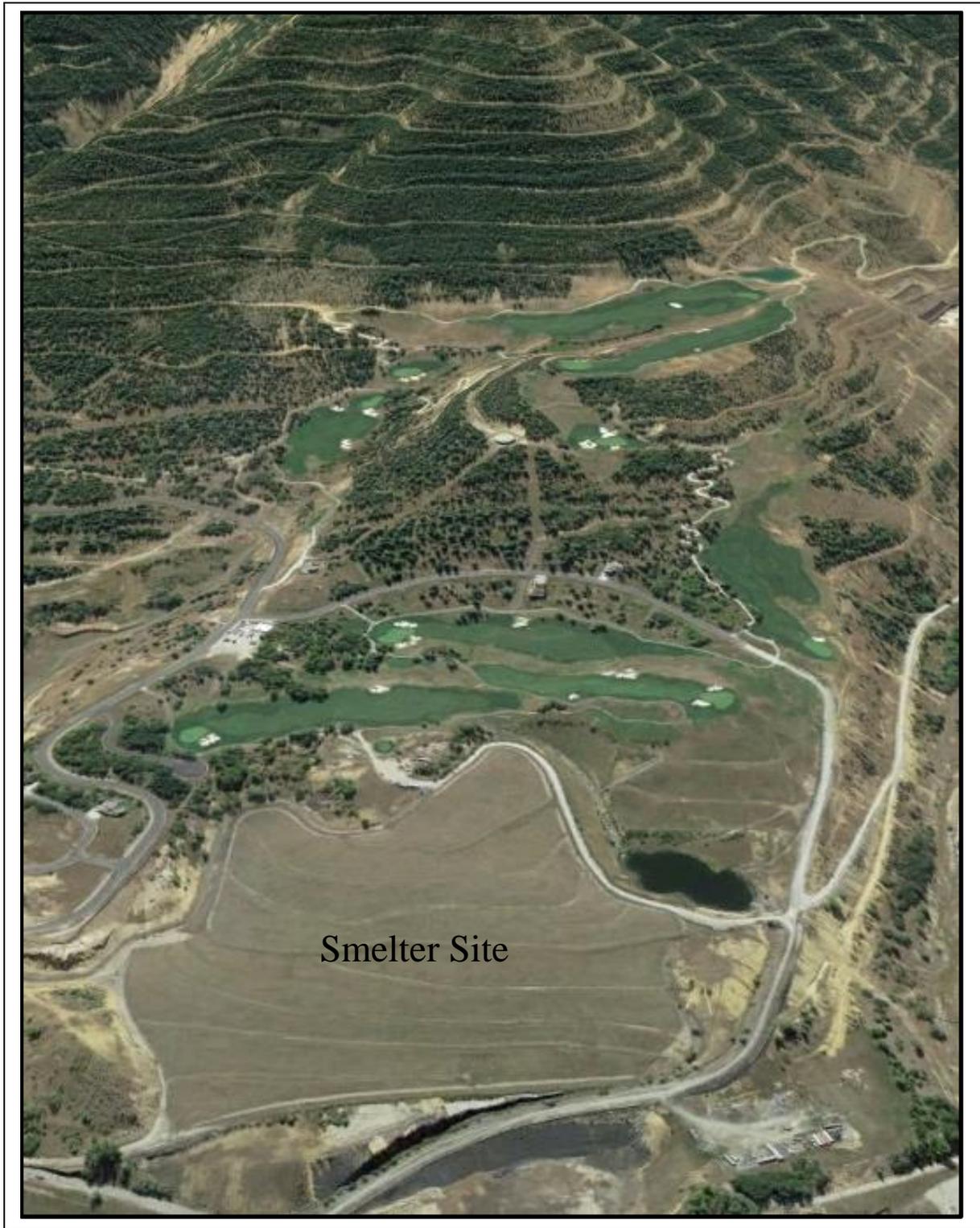


IDAHO STATE HISTORICAL SOCIETY  
SILVER VALLEY TOUR

2019



Welcome to the World Famous  
Coeur d'Alene  
Mining District



Cover: Built in 1917, the Bunker Hill smelter would go through many changes before it would look like this picture taken in 1981, just before the complex closed. When the smelter and nearby zinc plant (stack above and right of the smelter) shut down, 2,100 people lost their jobs and the Silver Valley's economy was devastated. Pollution from years of smelter emissions and millions of tons of mine waste from over 200 mines, resulted in the 1983 listing of a 21 square mile area (the "Box") surrounding the smelter and zinc plant as the Bunker Hill Superfund site.

Above- Bunker Hill smelter site after reclamation. (Google Earth, 2015, Steve Petroni).

# **THE GEOLOGY AND HISTORY OF THE COEUR D'ALENE MINING DISTRICT, IDAHO**

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## **Idaho State Historical Society**

**SILVER VALLEY TOUR**

**August, 2019**

### **Field Trip Guide**

**Earl H. Bennett (Univ. of Idaho, ret.)**

**THANK YOU FOR ATTENDING AND ENJOY THE TRIP!**

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**ROAD GUIDE**

This guide starts at the Sherman Ave. exit from Interstate 90 in Coeur d’Alene, ID. The mileage markers (MM) refer to the markers on the Interstate (i.e., MM15 is the Sherman Ave. exit). Locations are shown in **Figure 1**.

**Mile Marker (MM) 15. Exit 15.** Sherman Ave. Fernan Lake on left.

In 1878, General William Tecumseh Sherman selected part of the present-day city of Coeur d’Alene for a military fort, whereupon the U.S. government set aside 999 acres for the compound to be called Fort Coeur d’Alene. Part of the original site is now occupied by North Idaho College. In 1887, the installation was renamed Fort Sherman in honor of its founder.

The name Coeur d'Alene had an earlier origin. When David Thompson, an early-day explorer, visited the area in 1809, the Indians were known as the Coeur d'Alene or "Awl Heart," a name that cynically described the sharp trading practices of the Indians who, in the eyes of their critics, had hearts as small as the point of an awl.

The discovery of the mines in the Coeur d'Alene district, 30 miles to the east, spurred the economic development of the town that sprang up near the fort. The town became the supply center for the mines and was incorporated as Coeur d'Alene in 1887. Fort Sherman was abandoned as a military post in 1900. Coeur d'Alene is a fast-growing city with a population of over 50,650.

Mileage sign noting that it is 36-miles to Kellogg. South of I-90 is the golf course for the Coeur d'Alene Resort. The course features a floating green. West of the course is Tubbs Hill, named for Tony Tubbs who sub-divided his homestead to make part of the new city. The west side of the hill was the docking point for paddle-wheel steamers that transported men and supplies across the lake to the landing near the Cataldo Mission. Ore being shipped from the district was unloaded at a railhead near Tubbs Hill (now the city boat launch) for transport to various smelters by the Northern Pacific Railroad.

**MM 28, Exit 28.** Fourth of July Pass (elevation 3,069 feet). Prichard Formation along road. Overpass crosses I-90. Just east of the crest is the site where the Mullan tree once stood; the tree was a survey marker on the old Mullan military road. Fourth of July Canyon was named by Lt. Mullan's men when they celebrated the holiday near here while building the road in 1859.

**MM 37.** Cataldo Flats. The Mine Owners Association (established in 1889) built a dredge in 1934 that floated behind the Cataldo mission and pumped thousands of tons of mill tailings out of the Coeur d'Alene River onto Mission Flats (**Figure 2**). The tall grasses growing on the flats are Fragmites, a metal-tolerant species. Some of the tailings were used for the road bed for I-90. Several reclamation projects have been completed around and at the mission.

The tailings are a product of how the ore minerals were separated from waste rock. Originally high-grade ore was hand-picked and sent to the smelter. This was followed by crushing the remaining low-grade ore and using crude gravity techniques to remove more of the ore minerals. The fine waste rock from this process is called mill tailings and for many years the tailings were released into the drainages of the South Fork of the Coeur d'Alene River. This was not a deliberate act of environmental degradation, but simply the technology of the time. The tailings would wash down the river and this was exacerbated by the periodic flooding of the river system. Lots of other things were thrown into the contaminated streams (**Figure 3**).

In 1900, farmers began to grumble about tailings pollution in the Chain Lakes reach of the river and in 1903, Josiah Hill filed suit against Standard-Mammoth for polluting his farmland with tailings. The Mine Owners Association (MOA) representing the mine owners, solved this problem by purchasing pollution easements on these farms beginning in 1904. To try and contain the tailings, the MOA built tailings dams at Osburn in 1901 and at the Pinehurst Narrows and the mouth of Canyon Creek a year later (**Figure 4**). The advent of a new technology in the 1920s called flotation and then selective flotation allowed more of the metallic minerals to be removed from the host rock, but required finer grinding and usually resulted in increased production adding

to the tailings problems. As noted, in the late 1930s, a dredge was installed by the Mission to pump the fine tailings out of the river and onto Cataldo Flats.

**MM 39, Exit 39.** Old Mission State Park turnoff (restrooms). Hills to north are Prichard Formation. The Cataldo Mission of the Sacred Heart is the oldest standing building in Idaho and a registered national historical landmark. The mission was built in 1853 by the Coeur d'Alene Indians under the direction of a Jesuit missionary, Father Anthony Ravalli, and named for another priest, Father Joseph Cataldo. This structure replaced an earlier mission near St. Maries. This mission has special significance for the Coeur d'Alene tribe, who supposedly foretold the coming of the Black Robes (Jesuits) long before they arrived. The rangers at the State Park give an excellent tour and it is well worth a stop. North of I-90 is the East Mission Flats mine waste repository.

