bureau of Mines and Geology Press Bulletin 18, 1936), 3-4; Ross, *Mining History of South-Central Idaho*, 25; and ISHS, *Idaho, An Illustrated History*, 39.
[171] Katherine Aiken's research has the organization date of the Miners' Union as 1891, the same year as the Mine Owners (Katherine Aiken, personal communication September 20, 2024).
[172] Lingenfelter, *Hard-Rock Miners*, 198–201, 204–5; Hart and Nelson, *Mining Town*, 50, 54–56; and Paul, *Mining Frontiers*, 282.

> and increasingly Socialist union soon opened its membership to all mine, mill, and smelter workers, but it only represented a minority of miners.[173]
>
> Violence and class warfare erupted again in the Coeur d'Alenes in 1899 after owners refused the union's wage and hiring demands. [At the time, it was believed] miners blew up the Bunker Hill and Sullivan mill [concentrator] because it was the only company not paying $3.50 per day to all mine workers. Again, the troops arrived, and martial law was imposed for over a year. For many years after this incident, mine owners maintained a central hiring agency that screened potential employees.[174]

A number of union leaders were jailed for months after the bombing, and numerous miners were fired from various mines for having been suspected of participating in the union. Court cases triggered by the union fight continued through 1907.[175] Advancements in mining and processing around this time allowed for dramatic increases in production but did little to increase safety for the miners.

In the early 1900s, the dry pneumatic Wiggle Tail stoper or rock drill replaced traditional hand jacking for blasting hole drilling. This tool, while more efficient than hand drilling, could create rockfall from ceilings—and thus were known as "widow makers"—and created clouds of dust during operation, which led to lung disease (silicosis) in miners who used them. A wet version of the stoper was introduced in 1918 that helped to suppress dust.[176]

Also, new methods of ore concentration were developed during this time, including the Wilfley table and flotation, both of which increased the amount of silver and lead recovered during processing. The Wilfley was a mechanized shaking table with a sloped and riffled deck, which used water flow to separate metals from the waste material and concentrate them in the riffles.[177] Flotation, while an effective and efficient way to extract metals, created very fine tailings known as slime that were difficult to contain. If they were stockpiled, they could easily be moved by winds when dry and more easily carried by water for greater distances.[178] While these advancements in technology increased production, mining work continued to be dangerous, and miners remained underpaid. McKay recounts the details:

> Miners put in a six- to seven-day work week and shifts in underground mines ranged from eight to twelve hours, depending on the success of the mine, the presence of unions, state legislation, and local practice. The passage of an eight-hour law in Idaho in 1907 came only after the labor shortage of 1906 to 1907 forced mine owners to raise wages and shorten the workday to maintain an adequate labor force. Most miners worked for wages, although some did contract to do specific jobs for set fees. Many men turned to hard-rock mining because it paid substantially higher wages than other industries. Miners generally spent much of their free time prospecting. In high-elevation districts, snow levels curtailed winter-time prospecting, so miners kept busy

[173] Lingenfelter, *Hard-Rock Miners*, 227; Arrington, *History of Idaho*, 1:460; and Wells, "Western Federation of Miners," 22, 28, 34. The Western Federation of Miners was founded in 1893 (Katherine Aiken, personal communication September 20, 2024).
[174] Ransome and Calkins, *Geology and Ore Deposits*, 81; Aiken, "Mining in the Coeur d'Alenes," 17; and John Fahey, *The Inland Empire, Unfolding Years, 1879–1929* (Seattle: University of Washington Press, 1986), 181.
[175] Charles Mooney, *Burke: The Elusive Dream* (Monee, IL: Charles Mooney, 2023), 294; and Teske, et al., *Idaho's Mineral Industry*, 16.
[176] Committee on Superfund Site, *Superfund and Mining Megasites*, 31–32.
[177] McKay, *Mining Idaho's History*, 130.
[178] Committee on Superfund Site, *Superfund and Mining Megasites*, 32–33.

constructing buildings or doing underground work. In wintertime some left the mining districts altogether, living in Lewiston, Boise, along the Salmon River, or a west-coast city during the cold months.[179]

For many years, Cornish miners formed a nucleus of skilled hard-rock miners in the American West. They passed on techniques, equipment, terminology, and even the system of contract work and of leasing a mine and working it on a royalty basis.[180] When miners leased a mine, they passed a percentage of the gross receipts on to the owners rather than working on a contract basis or for hourly wages. The owners considered leasing a mine a safe investment: they did not have to pay expenses; less ore was lost through stealing or carelessness; and the lessee was responsible for damage to the property and for employee accidents. The lessees assumed greater risks but expected greater dividends without a heavy initial outlay for machinery or expensive development work. Lessees were not held liable by lien laws for their employees' unpaid wages, however, so some miners did not get paid for their work; their only recourse was to file an injunction to collect wages from the clean-up of gold, if any. Leasing was most common in young camps or in declining districts. Lessees could make good profits if they had a favorable agreement and encountered a solid pocket of high-grade ore; this was the main way working miners accumulated small fortunes. When leasing an undeveloped property, the owner and the lessee gambled that paying ore would be found. Miners rarely reopened closed mines: due to their rapid deterioration it was too costly and dangerous.[181]

Underground work at lode mines was, and continues to be, extremely dangerous. Many miners suffered work-related injuries, illnesses, from hazards like falling objects, drilling and loading holes and handling explosives, cage and bucket accidents, falls, bad air, cave-ins, floods, mine fires, and silicosis. Many died. In the mid-1890s, the Idaho legislature created the office of inspector of mines, which prepared annual reports on the state's mining industry. However, since these mining inspectors generally showed more concern for the health of the industry than for the health and safety of the state's miners, by 1910 territorial and state legislatures had passed a wide range of legislation in Idaho to help protect underground miners. A 1909 bill placed liability with the employer for accidents caused by defects in machinery, passageways, and other workplace conditions, by the negligence of managers, or by the actions of an employee following the employer's rules. Regulations related to safety concerns such as fire protection, cage operation, and the storage and use of dynamite were also passed. Beginning in 1917, the law mandated that Idaho mine owners pay into the state workmen's compensation fund. Early miners' unions in Idaho concerned themselves primarily with wage issues, not health and safety.[182]

[179] Young, *Western Mining*, 224; Walker De Marquis Wyman, "The Underground Miner, 1860–1910: Labor and Industrial Change in the Northern Rockies" (PhD diss., University of Washington, Seattle, 1971), 111, 386; and Paul, *Mining Frontiers*, 143.
[180] A. C. Todd, "Cousin Jack in Idaho," *Idaho Yesterdays* 8 (Winter 1964–1965): 2, 6.
[181] Brown, *Hard-Rock Miners*, 101–2, 110; Wyman, "Underground Miner," 118; and Shenon and Full, *Evaluation Study*, 1:197.
[182] Brown, *Hard-Rock Miners*, 77–78, 82, 86, 93; Wyman, "Underground Miner," 257, 268, 289; Wyman, "Mining Law in Idaho," 19–20, 22; and Hawley, *History of Idaho*, 493. Aiken noted that in the Coeur d'Alene mining district, one union issue not related to wages was the $1 hospital fee, which was deducted from workers' pay (Katherine Aiken, personal communication September 20, 2024; "On Coeur d'Alene Lake, Idaho," *Industrial Worker* [Spokane, WA], June 17, 1909, 1, https://www.marxists.org/history/usa/pubs/industrialworker/iw/v1n14-jun-17-1909-IW.pdf).

After the union troubles, some miners recounted, "safety became a dirty word. The frequency of accidents increased. The shifters' reply to a man who complained about a dangerous workplace became a standard answer, 'If you are scared down here, I know lots of guys who will take your job.'"[183]

Living quarters were another concern for miners. McKay described the conditions:

> For example, in 1907, the Snowstorm Mine in the Coeur d'Alene mining district built a bunkhouse, complete with electric lights and steam heat that could house 240 workers. A 1911 Idaho law prohibited companies from requiring workers to shop only at the company store; although some of the stores remained in business after this, miners and their families then could shop at competing stores. Many smaller mines provided room and board for some or all of their workers, for which they deducted a monthly charge from wages. These facilities were generally arranged more haphazardly and might be mixed with privately owned buildings near the mine or mill.[184]

As miners' unions fought and bargained for safer conditions for workers, the health of the environment around the mines was being questioned for the first time. By around 1900, farmers along the Coeur d'Alene River were making note of mining waste runoff in the river water, which they claimed was poisoning their livestock and crops. By 1904, four lawsuits had been filed in the U.S. Federal Court in Wallace against mining companies in the Coeur d'Alene mining district.[185] The lawsuits named as defendants the Federal Mining and Smelting Company, Morning Mining and Milling, Empire State-Idaho Mining and Development, Bunker Hill, Hecla, Sullivan Mining and Development Company, and others, claiming that the river water was "polluted by the refuse from the mills . . . which is injuring the lands of the plaintiffs."[186] Aggregate damages were sought in the amount of $1 million.[187]

Although the mines prevailed in court, some mine owners built impounding dams across the creeks to store their toxic debris, while others sought out-of-court settlements, and still others began purchasing large tracts of land for tailings storage.[188] In an attempt to indemnify against future lawsuits, a program was initiated by the Mine Owners Association in 1910 to purchase the property rights or pollution easements on much of the land bordering the Coeur d'Alene River.[189] However, this program did little to quiet the demand for a comprehensive solution. Without a comprehensive plan to protect the environment, mining pollution continued unabated. This meant, in the Coeur d'Alene mining district, the lead-silver-zinc operations would produce far greater revenues than the gold mining of earlier times.[190]

By 1914, prior to the onset of World War I, mining for more diverse metals in Idaho was rising. With the war, the need for metals swept the industry and affected production. By 1917, production of silver, copper, zinc,

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[183] Art Norlen, *Death of a Proud Union: The 1960 Bunker Hill Strike* (Cataldo, ID: Tamarack Publishing, 1992), 9.
[184] Hart and Nelson, *Mining Town*, 46–47; Hardesty, "Power and the Industrial Mining Community," 88; and James B. Allen, *The Company Town in the American West* (Norman: University of Oklahoma Press, 1966), 80, 92.
[185] "Spokane Companies Involved," *Spokane (WA) Press*, March 24, 1904, 4.
[186] "Spokane Companies Involved," 4.
[187] "Farmers Against Miners," *Spokane (WA) Press*, August 21, 1905, 2; and Committee on Superfund Site Assessment, *Superfund and Mining Megasites*, 29.
[188] Committee on Superfund Site Assessment, *Superfund and Mining Megasites*, 33.
[189] Committee on Superfund Site Assessment, *Superfund and Mining Megasites*, 29.
[190] Teske, et al., *Idaho's Mineral Industry*, 16.

lead, and mercury had hit its peak for the war effort. After the war ended, production saw a rapid decline back to pre-war levels.[191]

In 1920, Congress passed the Mineral Leasing Act, which indicated changing ideas about the use of the country's public lands. The law claimed the federal government owned all deposits of coal, phosphate, sodium, oil, oil shale, and gas on public land and made these deposits available for development and commercial exploitation on a lease basis, with royalties paid to the government on all production. Half of those royalties were sent back to the states.[192] This new law separated the legal status of those minerals from hardrock minerals such as gold, silver, lead, and copper.

While mining was not the predominant economic engine in Idaho during the early part of the twentieth century, improvements in transportation and mining technology allowed for production increases. This in turn created additional capital that funded improvements and further developed mining complexes. By the 1920s, power shovels rather than hand laborers loaded rock or tailings into trucks or rail cars that hauled material to mills for processing.[193] Outside investments could fund the construction of large and expensive dredges to rework partly worked placers, thus increasing yields.[194] By the early 1920s, one company, the Sawtooth Dredging Company, was working over 5 miles of Stanley Creek using a steam-driven gold dredge built by the Bucyrus Company of South Milwaukee, Wisconsin.[195] This 2,000-cubic-yard capacity dredge was fitted with special screens to capture gold- and platinum-bearing black sands. In 1928, after going into receivership, the Sawtooth Dredging Company sold their land and dredge to C. H. Shaw of San Francisco. Testing of the placers showed good results, but Shaw's plans to build an electric power plant and dredge the property did not move forward.[196]

Lode Mining and the Rise of Strategic Metals Mining, 1930s–1977

In 1930, miners in the Sunshine Mine opened the Silver Belt ore body, which had been previously disregarded, as miners thought it was a superficial vein. Located on the 1,700-foot level of the mine, the vein was found to be extremely rich. The discovery caused mine operators to reopen old prospects and take another look. By 1931, the Sunshine Mine was producing more silver than all other silver mines in Idaho. By 1937, the Sunshine Mine was producing more silver than any other mine in the world, mining nearly 14 million fine ounces of silver in that year alone.[197]

Although the Sunshine Mine was highly productive during this period, the Great Depression profoundly affected Idaho, its citizens, and the mining industry. The prices of silver and lead started to plunge between 1926 and 1927, and continued a downward trend into the Great Depression. Low metal prices caused many mines to shut down or slow production.[198] In south-central Idaho, both the Empire and Livingston Mines shut down, while in the Coeur d'Alene mining district, the Tamarack & Custer, Sherman Lead, Pennsylvania, and

[191] McKay, *Mining Idaho's History*, 54; and Ross, *Mining History of South-Central Idaho*, 14–15.
[192] Teske, et al., *Idaho's Mineral Industry*, 55.
[193] Rodman, "Modeling as a Preservation Planning Tool," 54.
[194] Teske, et al., *Idaho's Mineral Industry*, 16.
[195] Clark C. Spence, *A History of Gold Dredging in Idaho* (Boulder: University Press of Colorado, 2016), 128; and Bucyrus Company, "The Bucyrus Legacy," brochure, on file at Yankee Fork Gold Dredge Association, Land of the Yankee Fork State Park, Challis, ID.
[196] Spence, *History of Gold Dredging in Idaho*, 129.
[197] P. J. Shenon and R. H. McConnel, "The Silver Belt of the Coeur d'Alene District, Idaho," USGS Pamphlet No. 50 (Moscow: University of Idaho, 1939), 2.
[198] McKay, *Mining Idaho's History*, 52.

Dayrock Mines paid dividends to their shareholders in 1929 and shut down the following year.[199] However, as gold prices increased in 1933, placer mining was revived at an industrial scale, and many unemployed miners and other people took to panning in creeks and rivers.[200] McKay described,

> The price of gold has a tremendous effect on the potential profits recovered from any particular deposit. Beginning in 1834, the United States government maintained an official price of gold, tied to coinage, of $20.67 per troy ounce. In April 1933, the United States went off the gold standard, and the market price of gold rose to just over $34.00 per ounce. The Gold Reserve Act, passed at the end of January 1934, removed gold from coinage and restricted private ownership of the metal. The following month, the government set the price at $35.00 per ounce, and this remained the prevailing price into the 1960s. Small-scale miners could sell their gold to the U.S. Mint, to the assay office at Boise, or to private buyers licensed by the mint, and the previous government-imposed two-ounce minimum was no longer enforced. Small-scale and large-scale placer operations across the state, as well as lode mines, increased production in response to the Gold Reserve Act.[201]
>
> The higher price of gold led many unemployed people to try mining when Government agencies actively encouraged placer gold mining as an alternative to relief in the 1930s. The new miners required relatively little equipment to remove marketable gold from streams and dry gravels. They often owned automobiles, and by then roads built at the time made it easy to reach the previously inaccessible mining districts. Popular equipment included rockers, long toms, sluice boxes, and new devices such as small suction dredges and mechanical sluices powered by gasoline motors.[202]
>
> The Idaho Bureau of Mines and Geology, like other state agencies in the West, responded to numerous inquiries from hopeful prospectors and miners by issuing small publications full of practical advice for novice placer miners. The University of Idaho, the Northwest Mining Association, and other organizations offered classes in placer mining that several thousand people attended. Despite high hopes and much hard work, placer mining did not reliably provide the needed income; in 1935, most of the small-scale placer miners in the West earned less than two dollars per day.[203]
>
> During these Depression years, hundreds of prospectors and miners worked the Salmon River bar placers below French Creek, especially between Riggins and Whitebird. Unlike many in the high mountains, these deposits could be worked most of the year. There, miners worked with relatively inexpensive rockers, sluice boxes, hydraulics, power shovels, and washing plants, and

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[199] Ross, *Mining History of South-Central Idaho*, 13–16; and John Fahey, *The Days of the Hercules* (Moscow: University of Idaho Press, 1978), 252.
[200] John C. Reed, "Geology and Ore Deposits of the Florence Mining District, Idaho County, Idaho," USGS Pamphlet No. 46 (Moscow: University of Idaho, 1939), 20.
[201] Mitzi Rossillon and Dale Martin, "In Dubious Gravel, Placer Gold for the Unemployed?" (paper presented at the Montana History Conference, Helena, October 27, 1995), 2; and Charles W. Miller, Jr., *The Automobile Gold Rushes and Depression Era Mining* (Moscow: University of Idaho Press, 1998), 15–16.
[202] McKay, *Mining Idaho's History*, 35.
[203] Rossillon and Martin, "In Dubious Gravel," 1–3, 5; Miller, *Automobile Gold Rushes*, 19, 22, 31–32, 42–44.

> to keep their living expenses low, most lived in tents. Although new roads in the area improved access, some "floating miners" chose to prospect along the rivers in rafts.[204]
>
> Hydraulicking revived in a number of placer districts in the 1930s. Its use in Idaho continued through at least the 1930s, even in some of the oldest districts such as Elk City, Warren, and Leesburg. Some operations of this period may have combined methods by using mechanized earth movers such as tractors pulling scrapers to remove the overburden and then monitors to break down the paying gravels and feed them into the sluices.[205]
>
> Lode mining, like placer mining, experienced a revival in the 1930s in many Idaho districts due to the increased price of gold and also improved transportation. The price of silver, which had dropped in the early 1930s, also rose in 1934, and led to many old mines reopening. Guaranteed prices for both gold and silver, set in 1934, boosted the industry. New mills were built with more up-to-date processes.[206]

By the early 1930s, rising environmental concerns about mining waste pollution in the Silver Valley region of northern Idaho demanded a governmental response. In 1931, the State of Idaho created the Coeur d'Alene River and Lake Commission, which was tasked with investigating practical means of eliminating from the Coeur d'Alene River and Lake "all industrial wastes which pollute the same" and determining methods of preventing pollution "detrimental to vegetation and domestic crops; to public health or to the health of animals, fish or aquatic life or detrimental to the use of waters for recreational purposes."[207] After a series of public hearings to gather information, state and federal agencies, including the Idaho State Sanitary Engineer, Department of Public Welfare, U.S. Bureau of Mines, Surgeon General of the U.S. Public Health Service, U.S. Bureau of Fisheries, and Bureau of Biological Survey of the U.S. Department of Agriculture, performed studies and divulged their findings to the Commission.[208] The Commission offered two recommendations. One was that dredging of the Coeur d'Alene River "may be" effective in cleaning polluting deposits from the bottom of the river, and the second was that the most efficient means of dealing with the toxic fine tailings from the mills was to contain them in settling ponds, not release them to the river.[209]

Perhaps subverting the Commission, mine owners began dredging operations in 1932, pumping tailings from the river to holding ponds. That same year, a final reporting of the findings and recommendations of the Commission was made to the state legislature, which promptly disregarded the report and made no legislative changes to help correct the issues.[210]

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[204] Bailey, *River of No Return*–470–71; and S. H. Lorain and O. H. Metzger, *Reconnaissance of Placer Mining Districts in Idaho County, Idaho* (n.p.: U.S. Bureau of Mines Information Circular 7023, 1938), 80.
[205] Miller, *Automobile Gold Rushes*, 141; John Wellington Finch, ed., *Ore Deposits of the Western States* (New York: American Institute of Mining and Metallurgical Engineers, 1933), 438; and Logan W. Hovis, "Historic Mining Sites: A Typology for the Alaskan National Parks" (unpublished manuscript on file, National Park Service, Alaska Regional Office, Anchorage, 1992), 26.
[206] Miller, *Automobile Gold Rushes*, 111–12.
[207] Fred J. Babcock, E. O. Cathcart, and James H. Taylor, *Report and Recommendations of the Coeur d'Alene River and Lake Commission to the Twenty-Second Session of the State Legislature of Idaho* (Boise, ID: Legislative Services Office, 1932), 8.
[208] Babcock, Cathcart, and Taylor, *Report and Recommendations*, 11–16.
[209] Babcock, Cathcart, and Taylor, *Report and Recommendations*, 24.
[210] Keith R. Long, "Tailings Under the Bridge: Causes and Consequences of River Disposal of Tailings, Coeur d'Alene Mining Region, 1886–1968," *The Mining History Journal* 8 (2001): 83–101, here 93, https://www.mininghistoryassociation.org/Journal/journal2001toc.htm; and Babcock, Cathcart, and Taylor, *Report and Recommendations*, 24–25.

Gold mining, which produced significant returns during the Great Depression due to high prices, was halted during World War II.[211] One year after the attack on Pearl Harbor, gold mining was deemed nonessential for the war effort. McKay wrote,

> The War Production Board Order L-208 of 1942 suspended gold mining in the United States for the duration of World War II. When the order was rescinded, many placer and lode gold mines in Idaho did not resume operations; they remained closed due to the high costs of labor, supplies, and equipment.[212]
>
> During and after World War II, however, Idaho became a leading producer of several strategic metals such as tungsten, quicksilver, antimony, and cobalt. With the development of the base metal industry, many of Idaho's mining districts could be characterized as industrial islands, isolated in the mountains but connected to the world market by railroad. The mining and milling industry, like others in the West, became large-scale and corporate—one in which highly capitalized ventures with international investors displaced small or modest operations run by entrepreneurs. Wage workers and managers clashed in some of Idaho's mining districts as the classes became more stratified; the distinctions between laborers, supervisors, and financiers increased. Mine operators were subject to forces beyond their control, such as international market price fluctuations and transportation costs. To allow for these uncertainties and to maintain solid business practices, some companies tried to control all aspects of production by integrating mining and the processing of ores.[213]
>
> Regardless of the mining method, between 1930 and 1942, Idaho's gold mines produced some 1.1 million ounces of gold; and placer gold accounted for about 42 percent of this total. [214]

During World War II, there was an extraordinary demand for metal products, especially lead and copper for artillery. While copper had been mined incidentally in Idaho for many years, it was the wartime need that boosted production. McKay detailed its history:

> After World War I, however, prices for copper plummeted, and for two decades companies mined only the higher-grade ores. Copper was used to manufacture cartridge brass, and, therefore, considered one of the metals vital to the World War II effort.[215]
>
> The production of copper in Idaho began around 1894, although little mining took place until 1911. About 65 percent of the copper was a byproduct of mining for other metals, primarily lead, zinc, and silver but also cobalt, gold, and tungsten. As of 1964, mines in the Coeur d'Alene district had yielded about 56 percent of the total copper in Idaho, with the exception of the Snowstorm Mine, which produced mainly copper. In 1904, a two-hundred-ton leaching plant was built to treat copper ore from the Snowstorm. Production peaked in the first two decades of the twentieth century. Alder Creek in Custer County (Empire Mine) and Blackbird in Lemhi

[211] Teske, et al., *Idaho's Mineral Industry*, 16.
[212] Staley, *Gold in Idaho*, 9; and Teske, et al., *Idaho's Mineral Industry*, 58.
[213] Hardesty, "Power and the Industrial Mining Community," 81–82.
[214] Staley, *Gold in Idaho*, 9; and Teske, et al., *Idaho's Mineral Industry*, 58.
[215] Thomas R. Navin, *Copper Mining and Management* (Tucson: University of Arizona Press, 1978), 132.

County (Harmony and Pope-Shenon were the main producers) make up the other two relatively large copper-producing districts.[216]

These districts used overhead stoping as their main ore extraction method. Ore and concentrates were shipped to smelters in Utah and elsewhere. Other areas with some copper production included the Hoodoo and Volcano mining districts.[217] In the early 1900s, however, a few remote Idaho mining districts such as Yellow Jacket and the Lost Packer on Loon Creek imported copper blast furnaces, developed in Baltimore, to treat the ore.[218]

At first, copper was processed by crushing, grinding in ball mills and rod mills, and concentrating by gravity separation using jigs, tables, or vanners.[219] The concentrate then was shipped to a smelter. But this process, used until shortly before World War I, only recovered about two-thirds of the copper values. A major breakthrough in the treatment of sulphide copper ores occurred in 1915 when froth flotation, which removed up to 93 percent of the copper in sulphide ore, replaced gravity concentration. Oxide ores were treated by leaching, a chemical process that usually involved sulfuric acid. In open pits, the ores were trucked to leaching dumps and treated by heap leaching in the dump or spread out and then treated.[220]

The Seven Devils copper deposits stretch for 120 miles in a band 2 to 40 miles wide. Although miners found copper lode deposits there in the early 1860s, for various reasons recovery efforts failed in the Seven Devils area over the ensuing decades. A smelter, built in response to the 1897 boom at the town of Cuprum, failed to work and the district closed down as a result of litigation among Montana investors in 1902. A cyanide mill built in the early 1900s shipped gold to the Denver mint until cyanide supplies from Germany were cut off due to World War I, which caused the mill to shut down. Copper companies that had pioneered large open pit mining in Utah considered moving into the Seven Devils, but their methods could not be used in the remote area. Even with the building of a new smelter at Landore in the early 1900s, and the construction of a bridge across the Snake River at the base of the Kleinschmidt grade (a twenty-two-mile road from the Peacock Mine down to the river), transportation problems continued to deter large-scale mining in the area. The situation improved in more recent years, however, with the advent of open pit mining at the Silver King Mine.[221]

Rich copper ores were discovered in the Alder Creek district near Mackay in 1884. After spending about $3 million in unsuccessful development work, the mine finally did produce copper from 1905 until 1929, with some sporadic production through the late 1950s. The Empire

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[216] McKay, *Mining Idaho's History*, 53.
[217] USGS, *Mineral and Water Resources of Idaho*, 69, 74; Clyde P. Ross, *The Copper Deposits Near Salmon, Idaho* (n.p.: USGS Bulletin 774, 1925), 2, 30; R. Duncan Gardner, *Milling Methods and Costs at the Harmony Mines, Baker, Idaho* (n.p.: U.S. Bureau of Mines Information Circular 6285, 1930), 1; Ransome and Calkins, *Geology and Ore Deposits*, 81–82; Richard C. Waldbauer, *An Historical and Archaeological Survey of the Hoodoo Mining District, Idaho* (n.p.: U.S. Forest Service Cultural Resources Report 7, 1981), 48–49; and Wells, *Gold Camps & Silver Cities*, 64.
[218] ISHS, "Recovery Processes for Idaho Ores," 1–2.
[219] A vanner was a concentrator table for both sand and slimes (McKay, *Mining Idaho's History*, 130).
[220] Navin, *Copper Mining and Management*, 43–48.
[221] Wells, *Gold Camps & Silver Cities*, 107–8; David H. Stratton and Glen W. Lindeman, *A Study of Historical Resources of the Hells Canyon National Recreation Area* (prepared for the Hells Canyon National Recreation Area, 1978), 42–44; and Federal Writers' Project, *Idaho, A Guide in Word and Picture* (Caldwell, ID: Caxton Printers, 1937), 173.

> Mine, with its approximately 120,000 feet of underground development, produced copper and byproduct gold. A 16,000-foot-long aerial tram located on a railroad siding conveyed ore from the mine to the mill. A spur line of the Oregon Short Line had reached Mackay in 1901, and soon a company-owned railroad served the Empire Mine. By the late 1910s, the ore went directly to a smelter in Utah instead of to the local smelter. Mines in this area helped Utah smelters recover copper ores by providing different ores than what the smelters could obtain elsewhere. In the 1920s, recovery at the Empire improved when the mine installed a 150-ton flotation plant.[222]

During World War II, because much of the labor force was sent to fight, production struggled to meet the need for lead and copper. Wartime shortages, restrictions, and rationing caused issues acquiring materials, equipment, and other mining necessities and increased transportation challenges.[223] In northern Idaho, 12 new mills were constructed in an attempt to process tailings and waste piles to capture more lead. Despite the labor shortages, these new mills reclaimed about 6.6 million tons of tailings from stockpiles, creeks, and dumps and reprocessed millions of pounds of lead and zinc and millions of ounces of silver.[224] Idaho also led the nation during the war with the production of other metals that were crucial to the war effort, such as tungsten and antimony.[225]

Gold miners resumed work after the war ended in 1945; however, many of the shuttered mining operations never fully reopened or reached the production levels they had achieved before the war.[226] The use of dredges rose during this period, and many already mined placers were re-run through dredges to capture missed gold. In the late 1940s, a successful run at dredging in Stanley Creek occurred. The Jordan Placer Company, Inc., operated a dragline with a 1-cubic-yard bucket and 70-ton wash plant mounted on tracks that ran atop the creek banks and in the shallows. Between 1948 and 1950, the dredge mined placers along a short 1.5-mile stretch of Stanley Creek and collected $233,000 in gold.[227] On the nearby Yankee Fork, J. R. Simplot and his partner, Fred Baumhoff, purchased the Yankee Fork gold dredge and ran it between April 1950 and June 1953, mining the rich placers just south of Bonanza north to Jordan Creek. [228] In 1967, Simplot donated the dredge to the U.S. Forest Service, which continues to retain ownership.[229]

After World War II, other metals rose to prominence in the Idaho mining industry, including tungsten, antimony, mercury, cobalt, manganese, and zinc. As McKay described,

> <u>Tungsten</u>

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[222] Koschmann and Bergendahl, *Principal Gold Producing Districts*, 127; U.S. Bureau of Mines, *Empire Mine, Mackay, Custer County, Idaho, Copper*, War Minerals Report 267 (1944), 2–3; Varley, et al., *Mining Districts of Idaho*, 69–70; and Wells, *Gold Camps & Silver Cities*, 123–26.
[223] Ross, *Mining History of South-Central Idaho*, 5.
[224] Committee on Superfund Site Assessment, *Superfund and Mining Megasites*, 39; and Philip J. Shenon, "The Coeur d'Alene Mining District," in *Guidebook to the Geology of the Coeur d'Alene Mining District* (Moscow: Idaho Bureau of Mines and Geology, 1961), 2.
[225] Teske, et al., *Idaho's Mineral Industry*, 17.
[226] Gage McKinney, "Order L-208: The Closing of America's Gold Mines during World War II," *Mining History Journal* 25 (2018): 71, https://www.mininghistoryassociation.org/Journal/MHJ-v25-2018-McKinney.pdf.
[227] Spence, *History of Gold Dredging in Idaho*, 130–31.
[228] Spence, *History of Gold Dredging in Idaho*, 135; and George C. Stephens, "Field Guides to the Quaternary Geology of Central Idaho: Part C History of Gold Mining on the Yankee Fork River, Custer County," in *Guidebook to the Geology of Central and Southern Idaho*, P. K. Link and W. R. Hackett, eds., *Idaho Geological Survey Bulletin* 27 (April 1991): 223–26, here 225.
[229] Packard, *Gold Dredge on the Yankee Fork*, 30–31; and Spence, *History of Gold Dredging in Idaho*, 136.

In the 1940s and 1950s, after the development of new technologies and markets, Idaho was one of the leading tungsten-producing states. Between 1942 and 1944, Idaho produced 40 percent of domestic tungsten; the Ima Mine in Lemhi County and the Yellow Pine tungsten ore body in Valley County (discovered as a result of diamond drilling by the U.S. Bureau of Mines in 1941) were the two principal sources.[230]

The Ima Mine produced tungsten concentrates before and during World War I, but shut down when the war ended due to declining prices. At that time, jigs and Wilfley tables in the mill obtained only a 25 percent recovery. In early 1945, the Bradley Mining Company took over the Ima Mine and developed it into one of the nation's largest producers, with byproducts of silver, lead, and copper. The mine recovered tungsten and a pyritic silver concentrate through gravity concentration, flotation, and magnetic-separation units in the 1940s, with an 85 percent recovery.[231]

Antimony

Used primarily to harden and strengthen lead alloys, antimony's wartime applications include bullets, shrapnel, bearings, storage batteries, and flame-proof fabrics. Most of the domestically produced antimony comes from Idaho's Wood River region and the Coeur d'Alene and Clark Fork districts in Idaho, where it is recovered as a byproduct from complex ores containing lead, silver, zinc, and copper. Stibnite, an antimony sulphide, is found in some districts, including the Yellow Pine area, which contains the largest known stibnite deposit in the nation. Antimony production at Yellow Pine began in 1932, and it remained the main producer in the United States until 1952. In fact, during World War II, Yellow Pine produced 95 percent of the antimony mined in the U.S. Since then, almost all antimony produced in Idaho is a byproduct from ores treated by the Sunshine Mining Company plant near Kellogg. This company developed a process for producing a high purity antimony metal from the complex antimony-silver ores of the Coeur d'Alene dry belt.[232]

The discovery of ore deposits at Stibnite in Valley County—gold, antimony, mercury, tungsten, and silver—occurred during the Thunder Mountain rush in the early 1900s, but the isolated area was slow to develop. The production of gold and antimony there commenced on a large scale in 1932, after the Bradley Mining Company of San Francisco bought the properties (F. W. Bradley was president of the Bunker Hill & Sullivan Mining Company). In 1938, the company began large-scale open pit mining in conjunction with its underground operations, and in 1943, it converted completely to open pit operations. In 1944, after Bradley Mining started working its

[230] USGS, *Mineral and Water Resources of Idaho*, 223–25, 233; David D. Alt and Donald W. Hyndman, *Roadside Geology of Idaho* (Missoula, MT: Mountain Press Publishing Co., 1989), 221; John L. Bertram, "NRHP Nomination form for Stibnite Historic District" (Washington, DC: National Park Service, 1986), 8-1; and Arthur Campbell, "Idaho's Strategic Minerals," in Idaho Inspector of Mines, *Forty-Fifth Annual Report of the Milling Industry of Idaho* (1943), 13.
[231] C. M. Dice, *Methods and Costs of Concentrating Hubnerite Ores at the Ima Tungsten Mine, Lemhi County, Idaho* (n.p., U.S. Bureau of Mines Information Circular 7230, 1943), 1, 4; Henry L. Day, "96 Years of Mining in Idaho" (typescript, 1956), 10–11; and U.S. Bureau of Mines, *Blue Wing Mining District, Lemhi County, Idaho, Tungsten* (Washington, DC: U.S. Bureau of Mines, 1943), 1–3, 13.
[232] USGS, *Mineral and Water Resources of Idaho*, 41–42, 44; James M. Montgomery, Consulting Engineers, Inc., *Cultural Resources Inventory/Assessment Package Environmental Impact Statement, Stibnite Mining Project Gold Mine and Mill* (1981), 2-9; and Campbell, "Idaho's Strategic Minerals," 12.

important tungsten deposits, the selective flotation mill was expanded to process 750 tons per day of tungsten or antimony concentrates. The company built a smelter in 1948. Twenty-six huge pipes condensed the antimony concentrate from gas back into a fine powder that was packed in drums or bags, then shipped to an out-of-state refinery.[233]

Total yields from Stibnite for the twenty years between 1932 and 1952 totaled $53 million. The tungsten ore body was exhausted in 1945 and the re-treatment of old tailings was completed that year. Later, the company established open-pit operations, using power shovels, tracks, and trucks to mine benches thirty feet in height; dynamite, placed in holes bored by churn and wagon drills, to blast away walls of rock; and a pump to force water diverted from the East Fork of the South Fork of the Salmon River, from the open pit into a timbered diversion tunnel.[234]

As Yellow Pine mine's company town, Stibnite provided some 160 low-cost company houses. The facilities included a recreation hall, a school, and a hospital; the mercantile was owned by employees. At one time, over one thousand people lived in Stibnite.[235] The Yellow Pine property closed down in 1952 when the domestic price of antimony fell below the cost of production. During the 1950s, government-guaranteed prices for tungsten stimulated prospecting and led to the discovery of new deposits. Besides Stibnite, properties in Custer, Shoshone, and other counties also produced tungsten.[236]

The first claims on the Hermada antimony deposit in Elmore County were staked in 1947. Like the Yellow Pine property, the Hermada Mine was originally worked by adits and other underground workings, but these were abandoned in favor of open-pit mining. The ore was stripped and mostly mined with a bulldozer, then broken either by a bulldozer or by blasting, and finally, hand sorted, and hand loaded into trucks. Most of the ore was concentrated at the nearby Atlanta plant of Talache Mines, a flotation mill. Fines and low-grade ore were mixed with waste and pushed into a dump.[237]

Mercury

The first small recovery of mercury in Idaho was made during World War I, and years of production followed from 1939–1948 and from 1951–1961. Idaho's deposits occur in the eastern part of Valley County's Yellow Pine district (the Hermes Mine), and the Idaho-Almaden Mines in Washington County near Weiser has also produced some mercury.

The Idaho-Almaden deposit was discovered around 1936. L. K. Requa and his associates leased the claims and explored by trenching, sinking shallow shafts, and drifting. Most of the mining was done by open pit, and in the early years the ore was mucked, sorted, and trammed by hand. Some mining was done underground by room-and-pillar stoping based on the ratio of overburden

233 Montgomery, *Cultural Resources Inventory/Assessment*, 2-11, 2-13.
234 Wells, *Cold Camps & Silver Cities*, 157; John W. Cole and H. D. Bailey, *Exploration, Development, Mining, and Milling of a Unique Tungsten Ore Body at the Yellow Pine Mine, Stibnite, Idaho* (n.p.: U.S. Bureau of Mines Information Circular 7443, 1948), 3–4, 12–13, 17; Day, "96 Years of Mining in Idaho," 7; and Bertram, "NRHP Nomination form for Stibnite Historic District."
235 Montgomery, *Cultural Resources Inventory/Assessment*, 2-7, 2-8, 2-12.
236 Hubbard, *Mineral Resources of Idaho*, 57–58.
237 Constantine C. Popoff, *Hermada Antimony Deposit, Elmore County, Idaho* (n.p.: U.S. Bureau of Mines Report of Investigations 4950, 1953), 3–4, 6.

to ore. After a large amount of low-grade ore had been developed, in 1955 the owners installed a 150-ton rotary furnace, the largest of its kind in the United States. The mercury was condensed in steel pipes, and the gases were cleaned as they passed through redwood-stave tanks to a stack. The mine roasted about twenty-five tons of ore to fill each flask. From then until 1961, when the ore was exhausted, the open pit mine ranked as one of the major domestic producers.[238]

Some flasks of mercury were shipped from the cinnabar deposits in Yellow Pine during World War I, but the district's Hermes Mine came into its own during World War II, when it was the second largest mercury producer in the United States. Owner J.J. Oberbillig spent the 1920s consolidating claims and blocking out ore. In 1927, F. W. Bradley took over. His company brought in heavy machinery on the backs of mules. By 1929, trucks had reached the remote area, and in 1930 a small landing field had been cleared. The United Mercury Company took over in 1939, and built bunkhouses, cookhouse, cottages, blacksmith shop, framing shed, warehouses, a post office, assay office, sawmill, and school to house sixty employees. The company installed two seventy-five-ton rotary furnaces in 1941, and in 1958 built a flotation plant with leaching tanks and electrolytic deposition equipment at the Hermes Mine. The mine shut down in 1948 but reopened during the Korean War.[239]

Cobalt

Idaho is one of the few cobalt-producing areas of the United States. This metal, used in manufacturing chemical catalysts and steel alloys, was recognized in the Blackbird mining district in Lemhi County prior to 1900. Although a small amount was produced in 1918, due to the high expense of separating cobalt from copper, the Blackbird mine's high elevation, and strong foreign competition, not much cobalt mining occurred in Idaho until the 1940s, when a war-related search for cobalt deposits recognized the Blackbird district's potential.

In 1943, the Howe Sound Company diamond drilled in Blackbird and began active underground exploration. The company built a six-hundred-ton concentrator that used differential flotation to produce cobalt and copper concentrates and gold. Howe Sound also built a company town called Cobalt about nine miles from the mine. In the 1950s, the Blackbird district produced nearly fourteen million pounds of cobalt and, also, significant amounts of copper and gold. The concentrates were shipped to a smelter and refinery in Utah. The district's Calera Mine closed in 1960 upon the termination of a government contract to purchase cobalt. One other Idaho source—the Coeur d'Alene district's electrolytic zinc plant in Kellogg—produced cobalt as a byproduct of its operation.[240]

Manganese

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[238] USGS, *Mineral and Water Resources of Idaho*, 121; Margaret R. Lickes, *Mining, Processing, and Costs: Idaho Almaden Mercury Mine, Washington County, Idaho* (n.p.: U.S. Bureau of Mines Information Circular 7800, 1957), 4–5; Wells, *Gold Camps & Silver Cities*, 157; and Alt and Hyndman, *Roadside Geology*, 171.
[239] Smith, *Boise National Forest*, 14–15; USGS, *Mineral and Water Resources of Idaho*, 121; Montgomery, *Cultural Resources Inventory/Assessment*, 2-16; and U.S. Bureau of Mines, *Bonanza (Hermes) Mercury Mines, Valley County, Idaho* (n.p.: U.S. Bureau of Mines War Minerals Report 106, 1943), 1–3.
[240] Hubbard, *Mineral Resources of Idaho*, 14–15; and USGS, *Mineral and Water Resources of Idaho*, 66, 68.

The production of high-strength steel requires manganese as an alloying metal; it is also used in the production of cell batteries and in the chemical industry. The United States has relied heavily on imported manganese ore. The metal was first found in Idaho in 1919. Although the state does not produce much of this ore, some production occurred in the mid-1920s near Cleveland in southeastern Idaho. Most of Idaho's manganese comes from this area and from Lava Hot Springs. Other deposits are found in Shoshone, Lemhi, Owyhee, and Washington counties. In the 1950s, the U.S. government began a stockpiling program and offered premium prices for manganese ore. A buying depot in Butte, Montana, accepted low-grade ore. These measures to encourage the expansion of domestic manganese mining stimulated production in Idaho to some extent, particularly in Adams, Bannock, and Butte counties.[241]

Idaho led the nation in the production of strategic metals such as cobalt, tungsten, and antimony in certain years during the 1940s and 1950s.[242]

Zinc

Mines producing zinc ore made Idaho a major producer of this metal. During this period, reworking old mine tailings and dredging river channels for tailings became profitable. The Pine Creek area boomed, and for several years in the 1940s Idaho led the nation in zinc output. Only a few Idaho mines outside of the Coeur d'Alenes, such as the Triumph and the Clayton, produced significant amounts of zinc in the 1940s and 1950s.[243]

Initially, the lack of markets and uses for zinc and the difficulty of recovering the metal from lead-silver-zinc ores delayed the mining of zinc. Coeur d'Alene ore did not yield zinc oxides by roasting because it contained impurities such as silica, so the mines had to find a way to produce the metal itself rather than marketing zinc oxides. The development of selective flotation enabled mills to recover zinc sulphides effectively. The Bunker Hill & Sullivan and the Morning mining companies experimented with ways to treat zinc just before World War I and turned to flotation. During the 1910s and 1920s, much of the zinc produced was shipped to an electrolytic plant at Great Falls, Montana.[244]

The electrolytic process started with sulphide zinc concentrates milled from raw ore. These were roasted; leached with a sulfuric acid solution; the resulting liquor was purified; and the zinc was deposited electrolytically. The spent electrolyte was used to leach more ore. This method, based on low current density and a weak sulfuric acid, was favored in the Northwest as a result of the potential availability of hydroelectric energy.[245]

Bunker Hill & Sullivan began looking into building an electrolytic zinc plant by the 1910s. The company recruited U. C. Tainton, a metallurgist who had built a zinc pilot plant in California using high current density and a strong acid strength, a process that worked well with a variety of

[241] Campbell, "Idaho's Strategic Minerals," 12; Hubbard, *Mineral Resources of Idaho*, 36–37; and USGS, *Mineral and Water Resources of Idaho*, 17, 19.
[242] McKay, *Mining Idaho's History*, 1.
[243] Day, "96 Years of Mining in Idaho," 5–6; and Ransome and Calkins, *Geology and Ore Deposits*, 83.
[244] Varley, et al., *Mining Districts of Idaho*, 12; Fahey, *The Days of the Hercules*, 155; George Domijan, "Historic American Engineering Record [HAER]: Sullivan Electrolytic Zinc Plant" (1993), 3.
[245] Domijan, "HAER: Sullivan Electrolytic Zinc Plant," 3.

> impurities. The company built the Sullivan zinc plant in 1928. It was the only one in the world that successfully operated on a high current density, strong acid basis. This plant produced high-purity zinc metal for zinc-base die casting alloys used in many industries, and for galvanizing sheet iron and iron wire. Over the years, the plant expanded and added new facilities, such as a cadmium plant that produced cadmium and copper as byproducts of the zinc recovery and a plant that produced marketable sulfuric acid. A slag fuming plant built in 1943 recovered zinc in the blast furnace slag of the lead smelter.[246]
>
> By 1963, the Bunker Hill Company was refining nearly 24 percent of special high-grade zinc and 20 percent of the primary refined lead in the United States. By 1972, the plant was producing over three hundred tons of zinc a day, and about half its concentrates came from mines that Bunker Hill did not own.[247]

During the Korean War, the prices for lead and zinc rose, and Idaho's producers made good profits. However, these record high prices soon fell. As McKay wrote, "From 1953 until 1962, lead and zinc prices declined, resulting in the closing of some of the area's base metal mines."[248]

During the Cold War, the world saw a rise in nuclear and space age technology. These new technologies needed space age materials, and many of these new structural metals were produced in Idaho mines. These metals were needed for aircraft, missiles, satellites, and nuclear reactors to protect equipment and personnel from high temperatures, stresses, and absorption of thermal neutrons. Some of these metals include beryllium (found in south-central Idaho), niobium, tantalum, and uranium (Bear Valley deposits—largest in the United States), thorium (Lemhi Pass mining district), and zirconium (found in Valley and Idaho Counties). Many of these metals are found within black sands within placer deposits.[249]

In 1955, exploration was underway seeking uranium deposits in Lemhi and Blaine Counties, and thorium was being produced as a byproduct of monazite processing. Additional discoveries of these metals were located in the Coeur d'Alene mining district, in two mines in the Gibbonsville mining district, near Naples in Boundary County, and in veins southwest of Hailey in Blaine County, to name just a few.[250] McKay noted,

> Idaho areas that were dredged for monazite included the Boise Basin (where monazite was a byproduct of gold dredging), Bear Valley, Warren, Ruby Meadows north of McCall, and the Long Valley south of Cascade.[251]

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[246] McKay, *Mining Idaho's History*, 51.
[247] Domijan, "HAER: Sullivan Electrolytic Zinc Plant," 4–5, 27, 45, 47, 52; Henry L. Day, "Mining Highlights of the Coeur d'Alene District," *Idaho* Yesterdays 7 (Winter 1964): 3–7.
[248] Day, "Mining Highlights of the Coeur d'Alene District," 6; George Domijan, "HAER: Bunker Hill Lead Smelter" (1993), 25; Frank B. Fulkerson, *Economic Aspects of Silver Production in the Coeur d'Alene Mining Region, Shoshone County, Idaho* (n.p.: U.S. Bureau of Mines Information Circular 8207, 1964), 2; and David Sisson, *Pine Creek Rehabilitation Project, ID6-96-43* (prepared for Bureau of Land Management, Coeur d'Alene District, 1996), 14.
[249] Teske, et al., *Idaho's Mineral Industry*, 15.
[250] Earl Ferguson Cook, "Prospecting for Uranium, Thorium, and Tungsten in Idaho," Idaho Bureau of Mines and Geology Pamphlet No. 102 (Moscow: University of Idaho, 1955), 1, 10–14.
[251] R. H. Storch, *Ilmenite and Other Black-Sand Minerals in the Gold Fork Placer Deposit, Valley County, Idaho* (n.p.: U.S. Bureau of Mines Report of Investigations 5395, 1958), 1; Richard H. Storch and D. C. Holt, *Titanium Placer Deposits of Idaho* (Washington, DC: U.S. Bureau of Mines Report of Investigations 6319, 1963), 1; USGS, *Mineral and Water Resources of Idaho*, 212–13, 219; Hubbard, *Mineral Resources of Idaho*, 55; and Teske, et al., *Idaho's Mineral Industry*, 17.

Between 1949 and 1955, the U.S. Bureau of Mines conducted a survey of radioactive placer minerals in Idaho, funded by the Atomic Energy Commission. The Commission also stimulated uranium production by offering discovery and development bonuses. This led to a uranium mining boom that continued until 1958. People in Idaho and other western states prospected for radioactive materials with Geiger counters. First found in Idaho in 1920, the first uranium ore was shipped in 1955 from a deposit south of Salmon. Uranium mines in Custer County east of Stanley [were productive] in the late 1950s. At least sixteen radioactive minerals were identified in various Idaho locations in both placer and lode deposits.[252]

Dredging at Bear Valley in Valley County between 1953 and 1959 produced $12.5 million in columbium (niobium), tantalum, uranium, and some monazite. This dredging of Bear Valley initiated the first exploitation in the world of placer deposits primarily for the recovery of radioactive blacks. In some years, these placers supplied almost the entire domestic production of niobium and tantalum. A plant in Lowman treated euxenite concentrates from the Bear Valley by electrostatic and electromagnetic processes. Minerals were separated by being passed over electrically charged rotating drums or belts (based on their conductivity) or by passing through a strong magnetic field (based on their magnetic susceptibility).[253]

From 1950 until 1955, dredging for monazite occurred in the Long Valley area of Valley County after India put an embargo on its exports of the rare-earth mineral. The operation closed down, however, due to an unfavorable market for monazite. The monazite, ilmenite, garnet, and zircon [were] separated at the Baumhoff-Marshall plant in Boise. In 1956, several thousand tons of stockpiled ilmenite were retreated, cleaned, and shipped to market. The production of monazite and byproducts yielded about $3.5 million.[254]

Exploration of thorite rare-earth deposits in the Lemhi Pass region was done mostly by bulldozer in 1956. The black sand placer deposits of thorium and rare earths may exceed that of the lode deposits, however.[255]

The classification of beryl as a strategic metal comes both from the strong, hard, fatigue-resistant alloy it makes when combined with copper and from its use in nuclear reactors. Idaho has only a few known deposits of this metal, and by 1963 the state had produced only one ton at most from a deposit in Latah County.[256]

Additionally, some rare earth metals, such as euxenite, were found in the Diamond Creek and Hall Mountain areas.[257]

[252] Bruce J. Noble, Jr. and Robert Spude, *National Register Bulletin 42: Guidelines for Identifying Evaluating, and Registering Historic Mining Properties* (Washington, DC: National Park Service, 1992), 18; E. F. Cook, *Radioactive Minerals in Idaho* (n.p.: Idaho Bureau of Mines and Geology Mineral Resources Report 8, 1957), 1; and Ross, *Mining History of South-Central Idaho*, 24.
[253] Wells, *Gold Camps & Silver Cities*, 157; Storch and Holt, *Titanium Placer Deposits*, 2; Teske, et al., *Idaho's Mineral Industry*, 24; and USGS, *Mineral and Water Resources of Idaho*, 15, 235.
[254] Storch and Holt, *Titanium Placer Deposits*, 3; Smith, *Boise National Forest*, 15–16; Day, "96 Years of Mining in Idaho," 10; and Wells, *Gold Camps & Silver Cities*, 52.
[255] Alfred L. Anderson, *Uranium, Thorium, Columbium, and Rare Earth Deposits in the Salmon Region, Lemhi County, Idaho* (n.p.: Idaho Bureau of Mines and Geology Pamphlet 115, 1958), 1, 49; and USGS, *Mineral and Water Resources of Idaho*, 214, 216.
[256] USGS, *Mineral and Water Resources of Idaho*, 49; and Hubbard, *Mineral Resources of Idaho*, 8.
[257] Keith R. Long, et al., *The Principal Rare Earth Elements Deposits of the United States: A Summary of Domestic Deposits and a Global Perspective* (Washington, DC: U.S. Geological Survey, 2010), 19, 49, 51, 53.

The 1960s brought change within the mining industry with the types of metal mined and in the fight for miners' rights. As previously noted, miners' strikes had occurred since mining began in Idaho. In the Coeur d'Alene mining district, strikes took place in 1899, 1937, 1946, 1949, and 1955.[258] In 1960, after contract negotiations broke down between the Mine, Mill and Smelter Workers Union, Local 18 (Mine-Mill) and Bunker Hill management, labor voted to strike. It was this strike at Bunker Hill that divided the mining community of Kellogg and brought significant changes to the union.[259] McKay wrote,

> After World War II, the Kellogg local of the International Union of Mine, Mill and Smelter Workers was targeted for having Communist affiliations and being too militant. The union organized a strike against the Bunker Hill Company in 1960. The community response centered on the question of whether the union's leadership was pro-Communist, and the local [union chapter] lost bargaining rights at Bunker Hill. This reflected the power of the anti-Communist movement during the 1950s and 1960s.[260]

The strike lasted for seven months and ended after union members voted in the Northwest Metal Workers Union to represent them. The new union quickly signed a five-year contract with Bunker Hill management.[261]

Two laws passed by Congress in 1948, the Water Pollution Control Act and the Mining Waste Pollution Control Act, compelled the mining industry to start making changes to stem the contamination caused by mining activities. In the Coeur d'Alene mining district, between the 1950s and the mid-1960s, some changes were made such as the addition of an acid plant to capture sulfur dioxide from gases exhausting through smoke stacks; construction of new, more efficient smoke stacks; returning coarse waste material to abandoned workings; and, by 1968, depositing mill tailings in settling ponds.[262] McKay noted,

> The progressive nature of mining—working and reworking a site as new technology and new uses for metals developed—altered the natural landscape. Trails and roads were constructed to access mines and mills. Residents of mining communities hunted and fished intensively. The forests surrounding mines were clearcut to supply mine timbers, fuelwood, and charcoal-producing operations. Dams and ditch systems changed existing water flow patterns. Hydraulic mining resulted in steep cutbanks at the washing pits and huge volumes of tailings downstream. Dredging churned up the ground and left behind windrows of tailings and artificial ponds. The working of underground lode mines left identifiable openings in the ground and waste rock dumps ranging from small to extensive. Milling operations left behind tailings on-site and often much farther downstream. Water drained from mines polluted streams and rivers. Open pit mines created gaping holes in the earth and large piles of overburden. Smelter sites, marked by slag

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[258] Norlen, *Death of a Proud Union*, 6–7, 17–18, 25–27, 32–36.
[259] Bradley Dean Snow, "Living with Lead: An Environmental History of Idaho's Coeur d'Alenes, 1885–2011" (PhD diss., Montana State University, Bozeman, 2012), 103.
[260] Corinne M. Davis, "One Union Against a Town, Local 18 of the International Union of Mine, Mill and Smelter Workers at the Bunker Hill Company, Kellogg, Idaho, 1941-1960" (Master's thesis, University of Idaho, Moscow, 1991), iii.; and Aiken, "Mining in the Coeur d'Alenes," 17.
[261] Norlen, *Death of a Proud Union*, 131–39, 142–45.
[262] Committee on Superfund Site Assessment, *Superfund and Mining Megasites*, 40–41.

> piles, sent toxic fumes containing sulfur dioxide and heavy metal particulates into the air and polluted the areas located downwind.
>
> The examination of one district, the Coeur d'Alene mills, sheds light on the effects mining methods and technology had on the surrounding landscape over an eighty-year period. By the early 1900s, the environmental effects of tailings disposal from Coeur d'Alene mills had become an important issue. At that time, the mills discharged over four thousand tons of tailings into the South Fork of the Coeur d'Alene River and its tributaries daily. These tailings were either coarse and had relatively low values in lead and silver, or they were fine with relatively high values in lead and silver. Coarse tailings tended to settle quickly near their deposit site, but fine tailings were readily swept away downstream. Sometimes railroads hauled coarse tailings away and used them for ballast under tracks and ties. The introduction of flotation, however, led to much finer tailings starting in the early 1910s. Nearly all mill feed was ground to a fineness suitable for flotation. These tailings were thus carried much farther downstream, often forming tailings bars on river bottom land and smothering farmland.
>
> Flotation plants were established just to re-treat tailings behind dams and on dumps. After running through flotation cells, these fine tailings also were discharged and carried away in the streams. Changes in the kinds of ores exploited also affected the tailings. Because concentrators could not make perfect separation, tailings carried lead, silver, zinc, copper, tungsten, and antimony along with the gangue, ranging in size from small pebbles to extremely fine powder. The mills have dumped an estimated seventy-two [million] tons of tailings containing heavy metals and toxic chemicals into the South Fork of the Coeur d'Alene River.[263]

As noted earlier, neither the state nor the federal government had responded in any meaningful way to address mining pollution and contamination. A suction dredge and the construction of dikes along the Coeur d'Alene River were two ways the mining companies attempted to mitigate the continued contamination.[264] McKay wrote,

> The dredged tailings were deposited on the Mission Flats [near the Cataldo Mission]; by 1951, the tailings covered over two thousand acres at a depth of twenty-five to thirty feet. Some of these tailings were later re-milled by flotation for lead and zinc. Some were also used as roadbeds for Interstate 90.[265]
>
> In the 1950s, mining companies adopted a new method of removing tailings: pumping them back underground into the openings created by mining. Only about 58 percent of the tailings in a mill can be disposed of in this way because tailings take up more space than the original ore did.[266]

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[263] Nicholas A. Casner, "Toxic River: Politics and Coeur d'Alene Mining Pollution in the 1930s," *Idaho Yesterdays* 35, no. 3 (1991): 3–4; Fredric L. Quivik, *Expert Report of Fredric L. Quivik: United States v. ASARCO, et al.*, Civil Action 96-0122-N-EJL, 1999.
[264] McKay, *Mining Idaho's History*, 61.
[265] Katherine G. Aiken, "Not Long Ago a Smoking Chimney Was a Sign of Prosperity: Corporate and Community Response to Pollution at the Bunker Hill Smelter in Kellogg, Idaho," *Environmental History Review* 18 (Summer 1994): 68; Casner, "Toxic River," 3, 5, 11, 13, 18; and George Domijan, "Land Status and Mining Development in the Coeur d'Alene Mining District of Northern Idaho" (Master's thesis, University of Idaho, Moscow, 1986), 91–92.
[266] Domijan, "Land Status and Mining Development," 91–92.

The extensive quantity of minerals extracted from Coeur d'Alene mines resulted in residual tailings throughout the region. Railroads reportedly used tailings as ballast, street builders used them as fill or paving material, and brickyards utilized them to make bricks.[267] The environmental implications associated with mine tailings are still widespread in the area. Prior to 1968, they were deposited directly into the Coeur d'Alene River and its tributaries. The practice of dumping tailings directly into waterways was ultimately banned.[268] Dredging in the Coeur d'Alene River as a way to clean up mining waste lasted until 1968, when the mines stopped disposing of tailings in the river and built individual settling ponds due to pressure from state and federal agencies.[269] However, some of these containment facilities were ineffective, and mine waste continued to enter the river.

Contaminated tailings were not the only concern for people living near mining complexes. Acidic drainage from mine adits, tunnels, and waste piles (such as in the Blackbird mining district, on Panther Creek), and air pollution from smelters caused additional worries. McKay described,

> Smelter fumes containing sulfur dioxide and heavy metal particulates have also been a problem downwind of the Bunker Hill smelter. The company chose Kellogg, with its small population, as its smelter location in 1917 partly to avoid litigation related to the fumes. Such problems are typical with smelters, and by the early 1900s, significant improvements in smelter technology had been developed that limited smoke pollution. Baghouses and taller smokestacks, for example, were introduced in the early 1900s, along with electrostatic precipitators that helped gases diffuse. From the beginning, the Bunker Hill smelter, with its baghouse and electrostatic precipitators, was state-of-the-art. As extra insurance, the company bought smoke easements [for lands likely affected by emissions].[270]

The steps taken by Bunker Hill to limit its smelter emissions were accompanied by promises from the federal government not to sue should the company's emissions harm federally owned forest lands, as long as Bunker Hill agreed to pay for such harm. The company made additional improvements to the smelter in the 1920s, yet these changes did little to diminish the amount of toxic smoke and noxious fumes that poured into the nearby communities.[271]

The second half of the twentieth century marked a transitional period for the Coeur d'Alene mining district's economy, with mining experiencing gradual decline. Although the Coeur d'Alene mining district prospered for decades, it also faced economic downturn beginning in the 1950s.[272] Occasional surges in silver prices triggered upticks in production, but the general pattern has been relatively consistent. Most of the mines closed for good. Those that remained in operation continued to be a source of employment for Coeur d'Alene mining district towns but were no longer the only force behind the local economy.[273]

In the 1960s, Bunker Hill employees continued to work in the plant and live in the nearby communities, all the while becoming increasingly aware that lead emissions were impacting their health and the health of their families. Many filed complaints with their union representatives about the toxic working conditions, to no avail.

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267 Keith R. Long, *Production and Disposal of Mill Tailings in the Coeur D'Alene Mining Region*, *Shoshone County*, *Idaho, Preliminary Estimates* (Tucson, AZ: USGS, U.S. Department of Interior, 1998), 7; and Long, "Tailings Under the Bridge," 85.
268 Committee on Superfund Site Assessment, *Superfund and Mining Megasites*, 16.
269 Long, "Tailings Under the Bridge," 94; and Committee on Superfund Site Assessment, *Superfund and Mining Megasites*, 41.
270 Casner, "Toxic River," 6; Katherine G. Aiken, "Western Smelters and the Problem of Smelter Smoke," in *Northwest Lands, Northwest Peoples, Readings in Environmental History*, Dale D. Goble and Paul W. Hirt, eds. (Seattle: University of Washington Press, 1999), 502–3, 507–8, 510.
271 Aiken, "Not Long Ago," 69–70.
272 Long, *Production and Disposal of Mill Tailings*, 3.
273 Larkin Mullin, "Mullan, Idaho," 2014, https://spokanehistorical.org/items/show/490.

Early miners' unions in Idaho concerned themselves primarily with wage issues, not health and safety. In response, the company made a few substantive changes and began a marketing campaign touting its environmental record. Some area newspapers assisted the campaign by publishing complimentary articles about the company's improvements.[274]

These efforts coincided with the dawning of a nationwide environmental movement. This movement followed the 1962 publication of Rachel Carson's book, *Silent Spring*, which chronicled the deleterious effects caused by pesticides and chemicals, repeated fires on the polluted Cuyahoga River in Ohio, and other environmental disasters.[275] Around the same time, in central Idaho in 1960, U.S. Senator Frank Church and other concerned activists were working to secure national park status for the Sawtooth Mountains in order to protect its pristine recreational beauty from exploitation by mining, livestock grazing, and timber harvesting. Instead, in 1966, the National Park Service and U.S. Forest Service jointly proposed the area should be a national recreation area, which would have fewer restrictions than a national park; Church soon agreed. Meeting with constituents and colleagues, Church worked to gather consensus, but the bill he proposed languished in Congress.