Behind and just west of the mission is a boat launch. This is the dock area where the original narrow-gauge railway built by D.C. Corbin in 1887 brought hand-cobbed, high-grade ore from the early mines to be loaded on paddle wheel steamers. The boats steamed down the river to Harrison and then across the lake to Coeur d'Alene where the ore would be loaded on rail cars of the Northern Pacific Railroad and shipped to smelters nationwide.

**MM40.** Bridge over the Coeur d'Alene River

**Exit 40.** Cataldo turnoff. The town of Cataldo is named for the Jesuit priest Joseph Cataldo, who arrived among the Coeur d'Alene Indians in 1865. He was still active with the tribe, when he was 90 years old.

Kootenai-Shoshone County line. The hill just east of Cataldo is underlain by the Burke Formation.

One story says that Shoshone County was mistakenly named by the Washington territorial government. Knowing little of the geography of this wild place, the legislators thought the local Indians were part of the Shoshone-Bannock tribe of southeast Idaho. Therefore, the name Shoshone County was given to the new mining area in 1861.

**MM 42.** Just after an overpass over I-90.

**MM 43, Exit 43.** Kingston. Hill to the left (north) is Kingston Ridge (Burke Formation). The hill to the south is underlain by Prichard Formation. The two hills are separated by the trace of the Osburn fault, which is in the valley. This location is the confluence of the North and South Forks of the Coeur d'Alene River.

It is likely that one of Lt. Mullan's men discovered gold in the South Fork of the Coeur d'Alene River. The initial discovery, however, is arguably credited to Andrew Prichard who found gold at Evolution (near Osburn) in 1878. Prichard's later discovery on the North Fork of the Coeur d'Alene River near Murray in 1881 was the spark that ignited a gold rush to the area. The rush was further fueled by the Northern Pacific Railroad, which had recently completed its line to Spokane Falls. The company plastered the entire country with handbills touting the riches of the

Murray gold fields to drum-up business for the new line. Thousands flocked to the area, but like all gold rushes the boom died a short while later.

In 1917, a large bucket-wheel dredge was assembled by the Yukon Gold Company to work gold-bearing gravels on the North Fork. The dredge was used from 1917 to 1926 and mined some 62,663 ounces of gold. Piles of gravel or dredge spoils are heaped near the town of Murray. Total lode and placer gold production from the Murray area from 1884 to 1934 is estimated at 297,137 ounces.

The initial gold rush to Murray was over by 1885, but by then prospectors had fanned out in all directions. On May 2, 1884, John Carten and Almedas Seymore staked a showing of galena (lead mineral) at the site of the Tiger Mine near present-day Burke. This discovery is credited with being the first in the district and unlike a more famous story concerning the discovery of the Bunker Hill Mine, pack animals may actually have dislodged galena-bearing rocks along this trail.

**MM 45. Exit 45.** Pinehurst and the old road to Smeltonville. Pine Creek is in the Prichard Formation. The Osburn fault passes from the north side to the south side of I-90 at Pinehurst. The town is the gateway to the Silver Valley and the Coeur d'Alene Mining District.

Located in the Pine Creek drainage are several mines that produced zinc-rich ore. These are vein deposits in the middle Prichard Formation. The largest producing mine was the Sidney that was developed in the late 1920s to provide zinc feed for the Sullivan Mining Company's (a joint venture between Bunker Hill and Hecla) new electrolytic zinc plant. A tramway carried the ore from the Sidney to the old Sweeney mill (footings still visible) located just west of the smelter. Other mines on Pine Creek included the Constitution, Highland-Surprise, Little Pittsburgh, Liberal King, Douglas, and Nabob. Beautiful samples of stratabound ore, reminiscent of samples from the Sullivan Mine in Kimberly, British Columbia, were found on the Constitution Mine dump.

Reconstructing the movement along the Osburn fault brings the Pine Creek mines (Pine Creek anticline) into a north-south alignment with the Moon Creek anticline (Ninemile Creek). Mines like the Interstate-Callahan, Success, Rex, and others on the east side of Ninemile Creek are also hosted in the middle Prichard and were primarily zinc-producing operations like the Pine Creek properties.

## **WELCOME TO THE FABULOUS COEUR D'ALENE MINING DISTRICT**

The Coeur d'Alene (Cda) Mining District in northern Idaho is one of the largest silver producing districts in the world. From the beginning of lode mining in 1884, the district's mines have produced over 1.2 billion ounces of silver, 8.5 million tons of lead, 3.4 million tons of zinc, and byproduct antimony, cadmium, copper, and gold. The total historic value of this production is over \$7.4 billion.

There are over ninety mines in the district. Eleven of these have each produced over 3 million tons of ore. Of mining operations in the United States, the Coeur d'Alene contains the largest underground mine (the Bunker Hill, over 150 miles of workings), the deepest mine (the Lucky

Friday-Gold Hunter, 9,587 feet deep) and the richest silver mine (the Sunshine, over 367 million ounces of silver). Two mines, the Lucky Friday- Gold Hunter and Galena, are still in production. Most of the mines are located along the South Fork of the Coeur d'Alene River and its major tributaries including Pine Creek, Big Creek, Ninemile Creek, and Canyon Creek. The South Fork is paralleled through the district by Interstate 90. Important towns in the district along I-90 from west to east include: Pinehurst, Kellogg, Osburn, Wallace, and Mullan. In more recent times the area has become known as the Silver Valley (**Figures 1 and 5**).

The Coeur d'Alene Mining District's mines are in metasedimentary rocks of the Belt Supergroup (Belt) of Precambrian age (1.4 by). The thickness of the Belt in the district is estimated to be between 15 and 20 kilometers. Only part of the basin is in western North America (WNA), the rest is believed to be in Australia, Siberia or Antarctica that with ancestral WNA were part of the Precambrian supercontinent called Rodinia.

Some early researchers believed the district's veins were hydrothermal and related to the Gem stocks. The great Bunker Hill geologist, Oscar H. Hershey, proposed another idea: "I submit that the facts point to invisible diffused mineralization in the upper Prichard strata as the source of nearly all the lead and zinc in the deposits of the district." Currently, a model that uses metamorphic/magmatic fluids and derives metals from one or more stratabound/stratiform sedimentary horizons is popular. The heat engine driving the process was the magma that formed the Idaho batholith.

Over the millennia, the continents and ocean plates joined together and drifted apart several times driven by continental drift and ocean floor spreading. As a result of these movements, the older metal-bearing sediments were folded at least twice; first along northwest trending folds (**Figure 6**) and secondly along north-south oriented folds. The amplitude of the northwest trending folds decreases rapidly from the reconstructed Pine Creek-Moon Creek anticline to the Silver Synclinorium, which contains most of the major deposits in the district and is one of the most deformed areas in the entire Belt basin.

After folding and concentrating ore minerals into fold crests, a series of fractures were generated either parallel to the trend of the northwest folds or oblique to this trend and in many places parallel or subparallel to the north-south folds. The metals were mobilized from the sediments into these fractures during regional metamorphism associated with the formation of the Idaho batholith.

The folding and faulting of the Belt metasediments within the Lewis and Clark zone is intense and greater than elsewhere in northern Idaho. It must be more than coincidence that the most highly deformed parts of the Belt basin contain major mineralization.

The primary economic minerals in the district are galena (lead sulfide), sphalerite (zinc sulfide), and tetrahedrite (copper, antimony, silver sulfide). Non-economic minerals in the veins include quartz and siderite (iron carbonate). pyrite (iron sulfide), chalcopyrite (copper- iron sulfide), and pyrrhotite (another iron sulfide).

Intrusive igneous rocks include the Gem stocks and Dago Peak stocks of Cretaceous age and diabase and lamprophyre dikes. The Gem stocks are about 115my.

The effects of post mineral faulting in the district can be better understood by visualizing the district as divided into two blocks by the post mineralization east-trending Osburn strike-slip fault, with the northern half broken into two smaller blocks by the north-trending Dobson Pass normal fault. The location of ore deposits before and after movement on these faults is shown in **Figure 5**. The normal and reverse faults in the district indicate a long and complex structural history.

### **The Columbia River Basalt Supergroup and Glaciation.**

About 17-million-years ago, the earth's crust between present-day western Idaho and eastern Oregon and Washington began to tear apart. This stretching was related to the Yellowstone Hotspot (which was under southwest Idaho at the time) and the interaction of the Pacific Oceanic Plate and North America along the west coast. Accompanying this extension was the outpouring from cracks and fissures of numerous lava flows comprising the Columbia River Basalt Group (CRBG, 17-6 my), which covered much of this area and filled in the Columbia Basin. As we headed east from the city of Coeur d'Alene, we crossed the eastern boundary of the basalt flows, which overlie the Belt sediments and other rocks. Sediments deposited by the glaciers in the last glaciation (about 10,000 years ago) dammed the ancestral Coeur d'Alene River system near Post Falls with the resulting formation of Lake Coeur d'Alene.

**MM45.** Just past the Pinehurst exit are the narrows where the Osburn fault crosses the highway. Past this constriction, the valley (Smelterville Flats) opens up. Millions of tons of mill tailings that once filled this valley have been removed as part of the massive Superfund cleanup.

**MM 46.** The volume of tailings from many mills was so large by the turn of the century that the river system could no longer remove the material. In 1904, both the Page Mine and the Bunker Hill Mine constructed tailings impoundments to capture the fine sediment and contained metal. One after another the companies began to impound their tailings in large ponds. Since 1968, there has been no major release of tailings directly into the river system by any of the active mines. South of I-90 is the Page Mine's tailings pond now used for a sewage lagoon for the valley as well as for an impoundment for some of the mill wastes removed during the Superfund program. The Page Mine is a little further south. The Page was operated by the Federal Mining and Smelting Company (later Asarco) from 1924 to 1969. The surface plant at the mine burned in 1973.

**MM48.** The drainage to the south is Government Gulch, the location of Bunker Hill's zinc plant, fertilizer plant, and laboratories. The Bunker Hill Company's smelter (**Figure 6**) used to be here just south of I-90. The 715-foot high stack at the smelter and a similar 610-foot-high stack at the zinc plant in Government Gulch were dropped into trenches and buried on May 26, 1996 (**Figure 7**). Over 10,000 people were on hand to view the spectacle and the moment was bittersweet for local citizens. The smelter and zinc plant were razed the same year as part of the Superfund project. Since 1987 Silver Valley Laboratories (SVL) has occupied the old Bunker Hill research lab. The rocks to the north are Prichard Formation all the way to the eastside of Osburn.

**Exit 49.** Bunker Avenue turnoff. The old Bunker Hill tailings impoundment is to the right. It is now the Central Impoundment Area (CIA) where millions of tons of mill tailings from the area have been concentrated.

**Exit 50.** Hill Street/Silver Mt. exit. Remains of the Bunker Hill concentrator are south of I-90. Behind the concentrator site is the Kellogg tunnel, entrance to the Bunker Hill Mine. The Silver Mountain ski area is on top of the ridge above Kellogg. The hill is serviced with a gondola completed in 1990 as part of the effort to ease the transition from mining to a more diverse economy.

The site of the Bunker Hill Mine was discovered by Noah Kellogg in 1885. A famous fable claims that the mine was really found by Kellogg's jackass. The first major development of the mine was by Simeon Reed, a Portland, Oregon, businessman, who purchased the mine in 1887 and formed the Bunker Hill Mining and Concentrating Company. The mine was originally connected to the old South mill by a tramway that passed over Wardner and Haystack Peak. In 1903, the two-mile long Kellogg tunnel was completed. The discovery of the huge March ore body in 1904 assured the future success of the venture. The old South mill had been blown up in the mining labor war of 1899. Several mills have operated since, the latest was located east of the smelter. The company built its own smelter in 1917 and an electrolytic zinc plant (with Hecla) in Government Gulch in 1928. Both plants underwent substantial changes over the years, including the addition of the 715-foot-high stack at the smelter and the 610-foot-high stack at the zinc plant completed in 1978. The company was instrumental in developing uses for zinc and contributed much to the zinc die-casting industry. In later years, sulfuric acid generated from the smelter was combined with phosphate ore from southeastern Idaho to make fertilizer in another plant in Government Gulch. The mining and metallurgical complex was the lifeblood of the valley until Gulf Resources and Chemical Corporation (who had purchased it in 1968) closed the operation in 1981 with the loss of 2,100 jobs. The closure was a devastating economic blow to the Silver Valley, and recovery is still underway. When the complex closed, it was producing about 20 percent of the nation's refined lead and zinc and 25 percent of its silver. The mine was reopened in 1988 but closed again in 1991. There are over 150 miles of underground workings and it is the largest lead/zinc mine in the United States.

In 1982, the Environmental Protection Agency (EPA) declared a 21-square mile area including the smelter and zinc plant and referred to as "the Box" as a Superfund site. This was the largest such site in the country at the time and the largest mining site. EPA, the state of Idaho, and the mining companies have contributed substantially to remediating the damage from past mining practices. From 1986 to 2018 over 7,000 properties in the Superfund area have had yards replaced to decrease the problem of fugitive lead. As noted, the zinc plant, smelter, and concentrator have been removed as well as the tall smoke stacks. Thousands of cubic yards of contaminated soil from Smelerville flats and other sites have been excavated and placed in the CIA, and millions of trees have been planted on the hillsides behind the smelter and zinc plant.

Bob Hopper bought the BH mine in 1992. It was called the New Bunker Hill Company. During 2007, Mr. Hopper built a small concentrating mill on site to process ore from the upper workings of the Bunker Hill mine. Bob died on January 4, 2011 and the property was taken over by his son Robert Hopper Jr. (Placer Mining Company). *See UPDATE, pg. 22*

We will stop at the Staff House Mining Museum. In the basement are two models that explain a great deal about the mines in the district. The rest of the museum explores major events in the history of the Silver Valley.

Just behind the museum is the base station for the Silver Mountain Ski Resort owned by Eagle Crest Partners, Ltd. Originally opened as Jackass Ski bowl in 1973, the area was taken over that year by the Bunker Hill Company and renamed Silverhorn Ski Area. After Bunker closed, the resort was taken over by the City of Kellogg. With help from Senator James McClure, and a major bond program, the 3-mile long gondola was constructed in 1989. The resort was renamed Silver Mountain when it opened in 1990. Eagle Crest purchased the facility in 1996 and built several additions of condominiums (Gondola Village and Morning Star Lodge and others) that sold out within a day or two of initial sales. Ground breaking for Silver Rapids, an indoor water park, was in 2005. In 2007, construction started on the Galena Ridge Golf Course and home sites near the old smelter location. The first 9 holes opened in 2010 to rave reviews. The complex is the centerpiece of Kellogg's attempt to move from a mining based economy to one bolstered by recreation.

As we head back to the interstate, another key part of the Kellogg economy is obvious. Dave Smith Motors, billed as the largest Chrysler, Dodge and Jeep Ram dealer in the world, appears to have new vehicles parked on every vacant lot in town. The dealership sells over 10,000 vehicles a year.

**MM 52.** Elizabeth Park Road. A project on the south side of the river to remove mill tailings from the active waterway was completed in 1994. The work was done by the mining companies and the Silver Valley Trustees. The Trustees were the administrator of a \$4.5 million fund created by an agreement in 1986 between the state and the mining companies. The Trustees accomplished a remarkable amount of remediation work outside of the Superfund "box" with major cleanup projects on Ninemile and Canyon Creeks and elsewhere.

**MM-52.5.** The blue buildings on the right are the 360-tonne per day flotation mill and concentrate leach plant (CLP) owned by the New Jersey Mining Company (**Figures 10 and 29**). In June 2011, New Jersey penned an agreement with the United Silver Corporation (Crescent Mine) for a \$2.5 million expansion program at New Jersey's fully permitted flotation mill and tailings facility. The improved mill was completed in 2012 and uses a unique paste-fill process to store tailings. The Crescent Mine was placed "on hold" in 2013 and no ore from the mine was processed in the new mill. New Jersey also joint ventured with Marathon Gold USA (2010-2012) and then Juniper Resources LLC (2013-2015) for work at the company's Golden Chest Mine near Murray. Ore from underground and an open pit at the Golden Chest was processed in the new mill from late-2014 through 2018.

**MM 54.** Take Exit 54 to go south up Big Creek to the Sunshine Mine.

Left of the turnoff from I-90 is an iron sculpture of a raise miner by the well-known mining artist Ken Lonn. The statue commemorates the 91 miners who died in the tragic Sunshine Mine fire of 1972. This was the second worst fire in a hard rock mine in U.S. history. Most of the fatalities were due to carbon monoxide poisoning. As a consequence of the fire, new and improved safety standards were instituted for underground mines.

1.1 Miles up Big Creek Road- Main office complex of the old Sunshine Mining Company is on the right just past the Sunshine tailings ponds that in part comprise the Big Creek mine waste repository. The building is now home for United Silver Corporation and several engineering firms

including CDM Smith and North Wind Engineering, both working on Basin cleanup. The former mine managers house (white) is across the road.

The large brown building behind the office complex is the silver refinery where copper and silver were extracted from concentrates. This plant was sold in 2002 to Formation Capital Corp, for processing ore from a cobalt-copper mine in east-central Idaho. Formation ran it as a custom precious metals refinery for several years. In 2013, Formation sold the metal refinery back to Sunshine Silver Mines Corporation, the current owner of the Sunshine mine, for \$12 million. The facility is now on care and maintenance.

South of the office complex is a building that is home to Silver Needles, Inc., a very successful small business that makes fire resistant clothing and other industrial safety garments. The company employs 30-40 people and has been in business for over 30 years. Their products are shipped all over the world.

Near the end of the paved road and on the right is the Crescent Mine, closed in 1977, but opened in 2007 for exploration by SNS Silver Corporation. The mine was later taken over by United Silver Corporation. The Crescent is the most westerly producing mine in the “Silver Belt” a line of silver mines that includes the Sunshine, Coeur, and Galena mines.

After much exploration (**Figure 11**), United Silver announced in August 2013, that all development work would cease on the South vein in the Crescent mine and the New Jersey mill would remain idle while they initiated more detailed sampling and mapping and reevaluated the exploration and mining plans for the Crescent. The mine was placed in receivership in June 2014.

On the left is the Sunshine Mine and the head frame of the Jewell shaft (named for the engineer in charge of the shaft sinking crew), the entrance to the mine (**Figure 12**). The Sunshine Mine was staked in 1884 by True and Dennis Blake, brothers from Maine, who had a homestead on Big Creek. The mine came into prominence in 1931 when a major strike of rich silver-bearing ore was made on the 1700 level. This level was also the intercept with the favorable Revett-St. Regis horizon. The "Shine" has produced some 367 million ounces of silver, probably the largest silver-production of any single silver mine in the world. By comparison, the fabled Comstock Lode in Nevada produced about 200 million ounces of silver from many mines.

In January 2006, Sterling Mining Company, leased the Sunshine Mine from Sunshine Precious Metals, Inc. (SPMI) and began driving a 5,700 foot drift (the Sterling Tunnel, **Figure 13**) to connect the Silver Summit Mine and the main Sunshine Mine as part of a major exploration project of the upper workings of the “Shine.”