When the threat of mining arose in the nearby White Cloud Mountains, the situation for Church's bill began to change.[276] In 1968, mining companies filed numerous claims for hundreds of acres near Castle Peak in the White Clouds, proposing an open pit molybdenum mine and tailings pond complex. A citizens' group formed in opposition to the mine proposal, roused public support, and met with Church, who publicly opposed the mine in 1969. Church and his co-sponsor, Idaho's U.S. Senator Leonard B. Jordan, soon amended the national recreation bill to include the White Clouds in its boundaries. By 1970, Democratic gubernatorial candidate Cecil D. Andrus supported the bill and successfully ran on conservation of the White Clouds as the central issue of his campaign. In 1972, then-President Richard M. Nixon signed the bill that established the Sawtooth National Recreation Area, which included protection for 756,000 acres of the Sawtooth, Boulder, and White Cloud Mountains and the valley they surround.[277] In 2018, the White Cloud area was renamed the Cecil D. Andrus-White Clouds Wilderness.[278]

The environmental movement helped to push for changes at the federal level, as well. In late 1969, Congress passed the National Environmental Policy Act (NEPA), and on January 1, 1970, President Nixon signed it into law. NEPA, the first major environmental law in the country, established the Council on Environmental Quality (CEQ) within the Executive Office to oversee implementation. That same year, the president pulled fifteen existing departments from four government agencies and merged them to create the new Environmental Protection Agency (EPA). The EPA was tasked with establishing and enforcing environmental protection standards, conducting research and gathering information to use to strengthen programs and recommend changes to policy, offering grants and technical assistance, and assisting the CEQ to develop and recommend

[274] Aiken, "Not Long Ago," 70–71; Brown, *Hard-Rock Miners*, 77–78, 82, 86, 93; Wyman, "Underground Miner," 257, 268, 289; Wyman, "Mining Law in Idaho," 19–20, 22; and Hawley, *History of Idaho*, 493.
[275] U.S. Environmental Protection Agency (EPA), "Milestones in EPA and Environmental History," 2024, https://www.epa.gov/history/milestones-epa-and-environmental-history.
[276] Ian Max Stevenson and Nicole Blanchard, "They Make 'The Heart Beat Faster.' How Idaho Preserved Sawtooth Mountains 50 Years Ago," *Idaho Statesman*, August 11, 2022, updated February 13, 2024, https://www.idahostatesman.com/news/local/environment/article263113678.html.
[277] Stevenson and Blanchard, "They Make 'The Heart Beat Faster.'," Rachel Cohen, "Why There's No National Park in the Sawtooths – and Why That Matters," August 16, 2022, https://www.boisestatepublicradio.org/news/2022-08-16/idaho-sawtooth-mountains-national-recreation-area-50th-anniversary.
[278] Josh Johnson, "Honoring the Legacy of Cecil D. Andrus in the White Clouds," October 18, 2021, https://www.idahoconservation.org/blog/honoring-the-legacy-of-cecil-d-andrus-in-the-white-clouds/.

new policies.[279] Nixon also signed into law the Occupational Safety and Health Act, which created the Occupational Safety and Health Administration, more commonly known as OSHA.[280] McKay noted how some of these new regulations and agencies began to change oversight of the mining industry in Idaho:

> The 1970 Clean Air Act and establishment of the Environmental Protection Agency marked the beginning of increased federal involvement with Bunker Hill.[281]
>
> Around this same time, the state of Idaho began to consider the effects of water and air pollution. In 1972, the legislature passed the Idaho Environmental Protection and Health Act and created the Department of Environmental Quality (DEQ) to help address these issues within the state.[282] Environmental disasters continued to cause issues in Idaho, yet the state did not regulate safety in lode mines.[283] McKay described one such tragedy. In 1973, a fire in the Bunker Hill smelter damaged the baghouse. The smelter continued operating for the next [eleven] months without repairs to the baghouse. This released the equivalent of eleven years of emissions.[284]

The lead emitted during those 11 months fell out of the sky, contaminating the surrounding landscape, towns, and people, leading to increased scrutiny by state officials.[285] In October 1974, then-Governor Cecil Andrus announced an agreement that Bunker Hill would offer medical treatment to people impacted by the lead and would implement changes at the smelter to reduce lead and particulates. Governor Andrus' announcement signaled a shift in the state's scrutiny of mining pollution, and combined with federal legislation, Bunker Hill was required to make significant health and safety improvements at the smelter plant.[286]

Ultimately, it was a horrific, deadly fire in northern Idaho's Sunshine Mine that transformed mining safety in the United States. Located in Shoshone County, between Kellogg and Wallace in the Big Creek mining district, the Sunshine Mine was primarily a silver mine, with copper as a secondary ore and antimony, lead, zinc, gold, and uranium as tertiary ores.[287] By 1971, the Sunshine Mine was the biggest silver producer in the United States, producing 7 million ounces of silver worth nearly $11 million that year alone.[288]

In the late morning of May 2, 1972, a fire began on the 3,700-foot level in the mine and, unbeknownst to the 174 miners working in the mine at the time, released deadly amounts of carbon monoxide and smoke that was

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[279] EPA, "The Guardian: Origins of the EPA," EPA Historical Publication-1 (1992), https://www.epa.gov/archive/epa/aboutepa/guardian-origins-epa.html.
[280] Occupational Safety and Health Administration (OSHA), "50 Years of Workplace Safety and Health," U.S. Department of Labor, 2024, https://www.osha.gov/osha50.
[281] Casner, "Toxic River," 6; Aiken, "Western Smelters and the Problem of Smelter Smoke," 510.
[282] Idaho Legislature, Title 39, Health and Safety, Chapter 1, Environmental Quality—Health, 1972, https://legislature.idaho.gov/wp-content/uploads/statutesrules/idstat/Title39/T39CH1.pdf.
[283] Brown, *Hard-Rock Miners*, 77–78, 82, 86, 93; Wyman, "Underground Miner," 257, 268, 289; Wyman, "Mining Law in Idaho," 19–20, 22; and Hawley, *History of Idaho*, 493.
[284] Aiken, "Mining in the Coeur d'Alenes," 18; Chris Johnson, "Bunker Hill, The Company That Made a Town," *Idaho Yesterdays* 41, no. 1 (1997): 3–4.
[285] Committee on Superfund Site Assessment, *Superfund and Mining Megasites*, 41.
[286] Snow, "Living With Lead," 1–2, 5, 7–8.
[287] USGS, "Sunshine Mine," accessed October 16, 2024, https://mrdata.usgs.gov/mrds/show-mrds.php?dep_id=10241626.
[288] Gregg Olsen, *The Deep Dark: Disaster and Redemption in America's Richest Silver Mine* (New York: Three Rivers Press, 2005), 3; Rachel Scott, "Yes, Sir, This Has Certainly Been Considered a Safe Mine," *The Atlantic* (December 1972), https://www.theatlantic.com/magazine/archive/1972/12/-yes-sir-this-has-certainly-been-considered-a-safe-mine/304565/.

recirculated throughout the mine in the ventilation system.[289] Carbon monoxide has no taste, odor, or color, and when inhaled, it prevents blood from being able to carry oxygen and causes asphyxiation. Ninety-one men died, and two, who survived on the 4,800-foot level, were rescued seven days after the fire started.[290] Despite the Sunshine Mine's repeated violations of both federal and state regulations for fire, explosives, electrical, ground support, and emergency escape route standards, little was done to improve conditions. Enforcement of the federal Metal and Non-Metallic Mine Safety Act of 1966 was lax throughout the industry because enforcement was through the Bureau of the Mines, whose board was stacked with industry heads. The Act had no monetary penalties, and it limited enforcement provisions to "imminent danger" and failure to address violations. The Act did not specify fire drills or trainings, and neither did it require evacuation plans or oxygen supplies underground.[291]

Eight months after the disaster, the Sunshine Mine reopened after being deemed safe by the Bureau of Mines (then a part of the U.S. Department of the Interior).[292] In 1973, the Bureau of Mines (replaced later that year with the Mining Enforcement and Safety Administration [MESA]) released the results of their investigation, placing blame on an inadequate escapeway, not immediately evacuating the mine, inadequate training on the self-rescuers (not required by law at that time), lack of staff training in evacuation procedures, barricading, the hazards of gases (not required by law in a metal mine at that time), and finally, the ventilation system. Later, it was learned that a foam sealant product that was widely used in the Sunshine and other U.S. mines had been banned in Britain due to flammability. The Bureau of Mines' own study in 1966 also noted the foam was a fire hazard yet did not prevent or caution against its use. With the ventilation system recirculating the noxious smoke and deadly carbon monoxide of the burning foam through the workings, 91 miners in the Sunshine Mine perished.[293]

Lawsuits against the Bureau of Mines and the manufacturers of the self-rescuers and foam proceeded through the courts over several years. The foam manufacturing company settled with the families of the deceased. After the end of the litigation, the foam was no longer used in U.S. mines.[294] The cause of the fire has yet to be determined.

In 1977, triggered by the Sunshine Mine fire, Congress passed the Federal Mine Safety and Health Act of 1977 (Mine Act). The Mine Act established mandatory safety and health standards for dust, noise, and medical examinations; mandatory health and safety training; established advisory committees; mandated inspections, investigations, and standards for record keeping; mandated procedures for enforcement and judicial review; mandated procedures to counteract dangerous conditions; mandated injunctions and penalties; and delineated miners' entitlements.[295]

Under the Mine Act, MESA implemented the new safety rules inspired by the Sunshine Mine disaster, including mandating a check-in/check-out procedure, sealed hoisting compartments with stand-alone ventilation

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[289] "Sunshine Mine Disaster 1972," *Yellow Pine Times*, April 2, 2023, https://yellowpinetimes.wordpress.com/2023/04/02/idaho-history-apr-2-2023/.
[290] Olsen, *The Deep Dark*, 352–53.
[291] Scott, "Yes, Sir, This Has Certainly Been Considered a Safe Mine."
[292] Olsen, *The Deep Dark*, 3–4.
[293] Olsen, *The Deep Dark*, 384–90.
[294] Olsen, *The Deep Dark*, 390–91.
[295] U.S. Department of Labor, Mine Safety and Health Administration (MSHA), "Federal Mine Safety & Health Act of 1977, Public Law 91-173, as amended by Public Law 95-164," 2006, https://arlweb.msha.gov/REGS/ACT/ACTTC.HTM.

systems and oxygen tanks, self-rescuers carried by each miner while underground, and recurring evacuation drills. MESA was later renamed the Mine Safety and Health Administration (MSHA) in 1978 and transferred to the U.S. Department of Labor.[296] These changes substantially transformed the metal mining industry in Idaho and across the United States.

In 1979, then-President James E. "Jimmy" Carter's administration proposed the establishment of a fund to assist in the cleanup of hazardous waste sites across the country. The fund was created with federal appropriations and oil and chemical industry fees.[297] In 1980, Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), also known as the Superfund Act, which created a fund for programs that responded to emergency releases of pollutants and contaminants, collected information and performed analysis, assessed liability to responsible parties, and cleaned up sites.[298] In response, by October 1981, the EPA created a National Priorities List of 114 contaminated sites, the cleanup of which would be addressed using the Superfund Act.[299] McKay noted,

> The Bunker Hill lead smelter shut down in 1981, partly due to a tighter EPA ambient air quality standard for lead enacted in 1980, and partly due to a drop in the prices of lead, silver, and zinc. Two years later, the Environmental Protection Agency designated twenty-one square miles surrounding the Bunker Hill Mine as one of the nation's largest Superfund clean-up sites.[300]

After closure of the smelter, the EPA uncovered hundreds of tons of buried contaminants such as mercury, magnesium, lead, and arsenic.[301] In 1983, the EPA added the Bunker Hill Mining and Metallurgical Complex to the contaminated sites list because of widespread environmental contamination by mining and smelting practices. The initial site cleanup comprised the area around the Bunker Hill smelter and included the cities of Kellogg, Wardner, Smelterville, and Pinehurst. The site was later expanded to about 1,500 square miles and 166 river miles in the Coeur d'Alene River Basin.[302] The environmental cleanup of the Coeur d'Alene River Valley and numerous other mining facilities across the state continues, as do the long-term health consequences for the resident human, fish, and wildlife populations in these areas.[303]

After its passage in 1977, no changes were made to the Mine Act for nearly 30 years. In 2006, Congress passed the Mine Improvement and New Emergency Response Act of 2006 (MINER Act). It was the first amendment to

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[296] Olsen, *The Deep Dark*, 393–94.
[297] EPA, "Administration Proposes Hazardous Waste Cleanup Fund," press release, June 13, 1979, https://www.epa.gov/archive/epa/aboutepa/administration-proposes-hazardous-waste-cleanup-fund.html.
[298] EPA, "Superfund History," 2023, https://www.epa.gov/superfund/superfund-history.
[299] EPA, "EPA Announces First 114 Top-Priority Superfund Sites," press release, October 23, 1981, https://www.epa.gov/archive/epa/aboutepa/epa-announces-first-114-top-priority-superfund-sites.html; Basin Environmental Improvement Project Commission (BEIPC), "The Bunker Hill Superfund Site," accessed October 16, 2024, https://www.basincommission.com/bunker-overview/; EPA, "Superfund Site: Bunker Hill Mining & Metallurgical Complex Smelterville, ID," 2024, https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.Cleanup&id=1000195#bkground.
[300] Aiken, "Mining in the Coeur d'Alenes," 18; Johnson, "Bunker Hill, The Company That Made a Town," 3–4.
[301] Julie Whitesel Weston, *The Good Times Are All Gone Now: Life, Death, and Rebirth in an Idaho Mining Town* (Norman: University of Oklahoma Press, 2009), 206.
[302] EPA, "EPA Announces First 114 Top-Priority Superfund Sites"; BEIPC, "The Bunker Hill Superfund Site"; EPA, "Superfund Site: Bunker Hill."
[303] Committee on Superfund Site Assessment, *Superfund and Mining Megasites*, 16.

the Mine Act, and it implemented new mine safety requirements for underground coal mines and other mines, such as prompt incident notification and development of a written accident response plan.[304]

Summary

Between 1860 and 1969, metal mining made the greatest contribution to Idaho's mineral production and boosted the state's economy. It is estimated that around $2.8 billion of the total $3.42 billion earned by mining came from the production of metals. The Coeur d'Alene mining district accounted for 80 percent of the total produced in the state, with the balance taken up mostly by the Boise Basin, Wood River, Stibnite, Blackbird, and Owyhee mining districts, and smaller contributions from the Atlanta, Bear Valley, Bayhorse, Florence, Gilmore, Mackay, Patterson, and Yankee Fork mining districts, each contributing about $10–40 million each. The final major producers during this time were the Elk City, Leesburg, Pierce, Rocky Bar, and Warren mining districts, each producing between $1 and 10 million.[305] The historical productivity of Idaho's mining regions left their legacies on the state by influencing settlement patterns, buildings, and infrastructure. Mining has also left a legacy of environmental challenges in its waterways and lands.

Idaho's early gold rushes created a strong basis for settlement and economic success for the state and the mining industry. By 1870, the population was about 15,000 people. Within the decade, that number doubled, as miners flooded into the areas of gold rushes. By 1910, the population of Idaho was over 325,000 people, with nearly 80 percent living in rural areas.[306] Mining was the biggest driver for early population growth in the state during this period, with 890 mining operations in just over 2,430 mines, employing nearly 7,000 persons, and producing over $8.65 million in products.[307] As Merle W. Wells wrote in 1961, "The story of Idaho is the story of its vast wealth of natural resources and the gradual development of its economic community through the utilization of these resources."[308] Additionally, Idaho's Sunshine Mine disaster led to federal legislation that improved safety in metal mining industry across the country. As Gregg Olsen, author of *The Deep Dark: Disaster and Redemption in America's Richest Silver Mine*, noted, "the industry's impact remains profound. It will always be so."[309]

[304] U.S. Department of Labor, MSHA, "Miner Act," accessed October 16, 2024, https://www.msha.gov/miner-act.
[305] Victoria E. Mitchell, *History of Selected Mines in the Pine Creek Area, Shoshone County, Idaho* (Moscow: Idaho Geological Survey, 2000), 1; and Ernest Oberbillig, "Mining in Idaho," Idaho State Historical Society Reference Series No. 9 (revised 1985), https://history.idaho.gov/reference-series/.
[306] U.S. Bureau of the Census, *Thirteenth Census of the United States Taken in the Year 1910: Statistics for Idaho* (Washington, DC: Government Printing Office, 1913), 570.
[307] U.S. Bureau of the Census, *Thirteenth Census*, 650.
[308] Teske, et al., *Idaho's Mineral Industry*, 9.
[309] Olsen, *The Deep Dark*, 396.

F. Associated Property Types

The NPS defines associated property types as being relevant to the themes, trends, and patterns of the subject context or contexts, and more broadly as properties associated with the "general growth or prosperity influenced by the theme and that are not directly resultant from the predominant theme of the context."[310] This MPD lists property types that are directly related to mining, such as those that represent the industrial processes of mineral mining, and other related property types that are indirectly associated with mining, such as communities and facilities that were built due to the financial, political, and workforce influences of area mines. National Register (NR) Bulletin 42, *Guidelines for Identifying, Evaluating, and Registering Historic Mining Properties*, states that complex mining-related properties should be organized by processing function. These functions are extraction, beneficiation, and refining.[311] The NPS further defines three additional categories of mining property types, specifically engineer-designed complexes, mining landscapes, and mining-related property types. This last category is a broad group that includes resources such as mining settlements, various types of housing, community facilities, and mining-related support structures and systems.[312]

In this section, Idaho's conventional mining property types and associated property types are listed and described, with characteristics and associated features noted. McKay noted,

> Many of Idaho's mines had both placer and lode deposits and, thus, were worked by several different methods of mining. Such sites may be quite internally complex and may reflect several periods of occupation and features related to different methods of mining.[313]

Mining-related buildings, structures, objects, sites, and landscapes can be exhibited within both the built environment and the archaeological record.

Extraction Resources

NPS guidance on mining property types describes two general categories of extraction properties: exploration and development/exploitation properties. Exploration properties are associated with the search for mineral resources. Development/exploitation properties are those structures and systems associated with defining and extracting ore.

For this MPD, there are four defined extraction property types: hardrock prospect, hardrock mine, open-pit mine, and placer mine. The placer mine property type contains five property subtypes: stream placer, ground sluicing and booming, drift mine, hydraulic mine, and dragline/dredge.

[310] National Park Service (NPS), *National Register Bulletin 16B: How to Complete the National Register Multiple Property Documentation Form* (Washington, DC: National Park Service, 1991; Rev. 1999), 15.
[311] Noble and Spude, *National Register Bulletin 42*, 9−14.
[312] Noble and Spude, *National Register Bulletin 42*, 9−14.
[313] McKay, *Mining Idaho's History*, 70.

Unlike lodes, placer mineral deposits have eroded from a lode deposit to be distributed in stream beds and other waterways.[314]

Hardrock Prospect

Hardrock prospects are an exploration type of extraction property.

Hardrock prospects can appear as adits, shafts, holes, trenches, or cuts. A prospect adit is characterized by a horizontal entrance at the mine's surface. These types of prospects may contain a network of other passages such as winzes (downward shafts), raises (upward shafts), and drifts and crosscuts (both horizontal). Stopes are large areas excavated into an ore body inside the prospect. Timbering at the entrance or within the adit supported areas of softer earth to prevent collapse.[315]

Wheelbarrows or ore cars on rails transported ore out of the mine and carried supplies inside. In deeper prospects, ventilation systems such as hand-powered blowers or windsocks forced stale air out of the prospect. Drainage systems pumped out accumulated water. Hand drilling and later air-powered mechanical drills allowed miners to further excavate hardrock prospects.[316] All of these features may be visible at a hardrock prospect property.

A prospect shaft is a vertical entrance created by digging down to and blasting the bedrock. Hoisting systems such as steam-powered donkey hoists, windlasses, horse whims, crab winches, or simple buckets carried waste rock and ore-bearing rock to the surface. As the shaft deepened, timber cribbing shored up areas of weak soil or decaying bedrock.[317]

Prospect complexes typify many mining landscapes with systems of holes, trenches, and cuts. McKay wrote,

> Hand-dug circular prospect pits can be difficult to differentiate in the field from depressions caused by fallen trees or holes dug by relic collectors. It may also be difficult to differentiate between exploration work and extractive work just from the physical [remnants].
>
> Prospectors generally dug trenches at right angles to the strike to find the width of the vein. A trench dug along the strike indicates a search for better values along the length of the deposit. A long, deep cut or trench along the vein with little waste rock on the surface indicates that ore was probably removed either from the surface or by mining upward from underground workings.[318]

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[314] American Geological Institute (AGI), *Dictionary of Mining, Mineral, and Related Terms* (Alexandria, VA: American Geological Institute, 1997), 318; McKay, *Mining Idaho's History*, 15; and NPS, *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation* (Washington, DC: National Park Service, 1997), 10.

[315] Donald L. Hardesty, *Mining Archaeology in the American West* (Lincoln: University of Nebraska Press, 2010), 39; Eric Twitty, *Riches to Rust: A Guide to Mining in the Old West* (Lake City, CO: Western Reflections Publishing, 2002), 23, 48; and McKay, *Mining Idaho's History*, 71.

[316] James E. Fell and Eric Twitty, "NRHP MPD Form: The Mining Industry in Colorado" (n.p.: National Park Service, 2008), 130, 134; and Hardesty, *Mining Archaeology*, 39–40.

[317] Twitty, *Riches to Rust*, 145–46, 173.

[318] ISHS, "Lode Mining Cultural Resources," Idaho State Historical Society Reference Series No. 1062 (1994), https://history.idaho.gov/reference-series/.

> An example of [hardrock prospect] is site 10SE1155. The site consists of a shaft with log shoring and three shallow prospect pits dating from approximately 1900. The features were dug as part of the exploration of copper deposits along the Bitterroot Divide, and the claim was patented but apparently did not produce.[319]

Hardrock prospects follow a pattern on the landscape, although their presence does not necessarily mean the operation was viable. Often, miners dug prospects to maintain title to their claims.[320]

Simple materials defined residences at these complexes. Once a prospect was abandoned, miners sometimes dismantled and removed buildings to reuse elsewhere. Alternately, the buildings eventually succumbed to time and the elements due to their impermanent nature. Regardless, residences may only be identified via archaeological evidence, as opposed to extant built-environment resources.[321]

Surface plants, or support facilities and machinery, were typically situated at hardrock prospect entrances. These facilities and features contained “light-duty, inexpensive, and impermanent components” that often consisted of blowers, boilers, hoists, and air compressors of varying sizes.[322] Log cribbing filled with waste rock provided stable machine foundations. Blacksmith shops were a necessary component of prospects and were often constructed of local material. The refuse left by prospect shops is typically small. Other common features that may be visible at hardrock prospects include remnants of forges, hoists, machine or structure foundations, rails, hoist houses, claim markers, hand tools, trails, roads, and waste rock piles.[323]

Hardrock Mine

Hardrock mines are a development/exploitation type of extraction property.

Hardrock mines were mined for the mineral lode, defined as a mineral deposit contained in rock. These deposits may have appeared as veins and were extracted from under the earth, which required excavation. When a hardrock prospect yielded ore of economic value, the simple “rat hole” prospect required more planning and investment to extract the ore. As the ores were contained in veins in bedrock, miners had to follow the veins by tunneling by drilling or “jacking” holes with a pick, inserting explosive charges into the holes, blasting the rock loose, and removing the displaced rock or muck for processing.[324] McKay described lode mining sites:

> The locations of mineralized faults determined much of the development of Idaho’s mining districts after the initial placer mining boom. Lode mine workings follow or intersect underground veins by means of shafts, tunnels, adits, and other openings. Unlike placer deposits, which generally follow stream channels, lode deposits may extend away from creek bottoms and even into adjacent drainages. Physical remains on the surface are often clustered together. Large-scale operations are often carefully designed to minimize ore handling between the working face and the mine opening and from there to the waste rock dump or mill. Features were often constructed on man-made terraces. Many smaller operations are more haphazard in arrangement

[319] McKay, *Mining Idaho’s History*, 71.
[320] Hardesty, *Mining Archaeology*, 35–36; and Fell and Twitty, “NRHP MPD Form: The Mining Industry in Colorado,” 171.
[321] Fell and Twitty, “NRHP MPD Form: The Mining Industry in Colorado,” 173.
[322] Fell and Twitty, “NRHP MPD Form: The Mining Industry in Colorado,” 173; and Twitty, *Riches to Rust*, 29, 38–39.
[323] Fell and Twitty, “NRHP MPD Form: The Mining Industry in Colorado,” 173; and Twitty, *Riches to Rust*, 29, 38–39.
[324] Committee on Superfund Site Assessment, *Superfund and Mining Megasites*, 25.

> and consist only of features related to ore extraction. If any ore was produced, it was transported by ore wagon or some other means to a mill or smelter located far from the mine itself. The hillsides around a lode mining area were often stripped of timber during the historic period to provide materials for mine timbers and building construction and fuel for mine machinery and other uses.
>
> Building [remnants] at lode mines are typically foundations or depressions, [remnants] of log buildings now only a few logs high or collapsed [remnants] of buildings. Other [remnants] may include corrugated galvanized iron siding (used on many buildings by about 1900 due to its strength, durability, low cost, and ability to be reused), and board-and-batten siding and double-board siding. Sometimes the ingenious use of available building materials, such as flattened barrels and cans reused for siding, is evident. Forest fires and heavy snow in the winter have taken a toll on buildings at remote, high elevation locations. Many buildings indicated on claim maps cannot be found on the ground today.
>
> The underground workings of a lode mining area at abandoned lode mines generally are flooded, collapsed, and hazardous, and thus cannot be seen or recorded. Occasionally a mine adit will be safe to enter, like the Sunnyside Mine at Thunder Mountain, which has a long adit in which historic[-period] graffiti still exists.[325]

Larger hardrock operations exhibited an increased level of infrastructure and technology. Adits widened into tunnels as they expanded in length and width. Both tunnels and shafts were likely to contain surface plants at their entrances, which might have included multiple structures and more highly mechanized methods of ore extraction, removal, and tools for mine maintenance. Hoisting machinery, hoist houses, ore bins or sorting houses, machine shops, administrative offices, and powerhouses characterized many larger hardrock operations. Powerlines, tramways, ventilation systems, drainage systems, roads, and railroads were also typical features. In some cases, the mine company may have provided worker housing and/or change-houses.[326]

A hardrock mine may have developed into an engineer-designed complex that contained its own beneficiation and smelting processes in addition to the features described above. All parts of the complex worked together to maintain efficiency and profitability. Large businesses with enormous profit margins operated these complexes, which demonstrated the advancement of mining technology, methods, and engineering. A mine complex may be centered within a mining landscape, where the activities of the operation altered the landscape. Some smaller hardrock mine complexes existed, but these were rare.[327]

Buildings, structures, sites, and objects at hardrock mines may be present within both the architectural/built environment and as archaeological resources. Features observed at a hardrock mine may include earthen platforms or concrete foundations for buildings; concrete, masonry, or timber foundations for machinery; privies or privy pits; refuse dumps; rail lines and rail trestles; powder/explosive magazines; shaft or tunnel houses; headframes; utility poles; compressed-air system features; boilers; ore bins or ore sorting houses;

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[325] McKay, *Mining Idaho's History*, 76–77.
[326] Noble and Spude, *National Register Bulletin 42*, 13; and Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 178–84.
[327] Hardesty, *Mining Archaeology*, 8; and Noble and Spude, *National Register Bulletin 42*, 13.

tramways; and blacksmith shops containing forges, clinker and refuse dumps, and drill sharpening machines.[328] These features are only some that may be observed at a hardrock mine. Buildings and/or structures may be standing or in ruin, while shaft and tunnels may be open, collapsed, or filled. Determining the underground workings of a hardrock mine is safest using archival documents. However, these documents may not exist. In this case, documenting underground workings of a mine is not required if the mine is unsafe.[329] Waste rock piles also typify many hardrock mines.

McKay noted some examples of hardrock mine features that were encountered in Idaho:

> A relatively uncommon feature at Idaho's lode mines, [a tunnel] occurs at the Mountain Chief Mine in the Seven Devils mining district, which has a six-hundred-foot tunnel through a ridge, with portals at either end. Ore cart rail is in place, and the timber supports are in good shape as of this writing.[330]
>
> An ore sorting shed was sometimes located near the ore bins; the ore car unloaded directly into the shed, where the high-grade ore was sorted and sacked for shipping. The Silver Tide mine (site 10EL862) has a twentieth-century ore bin built of logs and lined with sheet metal.[331]
>
> Remains of an aerial tramway may include loading stations and terminals (sometimes with ore bins), steel or wooden towers, brake station building, ore buckets, wire rope or cable, pulleys, control machinery, and evidence of cleared vegetation along the route. Due to deterioration over time, the cable is usually found on the ground rather than suspended (an aerial tramway near Burke, site 10SE777, still is suspended in places). The aerial tramway that brought ore to the stamp mill at the Gold Coin Mine (site 10-SE-803) still has its associated machinery and equipment including pulleys, ore cars, and brake and control levers.[332]

Open-Pit Mine

Open-pit mines are a development/exploitation type of extraction property.

Miners excavated open-pit mines when ore was situated near the ground surface. These are similar to quarries but contain a system of benches and roads, as well as machine shops, offices, and leaching ponds. The surface plants of open-pit mines resembled those at hardrock mines, where support facilities were generally clustered in one area near the mine entrance. Small open-pit operations worked ore bodies in benches and transported material in ore cars or animal-drawn vehicles. Mines with mechanized methods may have had electric or steam-powered air compressors.

Extracting ore from large open-pit mines required large earth-moving equipment. Truck-mounted drills allowed miners to drill deep holes, where they inserted powerful explosives to blast away larger volumes or rock. Some open pit mining operations used dragline cranes for the removal of overburden or for the movement of ore. The

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[328] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 180–84.
[329] McKay, *Mining Idaho's History*, 104.
[330] Kenneth J. Swanson, *Thunder Mountain Mining Project Cultural Resource Investigation* (prepared for James M. Montgomery, Consulting Engineers, 1984), 28; Stratton and Lindeman, *A Study of Historical Resources*, 40.
[331] McKay, *Mining Idaho's History*, 77.
[332] McKay, *Mining Idaho's History*, 78.

pit floors and access roads widened to accommodate loaders and the trucks that hauled the ore from the blasted material. A crusher positioned over the ore bins crushed the ore deposited there. The headwalls of the pit increased in height because of the greater volume of material removed from the pit.[333]

McKay discussed open-pit mine features that were found in Idaho:

> An example of the historic workings at the Orogrande mining district in Idaho County with its low-grade deposit of ore, the Orogrande-Frisco, shows the progression from working first an extensive glory hole and then an open pit operation. First, the oxidized ores were mined by the glory-hole method in the early 1900s, and good values were recovered from the amalgamation process. The operations and recovery rate at the company's stamp mill were watched closely by mine operators in the region who were hoping to learn how to treat low-grade ores at their mines.[308]
>
> Interest in the gold remaining in Orogrande’s gravels and ores revived in the early 1930s, partly as a result of improved roads. In addition, the development of dragline shovels and bulldozers allowed working low-grade gravels on a large scale. Active development work at the Orogrande-Frisco mine resumed in 1933, and the mining company built a five-hundred-ton cyanide mill. In 1937, the mine was described as the largest open-pit mine in Idaho, and in 1938, its mill was the largest cyanide-process mill in the Pacific Northwest.[334]
>
> Since World War II, open-cut mining has been characterized by increased productivity of labor, decline in grade of the ore, larger capacities of trucks and excavating equipment, more efficient drilling, and increased production. At the same time, the cost of underground mining has risen steadily. In the late 1960s, over 90 percent of the metal produced in the United States came from open-pit operations.[335]

Features could include roads, conveyor belt systems, rock crushers and crushing stations, generator stations, fuel tanks, grizzlies, and air compressors. The remnants of the pit itself would also be considered a feature, and may appear as a pit floor, a headwall, open cuts, or an open pit.[336] As with other property types, buildings or structures may be standing or in ruin.

Placer Mine

Placer mines are a development/exploitation type of extraction property. Within the placer mine type are five subtypes: stream placer, ground sluicing and booming, drift mine, hydraulic mine, and dragline/dredge.

Geological and environmental actions make placer gold available to panning, sluicing, hydraulic mining, and dredging in creeks, rivers, lakes, and on gravel terraces and benches.[337] McKay wrote,

[333] McKay, *Mining Idaho’s History*, 75.
[334] McKay, *Gold for the Taking*, 99.
[335] Eugene P. Pfleider, ed., *Surface Mining* (New York: American Institute of Mining, Metallurgical and Petroleum Engineers, Inc., 1968), 4, 11, 169.
[336] Fell and Twitty, “NRHP MPD Form: The Mining Industry in Colorado,” 189–90.
[337] McKay, *Mining Idaho’s History*, 2–3, 6–7; and Yukon-Charley Rivers National Preserve, “What is Placer Gold Mining?”

> Cultural resources associated with placer mining in Idaho cover a wide variety of features, including those associated with traditional hand methods, ground sluicing and booming, hydraulicking, river mining, and dredging. Placer mining surface equipment was often moved along a creek and then abandoned miles from where it was first used. Many of Idaho's placer mining deposits were worked by hand methods, then by hydraulicking, and later by dredges. Each of these methods tends to obscure the [remnants] of earlier activities. Any placer-related artifacts from the pre-1890s period, when supplies were sometimes difficult to obtain, would most likely be constructed on-site of local materials.
>
> Many mines recorded in Idaho had both placer and lode deposits and, thus, were worked by several different methods of mining. Such sites may be quite complex and may reflect several different periods of occupation and features related to different mining methods. For example, site 10SE410 in the Wallace area, mined from the late 1880s to the present, has thirty-one major features, including sluice boxes, steel pipe, a water tank, a ball mill, adits, possible remains of a stamp mill, dredge tailings, and artifact scatters. Sometimes all or parts of the remains of placer mining are buried under waste rock dumps from lode mining activity, such as at the Jacobs Gulch Mine/Lower Nottingham Mine (sites 10OE5312 and 10OE3675).[338]

Placer mines involved processing stream or river gravels for gold particles. In some cases, some placer workings could extend for thousands of feet and were worked by numerous companies; however, a placer mine is defined by distinct claim boundaries and worked by a mining company. Both can be documented as resources, and ground-truthing and archival research are necessary to identify the extent of mines and the mining companies that worked them, respectively.[339]

Five placer mine property subtypes are described in this section: stream placer, ground sluicing and booming, drift mine, hydraulic mine, and dragline/dredge.