The company had a banner year in 2007. They acquired the old tailings pond in January. The Jewell Shaft at the Sunshine was repaired and made operable to the 3100 level, which was found to be in good condition. Atlas Faucett Contracting completed the \$2.8 million Sterling Tunnel in April, the first ore mined from the upper part of the Sunshine vein was sent to ore bins at the mill in September. Repairs to the Silver Summit hoist and shaft (needed before mining could start as it is the secondary escape way for the Sunshine mine) were completed at month’s end.

The mill was refurbished and operable by November and new diesel equipment was acquired to begin mining operations. The company raised over \$25 million during the year and was listed on the Toronto Stock Exchange in October.

The growing global recession that accelerated in the second half of 2008 greatly impacted metal prices. Sterling suspended operations at the mine and filed for Chapter 11 bankruptcy on March 2, 2009. The court decided that Sterling's interests in the mine would be sold to the highest bidder. In April 2010, a new privately-held company, Silver Opportunity Partners, LLC won the Sterling lease and by October the company had 29 people working at the site, had pumped the mine down to just above the 3700 level and was developing a mining and exploration program.

In 2011, Silver Opportunity changed its name to Sunshine Silver Mines Corporation. In early 2012, work in the mine was halted by an underground fire that was finally put out in mid-June. Work then resumed with successful exploration drilling in the Sterling Tunnel. Rumors were that the company planned on building a new mill to replace the aged facility at the mine site. The company is expected to go public, but there has been no word on when an IPO would be made. Exploration work continues at the mine today.

*RETURN TO INTERSTATE 90 and drive east to Osburn and Wallace, ID.*

South of I-90 is Rosebud Gulch in Osburn. The highly visible Polaris mill is on the east side of the gulch. The mill is near the site of a \$17 million program by the Consolidated Silver Corporation to look for deep ore bodies in the old Silver Summit Mine. Some ore was discovered, but not in commercial quantities. Terror Gulch is north of the highway and the rocks here are part of the Prichard Formation.

**MM 56.** Outskirts of Osburn. Established in 1887, the town is named for Billy Osburn, a principal owner in the early Mineral Point (later Coeur d'Alene) mine. To the right of I-90 is McFarren Gulch and the location of the old Coeur d'Alene mine (not the same mine as the Coeur Mine, which is on the east end of Osburn). The Coeur d'Alene Mine was a major producer of copper and silver in 1941-1942, but after that the ore was quickly exhausted. Coeur d'Alene Mines Corporation (Coeur) was formed in 1928 and is a major mining company, once owning the Coeur and Galena mines and still operating the Rochester Mine in Nevada (the largest heap-leach silver mine in the world) among other properties. Coeur reclaimed the old Mineral Point mine site in 2002 as part of a settlement with the federal government.

As noted, all of the mills in the district used to dump mill tailings directly into the Coeur d'Alene River and its tributaries. Periodic flooding moved the metal-rich tailings through the drainage and eventually into Coeur d'Alene Lake. This practice contaminated the Silver Valley and the lake with metals. At the turn of the century, several wooden dams were built to contain mill tailings. These dams were frequently breached by spring runoff. In 1944, Hecla Mining Company built a sink- and-float plant near Osburn to reclaim zinc and lead from about 2 million tons of old mill tailings that filled the valley. The plant produced substantial amounts of the metals but was destroyed by fire in 1948. **Figures 14 and 15** were taken looking east from Two-Mile Creek and show how Osburn Flats looked in the 1930s and in 1993.

Today, the Zanetti Brothers Cement plant occupies the old Hecla sink-and-float plant site. Note the University of Idaho logo painted on several storage tanks. “Go Vandals!”

Ahead on the left is the tailings pond for the Coeur and Galena mines. Today, all of the active mines impound tailings, and no contaminated mine waster is discharged into the river system. The Osburn fault passes across the valley and is now north of I-90. The fault trace goes through the prominent saddle to the northeast.

**MM58.** The Coeur Mine (**Figure 16**) is south of the Silver Hills Junior High School and an old overpass. Rocks on the lower slopes are part of the Wallace Formation. Units of the St. Regis Formation form the top of the hill. The units are separated by the Polaris fault. The hill north of I-90 is underlain by Wallace Formation, which also outcrops on both sides of the road leading into the city of Wallace.

The Coeur was placed in production in 1974. It was owned by Coeur d’Alene Mines Corporation and operated by Asarco until 1991. It opened briefly in 1996 when it again closed because of low reserves. The Coeur produced about 2.5 million ounces of silver a year. It now belongs to Americas Silver Corporation and both the mine and 500 tpd mill are on standby.

**Just before MM 60.** Long Creek. The Galena Mine is about 1 mile up Long Creek.

**MM 61, Exit 61.** The concrete footings of the old Hercules mill are on the left. The Hercules mill was built in 1911 and burned in 1976. At one time it was the largest water-powered mill in the world. Ore from the Hercules Mine (in Gorge Gulch near Burke) was processed here as well as from other Day family holdings. All rocks in this part of the valley are part of the Wallace Formation.

Entering Wallace. Last outcrop south of I-90 is Wallace Formation. The town is named for its founder, Col. Wallace, who originally named the town Placer Center. Half of the town was destroyed in the great forest fire of 1910. Until 1986, when the bypass over Wallace (now the “Center of the Universe”) was completed, all traffic on I-90 had to go through downtown. In 1991, the town held a mock funeral to “retire” the last stoplight on I-90. As in older times, we will take Exit 61, turn right at the stop sign at the bottom of the ramp and go to the next stop sign, which is on South Frontage Road. To the right is the Mining Heritage Exhibit and Visitors Center (with restrooms) definitely worth a stop to see how the district’s mines operate. The sculpture on the lawn of a miner and his family (also by Ken Lonn) was moved from the Sunshine Mine. Past the park, turn left on South Frontage Road to go downtown. South Frontage Road turns to the right just past the Wallace Library and you are now on 5<sup>th</sup> Street. To the west is the historic residential district of Wallace. The ticket office for the Sierra Silver mine, a good tour to see how mining is done in the district’s mines, is left on Cedar Street. Proceed on 5<sup>th</sup> to where it turns left onto Bank Street. Buildings along Bank Street include the Coeur d’Alene District Mining Museum, Asarco’s old office, White and Bender Building, First National Bank of Wallace (now vacant), Rossi Insurance Building, and the Shoshone County Courthouse. Great stops are the Wallace Mining Museum, Northern Pacific Railroad Depot Museum and the Oasis Bordello Museum. Other shops and businesses sell silver goods, antiques and souvenirs.

## **Road log for the trip after lunch.**

**Just before MM 60.** Long Creek. The Galena Mine and mill (**Figures 17 and 18**) are about 1 mile up Long Creek accessed from the old Wallace-Osburn road. At the mine the St. Regis Formation is faulted against the Wallace Formation along the Polaris, Argentine, and Kilbuck faults. The Galena Mine was purchased by a subsidiary of the Callahan Lead-Zinc Company and was mined off and on until the Great Depression. After a geologic study of the area, Asarco decided that the mine had potential for deep development, and in 1947 the company arranged a lease agreement with Callahan and Day Mines, Inc. A shaft sunk almost 3,000 feet found commercial silver ore. This new Galena Mine was placed in production in 1955 and was one of the largest producers in the district. This success was due to Asarco's efficient operation and to more than 22 years of labor harmony. The mine closed in 1991 due to low metal prices but was reopened in 1996. By now, Coeur d'Alene Mines Corporation had merged with Callahan. The mine was reopened under a new partnership between Coeur d'Alene Mines Corp. and Asarco called Silver Valley Resources Corporation. In 1999, Coeur d'Alene Mines Corp. bought out Asarco's interest in the partnership and took over operation of the mine.

In 2006, Coeur sold the Galena and Coeur mines and other holdings to U. S. Silver Corporation. The Galena Mine is still in production with ore processed at the Galena mill. In 2007, high prices for lead encouraged the company to exploit the silver/lead veins in the mine that were developed early in the mine's history but had not received any attention since the discovery of the rich Silver Vein in the 1950s.

In August 2012, U. S. Silver merged with RX Gold forming U. S. Silver and Gold Corporation. Coeur Mine redevelopment started in February with some production by year's end. Staff was reduced 30% in 2013 and a small mine plan implemented as metal prices fell. The focus was now on reducing costs and operational improvements.

The company merged with Scorpio Mining in 2014 and is now called Americas Silver Corporation. Emphasis shifted from the Ag/Cu veins in the Galena to the lower grade, but greater tonnage Ag/Pb veins. The Ag/Cu ore was processed in the Coeur mill, but now all ore is processed in the 1,000 tpd Galena mill and the Coeur mine/mill is on standby. The company cut costs by 15% and had a cash cost of about \$15/ounce. Production was 969,387 ounces of silver in 2018 along with lead.

Return to start of Lake Creek road. Return to I-90 via Exit 61 at Wallace. Proceed east on the Interstate to Mullan and the Lucky Friday mine.

**MM64. Exit 64.** Golconda District. Golconda Mine site to the left. The mine closed in 1957 and the site has been reclaimed by EPA. The Wallace Formation is north of the highway. The small brick building was originally used to house a step-down transformer when electric power was first brought to the district in 1903. At the time, this alternating current powerline installed by Washington Water Power (now Avista) was one of the longest in the world.

**MM65.** The Rock Creek property owned by Hecla Mining Company is on the right side of the road. A 5,000-foot-deep drill hole, at the time one of the deepest ever drilled in the Coeur d'Alene

Mining District, was completed at Rock Creek in 1988 by Teck Inc. The record was broken in 2011 when several 10,000-foot-deep holes were drilled near Two Mile Creek north of Osburn. See *UPDATE* pg 22.

**Exit 65.** Compressor District, Grouse Creek. St. Regis Formation on both sides of I-90.

The Compressor District was not really a mining district at all, but the site of the largest water-driven air compressor in the world. Built in 1900 and used until 1950, the compressor was driven by a 33-foot-diameter Pelton wheel flanked by two 11-foot-diameter wheels (**Figure 19**). The machine produced over 1,000 horsepower and provided all of the compressed air for the large Morning Mine. Streams were diverted to the site from many miles around to drive the compressor. Eventually, electric motors were added to help run the unit in the dry part of the year.

**Exit 66.** Gold Creek exit. St. Regis Formation. The location of “Elmer’s Fountain” on Gold Creek. The fountain was built by Elmer Almquist out of old mining equipment.

**Exit 67.** Morning District. The dump of the large Morning Mine is north of the highway. The yellow buildings on the left are all that is left of the Morning mill (**Figure 16**). The portal of the Morning No. 6 tunnel is in rocks of the Wallace Formation. The 2-mile-long tunnel crosses the Osburn fault.

The Morning Mine was developed in 1889 by Charles Hussey, a Spokane banker. After a change in ownership in 1897, a new mill was built, and the No. 6 tunnel was driven from the mill site near Mullan to the mine. In 1905, the mine was purchased by the Federal Mining and Smelting Company, which merged with Asarco in 1953. The Morning mill was an active laboratory where Federal's metallurgists wrestled with the problem of separating zinc and lead from the complex ore. Selective flotation, discovered in the 1920s, solved this problem. In 1961, Hecla obtained a lease on the mine and in 1966 purchased the property. The Morning mine and Star mine (both part of the same ore body) were then operated as the Star-Morning Unit. Fire destroyed the Morning mill in 1957. Hecla ceased mining the Star-Morning in 1982. The mine was then leased by the Star-Phoenix Mining Company, but again closed in 1990.

The Star-Morning Mine is essentially a one-vein system with a few parallel veins (**Figure 20**). The mine is about 4,900 feet long and 7,900 feet deep. The deposit is in the Revett-St. Regis group of mines but is different than the other mines. The Morning Mine on the east end of the system is lead/silver-rich whereas the Star Mine is zinc-rich. The Star-Morning has the second largest tonnage production in the district after the Bunker Hill.

Hecla Mining Company began a major program to digitize all underground data from their properties north of the Osburn fault in 2006. The digital data was entered into a computer program that allows for 3D visualization and analysis of the information. The scanning was mostly completed in early 2008 and early analysis revealed a number of tempting targets in the Lucky Friday, Star-Morning mines, and surrounding area. This is the most comprehensive subsurface analysis of mine data from the north side of the district ever undertaken.

Encouraged by their modeling effort, exploration was reinitiated in 2012 at the Star project with rehabilitation of the main 2000 level tunnel and the secondary escape ramp to the surface

completed as well as development of a 750-foot exploration drift. The #5 Shaft was repaired and provides secondary escape to the Grouse 700 level. A drilling program was encouraging. However, the project was placed on hold as Hecla was about to invest significant resources in the Lucky Friday Expansion Unit.

**Exit 68.** Mullan Exit, large letter "M" on hillside above Mullan. At Mullan, I-90 crosses the Osburn fault. The town is named for Lieutenant John Mullan, who between 1859-1860 constructed a 640-mile long military road between Walla Walla in Washington Territory and Fort Benton in Dakota Territory (now Montana).

Located to the north of I-90 is the football field of Mullan High School. This field is near the site of the Gold Hunter mill. The Gold Hunter was developed by Day Mines, Inc. The mine is in the Wallace Formation as were the early workings of the Sunshine Mine.

**Exit 69.** East Mullan/Lucky Friday Mine. To the right of the stop sign at the end of the exit ramp is the Atlas Mine in the St. Regis Formation. Turn left at the stop sign and go across the overpass to the Lucky Friday Mine. At the end of the overpass, the Lucky Friday tailings impoundment is to the left.

Like the Sunshine and Galena mines, the Lucky Friday (**Figure 21**) was a late bloomer in the district. Miners had to sink through upper Belt rocks to get to the favorable Revett-St. Regis horizon. In 1912, the Friday was sold at a sheriff's sale for \$2,000 and again in 1936 for \$120 in back taxes. In 1938, John Sekulic, a garage mechanic in Mullan, purchased the mine for \$15,000 and formed the Lucky Friday Mining Company. With a lot of faith in the venture and technical and financial help from Judge Albert Featherstone, the president of Golconda Mining Company, mining began in earnest. The company shipped its first ore in 1942. Like the Sunshine, the ore got better and better as the shaft went deeper. Hecla Mining Company merged with the Lucky Friday in 1964. The mine would become the flagship of Hecla's mining operations.

In 1978, a failed copper mining venture at Lakeshore, Arizona, brought Hecla close to financial disaster. The company would not suffer for long, however. Within two years, the big rise in silver prices, sparked by market speculations in 1979-1980 by the Hunt brothers of Dallas, Texas, enabled the company to pay off its large debt and begin sinking the \$30 million "Silver Shaft" at the Lucky Friday. The shaft bottoms at 6,000 feet below the surface and is the main production shaft at the mine. The 140-foot-high headframe stands in contrast to the old hoist works visible on the hill behind the mine offices.

The Lucky Friday Mine is in the Revett-St. Regis group of mines. It is also essentially a single vein like the Star-Morning, but it has been folded into a crude hook shape. The Friday produced over 125-million ounces of silver through 2002.

A long drive from the Friday 4050 level was completed to the Gold Hunter in 1977 and extensions of the Gold Hunter veins were found. In 1981, Hecla absorbed Day Mines, Inc. and acquired the Gold Hunter along with other Day assets including a large land package north of the Osburn fault. Company issues, national affairs, and very low metal prices closed the Lucky Friday in 1986, but it reopened the following year. Tough economic times continued to plague the industry with Hecla

barely making cash flow or suffering annual losses. Work was suspended on the Gold Hunter project until 1992.

In 1993 there were 11 new miners on the job who began development work at the Gold Hunter project. In spite of tough times, the decision was made in August 1994 to spend \$4.7 million developing the discovery and add 20 more jobs. A new mile-long drift from the 4900 level would link the Gold Hunter directly to the Silver Shaft.

In 1996, Hecla increased production of silver and lead at the Friday. Drilling from the new 4900 level hit high-grade silver intercepts in the Gold Hunter vein system. Hecla's board approved spending \$16 million in 1997 to develop the new ore body. The Lucky Friday mill was expanded to handle the extra production. By 1999, Hecla had increased production to 4.4 million ounces of silver at the Friday with more than 85 percent from the Gold Hunter.

The company enjoyed its second best production year ever in 2000 mining more than 5 million ounces of silver, but with low lead and silver prices, the company still lost money. Hecla announced layoffs and production cuts in mid-2001 to conserve resources. Only 50 workers remained in the mine.

Hecla moved back into the black in 2002. The mine was running at about 50 percent capacity. In 2003, the Friday continued limited production with 90 employees. In early December, the company announced a decision to drive a 5,500-foot-long drift on the 5900 level of the mine to provide access to an additional estimated 28 million ounces of silver in the deeper portions of the Gold Hunter. The development project would cost about \$8 million and allow production to double when completed in 2005.

The new drift from the Silver Shaft to the Hunter was about half finished at the end of 2004. Employment, which had dropped to 60 people in 2003, increased to 132 by June with a goal of 200 or more when the mine reached full production. There had been very little ore mined from the Friday itself for the past three years with almost all production from the Gold Hunter. To reflect the change, the operation was named the Lucky Friday Expansion Unit (LFEU).

The LFEU continued in 2005. Exploration drilling to the 6400 level proved up commercial ore below the 5900. The drill program doubled ore reserves to 17.2 million ounces of silver.

Multiple veins were mined in 2006 from both the 4900 and 5900 levels. The 5900 level drift was completed along with mill improvements. Exploration drilling from the 5900 intersected mineralized veins near the 7900 level and indicated a coalescing of some of the narrow veins into wider veins. During the year, some miners took home an extra \$20,000-\$30,000 bonus thanks to high metal prices. With favorable prices for lead and zinc as well as silver, the company posted a negative cash cost per ounce of silver in 2007 as the base metals paid for most of the mining operation

Studies began in 2007 on a new internal shaft that would allow access below the 5900 level. Hecla also started a surface drilling program to explore the "GAP" between the lowest levels of the old Gold Hunter mine and the current workings.

The year 2008 started well, but the rest of the year was plagued by declining metal prices (silver fell from near \$20/oz to \$9/oz by year's end) and continuing economic problems with the U. S. and global economies following the U. S. mortgage crisis.

The company's fortune brightened in 2009, with increased productivity and better metal prices alleviating the concerns of the previous year. Management continued planning for sinking an internal shaft from the 4900 level to go after the "30" and other veins beneath the Gold Hunter. Hecla employed some 253 workers at the mine at the end of 2009.

The company reported that the third quarter of 2009 was one of the best in its history, with a record number of tons and silver ounces mined at the LFEU. Hecla was debt-free at year's end.

In 2010, silver prices skyrocketed to over \$20 per ounce and the company enjoyed its best year ever. Hecla stepped up exploration, drilling 20 holes all along the mineral trend from the old Silver Mountain prospect east of the Lucky Friday to the Star Mine and opened the Upper Grouse adit at the Noonday vein in the Star. During the year, a hoist room was excavated and preparations for shaft sinking were underway at the LFEU. In 2010, LFEU miners achieved a record tonnage

In September 2010 a federal judge approved a plan whereby Hecla would pay \$263.4 million to settle its environmental liability in the Silver Valley ending a lawsuit with the EPA and Coeur d'Alene tribe that went back to 1991. The final payment was made in 2014.