<u>Stream Placer</u>
Individual miners and large companies developed stream placer mines to work streambeds. Placer mining was originally undertaken by a solitary miner using a gold pan in a creek or river, in the same method as prospecting. Using this method, a miner could typically go through about a cubic yard of placer gravels each day, and unless the placers were very rich, it was difficult to earn enough to pay for the claim.[340] McKay also noted that stream placer methods were used to mine river bars:

> Placer gold deposits were found along the Snake and Salmon rivers in Idaho, both in the sands of river bars and in higher bench gravels. Gold recovery techniques ranged from rocking and traditional sluicing to directing water from ditches and flumes in order to wash gravels into sluice boxes or other recovery apparatus.[341]

Early upgrades to the panning method were the rocker, sluice box, and long tom. The rocker, or rocking cradle, was easily moved when needed, could process about three cubic yards of gravel a day, and could be operated

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[338] McKay, *Mining Idaho's History*, 72.
[339] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 165.
[340] Wells, "Placer Mining Methods"; and McKay, *Mining Idaho's History*, 5–6.
[341] McKay, *Mining Idaho's History*, 75.

with much less water than a sluice box.[342] The sluice, which needed a considerable amount of water and a steep enough gradient to operate efficiently, could handle ten cubic yards of gravel each day. Sluices typically needed ditches or a flume to redirect water for washing the gravels and used mercury to create an amalgam to catch the flour gold.[343] The long tom was similar to a sluice, but smaller, and was thought to be more efficient than a rocker.[344]

To recover gold, companies installed long sluices and dug long trenches as they excavated placer gravel. McKay wrote,

> Some sites, particularly those that were worked in the 1930s or later, may still have wooden [remnants] of rockers, sluice boxes, manufactured gold-recovery machines of the 1930s, and components such as grizzlies and trestles. Sluicing resulted in low, parallel lines of gravels and cobbles. The finer debris from sluicing often accumulated in circular or elongated mounds several feet high and long. Associated tools might include horse-drawn scrapers (for tailings disposal), shovels, pitchforks, picks, carpentry tools, and hand tools for cleaning exposed bedrock such as stiff brushes and hand scrapers.
>
> Often, the only evidence of early placering is scattered, low mounds of cobbles and gravel perhaps one to three feet high and an unnatural, hummocky appearance to the ground. This is often obscured by vegetation.
>
> Few recorded sites in Idaho are good examples of traditional hand placering methods. Some, such as site10CW254, have remains of sluice boxes that probably dated from the 1930s or 1940s. Napias Creek in the Leesburg area and Baboon Gulch near Florence show evidence of hand methods.[345]
>
> Along the Snake and Salmon rivers, evidence of placer mining and associated dwellings has been found at many of the river bars. Features include stacked cobbles, dugouts, building foundations, household artifacts, trash dumps, cabin foundations, hydraulic cutbanks and pits, mining equipment, rectangular rock structures, adits, shafts, remains of burlap sluice boxes, and water conveyance systems. Features associated only with this type of mining (as opposed to features such as cutbanks, which are associated with hydraulicking) are uncommon. The remains of houseboats and other types of boats used by miners are an example.

Over time, many placer mining sites were affected by flooding or high-water levels. Some were submerged after the construction of dams for hydroelectric development. McKay noted a few extant sites:

> A survey of Chinese mining sites along sixteen miles of the Snake River identified perhaps sixty individual rock wall sites, including the well-preserved Mon Chu site (site 10JE95). The Lower

[342] Wells, "Placer Mining Methods"; and McKay, *Mining Idaho's History*, 7–8.
[343] Wells, "Placer Mining Methods"; and McKay, *Mining Idaho's History*, 8–9.
[344] Wells, "Placer Mining Methods"; and McKay, *Mining Idaho's History*, 8.
[345] McKay, *Mining Idaho's History*, 73.

> Salmon River Archaeological District is about fifty-one miles long and includes many historic archaeological sites, mostly remains of placer mining.[346]

Typical features of a stream placer include braided stream channels, trenches, pits, and piles of cobbles and gravel along stream channels. Networks of trails, ditches, and level areas or platforms denoting workstations may also be present.[347]

Archaeological evidence of placer operations is typically presented as tailings, which can vary in appearance and shape based on the methods used and the location of the placer operation. Gold panning exhibits little to no residual evidence, and there are few documented gold panning stream placers in Idaho. However, the use of sluices or long toms created long parallel lines of gravels or cobbles, which can sometimes manifest for several miles along a river or stream.[348]

Large stream placer operations may include mining of the entire length of a river. This enormous effort dramatically changed landscapes and altered the natural courses of rivers. Miners diverted water channels using flumes and ditches several miles in length, as well as utilizing dams. Features may include remnants of flumes, large stacks of boulders, canals, tunnels, trials, pathways, and roads or road alignments.

Miners also searched for placer metals on river bars or benches in areas of relict river channels. To access these deposits, miners may have used hydraulic methods or drift mining (see below). Evidence solely associated with the stream placer type of river bar mining is uncommon and may be difficult to identify from other types of placer mining such as hydraulicking.[349] Further, when a river mine operation ceased, the river often returned to its previous course and erased much of the evidence of the mine. River mines may also have been inundated by reservoirs or washed away by high water levels.

Workers at stream placer mines constructed multiple buildings for offices, blacksmith shops or machine shops, and residential structures. Support facilities or residential buildings may have sat atop platforms. Features associated with stream placers may include refuse dumps and scatters, stacked cobbles, structure or cabin foundations, dugouts, hydraulic cutbanks and pits, water conveyance systems, and remnants of burlap sluice boxes.[350]

Ground Sluicing and Booming

Ground sluicing was a placer mining method used generally to mine smaller benches and some of the upper reaches of creeks. It was most often used in combination with other mining methods. Miners diverted the natural running water of a stream or creek, or utilized water stored in a miner-created reservoir, to undermine creek banks and erode the light material covering pay gravels, which were then run through sluices. McKay wrote,

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[346] McKay, *Mining Idaho's History*, 75–76.
[347] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 165.
[348] CALTRANS, "A Historical Context and Archaeological Research Design for Mining Properties in California" (Sacramento: California Department of Transportation, 2008), 83; and McKay, *Mining Idaho's History*, 73.
[349] McKay, *Mining Idaho's History*, 13–14, 74–76; and Will Meyerriecks, *Drills and Mills: Precious Metal Mining and Milling Methods of the Frontier West* (n.p.: Will Meyerriecks, 2002), 8.
[350] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 165; and McKay, *Mining Idaho's History*, 75.

> Ground sluicing, a productive method used in mining districts, eliminated some of the hand labor needed in excavating and transporting gravels to sluices. This method required relatively shallow gravels, sufficient grade for the water to carry the soil, sufficient water, and room for tailings to be diverted at the lower end of the sluice. Water from a ditch or flume washed down a bank and carried the gravels through a narrow trench cut down to bedrock into a sluice. The bottom of the trench was riffled with holes, riffle bars, cobblestones, gravel, or other materials. Rocks too large to go through the sluice boxes were stacked in piles or windrows on barren or previously mined ground. The concentrated fine material was then washed in a rocker or sluice box to obtain the gold. Sometimes miners would hand shovel the gold-bearing gravels into the trench or directly into sluices. Small plank or earth dams might direct the water to undercut banks during the stripping operation. Ground sluicing was also used for stripping overburden off a hillside.[351]
>
> Miners turned to booming where the water supply was inadequate for steady ground sluicing. They impounded water above the deposits and released it at intervals, often through an automatic gate, to carry the gravel through sluices. While the reservoir refilled, miners piled boulders in windrows on barren ground. Once the paystreak was exposed, the operation continued as a shoveling-in or ground sluicing operation. This was also a good method for stripping light overburden.[352]
>
> Ground sluicing eliminated much of the hand labor excavating gravels and transporting gravels to sluices and was very productive in districts such as Leesburg. The [remnants] of ground sluicing and booming include wind rows of boulders and trenches in which the overburden was washed away down to bedrock. Booming operations can be identified by a dam with an automatic gate, along with other components associated with ground sluicing. Relatively few ground sluicing sites have been identified in Idaho to date. The Moore Gulch Chinese Mining Site (site 10CW159) near Pierce has ground sluices and other placer mining features dating from 1870–1895, including ditches, dams, tailings, a blacksmithing area, various mining-related artifacts, and a trash dump. The Hoodoo mining district also has remains of ground sluicing at various sites. Features related to booming have been identified at a few sites, such as site 10SE910, a hydraulic mining area in Shoshone County.[353]

Many of the features of ground sluicing and booming mining may have, in many cases, been destroyed or covered by overburden from later mining activities in the same area. Remnants could include wood sluices, stone walls or barriers used to direct or contain water, and paths and trails.[354]

<u>Drift Mine</u>
Drift mining is a subtype of placer mining that was utilized in areas where conditions prevented hydraulicking. Miners sunk shafts in the suspected location of deep underground deposits within stream beds containing placer

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[351] Young, *Western Mining*, 117; Waldbauer, *Hoodoo Mining District*, 74; S. M. Barton & Associates, *Report on Musselshell Placers, Clearwater County, Idaho* (Boise, ID: S. M. Barton & Associates, 1950), 17–18; William A. Goulder, *Reminiscences: Incidents in the Life of a Pioneer in Oregon and Idaho* (Boise, ID: Timothy Regan, 1909), 251; Rohe, "Hydraulicking in the American West," 19; and Earls, et al., *Leesburg Historic Mining District*, 300.
[352] Rohe, "Geographical Impact of Placer Mining," 184.
[353] McKay, *Mining Idaho's History*, 73.
[354] McKay, *Mining Idaho's History*, 126.

deposits. The shafts reached down to bedrock and followed the placer deposits horizontally as a tunnel. Sometimes adits were dug into hillsides to reach placer deposits there. McKay noted,

> The underground workings were usually timbered. Windlasses or derricks brought the gravel to the surface. Drift mining used traditional methods such as sluice boxes to work the gravels that were removed by drifting. The Boise Basin had the most extensive drifting operations in Idaho in the 1860s.[355]
>
> Sometimes the [remnants] of drift mining can be seen, but often there is little surface evidence. The most prominent surface features are the mine entrance, hoisting mechanisms, and tailing piles, along with associated [remnants] such as a blacksmith shop, carpenter shop, engine house, or sawmill. Documentary or physical evidence that gravels were washed in quantity is necessary to justify identifying a collapsed shaft with drift mining rather than exploratory works. An example of a drift mine is the Myrtle Placer (site 10SE677) in the Delta area. The miners drifted under the twenty-foot-deep overburden, timbered the workings with cedar posts, and used a windlass to haul the gravels out of the shaft in hundred-pound metal carbide barrels.[356]

The excavated material in a drift mine appears as cobbles and gravels washed by water. A drift mine operation might have contained hoisting systems, sluices, or rail and ore car systems. The softer material of a drift mine caused many mine entrances to collapse over time, and thus old shafts may not be immediately apparent. One example of early drift mining can be found in the Boise Basin.[357]

Hydraulic Mine

Hydraulic mining used a hose to jet high-pressure water onto a hillside and wash down gravel. Miners placed the gravel wash in large sluices resembling long toms, where grizzlies of diminishing aperture filtered out fine sands and gold particles. Tripods or mounts, called monitors, held hoses, which allowed operators to move the hose when needed and to keep it in place.[358] McKay wrote,

> Hydraulic mining came to most of Idaho’s mining districts within a few years of the discovery of gold. Hydraulicking was used as early as 1863 in the Boise Basin, where elaborate ditch systems supplied the water. The terraces in the Boise Basin were situated up to three or four hundred feet above the streams and were as much as two hundred feet deep and half a mile wide. These were extensively worked by hydraulic methods and remained productive through the 1890s. While the water was available, hydraulicking continued day and night. The terraces were later reworked by dredging and large-scale hydraulicking. Extensive use of hydraulicking came relatively late to other areas such as Silver City.[359]
>
> Hydraulic mining deeply scarred and eroded the landscape. Evidence of this activity on the land includes the steep, “finned” cutbanks or vertical cliffs typical of this method of working placer

[355] Randall E. Rohe, “Origins and Diffusion of Traditional Placer Mining in the West,” *Material Culture* 18 (Fall 1986): 149.
[356] McKay, *Mining Idaho’s History*, 73.
[357] McKay, *Mining Idaho’s History*, 14–15.
[358] Meyerriecks, *Drills and Mills*, 9–10.
[359] Rohe, “Hydraulicking in the American West,” 30; Finch, ed., *Ore Deposits of the Western States*, 440; and Koschmann and Bergendahl, *Principal Gold Producing Districts*, 123–24.

deposits. Hydraulic washing pits vary greatly in size and shape, but they generally have a scalloped, semi-circular concave shape at the headwall. Tailings that washed out the end of the sluice box often form overlapping fans. Use of a hydraulic elevator resulted in characteristic deep holes and low rounded mounds of tailings. Waste cobbles, generally hand-stacked in parallel walls to the side of the sluice and tailings, were washed out from the end of the sluice box. The tailings from one season's work were often deposited in the pit from the previous season. Two or more floor levels within a washing pit may indicate several seasons of work or safety precautions on a steep hillside.

Associated features include [remnants] of sluice boxes, ditches, flumes, other water conveyance features, derricks, stone boats, pieces of rubber boots, [remnants] of elevators or stackers, bedrock drainage tunnels to nearby streams or ravines for deposition of tailings, and wooden monitor supports. [Remnants] of hydraulic piping may be found, typically metal pipes and nozzles, but occasionally pieces of canvas hose. Revegetation is most rapid in the bottom of hydraulic pits and less so on the steep slopes of the pits, which are often eroded. Twentieth century hydraulic mining sites sometimes were worked by mechanized earth movers such as scrapers, power shovels, and bulldozers. These operations may have left behind broken and discarded pieces of machinery (rollers, track plates), fuel drums, fan-shaped over-burden piles, and excavations and tailings piles with push patterns and blade marks.

Today, neatly stacked rows of rocks at hydraulic sites are sometimes referred to as "Chinese walls." This is misleading, since both Asians and Europeans created such walls to store large amounts of rock without interfering with the sluicing operation or to reinforce an exposed cutbank. The ethnic origins of stacked tailings cannot be determined by the rock configuration alone; diagnostic Chinese artifacts or primary historical documentation provide more definite evidence of Asian mining at a particular site.[360]

Many hydraulic mining sites have been recorded in Idaho. The Buffalo Hill placers (site 10IH655) and the Pioneer Placer (site 10IH2331) outside of Elk City include dramatic features such as high cutbanks as well as ditches, stacks of rocks, and tailings. Some hydraulic mining sites are located on terraces above the Salmon River. The Boulder Creek drainage in Boundary County has sites 10BY198, 10BY248, 10BY401, and 10BY27, which together comprise the Idaho Gold and Ruby ditch, main hydraulic washing pit, remains of a steam shovel, and main camp and lode mine. The hydraulicking there occurred between 1909 and the 1920s. This large-scale operation included a five-mile ditch dug by a steam-powered shovel that measured twenty-one feet wide and six to eight feet deep, twenty miles of road, phone line, lode claims, large bedrock flume, spillway, machine shop, sawmill, planing mill, overhead cable system, and company town with thirty-five residences. An unusual feature at this complex is a poured concrete headrace in Boulder Creek that directed water to the company's flume.[361]

Large hydraulic mining operations tend to be the most visible, while smaller enterprises may be difficult to see on the landscape. For a small hydraulic mine, a flattened area that anchored the monitor may provide the primary clue as to the mine's subtype. Large tailings piles, steep cliffs, ditches, gullies, water conveyance

[360] LaLande, "Sojourners in Search of Gold," 45–46.
[361] McKay, *Mining Idaho's History*, 73–74.

systems, roads, trails, semi-circular washing pits, and the remnants of buildings such as shops and residences are also common features. Cultural material may include the remnants of hydraulic piping, hoses, hose nozzles, and sluice boxes.[362]

Dragline and Dredge

Draglines and dredges were also used in placer mines. A dragline is an excavator with a bucket suspended from a long boom and controlled by cable wires and winches. The dragline picks up gravels in a relatively flat site, such as a creek or river bottom, and deposits them into sluices for processing. A dragline dredge was a floating barge that contained a wash plant—a trommel, sluices, and jigs—and a dragline, whose bucket picked up gravel and dumped it into the wash plant.[363] McKay described features found at dragline operations as:

> The overburden removed in a dragline operation is generally stacked in two parallel rows of conical piles on either side of the streambed. The tailings are segregated by rocks and sands, and are deposited between the rows. In more random operations, overlapping conical piles are evident. The remains of a dragline operation dating from the late 1930s or the 1950s, visible at site 10CW350, include a wooden sluice box and a trash dump. Site 10CW380 has a large dragline bucket, conical tailings along Moose Creek, and collapsed structural remains.[364]
>
> Draglines became popular beginning in 1933 in California and other western states for the following reasons: they cost less than bucket-line dredges; they could work deposits that were small, discontiguous, or otherwise unsuitable for floating dredges; they could be moved easily; and they cleaned ordinary bedrock relatively efficiently. Draglines, however, had some disadvantages: they could not dig up the gravels continuously, and they did not work as well as bucket dredges in hard, compacted gravel.[365]

A bucket-line dredge is a floating barge with digging buckets mounted to its bow and a wash plant/sorting equipment inside, including a trommel and riffled sluices that catch the gold. Waste rock and other waste material are removed from the dredge via a stacker and a pair of tail sluices at the stern. During operation, an anchoring spud is driven into the bottom of the dredge pond, and the dredge rotates side to side on winch lines tied to the shore.[366]

Bucket-line gold dredges were very effective tools for mining placers but required a large investment to purchase and knowledgeable operators to control. In Idaho, Sid Roberts of Boise, Joe Montgomery of Hailey, and Carl Lane of Challis initiated the first gold dredging operation in 1897 along Stanley Creek in central Idaho with their dredge, the *Pearl L*.[367] McKay noted,

> Dredging peaked in Idaho in 1902, when ten were in operation at one time; declined in the 1910s; and then peaked again after the price of gold increased in 1934. More than fifty dredges

[362] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 165; McKay, *Mining Idaho's History*, 73–74; and CALTRANS, "Historical Context," 88.
[363] Wells, "Placer Mining Methods"; McKay, *Mining Idaho's History*, 12.
[364] McKay, *Mining Idaho's History*, 75.
[365] McKay, *Mining Idaho's History*, 12.
[366] Wells, "Placer Mining Methods"; McKay, *Mining Idaho's History*, 12; Grayson, "Bucket-line Gold Dredges," 3; and Reed interview.
[367] Spence, *History of Gold Dredging in Idaho*, 123–24.

> have operated in Idaho over the years, processing gravels from the Boise Basin to Yankee Fork to Elk City to Delta. The use of churn drilling to test proposed dredging grounds began in the 1890s. Some areas, like the Boise Basin, had deposits that were ideally suited to dredging—abundant water; absence of large boulders, clay, and cement; and soft, easily cleaned bedrock. As a result, dredges worked the Boise Basin off and on from 1898 into the 1950s.[368]
>
> After World War II, dredges were again a familiar sight in some districts, some even reworking the same gravels processed by earlier dredges that had shorter bucket lines. By the late 1950s, large-scale dredging operations in Idaho were concentrated in Bear Valley (rare earths) and Elk City (gold). Higher labor and operating costs, the working out of the dredge grounds, and the lack of markets for rare earths such as monazite soon shut down these operations, however.
>
> The best dredging ground was usually in broad, relatively flat river valleys. Dredging destroyed the original stream course, shifting the channel and often dividing it into multiple smaller channels. Some new lakes and ponds formed by dredging are still evident today. Reclamation of dredging sites, required by law since the 1950s, has obscured or obliterated some of these landforms. Many dredge tailings piles extend along Napias Creek in the Leesburg area.[369]

The Yankee Fork Gold Dredge, a bucket-line placer dredge, is located in its dredge pond on the Yankee Fork tributary of the Salmon River in Custer County, Central Idaho. The structure was listed in the NRHP in 2021, with a period of significance of 1940–1953.[370]

Features common to dragline operations included cranes, tractors with bulldozers, trucks, portable pumping units to fill ponds with water, and blacksmith shops and welding outfits to maintain the dragline equipment. These items may still be in evidence at dragline properties today. Collapsed or dilapidated structures, conical piles of overburden in parallel rows, and separate tailings piles of rock and sand are also possible evidence of a dragline operation.[371]

Dredge operations left behind tailings arranged in long, curving parallel wind rows. Ponds for the dredge, flumes, and ditches to feed water into those ponds (if needed); dredge mooring anchors; and various machinery, such as buckets, booms, sluices, trommels, and hoppers, may also be extant resources. Dredging could be a slow process, so some companies housed workers in nearby bunkhouses. Cookhouses, machine shops, tent pads, residences, assay shops, and retort buildings were common. The empty hull of the dredge itself, along with its associated machinery, is another associated feature. Over time, a dredge pond may fill with sediments, and vegetation may grow between the tailings, which may obscure evidence of a dredge operation.[372]

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[368] Ross, *Graphic History of Metal Mining*, 5; Wells and Hart, *Idaho, Gem of the Mountains*, 49; Teske, et al., *Idaho's Mineral Industry*, 22; Miller, *Automobile Gold Rushes*, 102; Sharon Murray, "A Bucket Full, Boise Basin's Dredging Heritage, 1898–1951," *Idaho Yesterdays* 34 (Fall 1990): 2; Rohe, "Geographical Impact of Placer Mining," 163, 165, 167–68; and Clark C. Spence, "The Golden Age of Dredging: The Development of an Industry and Its Environmental Impact," *Western Historical Quarterly* 11 (October 1980): 408.
[369] McKay, *Mining Idaho's History*, 74–75.
[370] Kathryn Burk-Hise, "NRHP Nomination Form for the Yankee Fork Gold Dredge," 2021, on file at the Idaho State Historic Preservation Office, Boise.
[371] McKay, *Mining Idaho's History*, 75.
[372] McKay, *Mining Idaho's History*, 74–75.

Beneficiation Resources

Ore is processed through beneficiation, or ore concentration, which extracts the valuable metals from the gangue (waste rock). Depending on the metal to be extracted, beneficiation processes could be simple or complex. The usual procedure began with crushing the ore into fine particles, and then separating the valuable metals from the unnecessary materials through concentration processes. From there, roasting and smelting further separated the metals from unwanted materials and created a mixture of metals called matte. In the final process, refineries turned this matte into bullion, or pure metals.[373] Each of these processes can leave behind evidence after abandonment.

For this MPD, there are four defined beneficiation property types: crushers, concentration mills, smelters, and refineries, though they are rare in Idaho.

Crushers

There are three subtypes of crushers: arrastras, Chilean roller mills, and stamp mills.

Crushers: Arrastras

Arrastras are considered one of the simplest and cheapest forms of beneficiation resources. An arrastra was a simple system using a circular stone basin, low walls, and a post, or capstan, in the center. Arrastras used waterpower or draft animals, indicating resources such as a corral for the draft animals or a water wheel or motor may have been present.[374] McKay lists some recorded arrastra features, including:

> The typical [remnants] at an arrastra site include a circular, stone lined depression, and sometimes the drag stones are still present (in Dixie, however, some were recycled as grave markers). Other arrastra parts might also still exist like the center pole, wooden bar, corral, and water wheel or motor. The Martinez Cabin and Arrastra (site 10-IH-396) in the Warren area still has drag stones, central spindle, parts of the tub, and evidence of the ditch that brought water to the arrastra.[375]

Crushers: Chilean Roller Mill

Chilean roller mills were similar to arrastras and typically comprised a low-walled, circular stone basin with a capstan in the center. Tied into the capstan was a horizontal axle upon which rotated a large stone wheel or cast-iron wheel that crushed the ore as it rolled. Chilean roller mills also utilized animal or water power, indicating that features such as a corral for the draft animals, water wheel, flume, or motor may have been present.[376] McKay listed a recorded Chilean roller mill feature, including:

> A water-powered Chilean mill resting on a cement slab has been recorded at the Deer Creek Mine (site 10NP300).[377]

[373] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 151.
[374] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 196; and McKay, *Mining Idaho's History*, 80.
[375] McKay, *Mining Idaho's History*, 80.
[376] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 196; and McKay, *Mining Idaho's History*, 80.
[377] McKay, *Mining Idaho's History*, 80.

Crushers: Stamp Mill

Stamp mills consisted of machinery to crush ore with heavy iron stamps or blocks that were repeatedly dropped on coarse ore. Water flowed over the crushed ore, sifting the particles of the precious metal, which were captured on plates or in pans. McKay listed some recorded Chilean mill features, such as:

> Often all that remains of a stamp mill are these foundations, sometimes with large bolts still in place, although scattered machinery pieces may also be found at these sites. Water tanks, often wooden, may be located near the top of the mill. Some intact stamp mills still exist in Idaho, often in remote areas. For example, the Pickles Mining Site (site 10IH2121) south of Warren has a two-stamp mill made in Chicago of the ditch that brought water to the arrastra.[378]

Concentration Mill

Concentration mills involved processes that separated waste material from the metalliferous material using chemical and/or mechanical processes. These facilities utilized numerous pieces of equipment, including ore bins for storage, crushers or rock brakers, stamp mills, and concentrator tables. Once the desired metals were recovered, they were sent to a smelter and then to a refinery.

As milling methods changed, mill buildings accommodated these changes, switching out old machines for new equipment, or retaining old equipment and moving it to another area. Mill buildings and/or historical documentation will likely reflect this evolution.

Mill structures often exhibited a variety of siding, including board-and-batten, corrugated metal, and, on newer buildings, steel frames with galvanized iron siding. Typical objects found at concentration mills include the various machinery used in the concentration process, such as the tables (buddles, jigs, vanners, and Wilfley tables) and their parts. The remnants of jigs may include metal screens and piston rods, and other tables may have linoleum lining with wood lathes. In Idaho, mill structures are typically collapsed or dilapidated, and most machinery has been removed. Extant are mill tailings, building foundations, machinery pads, refuse scatters, and construction materials (lumber, window glass, roofing, bolts, and nails).[379]

Smelters

Smelters are facilities that use heat and fluxes to separate waste rock from metals. The impurities in the metals become slag, which is poured off, leaving matte containing the desired metals that will be later refined.[380] Smelters needed several acres of flat space to accommodate their many facets of operation, including ore bins, water tanks, fuel bins, storage facilities, a vault, assay offices and laboratory, shops, water and power systems, railroads, warehouses, shipping facilities, residential buildings, offices, roasters, furnaces, and sintering plants. They also needed good roads, railroads, an abundant water source, a source of lead ore (for processing silver ores), cheap fuel (in the form of nearby timber), and flux. Proximity to these items was essential for a smelter's success. When a mine shut down, smelters were typically dismantled and sometimes relocated. McKay noted a few examples of smelter features:

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[378] McKay, *Mining Idaho's History*, 80.
[379] McKay, *Mining Idaho's History*, 79, 81.
[380] Hardesty, *Mining Archaeology*; and AGI, *Dictionary*, 449.

> The smelter complex at Bunker Hill was removed as part of the clean-up of the Superfund site there. All that remains of the 1905 smelter at Ponderay (site 10BR539) today are foundations, indications of the railroad spur, and a slag pile extending to Lake Pend Oreille. The [remnants] of a small-scale post-World War II smelter used to recover mercury from ore still stand near Warren (site 10IH1391). The smelter today consists of firebrick walls and two fire chambers resting on a concrete foundation slab.[381]

Extant features may include the exhaust stacks, foundations, chimneys, rail lines, debris, and structural remnants. Slag piles may appear as glassy or very fine-grained black or dark gray cobbles scattered around the former location of the smelter. Historic-period smelter sites are uncommon in the American West.[382]

Refineries

While smelters remove valuable metals from waste rock, refineries remove impurities from the amalgamated metals to make them useable for industry, commerce, or manufacturing. There are several methods of refining metals: distillation, fire, chemical, and electrolytic refining. Assay offices, banks, and express offices could also refine metals, but these sent their product to U.S. mints beginning in 1866.[383] McKay noted,

> Idaho has had only a few refineries. In the 1800s, refineries were located on the east coast in places such as New Jersey and Baltimore. Ore mined in Idaho had to be shipped around the nation, and sometimes overseas, to be refined.[384] The electrolytic zinc plant near Kellogg, built in 1928, was one of the few refineries built in Idaho. Today's examples are the Bradley Mining Company purification plant at Boise and the above-mentioned electrolytic zinc plant near Kellogg. The latter has been recorded in great detail for the Historic American Engineering Record.[385]

In some cases, smelters and refineries operated in tandem with each other, but more often smelters sent their final product to refineries in other areas, particularly those located in larger metropolitan areas. Few refineries operated or continue to operate in Idaho, one of which was the electrolytic zinc plant in Kellogg (in operation from 1928–1981) and the Bradley Mining Company plant in Boise, which was still in operation as of 2011. However, like many areas in the American West, smelter products in Idaho needed to be shipped out of state to refineries around the country. The remnants of refineries in Idaho may include smokestacks, chimneys, stone foundations, and the plant's rail line.[386]

Mining Landscapes

Historic landscapes are defined as "a geographical area that historically has been used by people, or shaped or modified by human activity, occupancy, or intervention, and that possess a significant concentration, linkage, or

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[381] McKay, *Mining Idaho's History*, 82.
[382] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 206; and McKay, *Mining Idaho's History*, 82.
[383] McKay, *Mining Idaho's History*, 83; and Noble and Spude, *National Register Bulletin 42*, 12.
[384] Paul, *Mining Frontiers*, 268.
[385] McKay, *Mining Idaho's History*, 83; and NPS, "Sullivan Electrolytic Zinc Plant, Government Gulch, Kellogg, Shoshone County, ID," Historic American Engineering Record (1993), from Prints and Photographs Division, Library of Congress, https://www.loc.gov/pictures/collection/hh/item/id0250/.
[386] McKay, *Mining Idaho's History*, 82–83; and Noble and Spude, *National Register Bulletin 42*, 13.

continuity of areas of land use, vegetation, buildings and structures, roads and waterways, and natural features."[387] McKay described mining landscapes as being:

> [A] broad category that can include any of the property types (noted previously and below). Historic mining properties generally can be considered rural historic landscapes. These are geographical areas that have been shaped by historic human activity and that have tangible features resulting from historic human use. They document mining-related environmental change that took place over time periods ranging from a few days to decades. They may range in size from small, well-defined locations (for example, along a creek drainage) to regions that cover square miles. Mining landscapes . . . contain substantial areas of vegetation, open space, or natural features that embody significant historical values. Buildings, industrial structures, objects, and archaeological sites may also be present. Mining landscapes have been shaped by prospecting and exploration; development; production and processing; and decline. Each of these stages may have been repeated several times as new technology was developed, or new ore bodies were discovered. The components of landscapes are often arranged in a pattern that minimizes haulage of ores and other materials.[388]

Most mining landscapes will be significant as historic districts and may include many of the property types discussed in this MPD. *National Register Bulletin 30: Guidelines for Evaluating and Documenting Rural Historic Landscapes* defines 11 landscape characteristics—processes and physical components—to aid in classifying and understanding rural landscapes. The landscape characteristics, with mining-related examples in parentheses, are:

Processes

- Land uses and activities (such as open-pit or hydraulic mining);
- Patterns of spatial organization (i.e., linear residential area, mining buildings proximal to water sources);
- Response to the natural environment (i.e., spatial or organizational layout of mining buildings and structures on steep canyon hillsides); and
- Cultural traditions (i.e., stacked boulders at a hydraulic mining site or traditional terraced Chinese gardens).

Components

- Circulation networks (i.e., roads and pathways, airstrips, bridges, or railroads);
- Boundary demarcations (i.e., claim markers);
- Vegetation related to land use (i.e., secondary growth on mining waste rock dumps);

[387] Noble and Spude, *National Register Bulletin 42*, 13.
[388] McKay, *Mining Idaho's History*, 68.

- Buildings, structures, and objects (i.e., buildings/structures related to mine or mill type);
- Clusters of features (i.e., groups of foundation remnants near a mine shaft);
- Archaeological resources (i.e., foundations and other remnants); and
- Small-scale elements (i.e., a tail race).[389]

Some mining landscapes may qualify individually for listing in the NRHP; others will contribute to the significance of a historic district. Most mining landscapes should be classified as historic districts, but landscapes that are small in size and have no standing buildings or structures may be classified as sites.[390]

Mining landscapes may comprise areas of mining-related buildings, structures, and objects; remnants of buildings, structures, and objects; archaeological sites; altered landforms; open space; vegetation; natural features; or a mix of all or some of these features.[391]

Mining-Related Property Types

Buildings, structures, or systems that support mine operations may have included entire communities, railroads, roads, and commercial and service industries. To qualify under this MPD, these resources should be directly associated with a particular mining resource (extraction, beneficiation, or landscape), been built by or for entities and/or individuals related to mining, or associated with the growth or prosperity of an area directly influenced by mining. Such mining-related resources should be recorded as components of overall mining operations or as mining-related resources under this MPD.

Mining Settlements, Housing, and Community Facilities

As Merle W. Wells noted in *Gold Camps & Silver Cities: Nineteenth Century Mining in Central and Southern Idaho*, "mining in Idaho brought permanent communities to a frontier area substantially sooner than would have been possible otherwise."[392] The remoteness of many mining operations necessitated that workers and operators live near their places of work. Settlements established for mining operations could range from small, temporary prospecting camps to large towns with infrastructure, businesses, and institutions such as residences, schools, churches, hospitals, unions, local and regional governments, cemeteries, civic organizations, industries, and various commercial and business ventures. Some of these resources may be part of and should be included within the larger mining property, or they may be individual and representative of nearby communities that supported a larger mining region.[393]

There are five mining settlements, housing, and community facilities subtypes: prospectors' camp, mining camp (also known as an unincorporated settlement), mining town, housing, and community facilities.