The LFEU enjoyed excellent production in 2011 from the 4900 and 5900 levels and continued on target to match 2010's 3.36 million ounces of silver. However, the year was marred by a serious rock burst in December. The Mine Safety and Health Administration (MSHA) ordered that the mine be closed while the Silver Shaft was cleaned of built up cement scale that had accumulated over the years since cement fill was first been used in the mine. The order would shut the mine for all of 2012.

The mine reopened in February 2013 and reached full production of 900 tpd in September. Work on the No. 4 internal shaft had been placed on hold until the Silver Shaft reopened. Once the Silver Shaft rehabilitation work was completed down to the 4900-foot level, Hecla started construction of a new haulage way around the area impacted by the 2011 rock burst, completing the bypass in early 2013. Sinking the #4 Shaft resumed in early 2013 and in May 2017, it was completed to a depth of 9,587 feet below the surface (**Figure 22**). Annual production was planned for 5 million ounces starting in 2017. Unfortunately, the United Steelworkers Union went on strike at the mine in March 2017 and it continues today.

Hecla Mining company celebrated its 125<sup>th</sup> anniversary in 2016. It is the oldest precious metals mining company in North America.

## **Possible Side Trip - Wallace to Burke via Canyon Creek.**

### Mileage Description

0.0 Set tripmeter to 0.0 (or record mileage) at the 7th and Bank Street intersection (blinking traffic light) in Wallace at the County Courthouse. Go east past the Public Safety Building on the left and follow the signs to I-90. Just past the ramp to I-90 continue straight ahead (north) onto Idaho Highway 4 to Burke. The orange buildings on the left are the machine shops of the Coeur d'Alene Hardware Company, a past producer of mining machinery. On the nose of the hill to the right was the location of the Sisters of Providence Hospital built in 1891.

0.5 Old Standard mill site on right (Figure 23). All that is left of the mill that processed ore from the Standard Mammoth Mine is one green building and a small brick building. The brick building housed the step-down transformer at the mill for electric power that was brought to the district in 1903. Wallace Formation is on both sides of road.

Houses on both sides of the road.

### MM2

1.4 Woodlawn Park. The road crosses the Osburn fault, which separates the Wallace Formation on the south from the Prichard Formation on the north.

1.7 On the right is the first of six tailings impoundments for Hecla's Star-Morning mine. The location of the much older tailings dam built in 1902 by the Mine Owners Association was to the east of the road. This area has been reclaimed and all old tailings removed by the Silver Valley Trustees. Today, this is the Lower Burke Canyon Repository for mine waste storage.

2.1 Grays Bridge Road

2.2 MM3- More Star tailings ponds on the right.

2.8 Canyon Silver Mine (former Formosa Mine) on right.

3.6 Road sign, Entering Gem. The Gem stock is exposed on the west side of the road. The Prichard Formation is on the east side.

Gem was the site of the Hecla mill. It was difficult to build large mills in the narrow canyon in the same place as the mines, so the mills and mines were spread up and down the canyon taking advantage of every wide spot in the canyon bottom.

3.9 This brick building, which was Hecla's assay office for some years, spans Canyon Creek and is all that is left of the giant mill complex. Most of the mill tailings in and along Canyon Creek from here to Frisco have been removed by the Silver Valley Trustees and later EPA actions.

4.2 Road sign- Entering Frisco.

The “Panic of 1893” coincided with a calamitous fall in metal prices, which caused the mine owners in the district to cut wages or close mines. Labor unions had existed in the district since Simeon Reed first cut miners' wages at the Bunker Hill in 1885. In 1892, the mine owners told the miners they were going to cut wages. The union men rebelled and went on strike. The owners countered by hiring non-union men (scabs) from outside the district to work the mines. In addition, a Pinkerton detective named Charles Siringo, hired by the mine owners, infiltrated the union at Gem. Union activists discovered the deceit and this along with other provocations by the owners led to the dynamiting of the nearby Frisco mill by union supporters on July 11, 1892. This was the first so-called labor war in the Coeur d'Alene. Governor Norman Willey requested federal troops to put down the lawlessness and restore order. An outgrowth of the conflict was the birth of a new labor union, the Western Federation of Miners. The organization would soon spread throughout the west. Many more violent confrontations would be the consequence in coming years.

4.4 MM5 Frisco Mill site is just before the bridge over Canyon Creek. All of this area has been cleaned up and remediated.

4.5 Bridge over Canyon Creek. The reclaimed dump of the Tamarack Mine is visible ahead on the left.

4.7 Road sign- Entering Black Bear townsite. Rocks are the Burke Formation. The north-south trending Frisco fault goes through here. The Tamarack Mine dump is across the creek ahead to the left, and the old Black Bear Mine is on the hillside to the right. The Tamarack was last operated by Day Mines, Inc. in 1979 and was then used for training by local mine rescue teams.

5.1 Bridge across Canyon Creek. The Standard fault cuts through here separating Burke Formation from Prichard Formation. The portal or entrance to the Tamarack mine is on the left.

5.3 MM6 Another bridge across Canyon Creek

5.5 Road sign, Entering Cornwall. Named for Cornwall, England, home of some of the best miners in the world in the late 1800s and early 1900s. Known as Cousin Jacks (they always had a Cousin Jack back home who needed work in the new country) these men came from a long tradition of mining tin and other metals in the Cornish mines.

5.8 Concrete portal on the contoured dump to the left of the creek is the Campbell No. 5 tunnel of the Standard-Mammoth (later the Green Hill- Cleveland) Mine. A famous picture of the Standard Mammoth mine (**Figure 3**) shows the miner's outhouses perched right over Canyon Creek. Mine tailings were not the only waste that was dumped into the creek, which was nick-named the “Little Nasty.”

5.9 Road sign, Entering Mace. The town is named for Amasa (Mace) Campbell, one of the owners of the Standard-Mammoth mine and principal in the original Hecla Mining Company. Many of the entrepreneurs who made fortunes in the Coeur d'Alene moved to Spokane, Washington, and built beautiful homes. The Campbell House is part of the NW Museum of Arts and Culture in Spokane and is a good example of a home designed and built by one of Spokane's most famous architects, Kirtland Cutter. Mace is known for the 1910 snow slide that killed 17 people and

destroyed several homes. The narrow canyon is subject to frequent snow slides brought down off the steep canyon walls by warm "Chinook" winds.

### 6.3 MM6 Road crosses Canyon Creek again. Road sign, Entering Burke.

The town of Burke. Most of Burke is in the Prichard Formation, but the Burke Formation is exposed near the end of the pavement.

Shifters Hill Road. The Hecla Mine was the original property of the Hecla Mining Company formed in 1891. The headframe at Burke serviced the mine. Later, in 1921, Bunker Hill and Hecla formed the Sullivan Mining Company to mine the Star Mine, located at the west end of the Morning Mine, for rich zinc ore to feed the electrolytic zinc plant at Kellogg. The Star was accessed by a 8,900-foot-long tunnel from the 2000 level of the Hecla Mine. After the Hecla was mined out in 1944, a new Star tunnel was driven in 1953 from the canyon level to the Star workings (**Figure 24**). An unsuccessful attempt was made by the Star Phoenix Company to reopen the Star mine in 1990.

Hecla began an exploration program at the Star in 2008 that would include, deep surface drilling, rehabilitation of the main 2000 level tunnel, opening the Upper Grouse adit to the Noonday vein and development of a 750-foot exploration drift. The #5 Shaft in the Star was repaired and it provides secondary escape to the Grouse 700 level. Exploration drilling started from the new drift to look at the southeast extension of the Noonday and Morning Veins. The program produced good results with the best intercept grading 29.1 opt silver and 8.9% combined lead and zinc over 5 feet. More drilling was planned in 2013, but the project was placed on hold as other company investments and the Lucky Friday Expansion Unit took priority.

Approaching the Star-Morning/Hecla surface plant, the date 1923 is visible on the end of the concrete flume that channels Canyon Creek. The date refers to the 1923 fire that destroyed the entire surface workings of the old Hecla plant and much of Burke and Gem (**Figures 25 & 26**). The surface plant was back in operation one year later with a new fireproof structure that remains today although in poor repair. The dump on the left, across from the concrete building on the road, is the old Hecla extension.

7.1 End of the pavement. The timbers to the left are the site of the Sherman mill. The rough dirt road that turns to the left at the end of the pavement goes up Gorge Gulch and to the upper tunnels of the Hercules Mine. The Sherman Mine was owned by Day Mines. It was also the site of the long Hercules No. 5 tunnel that went from the mill site to the Hercules Mine. The brick building at the mouth of Gorge Gulch was the old Hercules office.

Just before the end of the pavement is where the Tiger Hotel and the Tiger and Poorman Mines (**Figure 27**) were located. The hotel was unique because it was constructed over the railroad tracks. A tunnel was built through it to allow trains access to a loading platform for the Hercules Mine. Burke was named for John Burke. The town was featured in Ripley's "Believe It or Not" for its unique layout. It was built in such a narrow canyon that merchants had to roll up their store awnings or lose them to passing trains. The town is also known as the birthplace of Lana Turner.

Return to Wallace, to the intersection of State Highway 4 (Canyon Creek road) and Bank Street (I-90).