389 McKay, *Mining Idaho's History*, 68; Linda Flint McClelland, et al., *National Register Bulletin 30: Guidelines for Evaluating and Documenting Rural Historic Landscapes* (Washington, DC: National Park Service, 1997), 4–6; and Noble and Spude, *National Register Bulletin 42*, 13–14.
390 McKay, *Mining Idaho's History*, 68; and Noble and Spude, *National Register Bulletin 42*, 13–14.
391 McKay, *Mining Idaho's History*, 68; and Noble and Spude, *National Register Bulletin 42*, 13–14.
392 Wells, *Gold Camps & Silver Cities*, v.
393 Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 220.

Prospectors' Camp

Prospectors' camps were usually impermanent or occupied seasonally or intermittently. Local materials in the vicinity of the camp were often used for construction. Common domestic structures included tents, cabins, or frame buildings of milled lumber. These may exhibit as features such as tent platforms or pads, or collapsed or dilapidated building remnants. Miners also favored semi-subterranean lean-tos in placer mining contexts. Associated features may include outhouses and refuse dumps/scatters, which, along with the residential feature(s), would be proximate to prospect shafts, adits, or pits. Due to their impermanence, the remnants of prospect camps are often scant. Artifact scatters, should they still exist, will typically be sparse. The remnants of buildings may be present, but sometimes buildings were dismantled and transported elsewhere when a prospect was abandoned.[394]

Archaeologically, the remnants of a prospectors' camp may include level areas for tent pads or dwellings and collapsed log and frame structures, most often near the work site. Semi-subterranean lean-tos are more difficult to identify in the field, and dugouts were partially excavated into hillsides and appear as the ruins of a rock chimney and/or hearth. Some buildings were later dismantled and transported elsewhere. Builders numbered the logs for ease of reconstruction later, and often these numbers remain on the logs. Numbered logs can also indicate that the building had been pre-cut and sent as a package for construction on site.[395]

To classify under the prospectors' camp subtype, a camp must be directly associated with local prospect workings or located within an area subjected to prospecting.[396]

Mining Camp (Unincorporated Settlement)

Mining camps, also called unincorporated settlements, are distinct from formally platted towns. Mining camps sprung up during a mineral boom, or at a mill or a large mine that required a large workforce. This type of housing was generally integrated within or immediately adjacent to a mill or mine. Unlike a towns, which may have been formally platted, mining camps were not formally organized and were often impermanent. People used local materials for buildings and the architecture reflected a vernacular style. As a mining camp grew and matured, frame structures became more common, and log structures incorporated board and batten or planks into their construction. Residents dug privies behind their businesses and homes. Infrastructure tended to be unimproved, and road networks in and out of the camp were informal. Water was drawn from local sources or wells. Some businesses may have appeared, such as a saloon, post office, mercantile, hotels, and restaurants.[397] Two well-known examples of mining camps are Burke in Shoshone County and Bayhorse in Custer County. First developed as a tent city, the mining camp of Burke formed near the Tiger and Hecla Mines on the banks of Canyon Creek in 1884. Due to the extraordinary productivity of mines in the area, Burke transformed into a town. The town retains a few commercial buildings, residences, and the massive Star-Hecla complex.[398]

Bayhorse grew up around a prospecting claim that was filed in 1872. Work began on the claim in 1877, after lead-silver was found. By 1880, the mining camp had grown to include a smelter, mill, sawmill, and houses for

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[394] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 220; and McKay, *Mining Idaho's History*, 87–88.
[395] McKay, *Mining Idaho's History*, 88.
[396] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 220.
[397] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 221.
[398] Conley, *Idaho for the Curious*, 41–42.

workers. Five years later, Bayhorse housed 200 miners and had a refinery. Today, the mining-related remnants of Bayhorse are a ghost town managed by the Land of the Yankee Fork State Park.[399]

Mining Town

Mining towns were larger than mining camps and were often formally established through platting. Mining camps sometimes evolved into towns, particularly when a mineral boom persisted, the population of a mining camp increased and stabilized, and supporting development occurred. Towns tended to exhibit more planning than a mining camp and were often arranged in a grid and with a distinct business district. As a mining camp grew into a town, the business district expanded to include bakeries, butchers, assayers, laundries, blacksmiths, liveries, newspapers, doctors, dentists, barbers, and tailors. Bookstores and clothing stores may have also been present. Demographics also included women and children, which precipitated the construction of schools, churches, and meeting halls. Red light districts may have also been present, as well as ethnic enclaves and businesses. Towns exhibited greater social stratification and socioeconomic divisions in both residential areas and business areas.[400]

Towns that were established in support of area mines grew from initially platted townsites into larger communities that were tied to the prosperity of the surrounding mines. The population, development, economy, and production of these communities thrived during mining booms and waned during mining slowdowns. Towns of this kind were typically laid out on a gridded system of blocks and lots and possessed a variety of support facilities for their inhabitants. Many towns had a central commercial business district with stores, hotels, saloons, restaurants, banks, and other services, surrounded by residential tracts including boarding houses, single- and multi-family dwellings, and later apartments, interspersed with industrial complexes (breweries, cabinet makers, milliners, blacksmiths, liveries, sawmills, railroad yards, and others), infrastructure, and community facilities such as institutional buildings (governmental, educational, religious, medical, charitable, cultural and recreational centers), communal buildings (union halls, fraternal and sororal organization halls), and town cemetery.[401]

Towns were organized around their business district, which grew in complexity corresponding to the population and economic health of the surrounding mines. Commercial architecture varied but typically began with log or vernacular-style, wood-frame, false-front buildings. Over time, either due to economic success or in response to devastating fires, or both, buildings began to exhibit popular architectural styles constructed with more substantial materials, such as stone or brick masonry, in two- and three-story forms. Within such towns, those with economic means had their residences built in high-style architectural designs, such as Gothic Revival, Italianate, or Victorian styles including Second Empire, Queen Anne, and Stick.[402] Smaller homes were built in simpler, more vernacular styles. Examples of such mining towns include Idaho City, Challis, and Wallace.

Idaho City in the Boise Basin grew quickly after the discovery of gold in 1862; it was soon one of the largest towns in the Northwest, with a population of 7,000 residents by 1864. As the gold rush waned, miners,

[399] Conley, *Idaho for the Curious*, 362–63; Thomas B. Renk, "NRHP Nomination form for Bayhorse" (Washington, DC: National Park Service, 1976).
[400] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 222; and Hardesty, *Mining Archaeology*, 120–21.
[401] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 221–23.
[402] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 221–23; Virginia Savage McAlester, *A Field Guide to American Houses: The Definitive Guide to Identifying and Understanding America's Domestic Architecture* (New York: Alfred A. Knopf, 2018), 14, 267, 283, 317, 333, 345.

including the area's Chinese miners, left for more promising regions, and the town's population plummeted. Idaho City retains several of its historic resources, including both commercial and residential buildings and its historic cemetery.[403]

Alvah Challis platted the town of Challis in Custer County in 1876. Challis served as a distribution hub for supplies to local mines and ranches. Although sheep ranching quickly rose to economic ascendancy, the town retains many of its mining-related buildings in the oldest part of town, known as the Old Challis Historic District, including three log houses and a wood-frame residence clad in board-and-batten siding that date to the town's early period, 1876–1890.[404]

Wallace was originally known as Placer Center, but it was renamed for prospector and town founder Colonel William R. Wallace. The town was established in 1884 in Shoshone County, in northern Idaho. The town is located where several creek canyons converge with the Coeur d'Alene River, making it a central base of operations for mining exploration in that watershed. The first railroad into Wallace was completed in 1887 in support of the mining industry, and the town incorporated the following year. After a fire in 1890, the entire business district was rebuilt. The town retains a substantial number of buildings from that period through 1940.[405]

Company Towns

Company towns are a subset of mining towns. Towns established by mining companies typically had different appearances than those that grew up around multiple businesses existing in the same settlement. Towns of the latter kind possessed greater visual variety than those controlled by a single mining company, whose towns reflected company culture and values.[406] McKay noted some examples:

> A good example of a company town is Cinnabar in the Yellow Pine area, which has many board-and-batten buildings.[407] Another community in the area known as Midnight Camp today has two streets with frame structures in ruins and tent-house structural remains.[408]
>
> Cookhouses, such as the one at the Pacific Mine (site 10CR724) near Bayhorse, can sometimes be identified by adjacent trash dumps that include large tin cans, cow bones, and fragments of white porcelain plates and cups. The standing boarding house/dormitory at the Meadow Creek smelter community near Stibnite still retains its commercial laundry equipment as of this

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[403] Idaho City Historical Society, "Historic Idaho City: Boom Town," accessed October 2, 2024, https://idahocityhistoricalfoundation.org/?page_id=147.
[404] Jennifer Eastman Attebery, Brian Attebery, and Madeline Buckendorf, "NRHP Nomination form for Historic Resources of Challis (Challis MRA)" (n.p.: National Park Service, 1980). https://npgallery.nps.gov/NRHP/AssetDetail/24b44c67-a65c-41b9-8dc7-7d4f6ba08968.
[405] The entire town of Wallace was listed in the NRHP in 1983, as the Wallace Historic District (Nancy Renk, "NRHP Nomination form for the Wallace Historic District" [n.p., National Park Service, 1983], https://npgallery.nps.gov/NRHP/GetAsset/cfb4432e-8ba4-4843-8574-3342d0422b0a).
[406] Richard V. Francaviglia, *Hard Places: Reading the Landscape of America's Historic Mining Districts* (Iowa City: University of Iowa Press, 1991), 117–18.
[407] Edwin B. Douglas, "Current Program Aims at Cobalt Production in 1951," in George A. McDowell, *52nd Annual Report of the Mining Industry of Idaho* (1950), 62; Claudia Druss, *A History of Mining on Bismarck Mountain, 1870–1940* (n.p.: Basin & Range Research, 1988), 10; and Montgomery, *Cultural Resources Inventory/Assessment*, 2-17.
[408] Montgomery, *Cultural Resources Inventory/Assessment*, 2-12, 2-13, 3-9, 3-14.

> writing.[409] Residential areas at some large-scale placer mines, such as dredging operations, were sometimes relatively permanent. For example, the 1940s and early 1950s camp for Yankee Fork dredge workers had hewn log buildings with steep tin roofs, with rear board-and- batten woodsheds.[410]

At a minimum, company-controlled towns included a company store and bunkhouses. Architecture and the town layout were carefully designed and controlled by companies, which resulted in predictable regularity. Architecture was generally uniform for workers' housing, and companies constructed dwellings in rows along planned streets. Builders favored wood-frame buildings for their low cost and ease of construction, and local materials, like mine waste, provided foundations or as a mix in cement for building materials.[411] As noted, social stratification was apparent in company towns, including those exhibited in the larger and more elaborate designs of company owners' and operators' housing compared to the simpler and smaller designs of workers' housing. Upon closure of a mine operation, however, remaining dwellings could become more individualized. There is also evidence to suggest that resistance to the rules occurred even during a company's operation at a mine.[412]

Many company towns in Idaho lacked permanent foundations; thus, if buildings were removed or deteriorated, features may be difficult to identify. In some cases, buildings such as bunkhouses or cookhouses may still be extant. Cookhouses are typically accompanied by refuse dumps consisting of cans, faunal bones, and fragments of kitchen wares such as ceramic plates or cups.[413]

<u>Housing</u>
Housing, for both workers and owners, is typically found within other subtypes (prospectors' camps, mining camps, or towns). However, if associated mining resources are no longer extant, the miners' housing may be assessed as a stand-alone resource, provided historical documentation is included to inform and confirm the housing's significant role within this mining context.

A housing property may also be individually documented if the housing cannot be directly associated with a single industrial complex. This happens if the residence is too far from any one operation to be directly associated. McKay noted some residential examples:

> Dugouts recorded on the slope above the drainage bottom of Baboon Gulch in Florence (site 10IH1918) are excavated and leveled areas representing miners' dwellings such as tents, huts, or cabins, all thought to date after approximately 1870. Similar dugouts have been found in other early placer mining areas, such as Pierce. An example of an unusually substantial mining residence is the two-story rock and cement Mansion Building at the Melcher Mine (site 10CA348).

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[409] Montgomery, *Cultural Resources Inventory/Assessment*, 3-20.
[410] Packard, *Gold Dredge on the Yankee Fork*, 28.
[411] Francaviglia, *Hard Places: Reading the Landscape of America's Historic Mining Districts* (Iowa City: University of Iowa Press, 1991), 117–18; McKay, *Mining Idaho's History*, 88; and Paul J. White, *The Archaeology of American Mining* (Gainesville: University of Florida Press, 2017), 74.
[412] Francaviglia, *Hard Places*, 123; McKay, *Mining Idaho's History*, 88; and White, *Archaeology of American Mining*, 80.
[413] McKay, *Mining Idaho's History*, 88–89.

> The Mon Tung site (site 10-JE-89) on the Snake River, believed to have been occupied by a Chinese miner and merchant who drowned in 1880, was later destroyed by fire. The structure is similar to many other single-room rock wall shelters, occupied by both Chinese and Euroamericans, found in this area. It probably had a canvas tarp attached to a lumber or driftwood framework. A variety of diagnostic artifacts were found at the site, including common Chinese domestic wares for storing or consuming food. Two sites along the South Fork of the Salmon River that are believed to have been occupied by Chinese have been excavated, reconstructed, and interpreted (the Ah Toy and Tong Yan sites); both had earthen dwellings.[414]

Residences in mining towns such as Burke, Kellogg, and Wallace are also examples of mining-related housing resources. Features may include remnants of buildings or their foundations, privies and privy pits, and refuse scatters; cabins; cellars; boarding houses; bunkhouses; cisterns; stables and corrals; refuse dumps and scatters; roads; and structural platforms. Such resources may provide information on architecture, engineering, and residential environments in the Idaho mining industry, and/or information on demographics, socioeconomic structures, and lifestyles of residents.[415]

<u>Community Facilities</u>
As noted above, towns often contain commercial and residential buildings, as well as many other community-related facilities. Like housing, community facilities may be assessed within their associated mining towns or as stand-alone resources if they are located some distance from associated mines, the associated mining resources are no longer extant, or if they are located outside of a mining town, provided sufficient historical documentation is included to inform and confirm the facility's significant role within this mining context. This category includes institutional facilities such as those with roles in government, education, religion, medicine and benevolence/charity; culture and recreation; communal buildings such as union halls and fraternal and sororal organization halls; and cemeteries. These types of resources may be buildings, structures, and/or sites.

Community facilities may include buildings, structures, and/or sites that provide information on architecture, engineering, and community environments in the Idaho mining industry, and/or information on government, education, religion, medicine, charity, culture, unions, fraternal/sororal organizations, demographics, and socioeconomic structures.[416]

Other Related Property Types

Outside of settlements, housing, and community facilities, other mining-related property types that typically operated in support of mining operations include transportation systems (i.e., single-track trails, roads, tramways, railroads, small-gauge rail systems, etc.) powerhouses, hydroelectric plants, and water conveyance systems. McKay identified a few examples:

> For example, a trail (10-BY-244) in Boundary County runs from the main camp of the Idaho Gold and Ruby Mine to a placer area in a different drainage. The trail, which is shown on a 1923 map, measures two to three feet wide and includes a log and pole bridge.[417]

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[414] James, *Ruins of a World*, 21–22, 43, 45, 66–67; and Fee, "Dragon in the Eagle's Land," 111.
[415] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 220–21, 223–24, 229.
[416] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 220–21, 223–24, 229.
[417] McKay, *Mining Idaho's History*, 88–89.

> A good example of an early 1900s wagon road is the Elk City Wagon Road. Between 1895 and 1932, this fifty-three-mile-long road served travelers in the South Fork of the Clearwater area, connecting Harpster (near Grangeville) in the west to Elk City in the east. The first automobile traveled the road in 1911. Features along the road include surface cultural debris, tree blazes and other markers, corduroy road segments, and a widened viewpoint.[418]
>
> Many larger mining properties had their own railroad for hauling crude ore from the mine to the mill. For example, the Morning Mining & Milling Company had a railroad that was several miles long; Shay locomotives pulled the ore cars.[419] The rails, ties, railbeds, trestles, railroad bed, and other components of these lines are sometimes extant.[420]

Some of these related property types may be part of a larger mining landscape.[421]Property Type Significance

Each of the property types discussed above may be significant within the historic contexts presented in this MPD. McKay explained,

> The National Register of Historic Places is an important tool for evaluating and protecting mining-related and other historic properties. Properties eligible for listing in the National Register generally must be at least fifty years old and must possess two important qualities: historic significance and physical integrity. Evaluating significance involves assessing how well a specific property illustrates its property type(s) and how it relates to the historic context.
>
> When evaluating historic resources, it is important to think in broad terms, not only to assess properties individually but also to assess their place in larger systems. Sites or features should be compared to similar sites or features in neighboring mining districts or the region whenever possible. Evaluating the property in question against other properties is not necessary, however, if the property is the sole example of a property type that is important in illustrating an aspect of the historic context or if it clearly possesses the defined characteristics required to be strongly representative of the context. Mining properties can gain significance if they operated a long time, were new or experimental, or were associated with important owners, engineers, or inventors. For example, a mill that represents a major change in technology or was the first or last of an era might be significant.
>
> In some cases, it is necessary to evaluate an individual property such as one mine, particularly for undertakings that fall under the Section 106 compliance process. In such cases, it is still important to identify and conduct some research on the mining district in which the property is found, in order to provide a broader context for evaluating the significance of the property. In particular cases, such as when the property type is one not often found in Idaho (such as an intact

[418] Dale Gray, "NRHP Nomination form for Elk City Wagon Road (draft)" (1999).
[419] James Ralph Finlay, *The Mining Industry of the Coeur d'Alenes, Idaho* (New York: American Institute of Mining and Metallurgical Engineers, 1902), 36.
[420] McKay, *Mining Idaho's History*, 91.
[421] Noble and Spude, *National Register Bulletin 42*, 14.

> arrastra or an aerial tramway), comparisons should be made whenever possible to similar properties in a broader region, such as the county or the state as a whole.
>
> A number of documents should always be checked when researching a particular historic mining site or district.
>
> Mining property boundaries should be selected to encompass, but not exceed, the full extent of the resources making up the property. In some cases, the boundaries of actual mining claims may be appropriate, such as a group of claims that had interlocking boards of directors, shared machinery, and so forth. In a placer mining area, a drainage that was worked by several methods over many years might define the historic district. The boundaries of a historic landscape should encompass the significant concentration of buildings, sites, structures, or objects that comprise the mining property, along with landscape features such as tailing piles and waste rock dumps.
>
> The edges may be legal or political boundaries, cultural features, historic boundaries, or natural or cultural features such as ridgelines, streams, or roads. For large, discontiguous sites, each discontiguous element of the site should be enclosed by a separate boundary. As inventories are completed, the eligible historic district will take shape.
>
> Do not use arbitrary political boundaries such as today's national forests in defining the "best" example of a particular property type. More relevant boundaries are those based on topography or historic use, such as particular drainages or historic mining districts.
>
> Some types of properties are usually excluded from the National Register. These are: cemeteries; birthplaces or graves of historical persons; properties owned by religious institutions or used for religious purposes; structures that have been moved from their original locations; reconstructed historic buildings; properties primarily commemorative in nature; or properties that achieved significance within the past fifty years. If the property being evaluated is one of these, determine if it meets any of the Criteria Considerations as described in National Register Bulletin 15. For example, cemeteries are generally excluded from the National Register. A cemetery, however, may be eligible as part of a historic district as a result of its association with historic mining activities. It may also be eligible because it is the grave of a highly significant person or due to its distinctive design features, age, association with historic events, or information potential. Similarly, certain relocated components such as an ore cart, Wilfley table, or steam engine may be contributing features if the most recent relocation occurred over fifty years ago. Components of eligible districts do not have to meet the special requirements unless they compose the majority of the district or are its focal point. Examples of properties that generally will not be eligible include collections of mining artifacts removed from their original locations and placed in outdoor "artifact gardens"; reconstructed mining towns; and buildings, structures, and objects placed in museums.[422]

McKay also noted that certain principles should guide understanding the significance of historic mining related properties. These included documentary research to prepare a targeted historic context that is integrated within this broader statewide mining context; evaluating features using an interdisciplinary

[422] McKay, *Mining Idaho's History*, 94–95.

approach (history, archaeology, architectural history) with a focus on entire systems rather than individual resources; utilizing comparative properties within the subject or neighboring mining districts; and acknowledging that mining districts are characterized by cycles of occupation and abandonment, which create layers of features and require an understanding that complex industrial mining landscapes evolved over time.[423]

Registration Requirements

To qualify for listing in the NRHP under this MPD, resources must have a direct and significant association with metal ore mining; be geographically located in the state of Idaho; have achieved significance with the period 1860–1977; and retain sufficient integrity to convey that significance. The most likely area(s) of significance are in Business, Commerce, Community Planning and Development, Economics, Engineering, Exploration/Settlement, Industry, Invention, Labor, Law, Science, and Social History. Though less likely, other area(s) within which metal ore mining properties may convey significance include Conservation, Ethnic Heritage, Military, and Politics/Government.

Criteria for Evaluation

Criterion A

For a resource to be eligible for this MPD under Criterion A, the resource must be associated with an event or pattern of events specifically related to metal mining in Idaho within the period of significance. Applicable areas of significance for mining properties could include Business, Commerce, Community Planning and Development, Economics, Engineering, Ethnic Heritage, Exploration/Settlement, Industry, Invention, Labor, Law, Military, Politics/Government, Science, and Social History.[424]

Criterion B

For a resource to be eligible for this MPD under Criterion B, the resource must be directly associated with a person or persons significant to metal mining in Idaho within the period of significance. The significant person or persons need to have been present during the property's operation and/or involved in the property's development, and not simply invested in the mine or a member of the company. Mining resources may be difficult to associate with specific individuals. Resources directly associated with a specific metallurgist or engineer, for example, may qualify under this criterion.[425]

Criterion C

To be eligible for this MPD under Criterion C, a resource must possess the distinctive characteristics of a type, period, or method of construction related to metal ore mining in Idaho within the period of significance; represent the work of a master; possess high artistic values; or represent a significant or distinguishable entity whose components may lack individual distinction (i.e., contribute to a district).[426]

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423 McKay, *Mining Idaho's History*, 97.
424 Noble and Spude, *National Register Bulletin 42*, 15–17.
425 Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 203; and Noble and Spude, *National Register Bulletin 42*, 17.
426 NPS, *National Register Bulletin 15*, 44; Noble and Spude, *National Register Bulletin 42*, 17.

For some mining resources, architecture and/or construction methods reflected function. This is true for such resources as mills and hoist houses, where significance under Criterion C may be reflected in innovations in construction methods or materials. An alternate example of significance under Criterion C may be in the architecture of administration buildings or housing, which could be architect designed, exhibit artistic values, or exhibit specific ethnic influences. Mining properties may also exhibit innovation in engineering designs, advancements in mining technology, and/or be the work of engineering masters, such as for smelters, mills, or water conveyance systems.[427]

Criterion D

To be eligible for this MPD under Criterion D, a resource must have yielded, or may be likely to yield, information important in understanding the history of metal ore mining in Idaho within the period of significance. Examples of important information may include changes in mining technology, the miner's domestic household, ethnicity, gender, community development, and social structure. Resources eligible under Criterion D are likely those where documentary and extant structural evidence is lacking or nonexistent, while the possibility for archaeological research and investigations may yield a better understanding of the past. As McKay noted, to be eligible under Criterion D, properties "must contain important information about metal exploration, extraction, or beneficiation; industrial support activities; transportation networks; or mining-related settlements."[428]

Integrity Requirements

According to *NR Bulletin 42*, "Integrity is the ability of a property to convey its significance."[429] To be listed in the NRHP, a property must be significant under at least one of the criteria listed above and must have sufficient integrity to express that significance. For this MPD, the most important aspects of integrity are likely to be location, design, setting, feeling, and association. These aspects most directly convey the why, where, and when of a property's significance. Additionally, should mining-related properties' components lack individual distinction, they may be eligible for listing in the NRHP as significant and distinguishable entities, or as a historic district (Criterion C).[430] McKay also noted,

> The period(s) of significance for a mining property is the time range during which it was occupied or used, and for which the property is likely to yield important information. The general character and feeling of the historic period must be retained for eligibility. The period of significance of a particular property is the benchmark for measuring whether subsequent changes contribute to its historic evolution or alter its historic integrity.
>
> To retain historic integrity, a property will always possess several, and usually most, of the aspects. In evaluating a property, first determine which of the aspects of integrity are most important in conveying the significance of the resource (this requires knowing why, where, and for what period the property is significant). These receive more weight during the evaluation

[427] McKay, *Mining Idaho's History*, 95; and Noble and Spude, *National Register Bulletin 42*, 17.
[428] McKay, *Mining Idaho's History*, 95.
[429] Noble and Spude, *National Register Bulletin 42*, 19.
[430] Noble and Spude, *National Register Bulletin 42*, 19.

> process than the others. Thus, integrity depends to a substantial degree on the property's historic context(s).[431]

Moreover, *NR Bulletin 42* notes that a property's condition does not mean a property has lost integrity, whether due to harsh weather, abandonment, the passage of time, vandalism, or neglect, which can lead to deterioration or collapse of buildings and structures, loss of equipment, machinery, and transportation systems.[432]

Location

Location is the place where the historic property was constructed or the place where the historic event occurred.[433] To retain integrity of location, a mine property must remain in its original location where the historic mining activity took place. Mining-related buildings, structures, equipment, and machinery were often moved to new areas when the ore was depleted in the first location. Such equipment or structures can contribute to a property's significance if they were present during its period of significance. However, historic-period equipment that has existed at a mining property for less than 50 years may not contribute to the resource's significance, and equipment removed from the place of historic mining activity to another location for specifically for display or interpretation (i.e., "artifact gardens") will no longer retain integrity of location. A property must retain enough of its features in its original location to sufficiently connect a resource to its history and period of significance.[434] Mining-related properties may have expanded or contracted over time, in which case justification should be made for the nominated boundary of the property and how it relates to the historic or current boundary.

Design

Design is the combination of elements that create the form, plan, space, structure, and style of a property.[435] To retain integrity of design, a resource must convey its original plan, organization, spatial relationships, and engineering, even in an archaeological context. For instance, a smelter or ore concentrator must demonstrate the process of beneficiation. For hardrock and placer mines, as well as prospects, design can also refer to a resource's system of features, which are the visible elements created to perform or contain certain mining activities. These feature systems may be separated by some distance. Often, many mining resources, such as mills or smelters, experienced updating, upgrading, or expansion as mining technology and concentrating techniques changed. This type of change may also be an important design aspect and can illustrate the evolution of mining technology over time. Cumulative losses of mining components, such as buildings, machinery, landscape features, and transportation systems, should be taken into consideration.[436] Lode mining resources may have extensive or moderate underground features, such as tunnels, adits, stopes, vents, shafts, and raises. These features do not necessarily need to be inspected for integrity due to safety concerns.

Mining settlements (camps and towns) retain integrity of design when they retain historical organization of spaces, proportions, planning, scale, and the arrangement and interrelationships of buildings, structures, and sites within their boundaries. Individual housing and community resources retain integrity of design when they

[431] McKay, *Mining Idaho's History*, 98.
[432] Noble and Spude, *National Register Bulletin 42*, 19.
[433] NPS, *National Register Bulletin 15*, 44.
[434] McKay, *Mining Idaho's History*, 95, 98; and Noble and Spude, *National Register Bulletin 42*, 19.
[435] NPS, *National Register Bulletin 15*, 44.
[436] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 204; Hardesty, *Mining Archaeology*, 16–17; and Noble and Spude, *National Register Bulletin 42*, 20.

retain historical structural systems, massing, arrangement of spaces, pattern of fenestration, textures and colors of surface materials, type, amount and style of ornamental detailing, and arrangement and type of plantings (in a designed landscape).[437]

Setting

Setting is the physical environment of a historic property and is a reflection of the character of the place in which it played its historical role.[438] Some historic-period mines were vast industrial complexes, which contained buildings and structures for the specific functions of the mining or milling processes, and related properties such as residential, commercial, infrastructure buildings and structures. A historic mining resource's setting reflects where and how a mining resource was situated within the surrounding natural environment and the spatial relationship between the mining features, and to their natural surroundings. Properties in isolated areas retain integrity of setting if the surrounding landscape has remained mostly unchanged from the property's period of significance. This includes properties in mining landscapes. Natural changes in vegetation do not affect integrity of setting, but intrusions of modern buildings and modern mining activity or other activities (settlement, development, etc.) or removal of historical mining features will negatively impact integrity of setting.[439]

Materials

Materials are the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property.[440] These materials reflect the availability of local materials and technologies during the period of construction, as well as the preferred choices of builders. Mining and mining-related properties constructed with certain materials can help with characterizing their architectural style. If a property has experienced repair or restoration, the materials used in replacement must be in-kind, and other key elements original to the construction must be preserved. Over time, materials may have been traded out for updated or upgraded materials based on updated mining or materials technology or the preferences of a new owner. These upgrades, if they were made during the period of significance, should not diminish a resource's integrity of materials. However, the replacement of historic-period materials with contemporary materials outside the period of significance will diminish integrity of materials.[441]

Workmanship

Workmanship is the physical evidence of the crafts of a particular culture or people during any given period in history.[442] Craft, technology, and aesthetic rules all illustrate workmanship. This includes buildings, as well as mining machines and equipment.[443] Examples of workmanship include square timbering inside a mine, the vernacular style of dwellings in a prospectors' camp or mining town, or the architecture of a large administrative office. Like other aspects of integrity, enough of a property's features from the period of significance must remain to analyze workmanship.

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[437] NPS, *National Register Bulletin 15*, 44.
[438] NPS, *National Register Bulletin 15*, 45.
[439] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 204; McKay, *Mining Idaho's Past*, 98; Noble and Spude, *National Register Bulletin 42*, 21; and NPS, *National Register Bulletin 15*, 45.
[440] NPS, *National Register Bulletin 15*, 45.
[441] McKay, *Mining Idaho's Past*, 98; Noble and Spude, *National Register Bulletin 42*, 21; and NPS, *National Register Bulletin 15*, 45.
[442] NPS, *National Register Bulletin 15*, 45.
[443] McKay, *Mining Idaho's Past*, 99.

Feeling

Feeling is a property's expression of the aesthetic or historic sense of a particular period of time.[444] Mining resources can evoke strong emotions due to their expansive footprint on the landscape; size of their buildings, structures, and equipment; and dramatic abandoned presence in typically rural areas. Some abandoned mining features are noted tourist attractions. Feeling is often linked with integrity of setting, design, workmanship, and materials. The resource must give the viewer a sense of the activity that took place at the property during its period of significance, such as exploration at a hardrock prospect site, or mining and milling practices at a large hardrock mining complex. Mining-related properties maintain integrity of feeling if they retain physical or character-defining features to express their historic character. Modern intrusions or reconstructed or false-historical buildings or features compromise a property's integrity of feeling.[445]

Association

Association is the direct link between an important historic event or person and a historic property.[446] A historic mining or mining-related property retains integrity of association when its physical features convey its historic character and connects the property to its historic mining context. Enough of a property's historic features must remain for a resource to retain integrity of association. When a mining property retains a feeling of association, contemporary viewers can distinguish the historic activities or events that took place there. Structures and machinery can add to integrity, but this may be difficult for properties such as mine prospects, where very little remains. Substantial alterations made to buildings or destruction of a mine's critical components could compromise a resource's integrity of association. The degree to which the entirety of the mining entity or assemblage remains intact and readily visible on the property is an important consideration in evaluating a resource's integrity of association.[447]

Minimum Eligibility Requirements

To be eligible under this MPD, a property must

- Be a mining-related resource constructed and operating between 1860 and 1977.
- Be significant within one or more of the three temporal periods of the historic context as presented in this nomination.
- Be significant under Criterion A, for association with events that have made a significant contribution to the broad patterns of local or state history; under Criterion B, for a direct relationship with a historically significant person; under Criterion C, for architecture and/or engineering; and/or under Criterion D, for important archaeological or other evidence that may contribute to the understanding of human history within the temporal context of this nomination.

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[444] NPS, *National Register Bulletin 15*, 45.
[445] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 204, 229; McKay, *Mining Idaho's History*, 99; and Noble and Spude, *National Register Bulletin 42*, 21.
[446] NPS, *National Register Bulletin 15*, 45.
[447] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 176–77, 204; and NPS, *National Register Bulletin 15*, 21.

- Be definable within at least one of the associated property types, specifically extraction, beneficiation, or refining resources, or mining-related property types.
- Meet the registration requirements, including retaining sufficient integrity to convey historic significance within its temporal context.

Significance and Integrity by Associated Property Type

McKay outlined the significance and integrity requirements. These are provided here, edited for completeness:

> Evaluating the remains of historic mining activities can be quite challenging. Surviving buildings and technology are not common at mining sites. Most mining operations consisted of buildings and machinery that could be relocated as necessary when the ore or financing was exhausted. Much abandoned machinery has been salvaged or sold. Many mining-related sites today are characterized primarily by landscape features and archaeological features such as foundations and trash dumps.
>
> The primary requirement for a property to be eligible for listing in the National Register is that historic values are tied to tangible properties. The significance of a historic mining property—whether a building, structure, object, site, or district—should be determined based on an understanding of the history of the area. The historic context, therefore, allows for a comprehensive evaluation of a historic mining property's significance. Individual properties associated with the historic context of metal mining in Idaho generally should be compared with other properties related to that context in order to evaluate their relative significance. [448]

Extraction Properties

Hardrock Prospecting

> **Significance:** Exploration-related resources found at mining sites today have probably survived only because they were located in low-value areas that did not end up being developed. They are unlikely to be eligible under Criterion B except as contributing elements of a historic district. They are often associated with rampant speculation or boom and bust cycles, often financed by out-of-state investors. A combination of research and fieldwork may reveal a pattern of prospecting features that offers physical evidence of this speculative phase of mining. To be independently eligible under Criterion A, as representations of a pattern of prospecting events. If considered representative, then comparison with other exploration features in the mining district or state must be drawn.
>
> A grouping of hand-dug prospect pits and trenches along a ridge, with no other associated features, is generally not eligible.
>
> **Integrity:** Prospecting and exploration features are contributing features of placer or lode mine sites or of a historic district if they retain their basic physical characteristics of location, design,

[448] McKay, *Mining Idaho's History*, 102.

workmanship, and association. Modifications caused by the growth of vegetation or by subsequent mining activity during the historic period will not negatively affect integrity, but modifications caused by human activity after the historic period (the partial filling in of a pit with a bulldozer, for example) may make the feature or the property ineligible or non-contributing. The boundaries of a mining site that includes prospecting and exploration features should encompass these features. If exploration features cannot be associated with other mining-related cultural resources, they are not independently eligible.[449]

Hardrock Mine

Significance: To be eligible for listing under Criterion A, a lode or open pit mine must be a good illustration of the type of development work and/or production done at area mines during the period of significance. The mine does not need to have been a big producer, as long-term development work and speculation played a significant role in many mining areas. Under Criterion B, the property should be clearly associated with a significant miner or investor.

For eligibility under Criterion C, the mine must provide a very good, relatively intact example of the surface workings at a lode mine, whether small-scale or large-scale. The technology of tunneling, shoring, ventilating, and transporting miners, supplies, and ore, involve distinctive characteristics of a type that may be eligible under Criterion C if they retain integrity and if historic associations can be documented. Some mines may exhibit different technologies for the same function. For example, one mining site could have the remains of a whim, steam-driven hoist engine, and a system driven by an electric engine. Such a site is a good example of how the archaeological record is the cumulative end product of all past human activities at a particular site.

Some lode mines may be eligible under Criterion D because they have the potential to yield information needed to answer significant research questions. Waste rock dumps and underground workings at a lode mine may provide information about the local geology and the ore deposit that was being worked. Ore samples can reveal whether the ore was high-grade or low-grade and whether it was being taken from the oxidized or the sulphide zone. This information potential alone, however, does not make the site eligible under Criterion D.

A relatively undisturbed lode mining site that has several collapsed adits, structural remains near portals, a shaft with remains of a headframe, waste rock dumps, a network of roads and trails connecting the mine openings, an ore chute, ore cart rail, and the foundations of a mill may be eligible as an archaeological site if it has the potential to answer significant research questions.

Integrity: Resources related to extraction at lode mines generally must possess integrity of design, setting, materials, association, and feeling in order to be eligible. The property as a whole must retain sufficient integrity to illustrate the various steps in the process of lode mining.

Mines typically evolve through time and do not reflect their original construction plan, but they should be able to illustrate the property’s evolution. When describing a lode mining complex, it

[449] McKay, *Mining Idaho’s History*, 102.

is helpful to explain the discrete steps necessary for the process and to identify the observable features and artifact assemblages that are still present to illustrate each step. For example, there might be features or artifacts associated with the following processes at a lode mine: hoisting ore, dumping waste rock, pumping water from the adit, transporting ore to the mill, hauling waste rock to the dump, and repairing tools.

It is ideal to reconstruct the underground structure of mining sites, but this is rarely possible due to the lack of diagrams of the underground workings and the hazardous nature of most abandoned mines. So, design integrity will generally be evaluated by the property's ability to reconstruct the flow chart from the mine opening and on to the mill and beyond.

The removal of small machinery does not affect integrity except under Criterion C. Mines that consist only of an adit and associated waste rock dumps, with typical construction design and materials but no mine support features or handling, transportation, or milling facilities, are probably not independently eligible. Such mine openings and dumps would, however, contribute to a historic district. A mine complex that consists of only minor ruins and small-scale elements such as vents, ore bins, and wood piles will not be independently eligible under Criterion D because these features cannot reflect the process.

Lode mining sites that have been worked in recent decades have often lost several aspects of integrity because modern machinery and exploration and mining methods tend to change the landscape significantly. Historic building remains may have been bulldozed aside, trenches may have been dug with bulldozers, and a maze of modern roads may have been constructed. An open-pit mine that has operated since the historic period retains its integrity if recent extraction methods have been similar to those practiced during the historic period and if the character of the pit has remained basically the same, even though it is larger than it was during the period of significance. [450]

Placer Mine

Significance: The remains of placer mining activity in Idaho may be eligible for listing under Criterion A if they are associated with an important source of placer gold such as particular drainages in the Boise Basin. Under Criterion B, they should be clearly associated with a significant miner or investor. To be eligible under Criterion C, the resource must be a representative or unusual example of an important placer mining technology or of building design and construction. To be eligible under Criterion D, the resource must be likely to yield significant information on placer mining in Idaho.

A claim worked by hydraulics that has evidence of the water conveyance system in the form of a dam, ditch segments and pieces of metal piping, cutbanks and a concave washing pit, pieces of a sluice box, a tail race, and stacked cobbles would probably be eligible. In this case, the components lack individual distinction but the site retains enough integrity to illustrate the

[450] McKay, *Mining Idaho's History*, 103–4.

process. A dredging site that today has only tailings would not be eligible unless the tailings can answer a research question better either on its own or in comparison with other sites.

Integrity: Resources related to placer mining should retain integrity of design, setting, materials, and association. Placer mining sites should be documented, mapped, and evaluated as processes, not as clusters of isolated features. Each historic mine was once a well-integrated complex of water delivery systems, residential areas, mining areas, waste deposit areas, and transportation and possibly communications networks. The property as a whole should illustrate its relationship to the historic context.

If the property's design has been altered, the modifications should have been made within the period of significance or should be sympathetic to the original design. When evaluating a structure such as a dredge, all parts of the structure must be considered. If a structure has lost its configuration or pattern of organization through deterioration or demolition, it is usually categorized as an archaeological site and evaluated under Criterion D.

Integrity of setting means that the surrounding area should look the way it did during the period of significance for the property. Most if not all of the ground that was placered in the early years of a district was reworked several times; often all evidence of the earliest work has been obliterated. Flooding may have obliterated other features, such as ditch intakes or wing dams.

Standing buildings (primarily dwellings) associated with placer mining activities will not be individually eligible under Criterion A unless other associated mining-related features present help to provide a more complete picture of the activities at the location. Buildings may be individually eligible under Criterion C if they possess unique or representative architectural characteristics, however. A mine complex that consists of only minor ruins and small-scale elements, such as pieces of piping or stacks of rock, will not be independently eligible under Criterion D because these features cannot reflect the process and do not contain significant information for answering research questions.

Placer mining equipment was frequently moved from one claim or even mining district to another during the historic period. Integrity of location is, therefore, not critical for some resources. Although movable, an object such as a sluice box or a dredge is associated with a specific setting or environment and should be in a setting appropriate to its significant historic use, role, or character. In addition, tools or pieces of equipment were often reused in ways different from their original purpose. Possible reuse of items should be considered, because such reuse often removes artifacts from one chronological and functional context to another within the same mining district. Mining machinery that was moved to the location within the property's period of significance is considered contributing to the significance of the property even though it is not in its original location.

A hydraulic mining site that has been extensively salvaged or vandalized, has no standing structures, few if any foundations, no mining equipment, no undisturbed deposits of artifacts containing diagnostic items, and a water conveyance system that has been greatly modified by road construction has lost its integrity and is not eligible.[451]

Beneficiation and Refining Properties

Ore Beneficiation and Refining

Significance: Ore beneficiation resources may be eligible under Criterion A due to their association with the development of the milling industry in Idaho. Under Criterion B, they may be eligible if they are associated with a significant individual. And under Criterion C, they may be eligible under engineering if they retain sufficient machinery and remains of the power system(s) to illustrate the various steps of processing at the mill. For eligibility under Criterion D, they must be likely to provide information needed to answer significant research questions.

In order to be significant under Criterion D in terms of research questions related to industrial technology, the property must be dateable and must contain features or artifacts with enough integrity to provide information not available in written records about the equipment or processes used. If a mill is partially destroyed, it is not eligible if comparison indicates that similar properties with more integrity have been identified. Tailings and slag heaps can provide information about the local geology, scale of mining operations, and concentrating and re-treatment techniques. This information potential alone, however, does not make the site eligible under Criterion D; it must be tied to research questions that cannot be answered by other means, such as documentation.

A flotation mill that is still standing and has some of the machinery inside, such as a steam boiler, primary crusher, ball mill, and flotation cells, may be eligible under Criteria A and C. If the mine openings, water conveyance system, and transportation network also have good integrity, the site could be eligible as a representative example of a complex mining system.

A smelter site that contains only foundations, minimal evidence of the transportation network, and a slag dump is not eligible unless these features can answer significant research questions.

Integrity: In order to be eligible for listing under A, B, or C, a property related to ore beneficiation generally must possess integrity of location, design, setting, materials, and association. Ideally, the remains of the mill convey its significance as a key component of the overall industrial system. The integrity of a mill is enhanced by the identification of the mines that provided the ore and the place where ore was delivered to the mill; by evidence of the power system; by identification of the places where crushing, grinding, concentrating, flotation, and amalgamation were conducted; by the presence of mill tailings; and by the transportation network. Many of the mills in Idaho possess poor integrity and, thus, will only be eligible under Criterion D, if at all. They are less likely than residential features to contain artifacts specific to particular ethnic or other groups (corporate or mass-produced design and materials mask individual choice). The remains of mills, their power systems, associated equipment such as

[451] McKay, *Mining Idaho's History*, 102–3.

vanner tables, and mill tailings generally contribute to a historic district, however. Small-scale features such as stacks of firewood or an ore chute would not be independently eligible.

A mill, smelter, or refinery needs greater integrity to be eligible under Criterion C than under Criterion A. Integrity of design is generally limited to the ability to reconstruct the flow chart from the mine opening to the mill tailings piles. A process flow chart is essential for understanding the metallurgy at a particular mill, along with drawings of existing machinery and other features. For example, an arrastra or stamp mill will not be eligible under A, B, or C unless it possesses enough features to reveal its functioning (thus, an arrastra site that today consists of only the coping and drag stones would not be individually eligible unless it contained information potential).

If milling equipment was moved to the site from its original location during the historic period, this does not detract from the site's integrity so long as it contributes to the significance of the property to which it was moved. If the mill was associated with a particular mine, as most were, the property boundaries should include both the mine and the mill. If it was a custom mill or smelter, then the boundaries will most likely be the boundaries of the mill site itself.[452]

Mining Landscapes

Note: Historic mining landscapes often consist of the remains of many property types. Assessment of the landscape's significance and integrity should include discussion of the significance and integrity of the individual property types and of the overall landscape characteristics and qualities.[453]

Transportation

Significance: For a trail or road to be eligible under Criterion A, it generally must possess sufficient integrity to illustrate overall patterns of history associated with the transportation of individuals and freight within a mining district. For example, a trail corridor would be eligible if the tread is present, the vegetation has not been significantly changed by human activity, and blazes are still evident. A transportation resource is unlikely to be eligible under Criterion B. Under Criterion C, the property must be a representative or unique example of a certain type of engineering design. To be eligible under Criterion D, the property must be sufficiently intact to answer significant research questions.

Trails and roads associated with lode or placer mines require verification that today's corridor is the actual location of the historic travel corridor. Natural ecosystem changes over time will not detract from overall integrity, but man-caused changes after the historic period will. Transportation resources that can be identified only by historic records need to be distinguished from those that can still be located on the ground. A historic wagon road with associated features

[452] McKay, *Mining Idaho's History*, 104–5.
[453] McKay, *Mining Idaho's History*, 102.

such as hand-dug cuts, way stations, and trees with snubbing marks would probably be eligible. A historic trail to a mine, with no distinguishing features, would not be independently eligible.

Integrity: Transportation-related resources should retain integrity of location, design, materials, workmanship, and association. When evaluating linear resources such as trails, roads, or railroads, examine and evaluate the historic corridor that connected all associated areas of activity that worked together as part of the larger system.

Routine maintenance work on a road such as grading, applying layers of gravel, or replacing culverts does not significantly alter integrity. Increasing road width or rerouting segments does affect integrity.

Replacement of ties, rails, and other components of a railroad reduces integrity of materials but does not disqualify the line from listing. Changes related to adaptations made during the historic period (such as removal of certain railroad sidings) do not substantially diminish integrity. Abandoned railroad grades, even ones that have been converted to recreational trails, can still convey the essential nature of a linear transportation resource linking communities and industrial sites. Retention of historic bridges, culverts, and signage strengthens integrity.

Transportation resources that have lost engineering features are generally not independently eligible under Criterion C. Only sites with significant and unusual subsurface data are eligible under Criterion D, if they have the potential to answer significant research questions. Locations of associated buildings have more potential for containing data allowing the answering of research questions.[454]

Mining-Related Properties

Mining Settlements, Housing, and Community Facilities

Significance: Broadly, mining settlements, housing, and other community facilities are significant mining-related resources. They share the history of how prospectors, miners, workers, mine owners, and support-industry staff built, lived, shopped, learned, communicated, organized, socialized, recreated, worshipped, and were buried.

For prospectors' camps to be eligible under Criterion A, they should illustrate the overall pattern of history associated with the impermanent, seasonal, or intermittent domestic life of the prospecting individuals within a prospecting area, under the themes of industry or social history, and events, trends, and themes important to each region. Such resources would be eligible if sufficient camp features are present such as a fire hearth, leveled areas for tents or dwellings, and collapsed log or frame structures. A prospector's camp is unlikely to be eligible under Criterion B, given the challenges of associating a camp with a single person. Under Criterion C, the property must be a representative or unique example of a certain type, period, or method of construction, specifically as representative of the architecture associated with mineral

[454] McKay, *Mining Idaho's History*, 107.

exploration and discovery. To be eligible under Criterion D**,** the property must retain features that are sufficiently intact to answer significant research questions.[455]

Mining camps and towns range from small unincorporated camps, some that evolved over time into towns, to formally platted and planned towns that grew with the roaring economy of mining booms. These resources may be eligible under Criterion A for important associations with specific events, such as the founding of a mine, or a pattern of events, such as a flourishing mining district that led to the economic growth of nearby towns. Mining camps and towns may be eligible under Criterion B, if they are linked to an important individual during that person's productive life and they retain sufficient integrity from the person's time there. These resources may also be eligible under Criterion C, for architecture, if they embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction (i.e., part of a historic district). Mining camps and towns may be eligible under Criterion D, if within their historic context they could contribute meaningful information. Abandoned camps and towns may be especially helpful in understanding residential and commercial architecture, community development, economic status of the inhabitants, employment, and social history.[456]

Company towns may be eligible under both Criteria A and C, due to their association with the pattern of large corporations building communities for employees and due to distinctive architectural characteristics that the buildings may embody. A company town in which all the buildings have been removed and the townsite bulldozed would not retain sufficient integrity to be eligible, no matter how historically significant the town once was.

Housing (residential) resources may be eligible under Criterion A if they reflect their association with important aspects of mining history. Housing may be eligible under Criterion B, if it is linked to an important individual during that person's productive life and it retains sufficient integrity from the person's time in the residence. For listing under Criterion C, for architecture, the housing should embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, possess high artistic value, or represent a significant and distinguishable entity whose components may lack individual distinction (i.e., part of a historic district). And under Criterion D, they must have the potential to answer significant research questions.

Community facilities may be eligible under Criterion A for important associations with specific events, such as the founding of a mine, or a pattern of events, such as a flourishing mining district that led to growth of nearby towns and expansion of social and economic systems. Community facilities are unlikely to be eligible under Criterion B, given the challenges of associating a community facility with a single person. These resources may also be eligible under Criterion C, for architecture, if they embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, possess high artistic value, or

[455] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 228–29; and NPS, *National Register Bulletin 15*, 12–24.
[456] Fell and Twitty, "NRHP MPD Form: The Mining Industry in Colorado," 227–28; and NPS, *National Register Bulletin 15*, 12–24.

represent a significant and distinguishable entity whose components may lack individual distinction (i.e., part of a historic district).

Integrity: Mining settlements, housing, and community facilities associated with mining should possess sufficient integrity of location, design, setting, materials, workmanship, feeling, and association to convey their significance under Criteria A, B, or C. Eligible resources should include all of their basic structural elements. The whole resource must be considered, and its significant character-defining features must be identified. For example, if a building has lost its basic structural elements or character-defining features, as is true for many of the log cabins, frame buildings, and dugouts in Idaho's mining districts, it is generally categorized as a site and evaluated under Criteria A and/or D. If the resource has been relocated, it generally must have been moved during the historic period to retain integrity. Under Criterion D, the property must retain sufficient integrity to provide meaningful information on significant research questions.

The remnants of dwellings and residential areas at placer mines may be able to answer research questions about variability and change among households, demography, social geography, ideology, consumer behavior, ethnicity, class, and gender roles. For example, a Chinese dwelling rich in Chinese ceramics and other diagnostic artifacts might be eligible under Criterion D as a result of its ability to answer significant research questions. Privies and dumps associated with mining sites occasionally provide large enough collections of artifacts and other materials to allow statistically valid data analysis. A cemetery might contain information on ethnic groups and on the health of common people that is not otherwise available.

For research questions related to class and status issues, the sites to be analyzed must be datable and must contain a significant quantity and diversity of items that can be identified as luxury or higher-status goods; recycled goods; and manufactured or locally obtained items. The various features must reflect differences in total numbers and variety of artifacts and other indicators of class such as living space.[457]

Other Related Property Types

Significance: A great variety of support facilities were necessary at Idaho's placer and lode mines. They played a significant role in mining operations and in the development of the area as a whole. Support facilities can be eligible under Criterion A due to their association with mining-related activity in the district. They may also be eligible under Criterion B as a result of their association with significant individuals in local or state history. Under Criterion C, they are eligible if they are unique or representative examples of particular styles of construction or engineering design. And under Criterion D, they are eligible if they have the potential to contribute information necessary to answer significant research questions about the mining property.

The artifact assemblages present at some industrial support sites might be significant as good comparative collections of tools. A literature review must be done in order to determine which periods or aspects of mining history are underrepresented by this type of collection. The site

[457] McKay, *Mining Idaho's History*, 106–7.

itself must have been used for a relatively short period of time, with no contamination by multiple users with various purposes. At a blacksmith shop, for example, tools used by the blacksmith and repaired tools are of more interest than the repair scrap.[458]

Water conveyance systems were used for many purposes, and their purposes must be determined before they can be evaluated. They may have brought water to placer or lode mining operations, to machinery in a mill, to residences and other buildings at a mine, to gardens or orchards, to fire-fighting systems, or to sawmills and other support plants. The network should be traced from the source to the destinations.

Landscape features such as ditches, flumes, and trestles are contributing features of sites or districts if they are still recognizable. After an adequate representative sample of linear features such as ditches have been recorded, such features will not be independently eligible for listing as representative examples without association with other features of the entire mining system. Examples of rare or innovative techniques may be eligible under Criterion C.

Mining operations that were unsuccessful, even ones that failed to produce any gold, may still be eligible. An example would be the remains of a claim developed by a well-financed company that put in extensive preliminary work such as water conveyance systems. Such a site can illustrate the speculative nature of mining.

Mine support facilities must be evaluated as part of the overall mine and mill system. Thus, an office building that would not be eligible on its own might well be a contributing element of an eligible mining site due to its association with other features such as a shaft and the remains of a mill. The boundaries of mine support facilities, like those of all mining-related sites, should encompass all of the related features at the site, including the mine, mill, residential, and transportation features.

One researcher has defined the data requirements for answering research questions related to acculturation of Chinese blacksmiths. These include definitive proof that the feature in question was used by Chinese workers: broken or repaired tools and workshop scrap; catastrophic destruction of the shop so temporally distinct occupations can be isolated; and association of the workshop with contemporary residential features in order to compare acculturation in the work and home spheres. The required non-archaeological information would include reports on existing archaeological work at Euroamerican blacksmith shops; contemporary textbooks about shop practice; and information on artifact assemblages from blacksmith shops at homeland Chinese sites or at very early mining sites (probably in California) to establish a pre-acculturation baseline.[459]

Integrity: Mine support facilities must possess integrity of design, setting, materials, and association to be eligible for listing under Criteria A, B, or C. Eligible buildings must include all of their basic structural elements. The whole building or system must be considered, and its

[458] Mitzi Rossillon, "Impact Mitigation for Select Historic Features at the Park Mines (24BW210), Broadwater County, Montana" (prepared by Renewable Technologies, Inc., for Montana Department of Environmental Quality, 1998), 41, 47.
[459] Rossillon, "Impact Mitigation for Select Historic Features," 46–47.

significant features must be identified. If a building has lost its basic structural elements, as is true for many of the log cabins and frame buildings in Idaho's mining districts, it is generally categorized as a site and evaluated under Criterion D. Under Criterion D, the resources must retain sufficient integrity to provide meaningful information on particular research questions. If the support facilities have been relocated, they generally must have been moved during the historic period to be eligible for listing.

An extensive water conveyance system that has good integrity of all aspects of the system could be eligible under Criterion C even if other parts of the mining system are no longer evident. Features that are necessary, whether collapsed or intact, would include the dam, headgate, ditches and flumes, pressure box, penstock, and feeder ditches. This would require very high integrity, however, and comparison with other water conveyance systems that still have associated features intact (such as the hydraulic mining site or Pelton wheel).

Industrial support resources generally are not eligible unless other aspects of the mining system also have good integrity. Thus, a ditch and flume system missing evidence of a dam and leading to a mining area that has been greatly disturbed would not be eligible. The remains of an assay office at a site that has lost integrity as a system would not be eligible unless it could answer research questions specifically tied to that type of resource.

Properties that are associated with power production and supply must have integrity of configuration and organization as a system to be eligible. For example, a dam/ditch/flume/penstock system feeding water to an intact Pelton wheel that powered a compressor, with the appropriate drive belts still intact, would possess integrity.[460]

[460] McKay, *Mining Idaho's History*, 105–6.

G. Geographical Data

The geographical area encompasses the entire State of Idaho.

H. Summary of Identification and Evaluation Methods

The authors, Kathryn Burk-Hise, MS, and archaeologist Samantha Thiel, MA, utilized Kathryn L. McKay's *Mining Idaho's History: Metal Mining in Idaho, 1860–1960*, as the basis for the historic contexts in this MPD. HRA conducted background research on the history of mining in Idaho outside the temporal brackets established by McKay, reviewed mining district histories, peer-reviewed journals, Idaho geology reports, Idaho Bureau of Mines and Geology publications, and Idaho State Historical Society Reference Series texts.

As a model, the authors relied heavily on James E. Fell and Eric Twitty's MPD, *The Mining Industry in Colorado*, which was listed in the NRHP in 2008. NPS guidance that helped to inform the property types, areas of significance, and integrity for this MPD were the *National Register Bulletin 42: Guidelines for Identifying, Evaluating, and Registering Historic Mining Properties*, *National Register Bulletin 18: How to Evaluate and Nominate Designed Historic Landscape*s, *National Register Bulletin 30: Guidelines for Evaluating and Documenting Rural Historic Landscapes*, *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*, and *National Register Bulletin 16B: How to Complete the National Register Multiple Property Documentation Form*.

I. Major Bibliographical References

Aiken, Katherine G. *Idaho's Bunker Hill: The Rise and Fall of a Great Mining Company, 1885–1981*. Norman: University of Oklahoma Press, 2005.

______. "Mining in the Coeur d'Alenes." In *Idaho and the American West*. Boise: Idaho Humanities Council, 1994.

______. "Not Long Ago a Smoking Chimney Was a Sign of Prosperity: Corporate and Community Response to Pollution at the Bunker Hill Smelter in Kellogg, Idaho." *Environmental History Review*, 18, no. 2, 1994: 67–86. JSTOR, https://doi.org/10.2307/3984793.

______. "Western Smelters and the Problem of Smelter Smoke." In *Northwest Lands, Northwest Peoples, Readings in Environmental History*, edited by Dale D. Goble and Paul W. Hurt. Seattle, University of Washington Press, 1999.

Allen, James B. *The Company Town in the American West.* Norman: University of Oklahoma Press, 1966.

Alt, David D., and Donald W. Hyndman. *Roadside Geology of Idaho*. Missoula, MT: Mountain Press Publishing Co., 1989.

American Geological Institute. *Dictionary of Mining, Mineral, and Related Terms.* Alexandria, VA: American Geological Institute, 1997.

Anderson, Alfred L. *Uranium, Thorium, Columbium, and Rare Earth Deposits in the Salmon Region, Lemhi County, Idaho*. n.p.: Idaho Bureau of Mines and Geology Pamphlet 115, 1958.

Arrington, Leonard J. *History of Idaho*. Volume 1Moscow: University of Idaho Press, 1994.

Attebery, Jenifer Eastman, Brian Attebery, and Madeline Buckendorf. "National Register of Historic Places Nomination form for the Historic Resources of Challis (Challis MRA)." n.p.: National Park Service, 1980. https://npgallery.nps.gov/NRHP/AssetDetail/24b44c67-a65c-41b9-8dc7-7d4f6ba08968.

Axline, Jon. "National Register of Historic Places Nomination form for the Point of Rocks Historic Transportation Corridor." 2009. On file at the Montana Department of Transportation, Helena.

Babcock, Fred J., E. O. Cathcart, and James H. Taylor. *Report and Recommendations of the Coeur d'Alene River and Lake Commission to the Twenty-Second Session of the State Legislature of Idaho*. Boise, ID: Legislative Services Office, 1932.

Bailey, Robert Gresham. *River of No Return (the Great Salmon River of Idaho).* Lewiston, ID: Bailey-Blake Printing Co., 1983.

Bancroft, Hubert Howe. *History of Washington, Idaho and Montana, 1845-1889.* San Francisco: The History Co., 1890.

Barton, Sherwin, Bruce Stoddard, and Austin Milhollin, *An Evaluation of the Gold Mined Before April 17, 1867, from the Nez Perce Indian Reservation as Established by the Treaty of June 11, 1855, and of the Occupancy Use of the Reservation as it was Related to the Mining Activity.* Salt Lake City: Indian Claims Commission, Docket 180-A, 1957.

______. *Royalties and Gold Production Costs on the Nez Perce Indian Reservation, 1860–1867*. Prepared for U.S. Department of Justice, Indian Claims Section, Boise, ID, 1958.

Basin Environmental Improvement Project Commission. "The Bunker Hill Superfund Site." Accessed October 16, 2024, https://www.basincommission.com/bunker-overview/.

Bawiec, Walter J., and Lawrence L. Dee. *Historical Perspective of the Mineral Production of Idaho, with Comments on the Hailey 1°x2° Quadrangle, Idaho.* U.S. Geological Survey Bulletin 2064-T. Denver, CO: U.S. Geological Survey, U.S. Department of the Interior, last modified November 23, 2016.

Beal, Merrill D., and Merle W. Wells. *History of Idaho.* Vol. 1. New York: Lewis Historical Publishing Co., 1959.

Bennett, Earl H. *The Geology and Mineral Deposits of Part of the Western Half of the Hailey 1°x2° Quadrangle, Idaho.* U.S. Geological Survey Bulletin 2064-W. Washington, DC: U.S. Geological Survey, U.S. Department of the Interior, 2001.

"Body of Rich Ore Struck at Highland Mine." *Eastern Oregon News* (Baker), October 29, 1937.

Bertram, John L. "National Register of Historic Places Nomination form for Stibnite Historic District." Washington, DC: National Park Service, 1986.

Bolino, August Constantino. "An Economic History of Idaho Territory." PhD dissertation, Saint Louis University, St. Louis, MO, 1957.

______. "The Role of Mining in the Economic Development of Idaho Territory." *Oregon Historical Quarterly* 59 (June 1958).

Brown, Ronald C. *Hard-Rock Miners: The Intermountain West, 1860–1920.* College Station: Texas A&M University Press, 1979.

Bucyrus Company. "The Bucyrus Legacy." Brochure. On file at Yankee Fork Gold Dredge Association Archives, Land of the Yankee Fork State Park, Challis, ID.

Bureau of Land Management. "About Mining and Minerals." Accessed October 16, 2024, https://www.blm.gov/programs/energy-and-minerals/mining-and-minerals/about.

Burk-Hise, Kathryn. "National Register of Historic Places Nomination Form for the Yankee Fork Gold Dredge." 2021. On file at the Idaho State Historical Society, Boise.

CALTRANS. "A Historical Context and Archaeological Research Design for Mining Properties in California." Sacramento: California Department of Transportation, 2008.

Campbell, Arthur. "Idaho's Strategic Minerals." In Idaho Inspector of Mines, *Forty-Fifth Annual Report of the Milling Industry of Idaho*, 1943.

Casner, Nicholas A. "Toxic River: Politics and Coeur d'Alene Mining Pollution in the 1930s." *Idaho Yesterdays* 35, no. 3 (1991): 3–4.

Caywood, Janene, Theodore Catton, and David Putnam. *Comprehensive Historical Overview and Results of Archaeological Test Excavation at Selected Historical Mining Sites on Florida Mountain, Owyhee County, Idaho*. Prepared for CH2M Hill, Corvallis, OR, 1993.

Coeur d'Alene Tribe. "Native Names Project." Accessed October 9, 2020, https://gis.cdatribe-sn.gov/arcgisportal/apps/webappviewer/index.html.

Cohen, Rachel. "Why There's No National Park in the Sawtooths – and Why That Matters." August 16, 2022. https://www.boisestatepublicradio.org/news/2022-08-16/idaho-sawtooth-mountains-national-recreation-area-50th-anniversary.

Cole, John W., and H. D. Bailey. *Exploration, Development, Mining, and Milling of a Unique Tungsten Ore Body at the Yello Pine Mine, Stibnite, Idaho*. n.p.: U.S. Bureau of Mines Information Circular 7443, 1948.

Committee on Superfund Site Assessment and Remediation in the Coeur d'Alene River Basin. *Superfund and Mining Megasites: Lessons from the Coeur d'Alene River Basin.* Washington, DC: National Academies Press, 2005.

Conley, Cort. *Idaho for the Curious: A Guide*. Cambridge, ID: Backeddy Books, 1982.

Cook, E. F. *Radioactive Minerals in Idaho*. n.p.: Idaho Bureau of Mines and Geology Mineral Resources Report 8, 1957.

Cook, Earl Ferguson. "Prospecting for Uranium, Thorium, and Tungsten in Idaho." Idaho Bureau of Mines and Geology Pamphlet No. 102. Moscow: University of Idaho, 1955.

Couch, Samuel L. "Topophilia and Chinese Miners: Place Attachment in North Central Idaho." PhD dissertaion, University of Idaho, Moscow, 1996.

Davenport, Ben. "History of Mining in Idaho." Accessed October 16, 2024. http://mineidaho.com/education/history.

Davis, Corinne M. "One Union Against a Town, Local 18 of the International Union of Mine, Mill and Smelter Workers at the Bunker Hill Company, Kellogg, Idaho, 1941-1960." Master's thesis, University of Idaho, Moscow, 1991.

Day, Henry L. "96 Years of Mining in Idaho." Typescript, 1956.

______. "Mining Highlights of the Coeur d'Alene District." *Idaho Yesterdays* 7 (Winter 1964): 3–7.

Defenbach, Byron. *Idaho: The Place and Its People*. Chicago and New York: American Historical Society, Inc., 1933.

DeGrey-Ellis, Laura, and Paul K. Link. "Eocene Challis Magmatism." *Digital Geology of Idaho*. Idaho State University. Edited by Dave Pearson. Accessed September 20, 2023, https://www.isu.edu/digitalgeologyidaho/challis-volcanic/.

______. "Snake River Plain Aquifer." *Digital Geology of Idaho*. Idaho State University. Edited by Dave Pearson. Accessed September 20, 2023, https://www.isu.edu/digitalgeologyidaho/srp-aquifer/.

DeGrey-Ellis, Laura, Myles Miller, and Paul K. Link. "Mesozoic Idaho Batholith." *Digital Geology of Idaho*. Idaho State University. Edited by Dave Pearson. Accessed September 20, 2023, http://geology.isu.edu/Digital_Geology_Idaho/Module6/mod6.htm.