***UPDATE- December 2018***

**Azteca Gold Corp- Bunker Hill, 2007-2008**

Azteca Gold Corporation announced an option to buy the Bunker Hill mine from the New Bunker Hill Mining Company in August 2007. The mine contains a substantial zinc resource. Azteca dropped the option in July 2008, citing problems in reaching an agreement with the federal Environmental Protection Agency (EPA) and the owner, Bob Hopper.

**Azteca Gold Corp- Twomile project, 2007-2011**

In May 2007, Quantech Consulting, Inc. completed a geophysical survey on the Twomile property north of Osburn for Royal Apex Silver. Several geophysical targets were identified. In 2007 Azteca announced a 50/50 joint venture with Royal Apex. The company planned on drilling three core holes that were completed with the deepest hole bottoming at 1,920 feet. Azteca then started drilling three deeper holes, 005A, 005B and 006 in 2008. By the end of 2009 Azteca had drilled the following deep holes (**Figure 28**):

DDH005A- 8,784 feet-deep. At 7,950 feet reported 50 feet of massive sulfides.

DDH005B- Wedged off 005A at 4,000 feet. On 9/15 the hole was at 10,243 feet.

DDH006A- 11,173 feet- deep. Carbonate zone was described at 11,081 feet.

DDH006B- Wedged off 006 at 9,900 feet. On 9/15 the hole was at 11,643 feet.

Press releases noted several intercepts of both stratiform and vein-type mineralization in some of the holes. A hallmark of the drilling program (Ruen Drilling) is that these are the deepest holes ever drilled in the Coeur d'Alene mining district and were put down using conventional drilling rigs. Azteca stopped drilling in September to have Scintrex Ltd. do some down-hole geophysics. In 2010, Azteca began to drill Hole #9 that is about half way between DDH 5 and 6.

The company ran into serious problems in March 2011 when the Alberta Securities Commission noted that the company's president, had breached Alberta securities law by acting as the company's qualified person although he lacked the required experience for this position and other allegations. He was sanctioned and fined by the ASC in May 2012 and the project ended.

**Bunker Hill Venture, LLC. Bunker Hill Mine. 2015**

In March 2015, Bob Hopper Jr. announced that the Bunker Hill mine was back in business. An older mill at the site had been upgraded (**Figure 8**) and a smelting contract with a company in China penned. Ore stockpiled near the mine was the mill feed. In September the company was reopening the Russell tunnel in Wardner Gulch. The Russell was driven in 1970 for a blast hole stopping project in the Small Hopes area of the Sullivan mine. The tunnel would serve as a secondary escape way preparatory to resuming underground mining above the flooded lower levels

of the Bunker Hill mine (**Figure 9**). About 30 people were working on the new program called Bunker Hill Venture, LLC. It closed later in the year.

### **Bunker Hill Mining Corporation (Liberty Silver). Bunker Hill mine. 2017-2018**

In June 2017, Liberty Silver announced plans to look at the Bunker Hill Mine. In August they penned an agreement with the owner Placer Mining Corporation. Liberty's name changed to Bunker Hill Mining Corporation in November. Principals in the company were involved with the successful reopening of the Galena mine in 2006. The targets of first importance in the Bunker were the zinc-rich Newgaard and Quill orebodies (**Figure 30**). The company signed an important agreement with the Environmental Protection Agency in March 2018, concerning cleanup of the site, and the critical issue of future water treatment from the mine. In October 2018, the company announced a default of their lease with Placer and the termination of the project, but the agreement was continued in November under renegotiated terms.

### **Bayhorse Silver, Inc. "Bridging the Gap". 2013-2017**

In December 2013, an Oregon based company, Kent Exploration, Inc. announced a name change to Bayhorse Silver Inc. In addition to the Bayhorse Silver mine in Oregon the company planned an exploration program called "Bridging the Gap" (**Figure 31**) between the eastern end of the Page mine (Crown Point/Silver King mines) system, and the west end of the Bunker Hill Mine (Shea area). Three holes totaling 1,459.4 ft. penetrated both the Crown Point target and the Osburn Fault Zone intersecting St. Regis Formation in the hanging wall and Prichard Formation in the footwall. About 113 core samples were analyzed from the drilling program. Difficult ground and interest in their Oregon project caused the company to drop the project.

### **TransAtlantic Mining. Monitor property. 2015-date**

In 2015, TransAtlantic Mining completed 15 core drill holes from three separate drill pads near the Idaho-Montana state line. Holes totaled about 9,000 feet, with most in unmineralized Wallace Formation and targeting veins in the Richmond and Monitor mines (Figure 32). In general, there are two 5 to 8-foot wide chalcopyrite veins (trace gold) with fine grained siderite/ankerite margins and coarse-grained quartz centers. There has been no work reported since this initial drilling program.

# FIGURES

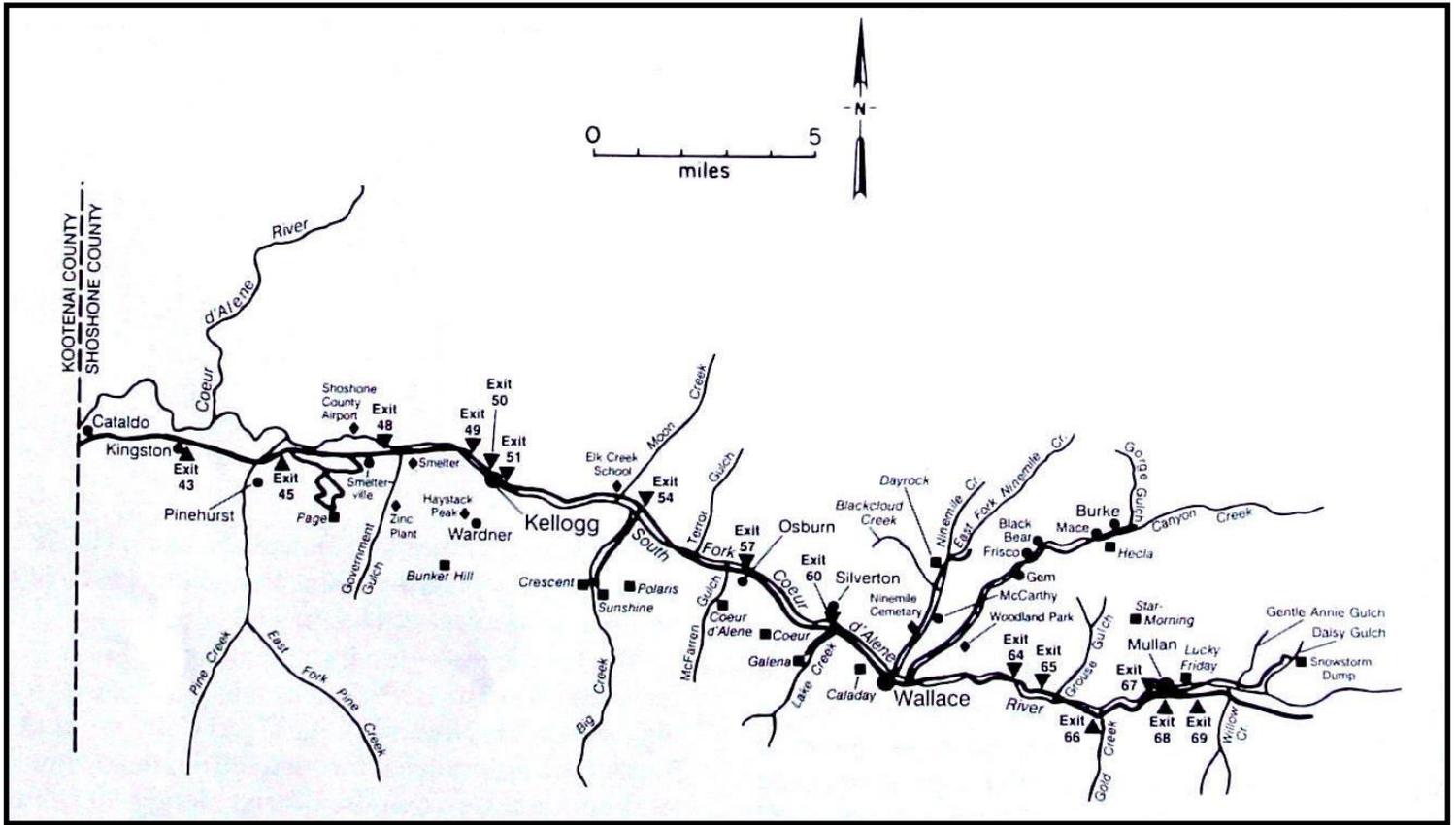


Figure 1. Road map of field-trip route along Interstate 90 from Coeur d'Alene to Mullan, ID.