Dice, C. M. *Methods and Costs of Concentrating Hubnerite Ores at the Ima Tungsten Mine, Lemhi County, Idaho*. n.p.: U.S. Bureau of Mines Information Circular 7230, 1943.

Diggings, The. "Tiger-Poorman Mine, Burke, Idaho." Accessed October 16, 2024, https://thediggings.com/mines/usgs10105998.

Domijan, George. "Historic American Engineering Record: Bunker Hill Lead Smelter." 1993.

______. "Historic American Engineering Record: Sullivan Electrolytic Zinc Plant." 1993.

______. "Land Status and Mining Development in the Coeur d'Alene Mining District of Northern Idaho." Master's thesis, University of Idaho, Moscow, 1986.

Douglas, Edwin B. "Current Program Aims at Cobalt Production in 1951." In George A. McDowell, *52nd Annual Report of the Mining Industry of Idaho*, 1950.

"Dredging Yankee Fork: With Tools Designed for That Difficult Mining Problem." *Mining World* (November 1940): 2–10. Association Archives, Land of the Yankee Fork State Park, Challis, ID.

Druss, Claudia. *A History of Mining on Bismarck Mountain, 1870–1949*. n.p.: Basin & Range Research, 1988.

Dryden, Cecil. *The Clearwater of Idaho.* New York: Carlton Press, 1972.

Earls, Amy C., Robert R. Kautz, Patrick O'Neill, Dan Scurlock, Jason D. Marmor, Susan Perlman, and Brian S. Schaffer. *Leesburg Historic Mining District, Lemhi County, Idaho, A Cultural Resource Investigation*. Reno, NV: Mariah Associates, Inc.,1993.

Egleston, T. *The Treatment of Fine Gold in the Sands of the Snake River, Idaho.* New York: American Institute of Mining Engineers, 1890.

Elliott, Wallace W. *History of Idaho Territory, Showing Its Resources and Advantages*. San Francisco: Wallace W. Elliott Co., 1884.

Elsensohn, Alfreda. *Idaho Chinese Lore.* Caldwell, ID: Caxton Printers, Ltd., 1970.

Fahey, John. *The Days of the Hercules*. Moscow: University of Idaho Press, 1978.

______. *Hecla: A Century of Western Mining.* Seattle: University of Washington Press, 1990.

______. *The Inland Empire, Unfolding Years, 1879–1929.* Seattle: University of Washington Press, 1986.

Fahrenwald, A. W. *The Recovery of Gold from Its Ores.* Moscow: Idaho Bureau of Mines and Geology Pamphlet 37, 1932.

"Farmers Against Miners." *Spokane (WA) Press*, August 21, 1905.

Federal Writers' Project. *Idaho, A Guide in Word and Picture*. Caldwell, ID: Caxton Printers, 1937.

Fee, Jeffrey Michael. "A Dragon in the Eagle's Land: Chinese in an Idaho Wilderness, Warren Mining District, ca. 1870–1900." Master's thesis, University of Idaho, Moscow, 1991.

Fell, James E., and Eric Twitty. "National Register of Historic Places Multiple Property Documentation Form: The Mining Industry in Colorado." n.p.: National Park Service, 2008.

Finch, John Wellington, ed. *Ore Deposits of the Western States*. New York: American Institute of Mining and Metallurgical Engineers, 1933.

Finlay, James Ralph. *The Mining Industry of the Coeur d'Alenes, Idaho*. New York: American Institute of Mining and Metallurgical Engineers, 1902.

Francaviglia, Richard V. *Hard Places: Reading the Landscape of America's Historic Mining Districts.* Iowa City: University of Iowa Press, 1991.

French, Hiram T. *History of Idaho: A Narrative Account of Its Progress, Its People and Its Principal Interests.* Chicago: Lewis Publishing Co., 1914.

Frey, Rodney. "Coeur d'Alene (Schitsu'umsh)." University of Washington, American Indians of the Pacific Northwest Collection. Accessed October 2, 2024, https://content.lib.washington.edu/aipnw/frey.html.

Fulkerson, Frank B. *Economic Aspects of Silver Production in the Coeur d'Alene Mining Region, Shoshone County, Idaho*. n.p.: U.S. Bureau of Mines Information Circular 8207, 1964.

Gardner, R. Duncan. *Milling Methods and Costs at the Harmony Mines, Baker, Idaho*. n.p.: U.S. Bureau of Mines Information Circular 6285, 1930.

Gillerman, Virginia S. *Rare Earth Elements and Other Critical Metals in Idaho.* GeoNote 44. Idaho Geological Survey. Moscow: University of Idaho, 2011.

"Gold Mines of Cariboo Mountain." *Idaho Yesterdays* 19 (Winter 1976).

Goulder, William A. *Reminiscences: Incidents in the Life of a Pioneer in Oregon and Idaho*. Boise, ID: Timothy Regan, 1909.

Gray, Dale. "National Register of Historic Places Nomination form for Elk City Wagon Road (draft)." 1999.

Grayson, Robin. "Bucket-Line Gold Dredges: A Review of World Techniques." *World Placer Journal* 8 (2008): 1–41. https://www.researchgate.net/publication/202236459_Bucket-line_gold_dredges_-_a_review_of_world_techniques.

Hardesty, Donald L. *The Archaeology of Mining and Miners: A View from the Silver State*. Special Publication Series 6. Ann Arbor, MI: Society for Historical Archaeology, 1988.

______. *Mining Archaeology in the American West.* Lincoln: University of Nebraska Press, 2010.

______. "Power and the Industrial: Mining Community in the American West." In A. Bernard Knapp, Vincent C. Pigott and Eugenia W. Herbert, *Social Approaches to the Industrial Past: The Archaeology and Anthropology of Mining*. London: H. B. Routledge, 1998.

Hardesty, Donald L., and Barbara J. Little. *Assessing Site Significance, A Guide for Archaeologists and Historians.* Walnut Creek, CA: Alta Mira Press, 2000.

Hart, Patricia, and Ivar Nelson. *Mining Town: The Photographic Record of T. N. Barnard and Nellie Stockbridge from the Coeur d'Alenes.* Seattle: University of Washington Press, 1984.

Hawley, James H. *History of Idaho, the Gem of the Mountains.* 4 vols. Chicago: S. J. Clarke Pub. Co., 1920.

Hovis, Logan W. "Historic Mining Sites: A Typology for the Alaskan National Parks." Unpublished manuscript on file, National Park Service, Alaska Regional Office, Anchorage, 1992.

Hubbard, Charles R. *A Survey of the Mineral Resources of Idaho*. Idaho Bureau of Mines and Geology Pamphlet 105, 1955.

Idaho Agricultural Experiment Station. *The Farming Business in Idaho*. Moscow: University of Idaho, 1927.

Idaho City Historical Society. "Historic Idaho City: Boom Town." Accessed October 2, 2024, https://idahocityhistoricalfoundation.org/?page_id=147.

Idaho State Historical Society (ISHS). "Four Stages in Idaho's Mining Development." Idaho State Historical Society Reference Series No. 4. Accessed October 16, 2024, https://history.idaho.gov/reference-series/.

______. *Idaho, An Illustrated History.* Boise: Idaho State Historical Society, 1976.

______. "Idaho's Gold Production." Idaho State Historical Society Reference Series No. 5. Accessed October 16, 2024, https://history.idaho.gov/reference-series/.
______. "Lode Mining Cultural Resources." Idaho State Historical Society Reference Series No. 1062, 1994. https://history.idaho.gov/reference-series/.
______. "Recovery Processes for Idaho Ores." Idaho State Historical Society Reference Series No. 380, 1966. https://history.idaho.gov/reference-series/.
______. "Site Report – Yankee Fork-Robinson Bar." Rev. January 1993. Idaho State Historical Society Reference Series No. 204, revised January 1993. https://history.idaho.gov/reference-series/.
Jackson, William Turrentine. "British Capital in Northwest Mines." *Pacific Northwest Quarterly* 47 (July 1956).
James, Ronald L. *Ruins of a World: Chinese Gold Milling at the Mon-Tung Site in the Snake River Canyon*. n.p.: U.S. Bureau of Land Management, Idaho Cultural Resource Series 4, 1995.
______. "Why No Chinamen are Found in Twin Falls." *Idaho Yesterdays* 36, no. 4 (1993).
Johnson, Chris. "Bunker Hill, The Company That Made a Town." *Idaho Yesterdays* 41, no. 1 (1997): 3–4.
Johnson, Josh. "Honoring the Legacy of Cecil D. Andrus in the White Clouds." October 18, 2021. https://www.idahoconservation.org/blog/honoring-the-legacy-of-cecil-d-andrus-in-the-white-clouds/.
Josephy, Alvin M., Jr. *The Nez Perce Indians and the Opening of the Northwest*. New Haven, CT: Yale University Press, 1965.
Kaas, Mike. "The Mining History of Bannack, Montana." Mining History Association (2011). https://www.mininghistoryassociation.org/Bannack.htm.
Kelly, Roger E., and Marsha C. S. Kelly. "Arrastras, Unique Western Historic Milling Sites." *Historical Archaeology* 17, no. 1 (1983).
Knapp, A. Bernard. "Social Approaches to the Archaeology and Anthropology of Mining." In A. Bernard Knapp, Vincent C. Pigott and Eugenia W. Herbert, *Social Approaches to the Industrial Past: The Archaeology and Anthropology of Mining*. London: H. B. Routledge, 1998.
Koschmann, A. H., and M. H. Bergendahl. *Principal Gold Producing Districts of the United States.* U.S. Geological Survey Professional Paper #610. Washington, DC: U.S. Government Printing Office, 1968.
Kowalewski, Michael. "Romancing the Gold Rush: The Literature of the California Frontier." *California History* 79, no. 2 (2000): 204–25.
LaLande, Jeffrey M. "Sojourners in the Oregon Siskiyous, Adaptation and Acculturation of the Chinese Miners in the Applegate Valley, ca. 1855–1900." Master's thesis, Oregon State University, Corvallis, 1981.
______. "Sojourners in Search of Gold: Hydraulic Mining Techniques of the Chinese on the Oregon Frontier." *Industrial Archaeology* 11, no. 1 (1985).
Lickes, Margaret R. *Mining, Processing, and Costs: Idaho Almaden Mercury Mine, Washington County, Idaho*. n.p.: U.S. Bureau of Mines Information Circular 7800, 1957.
Lingenfelter, Richard E. *The Hard-Rock Miners: A History of the Mining Labor Movement in the American West, 1863-1893.* Berkeley: University of California Press, 1974.
Link, Paul K., and Laura DeGrey-Ellis. "Sevier-Laramide Fold-Thrust Belt." *Digital Geology of Idaho*. Idaho State University. Edited by Dave Pearson. Accessed September 20, 2023, https://www.isu.edu/digitalgeologyidaho/fold-thrust-belt/.
Link, Paul K., Reed Lewis, Shubab Khan, and Keegan Schmidt. "Introduction." *Digital Geology of Idaho*. Idaho State University. Edited by Dave Pearson. Accessed September 20, 2023, https://www.isu.edu/digitalgeologyidaho/.
Livingston-Little, D. E. *Economic History of North Idaho, 1800–1900.* Los Angeles: *Journal of the West*, 1965.
London, Bill, and Charlie Powell. *Natural Wonders of Idaho: A Guide to Parks, Preserves, and Open Spaces.* Castine, ME: Country Roads Press, 1994.

Long, Keith R. *Production and Disposal of Mill Tailings in the Coeur d'Alene Mining Region, Shoshone County, Idaho, Preliminary Estimates*. Tucson, AZ: U.S. Geological Survey, U.S. Department of Interior, 1998.

______. "Tailings Under the Bridge: Causes and Consequences of River Disposal of Tailings, Coeur d'Alene Mining Region, 1886–1968." *The Mining History Journal* 8 (2001): 83–101. https://www.mininghistoryassociation.org/Journal/journal2001toc.htm.

Long, Keith R., Bradley S. Van Gosen, Nora K. Foley, and Danile Cordier. *The Principal Rare Earth Elements Deposits of the United States: A Summary of Domestic Deposits and a Global Perspective*. Washington, DC: U.S. Geological Survey, 2010.

Lorain, S. H., and O. H. Metzger. *Reconnaissance of Placer Mining Districts in Idaho*. n.p.: U.S. Bureau of Mines Information Circular 7023, 1938.

Magnuson, Richard G. *Coeur d'Alene Diary: The First Ten Years of Hardrock Mining in North Idaho*. Portland, OR: Metropolitan Press, 1968.

Marshall, Anne L. "Coeur d'Alene's Old Sacred Heart Mission." *SAH Archipedia*. Edited by Gabrielle Esperdy and Karen Kingsley. Charlottesville: University of Virginia Press, 2012. https://sah-archipedia.org/buildings/ID-01-055-0008.

McAlester, Virginia Savage. *A Field Guide to American Houses: The Definitive Guide to Identifying and Understanding America's Domestic Architecture*. New York: Alfred A. Knopf, 2018.

McClelland, Linda Flint, J. Timothy Keller, Genevieve P. Keller, and Robert Z. Melnick. *National Register Bulletin 30: Guidelines for Evaluating and Documenting Rural Historic Landscapes*. Washington, DC: National Park Service, 1997.

McGinnis, Andy. "Blood in the Salmon River Mountains: Sheepeater War." 2023. https://www.intermountainhistories.org/items/show/180.

McKay, Kathryn L. *Gold for the Taking: Historical Overview of the Florence Mining District, Idaho County, Idaho*. n.p.: U.S. Forest Service, Northern Region, 1998.

______. *Mining Idaho's History: Metal Mining in Idaho, 1860–1960*. Edited by Elizabeth J. Cunningham. Boise: Idaho State Historical Society, 2011.

McKinney, Gage. "Order L-208: The Closing of America's Gold Mines during World War II." *Mining History Journal* 25 (2018). https://www.mininghistoryassociation.org/Journal/MHJ-v25-2018-McKinney.pdf.

Meyerriecks, Will. *Drills and Mills: Precious Metal Mining and Milling Methods of the Frontier West.* n.p.: Will Meyerriecks, 2002.

Miller, Charles W., Jr. *The Automobile Gold Rushes and Depression Era Mining*. Moscow: University of Idaho Press, 1998.

Miller, P., and B. Van Fossen. *Spokane House and its History*. Olympia: Washington State Parks and Recreation Department, 1978.

Mitchell, Victoria E. *History of Selected Mines in the Pine Creek Area, Shoshone County, Idaho*. Moscow: Idaho Geological Survey, 2000.

Montgomery, James M., Consulting Engineers, Inc. *Cultural Resources Inventory/Assessment Package Environmental Impact Statement, Stibnite Mining Project Gold Mine and Mill*. 1981.

Mooney, Charles. *Burke: The Elusive Dream.* Monee, IL: Charles Mooney, 2023.

Mullan, Captain John C. *Report on the Construction of a Military Road from Fort Walla-Walla to Fort Benton.* Washington, DC: Government Printing Office, 1863.

Mullin, Larkin. "Mullan, Idaho." 2014. https://spokanehistorical.org/items/show/490.

Murray, Sharon. "A Bucket Full, Boise Basin's Dredging Heritage, 1898–1951." *Idaho Yesterdays* 34 (Fall 1990).

National Park Service. *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*. Washington, DC: National Park Service, 1997.

______. *National Register Bulletin 16B: How to Complete the National Register Multiple Property Documentation Form*. Washington, DC: National Park Service, 1991; Rev. 1999.

______. "Sullivan Electrolytic Zinc Plant, Government Gulch, Kellogg, Shoshone County, ID." Historic American Engineering Record, 1993. From Prints and Photographs Division, Library of Congress. https://www.loc.gov/pictures/collection/hh/item/id0250/.

Navin, Thomas R. *Copper Mining and Management*. Tucson: University of Arizona Press, 1978.

Nez Perce Tribe. "History." 2018. https://nezperce.org/about/history/.

Noble, Bruce J., Jr., and Robert Spude. *National Register Bulletin 42: Guidelines for Identifying, Evaluating, and Registering Historic Mining Properties*. Washington, DC: National Park Service, 1997.

Norlen, Art. *Death of a Proud Union: The 1960 Bunker Hill Strike.* Cataldo, ID: Tamarack Publishing, 1992.

Oberbillig, Ernest. "Mining in Idaho." Idaho State Historical Society Reference Series No. 9, revised 1985. https://history.idaho.gov/reference-series/.

O'Brien Reed, Kate. "National Register of Historic Places Nomination form for Chinese Sites in the Warren Mining District." Washington, DC: National Park Service, 1990.

Occupational Safety and Health Administration. "50 Years of Workplace Safety and Health." U.S. Department of Labor, 2024. https://www.osha.gov/osha50.

Olsen, Gregg. *The Deep Dark: Disaster and Redemption in America's Richest Silver Mine*. New York: Three Rivers Press, 2005.

"On Coeur d'Alene Lake, Idaho." *Industrial Worker* (Spokane, WA), June 17, 1909. https://www.marxists.org/history/usa/pubs/industrialworker/iw/v1n14-jun-17-1909-IW.pdf.

Onderdonk, James Lawrence. *Idaho, Fact and Statistics Concerning Its Mining, Farming, Stock-raising, Lumbering and Other Resources and Industries.* San Francisco: A. L. Bancroft and Co., 1885.

Packard, Howard A. *Gold Dredge on the Yankee Fork.* Great Falls, MT: Yankee Fork Publishing Co., 1983.

Paul, Rodman W. *Mining Frontiers of the Far West, 1848–1880.* New York: Holt, Rinehart, and Winston, 1963.

Peele, Robert. *Mining Engineers' Handbook*. Volume 2. New York: John Wiley & Sons, 1918.

Petersen, Keith C. *John Mullan: The Tumultuous Life of a Western Road Builder*. Washington State University Press, 2014.

Peterson, Richard H. "Simeon Gannett Reed and the Bunker Hill and Sullivan: The Frustrations of a Mining Investor." *Idaho Yesterdays* 23 (Fall 1979).

Pfleider, Eugene P., ed. *Surface Mining*. New York: American Institute of Mining, Metallurgical and Petroleum Engineers, Inc., 1968.

Popoff, Constantine C. *Hermada Antimony Deposit, Elmore County, Idaho*. n.p.: U.S. Bureau of Mines Report of Investigations 4950, 1953.

Quivik, Fredric L. *Expert Report of Fredric L. Quivik: United States v. ASARCO, et al.* Civil Action 96-0122-N-EJL, 1999.

Rabbitt, Mary C. *The United States Geological Survey: 1879–1989.* U.S. Geological Survey Circular 1050. Washington, DC: U.S. Government Printing Office, 1989

Ransome, Frederick Leslie, and Frank Cathcart Calkins. *The Geology and Ore Deposits of the Coeur d'Alene District, Idaho.* U.S. Geological Survey. Washington, DC: Government Printing Office, 1908.

Reed, Billy. Interview by the author. Yankee Fork Dredge, Stanley, ID. September 9, 2020.

Reed, John C. *Early and Recent Mining Activity in North-Central Idaho*. n.p.: Idaho Bureau of Mines and Geology Press Bulletin 18, 1936.

______. "Geology and Ore Deposits of the Florence Mining District, Idaho County, Idaho." U.S. Geological Survey Pamphlet No. 46. Moscow: University of Idaho, 1939.

Renk, Nancy. “National Register of Historic Places Nomination form for the Wallace Historic District.” n.p.: National Park Service, Department of the Interior, 1983. https://npgallery.nps.gov/NRHP/GetAsset/cfb4432e-8ba4-4843-8574-3342d0422b0a.

Renk, Thomas B. “National Register of Historic Places Nomination form for Bayhorse.” Washington, DC: National Park Service, Department of the Interior, 1976.

Richardson, Camilla. “1878 Bannock War and Chief Buffalo Horn.” 2023. https://www.intermountainhistories.org/items/show/412.

Rickard, T. A. *The Stamp Milling of Gold Ores.* New York: Engineering and Mining Journal, 1903.

Rohe, Randall E. “After the Gold Rush: Chinese Mining in the Far West, 1850–1890.” *Montana: The Magazine of Western History* 32 (Fall 1982).

______. “The Geographical Impact of Placer Mining in the American West, 1848–1974.” PhD dissertation, University of Colorado, Boulder, 1978.

______. “The Geography and Material Culture of the Western Mining Town.” *Material Culture* 16 (Fall 1984).

______. “Hydraulicking in the American West, The Development and Diffusion of a Mining Technique.” *Montana: The Magazine of Western History* 35 (Spring 1985)

______. “Origins and Diffusion of Traditional Placer Mining in the West.” *Material Culture* 18 (Fall 1986).

Romig, Robert L. “The South Boise Quartz Mines, 1863-1892, A Study in Western Mining Industry and Finance.” Master’s thesis, University of California, Berkeley, 1959.

Ross, Clyde P. *The Copper Deposits Near Salmon, Idaho*. n.p.: U.S. Geological Survey Bulletin 774, 1925.

______. *A Graphic History of Metal Mining in Idaho*. U.S. Geological Survey, Contributions to Economic Geology 821-A, 1930.

______. *Mining History of South-Central Idaho*. U.S. Geological Survey. Moscow: Idaho Bureau of Mines and Geology, 1963.

Rossillon, Mitzi. “Impact Mitigation for Select Historic Features at the Park Mines (24BW210), Broadwater County, Montana.” Prepared by Renewable Technologies, Inc., for Montana Department of Environmental Quality, 1998.

Rossillon, Mitzi, and Dale Martin. “In Dubious Gravel, Placer Gold for the Unemployed?” Paper presented at the Montan History Conference, Helena, October 27, 1995.

S. M. Barton & Associates. *Report on Musselshell Placers, Clearwater County, Idaho*. Boise, ID: S. M. Barton & Associates, 1950.

Schiach, William S., John M. Hendersen, and Harry B. Averill. *An Illustrated History of North Idaho Embracing Nez Perces, Idaho, Latah, and Shoshone Counties, State of Idaho.* Chicago: Western Historical Publishing, 1903.

Schmidt, Keegan, and Paul K. Link. “Accreted Terranes and the Salmon River Suture Zone.” *Digital Geology of Idaho*. Idaho State University. Edited by Dave Pearson. Accessed September 20, 2023, https://www.isu.edu/digitalgeologyidaho/accreted-terranes/.

Schulze, H. W. “A Brief History of the Sunshine Mine Operations.” *The Coeur d’Alene Mining District in 1963, Pamphlet 133.* Moscow: Idaho Bureau of Mines and Geology, 1963.

Schwantes, Carlos A. *In Mountain Shadows: A History of Idaho*. Lincoln: University of Nebraska Press, 1991.

Scott, Rachel. “Yes, Sir, This Has Certainly Been Considered a Safe Mine.” *The Atlantic* (December 1972). https://www.theatlantic.com/magazine/archive/1972/12/-yes-sir-this-has-certainly-been-considered-a-safe-mine/304565/.

Shenon, Philip J. “The Coeur d’Alene Mining District.” In *Guidebook to the Geology of the Coeur d’Alene Mining District*. Moscow: Idaho Bureau of Mines and Geology, 1961.

Shenon, Philip John, and Roy P. Full. *An Evaluation Study of the Mineral Resources in the Lands Ceded to the United States by the Nez Perce Tribe of Indians on April 17, 1867*. 4 vols. Nez Perce Tribe vs. United States of America, Indian Claims Commission Docket 175–180.

Shenon, P. J., and R. H. McConnel. "The Silver Belt of the Coeur d'Alene District, Idaho." U.S. Geological Survey Pamphlet No. 50. Moscow: University of Idaho, 1939.

Shoshone-Bannock Tribes. "Culture and History." 2023. https://www.sbtribes.com/about/.

Sims, Cort. "National Register of Historic Places Registration form for Mullan Road." 1990. On file at the Idaho State Historical Society, Boise.

Sisson, David. *Pine Creek Rehabilitation Project, ID6-96-43*. Prepared for Bureau of Land Management, Coeur d'Alene District, 1996.

Smith, Elizabeth M. *History of the Boise National Forest, 1905–1976.* Boise: Idaho State Historical Society, 1983.

Smith, Robert Wayne. *The Coeur d'Alene Mining War of 1892*. Corvallis: Oregon State College, 1960.

Snow, Bradley Dean. "Living with Lead: An Environmental History of Idaho's Coeur d'Alenes, 1885–2011." PhD dissertation, Montana State University, Bozeman, 2012.

Spence, Clark C. *British Investments and the American Mining Frontier, 1860–1901.* Moscow: University of Idaho Press, 1995.

______. "The Golden Age of Dredging: The Development of an Industry and Its Environmental Impact." *Western Historical Quarterly* 11 (October 1980).

______. *A History of Gold Dredging in Idaho*. Boulder: University Press of Colorado, 2016.

Spier, Robert F. G. "Food Habits of Nineteenth Century California Chinese." *California Historical Society Quarterly* 37 (1958).

"Spokane Companies Involved." *Spokane (WA) Press*, March 24, 1904.

Staley, W. W. *Gold in Idaho.* Idaho Bureau of Mines and Geology Pamphlet 68, 1946.

Stapp, Darby Campbell. "The Historic Ethnography of a Chinese Mining Community in Idaho." PhD dissertation, University of Pennsylvania, Philadelphia, 1990.

Stephens, George C. "Field Guides to the Quaternary Geology of Central Idaho: Part C History of Gold Mining on the Yankee Fork River, Custer County." In *Guidebook to the Geology of Central and Southern Idaho*, edited by P. K. Link and W. R. Hackett. *Idaho Geological Survey Bulletin* 27 (April 1991): 223–26.

Stevenson, Ian Max, and Nicole Blanchard. "They Make 'The Heart Beat Faster.' How Idaho Preserved Sawtooth Mountains 50 Years Ago." *Idaho Statesman*, August 11, 2022. Updated February 13, 2024, https://www.idahostatesman.com/news/local/environment/article263113678.html.

Storch, R. H. *Ilmenite and Other Black-Sand Minerals in the Gold Fork Placer Deposit, Valley County, Idaho*. n.p.: U.S. Bureau of Mines Report of Investigations 6319, 1963.

Stout, Koehler S. *Mining Methods & Equipment.* Chicago: Maclean Hunter Publishing Company, 1989.

Straub, Kristen, and Paul K. Link. "Columbia River Basalts." *Digital Geology of Idaho*. Idaho State University. Edited by Dave Pearson. Accessed September 20, 2023, https://www.isu.edu/digitalgeologyidaho/crb/.

"Sunshine Mine Disaster 1972." *Yellow Pine Times*, April 2, 2023. https://yellowpinetimes.wordpress.com/2023/04/02/idaho-history-apr-2-2023/.

Swanson, Kenneth J. *Thunder Mountain Mining Project Cultural Resource Investigation*. Prepared for James M. Montgomery, Consulting Engineers, 1984.

Tapanila, Lori, and Paul K. Link. "Mesoproterozoic Belt Supergroup." *Digital Geology of Idaho*. Idaho State University. Edited by Dave Pearson. Accessed September 20, 2023, https://www.isu.edu/digitalgeologyidaho/belt/.

Teske, A. J., Charles W. Sweetwood, Merle W. Wells, Rolland R. Reid, J. M. Whiting, Joseph Newton, and E. F. Cook. *Idaho's Mineral Industry: The First Hundred Years*. Idaho Bureau of Mines and Geology Bulletin No. 18. Moscow: Idaho Bureau of Mines and Geology, 1961.

Todd, A. C. "Cousin Jack in Idaho." *Idaho Yesterdays* 8 (Winter 1964–1965).

Trimble, William J. *The Mining Advance into the Inland Empire.* Madison: Bulletin of the University of Wisconsin 638, 1914.

Trull, Fern Coble. "The History of the Chinese in Idaho from 1864–1910." Master's thesis, University of Oregon, Eugene, 1946.

Twitty, Eric. *Riches to Rust: A Guide to Mining in the Old West.* Lake City, CO: Western Reflections Publishing, 2002.

Umpleby, J. B. *Geology and Ore Deposits of Lemhi County, Idaho*. U.S. Geological Survey Bulletin 528, 1913.

U.S. Bureau of the Census. *Thirteenth Census of the United States Taken in the Year 1910: Statistics for Idaho*. Washington, DC: Government Printing Office, 1913.

U.S. Bureau of Mines. *Blue Wing Mining District, Lemhi County, Idaho, Tungsten*. Washington, DC: U.S. Bureau of Mines, 1943.

______. *Bonanza (Hermes) Mercury Mines, Valley County, Idaho*. n.p.: U.S. Bureau of Mines War Minerals Report 106, 1943.

______. *Empire Mine, Mackay, Custer County, Idaho, Copper*. War Minerals Report 267, 1944.

U.S. Environmental Protection Agency (EPA). "Administration Proposes Hazardous Waste Cleanup Fund." Press release, June 13, 1979. https://www.epa.gov/archive/epa/aboutepa/administration-proposes-hazardous-waste-cleanup-fund.html.

______. "EPA Announces First 114 Top-Priority Superfund Sites." Press release, October 23, 1981. https://www.epa.gov/archive/epa/aboutepa/epa-announces-first-114-top-priority-superfund-sites.html.

______. "The Guardian: Origins of the EPA." EPA Historical Publication-1, 1992. https://www.epa.gov/archive/epa/aboutepa/guardian-origins-epa.html.

______. "Milestones in EPA and Environmental History." 2024. https://www.epa.gov/history/milestones-epa-and-environmental-history.

______. *Superfund CERCLA Compliance with Other Laws Manual: Part 2. Clean Air Act and Other Environmental Statutes and State Requirements*. OSWER Directive 9234.1-02, August 1989. Washington, DC: EPA, 1989.

______. "Superfund History." 2023. https://www.epa.gov/superfund/superfund-history.

______. "Superfund Site: Bunker Hill Mining & Metallurgical Complex Smelterville, ID." 2024. https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.Cleanup&id=1000195#bkground.

U.S. Geological Survey. *Mineral and Water Resources of Idaho*. Idaho Bureau of Mines and Geology Special Report 1, 1964.

______. "Sunshine Mine." Accessed October 16, 2024, https://mrdata.usgs.gov/mrds/show-mrds.php?dep_id=10241626.

Varley, Thomas, Clarence A. Wright, Edgar K. Soper, and Douglas C. Livingston. *A Preliminary Report on the Mining Districts of Idaho*. Washington, DC: U.S. Bureau of Mines Bulletin 166, 1919.

Waldbauer, Richard C. *An Historical and Archaeological Survey of the Hoodoo Mining District, Idaho*. n.p.: U.S. Forest Service Cultural Resources Report 7, 1981.

Walker, Deward E., Jr. *American Indians of Idaho*. Moscow: University of Idaho Press, 1971.

Wandschneider, Rich. "Nez Perce Treaties & Reservations: 1855 to Present." Josephy Library of Western History and Culture. Accessed September 2, 2023, https://library.josephy.org/nez-perce-treaties-exhibit/.

Wegars, Priscilla. "The History and Archaeology of the Chinese in Northern Idaho." PhD dissertation, University of Idaho, Moscow, 1991.

Wells, Merle W. *Boise: An Illustrated History.* Woodland Hills, CA: Windsor Publications, 1982.

______. *Gold Camps & Silver Cities*. n.p.: Idaho Bureau of Mines and Geology Bulletin 22, 1963.

______. "Idaho Military Posts and Camps." Idaho State Historical Reference Series No. 63, 1971. https://history.idaho.gov/reference-series/.

______. "Placer Mining Methods." Idaho State Historical Society Reference Series No. 99, 1964. https://history.idaho.gov/reference-series/.

______. *Rush to Idaho.* Idaho Bureau of Mines and Geology Bulletin 19. Moscow: Idaho Bureau of Mines and Geology, 1961.

______. "The Western Federation of Miners." *Journal of the West* 12 (January 1973).

Wells, Merle W., and Arthur A. Hart. *Idaho, Gem of the Mountains.* Northridge, CA: Windsor Publications, 1985.

Western Mining History. "Definition of a Mining District." 2023. https://westernmininghistory.com/library/38194/page1/.

Weston, Julie Whitesel. *The Good Times Are All Gone Now: Life, Death, and Rebirth in an Idaho Mining Town*. Norman: University of Oklahoma Press, 2009.

White, Paul J. *The Archaeology of American Mining.* Gainesville: University of Florida Press, 2017.

Wikoff, Melvin D. "Chinese in the Idaho County Gold Fields, 1864–1933." Master's thesis, Texas A&M University, College Station, 1972.

Wood, Caselle L. "Appendix E – Yankee Fork Historical Timeline." Salmon-Challis National Forest, South Zone Fish Program, U.S. Department of Agriculture, November 2011. https://www.usbr.gov/pn/fcrps/ce/idaho/uppersalmon/yf/Appendix%20E%20-%20Historical.pdf

Wunder, John. "The Courts and Chinese in Frontier Idaho." *Idaho Yesterdays* 25 (Spring 1981).

Wyman, Mark. "Mining Law in Idaho." *Idaho Yesterdays* 25 (Spring 1981).

Wyman, Walker De Marquis. "The Underground Miner, 1860–1910: Labor and Industrial Change in the Northern Rockies." PhD dissertation, University of Washington, Seattle, 1971.

York, Harold Albert. "The History of the Placer Mining Era in the State of Idaho." Master's thesis, University of Oregon, Eugene, 1939.

Young, Otis E., Jr. *Western Mining.* Norman: University of Oklahoma Press, 1970.

Yukon-Charley Rivers National Preserve. "What is Placer Gold Mining?" 2015. https://www.nps.gov/yuch/learn/historyculture/placer-mining.htm.

Zhu, Liping. *A Chinaman's Chance: The Chinese on the Rocky Mountain Mining Frontier.* Niwot: University Press of Colorado, 1997.

J. List of Idaho's Mining-Related NRHP-Listed Resources

The below listings comprise Idaho's previously NRHP-listed mining-related resources.

Name	NR Reference Number	Location
Assay Office	66000305	Boise, Ada County
Boise City-Silver City Road: Fick Property Segment	99000852	Kuna, Ada County
Swan Falls Dam and Power Plant	76000667	Murphy, Ada County
Hells Canyon Archaeological District	84000984	Cuprum, Adams County
Sawtooth City	750000625	Sun Valley, Blaine County
Placerville Historic District	84001029	Placerville, Boise County
Idaho City	75000626	Idaho City, Boise County
Orofino Historic District	82000384	Orofino, Clearwater County
Moore Gulch Chinese Mining Site	83000285	Pierce, Clearwater County
Bayhorse	76000671	Challis, Custer County
Custer Historic District	81000207	Custer, Custer County
Idaho Mining and Smelter Co. Store	05001601	Clayton, Custer County
Yankee Fork Gold Dredge	100006663	Stanley, Custer County
Atlanta Dam and Power Plant	77000459	Atlanta, Elmore County
Atlanta Historic District	78001059	Atlanta, Elmore County
South Boise Historic Mining District	75000629	Rocky Bar, Elmore County
Lower Salmon River Archaeological District	86002170	Cottonwood, Idaho County
Ah Toy Garden	90000893	Warren, Idaho County
Celadon Slope Garden	90000891	Warren, Idaho County
Chi-Sandra Garden	90000892	Warren, Idaho County
Chinese Cemetery	94000270	Warren, Idaho County
Gold Point Mill	00000792	Elk City, Idaho County
Old China Trail	90000894	Warren, Idaho County
Chinese Mining Camp Archeological District	94001018	Warren, Idaho County
Elk City Wagon Road - Vicory Gulch Smith Grade Segment	01000536	Elk City, Idaho County
Lake Pend Oreille Lime and Cement Industry Historic District	94001450	Lakeview and Bayview, Kootenai and Bonner Counties
Birch Creek Charcoal Kilns	72001577	Leadore, Lemhi County
Leesburg	75000634	Salmon, Lemhi County
Delamar Historic District	76000679	Silver City, Owyhee County
Silver City Historic District	72000446	Silver City, Owyhee County
Braddock Gold Co. Log Building & Forge Ruins	85002157	Thunder City, Valley County
Stibnite Historic District	87001186	Yellow Pine, Valley County
Miner's Hat	100007007	Kellogg, Shoshone County
John C. Feehan House	80001334	Murray, Shoshone County
Murray Courthouse	78001098	Murray, Shoshone County
Murray Masonic Hall	87000774	Murray, Shoshone County

K. Attachment 1 – Glossary[461]

ADIT - A mostly horizontal passage driven from the surface for the working, ventilation, or dewatering of a mine. An adit has only one opening, as distinguished from a tunnel.
AERIAL TRAMWAY - A system for the transportation of ore or rock in buckets that are suspended from a continuous cable system.
ALLUVIAL DEPOSIT - Clay, silt, sand, and gravel transported by flowing water and deposited in comparatively recent geological time as sediments in river beds, estuaries, flood plains, on lakes, shores, and in fans at the base of mountain slopes.
AMALGAM - An alloy of mercury with gold or another metal in the form of a soft putty. In the case of placer gold, a "dry" amalgam is one from which all excess mercury has been removed by squeezing through chamois leather and containing nearly equal proportions of gold and mercury.
AMALGAMATION - The process of using mercury to extract gold or silver from pulverized ore. The mercury combines with the gold and silver to form an amalgam; the amalgam is then heated to vaporize the mercury and leave the gold or silver as a residue. The mercury can be condensed from the vapor and re-used.
APEX - The legal name for the top of a vein in place (in most cases this is underground).
ARRASTRA - A circular mill for grinding ores, employed in the processing of gold and silver ores; a crushing mill. Heavy drag stones were dragged over the mixture of ore and mercury using a horse, water wheel, steam, or gasoline engine for power. As the ore was crushed, the free gold was amalgamated. The gold-containing amalgam was then dug from between the cobblestones forming the circular path.
ASSAY - To determine the amount and value of metal contained in an ore using a quantitative chemical analysis. The content, type, or quality of metal in an ore was tested, or "assayed," by an experienced assayer using various methods, including fire assay or acid tests.
ASSESSMENT WORK - Annual work done on an unpatented mining claim, required by federal mining laws for the maintenance of title to a claim.
BAGHOUSE - Pollution-control device that prevented particulates from being emitted from a smelter stack.
BALL MILL - A rotating horizontal cylinder in which nonmetallic materials were ground using various types of grinding media such as quartz pebbles, porcelain balls, or steel balls. Ball mills were fine crushers; they followed primary crushers.
BASE METAL - Copper, lead, zinc, and other common industrial metals.
BATHOLITH - A large body of intrusive, igneous, granitic rock crystallized at a considerable depth below the earth's surface.
BED - A seam, or horizontal vein of ore.
BEDROCK - The solid rock that underlies soil or gravel.
BENCH PLACER - Gravel deposits in ancient stream channels and flood plains that stand from fifty to several hundred feet above the present streams.
BENCHES - Concentric level terraces in an open-pit mine. The mineral or waste is removed in successive layers, each of which is a bench.
BENEFICIATION - See "Ore beneficiation."
BLACK SANDS - Sands that contain minerals of tin, tungsten, titanium, nickel, cobalt, and iron that are commonly found on stream and river banks and seashores.
BLAST FURNACE - A columnar furnace in which mixed charges of oxide ores, fluxes, and fuels are blown with a continuous blast of hot oxygen-enriched air in order to chemically reduce metals to their metallic state. The air blast melts the ore and fluxes, and metal and slag are separated.

[461] McKay, *Mining Idaho's History*, 124–30.

BLASTING - In underground mining, forcing off portions of rock by means of blasting powder. A hole is made with a borer, gunpowder is inserted and tamped in, and a fuse is attached and lit.
BOOMING - A technique used at placer claims where the water supply was not plentiful. It involved accumulating water with dams and reservoirs and the sudden release of a large supply of water to excavate placer gravels from a hillside.
BUCKET - In mining, an enlarged metal or wooden bucket used to haul matter out of a mine shaft. Sometimes used to carry miners.
BUDDLE - A pan with a rapidly spinning agitator into which tailings or water from ore dressing passes before it runs off.
BULLION - Uncoined gold and silver, often sent to the U.S. Mint for final refining.
CAGE - A frame with one or more platforms used to hoist men, supplies, and ore up and down a vertical mine shaft.
CHARCOAL KILN - A furnace in which wood was reduced to charcoal. The charcoal was used in smelting gold and silver ore. Also known as charcoal oven.
CHILEAN MILL - A milling system similar to an arrastra but using a large stone or iron-shod wheel in place of drag stones to nip and crush ore.
CHINA PUMP - A water-powered sump using a chain or belt of paddles or buckets used to divert streams from a mining site; an irrigation device native to southeast China.
CHLORIDES - Silver ore lying above the water table where exposure to the atmosphere converts silver sulphurets to chlorides; a compound of chlorine and silver.
CHLORINATION - A chemical method of removing gold from its gangue by the injection of chlorine gas into milled and roasted ore.
CHURN DRILLING - A drilling method used primarily for exploratory work. Churn drills were a cable tool rig often used for placer evaluations, drilling blast holes at open pit operations, and water well drilling.
CHUTE - See “Ore Chute.”
CLAIM - See “Mining Claim.”
CLAIM MARKER - A post, tree, rock cairn, or other marker placed at each corner and at the center of a claim.
CLASSIFIER - A device for dividing and grading crushed ore in a mill.
CLEAN-UP - The periodic recovery of amalgam from a sluice box or other gold-recovery device used to separate gold from sand, gravel, and other materials.
COKE - The product obtained from fixed carbon and incombustible material after strongly heating bituminous coal out of contact with air and driving off the volatile constituents.
COLLAR - Timbering or concrete around the mouth or top of a shaft.
COMPLEX ORE - An ore containing a number of minerals of economic value. It usually implies an ore whose valuable metals are difficult to recover.
CONCENTRATE - Ore that has been crushed and has had waste rock partially removed.
CONCENTRATOR/CONCENTRATION - A device or process for reducing the values in an ore into a smaller bulk in order to reduce the expense of further treatment and shipment to a smelter. Sluicing of placer ground was the earliest form. Hand-sorting of ore to obtain a higher grade was probably the most commonly used. In concentrating mills the ore was crushed, screened to the proper size, and then passed over vibrating tables to separate the heavier metals from the gangue. Concentrators included jigs, vanners, and Wilfley tables.
CONTACT METAMORPHISM - This occurs when country rock is intruded by a body of magma. Changes to the surrounding rocks occur because of penetration by the magmatic fluids and heat from the intrusion.
CORNISH PUMP - A very early steam-powered mine pump for removing water from underground workings, invented for the Cornish tin mines of England, that consisted of a steam engine that operated a walking beam. If the shaft was greater than 300 feet deep, an additional pump had to be installed.

COUNTRY ROCK - The rock surrounding a vein or lode, also known as waste rock or gangue.
CRIBBING - Close timbering, as the lining of a shaft. In placer work, cribbing may be needed to support the walls of a shaft, or a test pit put down in loose or wet ground.
CROSS-CUT - A horizontal opening driven at right angles to the direction of the lode to connect major workings, used for access, exploration, communication, and ventilation.
CRUCIBLE - A small refractory vessel for melting or calcinating ores and metals.
CRUSHING - Grinding ore or quartz by stamps, crushers, or rolls. Various types include Chilean mills, stamp mills, jaw crushers, ball mills, rod mills, and tube mills.
CUSTOM MILL - A refinery, smelter, or concentrator. In a custom plant, the processing is done on a fee basis with ownership of the metal technically remaining with the customer.
CYANIDE PROCESS/CYANIDATION - A method of extracting precious metals from low-grade ore or tailings by dissolving gold and silver in a solution of alkaline cyanide. The process was first used in the United States in 1892. The practice consisted of fine grinding of the entire tonnage in a roller, tube, rod, or ball mill. The crushed ore passed to leaching tanks. A solution of sodium or potassium cyanide was placed in the tank with the ore. The ore then gave up the silver or gold mineral into the solution. The gold was retrieved in zinc boxes (or by other methods of precipitation) where the precious metals were precipitated. The precipitate was smelted and refined into gold and silver bullion.
DAM - A barrier to confine or raise water for storage or diversion or to create a hydraulic head. A dam may also be a barrier to keep water from mine workings.
DEVELOPMENT - Driving openings into a proved ore body to prepare it for full-scale mining.
DIAMOND DRILLING - Method of drilling vertical or angled holes in overburden and ore deposits. Generally powered by gas or diesel engine with water as the drilling medium. Produces a core one to three inches in diameter.
DIKE - A tabular, nearly vertical wall-like rock body, generally igneous in origin, that cuts across surrounding rock strata; a well-defined and mineralized shear zone.
DIP - The inclination of the vein downward into the earth, compared to a horizontal plane (a 90-degree dip is vertical). Dip is a term used to describe the extent and direction of tilting of fractures and layering of rock.
DISSEMINATED ORE - Ore in which the metal-bearing particles are sparsely scattered through a rock mass.
DITCH - An artificial water course to convey water for mining. The ditch is dug into the earth.
DOUBLE JACKING - In underground mining, a method of hand drilling the holes to place dynamite. Two miners work together, one holding the drilling bit (or steel) in place with two hands while the second miner swings a sledgehammer.
DRAGLINE DREDGE - Power-shovel excavator with floating washing plants or special amalgamators.
DREDGE - A floating placer mine operation on a large raft or barge. Buckets or suction pumps scooped up sands and gravels that were then screened, sorted, and sluiced. Gold stayed in the sluice boxes while waste gravels and sand were washed back into the creek or sent by conveyor to stacks in the creek bed behind [the dredge]. A dredge was first successfully worked in the United States at the Bannack Mining District, Montana, in 1895.
DRIFT - A small tunnel run from the main tunnel or shaft to prospect for the pay load or block out the ground to facilitate its working. Drifts follow a vein or ore body.
DRIFT MINING - A variety of underground methods used to work alluvial deposits. Because it is so much more expensive than sluicing or hydraulicking, it tends to be used only on richer deposits.
DROSSING - Refers to the scum that forms on molten metals as a result of either oxidation or the rise of impurities to the surface.
DUMP - The place where the waste rock or tailings are put after being taken from the mine.

ELECTROLYTIC REFINING - The process of refining metals by casting them into anodes that are placed in an electrolyte consisting, usually, of a salt of the same metal dissolved in water. An electric current causes the pure metal to deposit on the cathode. Similarly, an electrically inert anode will result in deposition of the metal on the cathode from a purified solution of a salt of the metal.
ELEVATOR - In hydraulic mining, a pipe used to move placer deposits or tailings to a higher elevation by means of pressurized water.
ENRICHED ORE - Ore in which the original metal content has been increased by the addition of more metal brought down by descending surface waters. The water leaches metals from oxidized upper portions of the ore bodies and deposits it in the lower, unoxidized portions.
EXPLORATION - The work involved in gaining an understanding of the size, shape, position, and value of an ore body.
FACE - The extreme end of a tunnel, drift, or excavation; the place where the mining work is prosecuted.
FAULT - A displacement or break in the earth's surface along which movement has taken place so that the veins are not continuous. Faults are caused by tensional, compressional, or shear forces.
FINES - Fine gold particles found in placer gravels.
FISSURE VEIN - Deposit of mineral matter in or along a fissure or fissure system (fissures are fractures and faults).
FLASK (MERCURY) - An iron bottle in which quicksilver is sent to market. One flask contains seventy-six pounds of mercury.
FLOTATION - The separation of minerals from each other and from waste matter by inducing (through the use of reagents) relative differences in their abilities to float in a liquid medium. The process will separate all metallic sulfides or elemental metals. If necessary, differential flotation can be used on complex ores. In such an ore, each sulfide mineral, such as copper, lead, and zinc, can be separated from the others.
FLUME - An elevated, inclined trough, usually made of wood, for conveying water.
FLUX - A chemical substance used in metallurgy to react with gangue minerals to form slags that are liquid at the furnace temperatures concerned and low enough in density to float on the molten bath of metal or matte.
FREE-MILLING ORE - Ores that contain free gold or silver that can be separated from its surrounding country rock by the relatively simple methods of crushing and amalgamation (without roasting or other chemical treatment).
FREIBERG PROCESS - Ore beneficiation method that combined roasting and amalgamation to extract values from ore. The process economized on both fuel and mercury, although it required more elaborate machinery than the patio process.
GANGUE - The general name for all the minerals that contain no metals or are non-commercial and waste materials in a vein. As much of this gangue as possible is removed by the processes of concentrating and smelting.
GAUGE (RAIL) - The distance between rails on a rail- road line. Spur lines serving mines were either standard or narrow gauge. Standard gauge is usually 4 feet 8.5 inches wide.
GIANT - A nozzle that is employed in hydraulic mining to direct water pressure against a gravel bank.
GLORY HOLE - A conical pit of large size whose sides, being unsupported in any way, tend to slump into their natural angle of repose. They can be created by the collapse of a stope, or by a controlled caving process. The bottom of a glory hole can be connected to a raise driven from an underground haulage level.
GRIZZLY - An iron or wooden grate or screen that prevents large rocks or boulders from entering a sluice or other gold recovery equipment.
GROUND SLUICE/GROUND SLUICING - A linear excavation within a placer mine, usually dug down to bedrock, that is used for gold recovery in lieu of or in addition to a wooden sluice system. A stream of water was directed across the floodplain by using stone walls and barriers.

GRUBSTAKE - Supplies provided by a business owner to a prospector in return for a negotiated share in his earnings. An agreement between the miner and a business owner whereby food, clothing, ammunition, and mining supplies would be furnished in exchange for a negotiated percentage of return on the miner's earnings.
HAUL ROAD - In open-pit mining, a road rising from the bottom of an open pit at an incline of 8–12 percent up and down which ore trucks move. The haul road may spiral out of the mine, or it may switch back and forth with hairpin curves.
HEAD DAM - Collects water from a drainage and directs it into the ditch system of a placer mining operation.
HEADBOX - A wooden structure next to a ditch and directly upslope from a hydraulic mine. The box, also called a pressure box or bulkhead, served as a small reservoir that fed ditch water into the steel pipe leading down to the mine.
HEADFRAME - A timber or steel structure erected at the top of a shaft to carry the pulleys over which the cable runs for hoisting the cage. It is braced to withstand the pull of the hoisting engine.
HEAP LEACHING - A recovery process in which prepared ore is stacked in heaps on impervious pads and a solvent percolated through the heap to dissolve selected metal values.
HEAVY METALS - Principally the metals zinc, copper, cobalt, and lead.
HIGH-GRADING - Stealing rich ore by carrying it out of the mine or by removing rich amalgam from a mill. Also, production of high-grade ore by sorting the ore.
HILLSIDE PLACER - A group of gravel deposits intermediate between creek and bench placers.
HOIST - An engine for raising ore, rock, or other materials from a mine and for lowering and raising men and materials. Any engine with a drum on which hoisting rope is wound.
HYDRAULIC MINING - The excavation of a bank of gold-bearing gravel by a jet of water that is discharged through a nozzle under great pressure. The nozzle was known as a "monitor" or a "giant." The gravel was carried away by the water and transported through sluices with riffles to catch the gold. Delivering the water required a complex system of dams, ditches, headbox, and hydraulic nozzle.
HYDRAULICKING - See "Hydraulic mining."
IGNEOUS ROCK - Rock that has solidified from an original molten state.
INCLINE - An adit run into a mine at an incline from a vertical.
INTRUSIVE - Molten material that crystallizes and solidifies at depth, never reaching the earth's surface before consolidation. The rock may be exposed later by erosion.
JAW CRUSHER - A primary crusher designed to reduce large rocks or ores to sizes capable of being handled by any of the secondary crushers. It consists of a moving jaw, hinged at one end, that swings toward and away from a stationary jaw in a regular oscillatory cycle.
JIG - A machine in which the feed is stratified in water by means of a pulsating motion and from which the stratified products are separately removed.
LAUNDER - A chute or trough for conveying pulp, water, or powdered ore in the milling process.
LEACHING - The removal of the more soluble minerals by percolating water, or extracting a soluble metallic compound from an ore by selectively dissolving it in a suitable solvent, such as water, sulfuric acid, hydrochloric acid, cyanide, etc.
LEDGE - A visible portion of rock that contains rich ore.
LEVEL - Passageways that connect on the same general horizontal plane; horizontal passage or drift into a mine from a shaft. It is customary to work mines by numbered levels.
LIXIVIATION - A process of removing silver from refractory ores that involves the roasting and chlorination of the ore, followed by leaching with water, and then leaching with certain chemicals to precipitate the final product.
LOCATION - A validly registered mining claim that has been shown to contain a valuable mineral deposit.
LODE - A fissure in rock filled with valuable mineral, usually a quartz vein.

LODE DEPOSIT - A tabular-shaped deposit of valuable mineral between definite boundaries. It may consist of several veins spaced closely together.
LODE MINING - The mining of an in-place vein or deposit of metalliferous minerals (can be surface or underground).
LONG TOM - A small, compact sluice box that was twelve feet long and made of two boxes. The lower end was closed but had a screen in the bottom of the last two feet. Water entered the upper end and washed the gravel through the screen. The remaining slurry dropped into the lower box and the gold was collected in the riffles of the second box.
MATTE - The metallic mixture that results from smelting sulphide ores.
METAMORPHIC - Metamorphic rocks have been transformed from preexisting rocks into texturally or mineralogically distinct new rocks by high temperature, high pressure, or chemically active fluids.
MILL - A mineral treatment plant in which crushing, grinding, and further processing of ore is conducted to produce a concentrate.
MILLSITE - Nonmineral public lands to be used as a mill site under the Mining Law of 1872, as amended, for the processing of ore for the development of a claim.
MILLING - See “Ore Beneficiation.”
MINERS’ INCH - The volume of water flowing through a 1-inch-square hole in a board 6 inches below the stream’s surface; 2.5 cubic feet of water per second equals 100 miners’ inches.
MINING CLAIM - A tract of land with defined surface boundaries that includes mineral rights to placer deposits or to all veins of ore extending downward from the surface. In the U.S., the maximum size for a lode claim is 600 by 1,500 feet; the maximum size for a placer claim is 600 by 1,320 feet. On an unpatented mining claim, full title has not been acquired from the U.S. government.
MINING DISTRICT - An indefinitely defined mining area with a code of mining laws and a recorder, established by a mining community for self-government.
MONITOR - See “Hydraulic Mining.”
MUCKING OUT - Shoveling into ore cars the ore and waste rock left by the blasting of an ore face.
OPEN CUT/OPEN PIT - Methods of mining ore in which the workings are open to the surface.
ORE - The portion of a mineral deposit containing valuable metals that can be mined at a profit.
ORE BENEFICIATION - The process of extracting metal from worthless rock (the gangue); may include crushing, grinding, chemical treatment, and smelting. The resulting concentrate contains most of the metals’ values.
ORE BIN - A metal or wooden structure used to store ore prior to shipment.
ORE BODY - A solid and fairly continuous mass of ore that may include low-grade ore and waste as well as high-grade materials.
ORE CAR - A mine car for carrying ore or waste rock.
ORE CHUTE - An inclined passage for moving ore from a higher level in a structure, usually a mill, to a lower level, or to an ore car or conveyor.
ORE DEPOSIT - A general term applied to rocks containing minerals of economic value in such amount that they can be profitably exploited. Also applied to deposits that may become profitable to work by change in the economic circumstances that control their value.
ORE WAGON - A wagon of heavy construction with high sides for hauling ore from a mine to a mill.
OUTCROP - The exposure at the ground’s surface of a vein of ore.
OVERBURDEN - Waste earth and rock covering a mineral deposit.
OXIDATION - Firing in a kiln or furnace at temperatures sufficient to complete combustion and give the product oxide colors.

PANNING - A simple placer mining technique that removes gold from placer deposits with only a shovel and a hand-held pan. As water, sand, and gravel are swirled in the pan, the lighter sand and gravel is washed over the rim and the heavier gold sinks to the bottom of the pan.
PATENT - A written title to land granted by the government after the claimant fulfills certain obligations.
PELTON WHEEL - A metal, water-powered wheel (with buckets divided and shaped to increase the revolving velocity) used to generate hydroelectricity from small streams. Pelton wheels were used to provide illumination and other electrical power to late-nineteenth century hydraulic mines.
PENSTOCK - In hydraulic mining, the main pipe that conducted water between a ditch and the “giant” nozzle, usually made of riveted sheet-metal segments; or a gate for regulating water flow.
PERCUSSION DRILLING - Drilling into rock with either a hammer drill or a piston drill. The earliest type–hammering on a hand-held drill steel–was replaced by drills powered by steam, using compressed air and water to clean the hole.
PIT, EXPLORATION OR PROSPECT - A small excavation to explore for minerals, usually less than ten feet deep.
PLACER - Alluvial deposit of sand or gravel eroded from original bedrock. The mineral concentration results from weathering processes.
PLACER MINING - The extraction of metals from alluvial gravel by removing the material without value. Simple hand techniques include panning, sluicing, rocking, and dry concentrating. More complex mechanized techniques such as dredging and hydraulic mining require more capital investment and allow lower-grade deposits to be worked profitably.
POCKET - Rich spot in a vein or deposit.
PORTAL - The surface entrance to a drift, tunnel, or adit.
POWER SHOVEL - An excavating and loading machine consisting of a digging bucket at the end of an arm suspended from a boom, which extends from the part of the machine housing the power plant. The bucket moves forward and upward when digging, so it does not usually excavate below the level at which it stands.
PRECIOUS METAL - Usually designated as gold, silver, and platinum.
PROSPECT - Any mine workings of unproven value; an excavation showing a deposit of ore. Includes shallow shafts, adits, trenches, and drill holes.
PROSPECT PIT - A pit dug to prospect mineral-bearing ground.
PULP - A mixture of ground ore and water capable of flowing through suitably graded channels as a fluid.
RAISE - In underground mining, a vertical or inclined opening or passageway driven upward to connect one mine working area with another at a higher level.
REAGENT - A chemical or solution used to produce a desired chemical reaction; a substance used in assay or flotation.
REESE RIVER PROCESS - Pan amalgamation after previous roasting.
REFRACTORY ORES - Ores that resist the action of chemical reagents in the normal treatment processes and that may require roasting or other means to affect the full recovery of the valuable minerals.
RETORT - A vessel with a long neck used for distilling mercury from amalgam.
RETORTING - Heating an amalgam of mercury and gold or silver to vaporize the mercury and leave the gold and silver as a residue.
REVERBERATORY FURNACE - A long flat furnace used in smelting copper concentrates. Its principal function is the slagging of gangue minerals and the production of matte.
RIFFLES - The lining of the bottom of a sluice, made of blocks or slats of wood or stones, arranged so that chinks are left between them. The riffles slow water flow over them and trap the gold contained in sands or gravels.

ROASTING - The treatment of ore by heat and air, or oxygen-enriched air, in order to oxidize the minerals, removing Sulphur and arsenic compounds in the process.
ROCKER - A short, sluice-like trough with a shallow hopper at its upper end. The rocker separates larger gravels from fine heavy elements and captures precious metals by rocking the gravels back and forth over a series of screens and riffles.
ROD MILL - A mill for fine grinding using long steel rods to grind the material.
ROTARY DRILLING Method of drilling vertical holes in overburden and ore bodies for exploration or for blasthole drilling. Generally ran on self-contained truck-mounted units.
RUSSELL PROCESS - A metallurgical process that extracts silver via a leaching process (lixiviation).
SEDIMENTARY ROCK - Sedimentary rock is derived from preexisting igneous, sedimentary, and metamorphic rocks. It is formed by lithification of sediments, precipitation from solution, and consolidation of the remains of plants or animals.
SHAFT - A vertical opening from the surface of a lode mine, either on a vein or through the country rock. Made to prospect or mine underground ore or to hoist miners and materials in and out of a mine. May be used only in connection with pumping or ventilating operations.
SHAFT COLLAR - The timbers by which the upper parts of a shaft are kept from falling in.
SHAFT HOUSE - A building at the mouth of a shaft where ore or rock is received from the mine.
SHAY LOCOMOTIVE - A type of railroad engine that was used throughout the West to haul carloads of ore or timber.
SHEAR - The tendency of forces to deform or fracture a rock in a direction parallel to the force, as by sliding one section against another.
SINGLE JACKING - In mining, a method of hand drilling the holes to place the dynamite. One miner, working alone, held the drilling bit in place with one hand, swinging a sledgehammer with his other hand.
SINKING - The driving or excavation of a shaft or winze.
SINTERING - The heat treatment of fine ore particles to produce larger pieces for blast furnace feed.
SKIM GOLD - A residual placer deposit that yields high values in gold.
SLAG - Molten, glassy waste from which metals have been removed by the smelting process.
SLIMES - Very small, solid particles that pass through a 400-mesh screen. The powdered ore is held in suspension in water so as to form a kind of thin mud.
SLUICE/SLUICE BOX - A series of inclined wooden or metal troughs, each of which were about twelve feet long and twelve inches square. These were coupled together to form a continuous trough twenty-four to seventy-two feet long. Devices known as riffles were placed in the bottom of the sluice. As the gravel was washed through the trough, the heavier metals such as gold were retained by the riffles and the gravel was deposited at the bottom end.
SMELTER - A furnace in which metal is separated by fusion from those impurities with which it is chemically combined or physically mixed, as in ores.
SMELTING - The chemical reduction of a metal from its ore and certain fluxes by melting at high temperatures. The non-metallic material floated on top of the heavier metallic constituents in the molten state and remained in that position when it cooled and hardened.
STAMP MILL - Machinery for crushing ore using heavy iron blocks. A stamp consisted of a vertical steel stem with an iron foot or shoe that was lifted by a cam and dropped onto coarsely crushed ore. Usually, five stamps in a row were included in one battery (steel box). The discharge flowed over amalgamating plates, which caught particles of gold. Silver ore passed from stamps to pans for amalgamation.
STEAM ENGINE - A reciprocating engine, working by the force of steam on the piston; the steam expands from the initial pressure to the exhaust pressure in a single stage. Used for pumping, hoisting, milling, operating steam locomotives, etc.

STOCKPILED - Set aside for future processing.
STOPE - An opening made in extracting ore from a lode. In its length along a vein, a completed scope could range from several feet to as much as two thousand feet or so. Its width across a vein had to be at least four feet for work space but might reach as much as forty feet, depending on the width of the ore shoot. In height or depth, large scopes were developed by driving a series of horizontal access tunnels, usually about 100 feet apart in elevation; such tunnels and their vertical connecting raises or shafts provided for ventilation and other needs in addition to offering access to ore. Stopes extended up through the mountain, and were driven upwards to remove the ore by gravity. Since veins could dip in any direction, stopes follow the veins. (See Underground workings at a mine using the timbered cut-and-fill, inside front cover.)
STRIKE - The extent and direction of tilting of fractures and layering of rock; the direction the vein takes horizontally or on a level. Also, discovery of an ore deposit.
STRING - A series of sluice boxes telescoped together.
STRIPPING - Removal of barren or sub-ore-grade materials to expose and permit the mining of mineable grade ore.
SULPHIDE - A compound of Sulphur with another element.
TABLE, VIBRATING OR CONCENTRATING - A rectangular table equipped with riffles that concentrates gold or heavy metals through vibration of material in a stream of water.
TAILINGS - The gangue and other refuse material resulting from washing, concentrating, or treating ground ore that is discharged from a mill after the recoverable valuable minerals have been extracted. Although the milling process removes much of the precious metal from the tailings, they may be reworked at a later date to retrieve more of the precious metals with more efficient processes.
TAILINGS POND - A pond with a constraining wall or dam into which mill effluents are deposited.
THICKENER - A large round tank in a mill used to separate solids from a solution; also the clear liquid overflowing the tank.
TIMBERING - The operation of setting timber supports in a mine.
TRAMWAY - An established system of roads, rails, or cables over which ore is moved from the mine to the mill.
TRENCH - A long, narrow excavation dug through over- burden, or blasted out of rock, to expose a vein or ore structure.
TROMMEL - A revolving cylindrical screen that sorts ore by size.
TROY OUNCE - The one-twelfth part of a pound of 5760 grains, i.e., 480 grains. It equals 1.09714 avoirdupois ounces, or 31.1035 grams. This is the ounce used in all assay returns for gold or other precious metals.
TUNNEL - Horizontal passageway (common usage); more accurately, a horizontal opening driven at right angle to the vein, or along a vein in search of ore, open to the atmosphere at both ends.
UNDERCURRENT - The portion of a sluice system that receives the water and "fines" that drop through the grizzly. It was often set perpendicular to the main sluice and tailings sluice. The lower-velocity water washed the small-sized material over a series of quicksilver-coated riffles that captured the gold.
VANNER - Device used as both fine sand and slime concentrators. The vanner was rarely used after the advent of flotation, which is a much more efficient process.
VEIN - Aggregation of mineral matter in fissures of rocks, lying within boundaries clearly separate from neighboring rock. A vein is a fissure or crack in a rock filled by minerals that have traveled upwards from a deep source.
WASHING PIT - The main excavation of a hydraulic mine, often very large and deep.
WASHOE PROCESS - Treating silver ores by grinding in tubs or pans and adding mercury, sometimes with other chemicals such as salt or blue vitriol.

WASTE ROCK - Valueless material such as barren gravel or overburden. Waste rock is rock broken in the process of opening the mine and excavating tunnels. It contains no or very little ore.
WASTE ROCK DUMP - The uneconomical rock that was mined and disposed of in the vicinity of a mining operation, often at or near the entrance of an adit.
WATER WHEEL - A wheel with buckets or floats that is turned by flowing water and thus drives machinery used in mining and milling.
WHIM - A large drum worked by horse, steam, or water, used to raise ores and other materials to the surface from a shaft.
WILFLEY TABLE - An early form of jerking table used to concentrate ore by gravity.
WING DAM - An L-shaped rock and/or wooden coffer dam, built within the bed of a “live” stream so as to divert the flow from a section of the streambed and enable mining to take place.
WINZE - A shaft or incline driven downward in a lode mine to connect one level with another, to explore the ore deposit, or to ventilate underground workings.