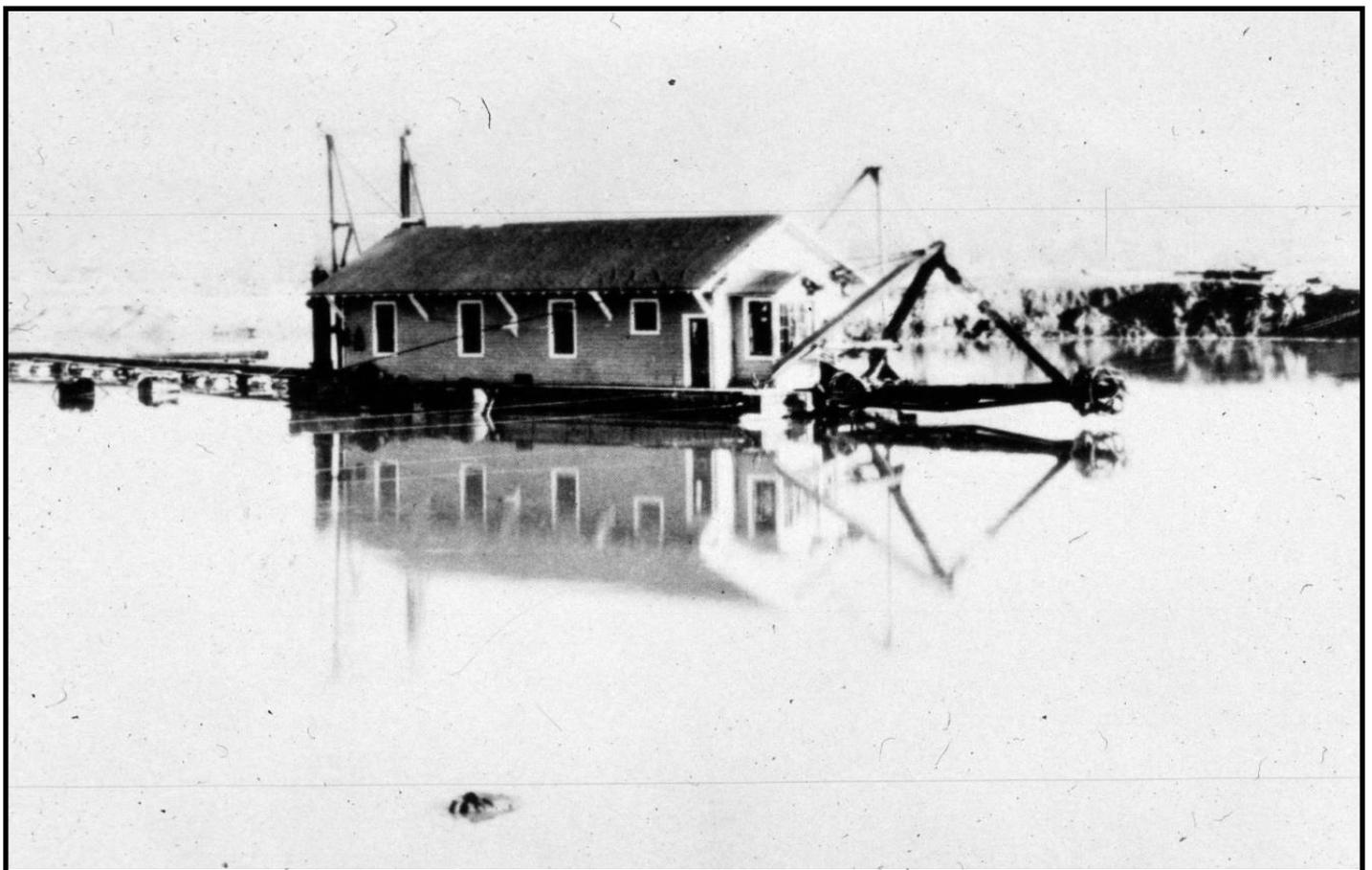


Figure 2. Cataldo Dredge built by the Mine Owners Association in 1934.

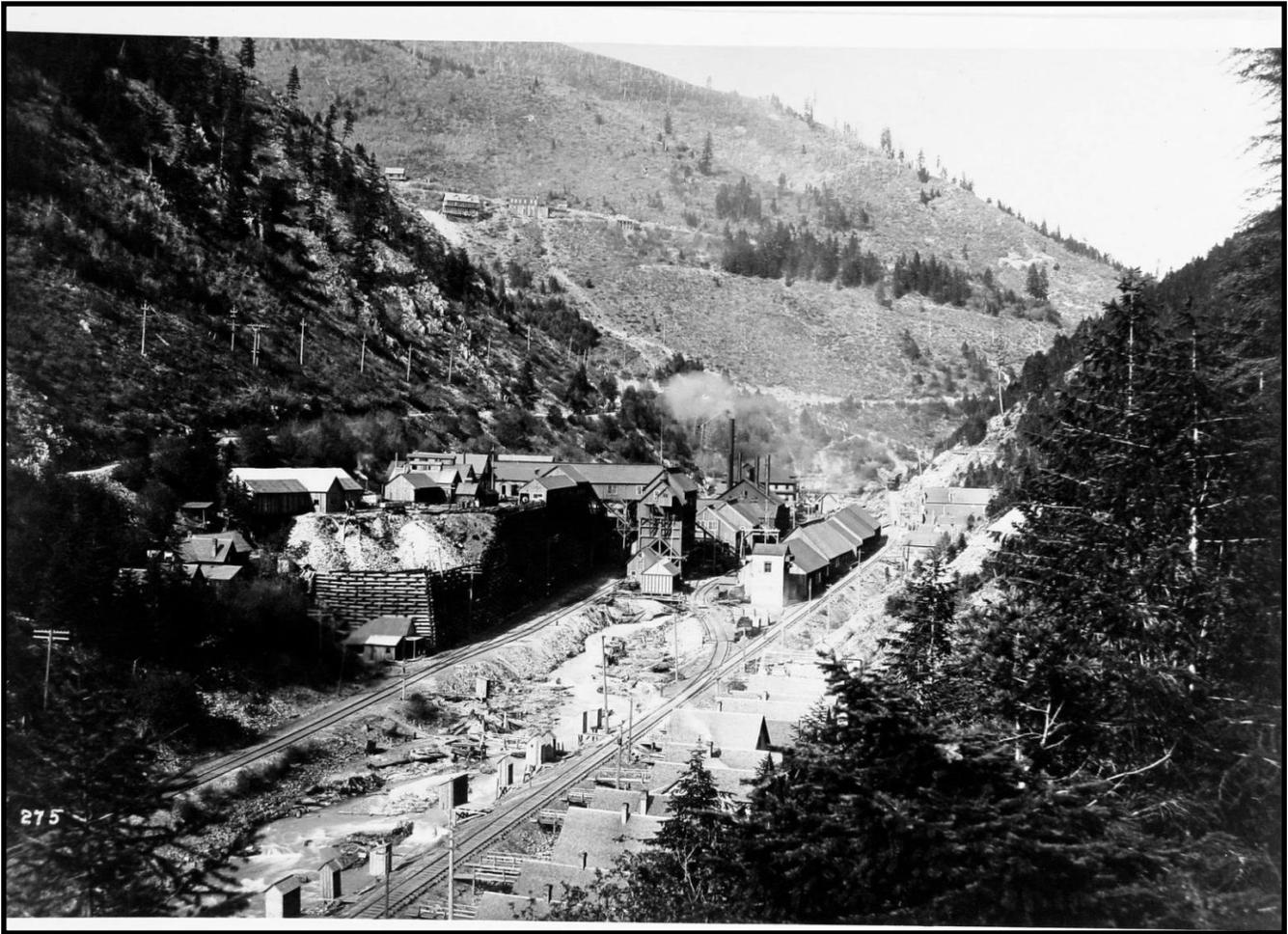


Figure 3. Note the “self flushing” outhouses over Canyon Creek across the trailroad racks from miner's homes near the Standard Mammoth Mine.

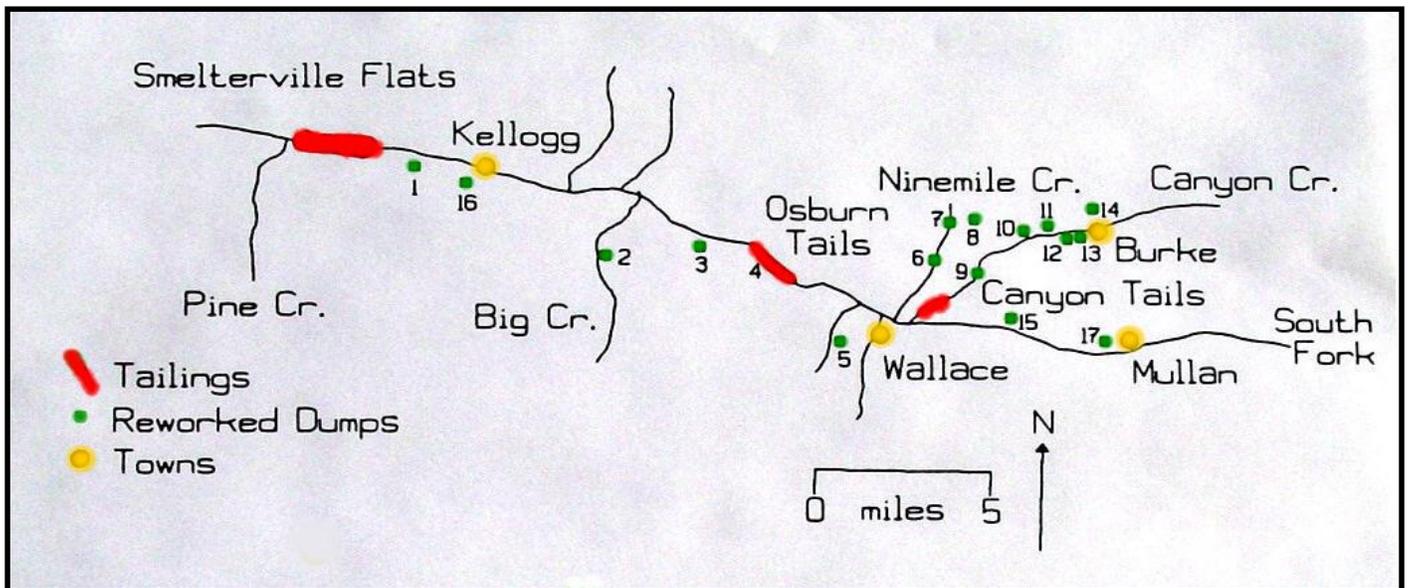
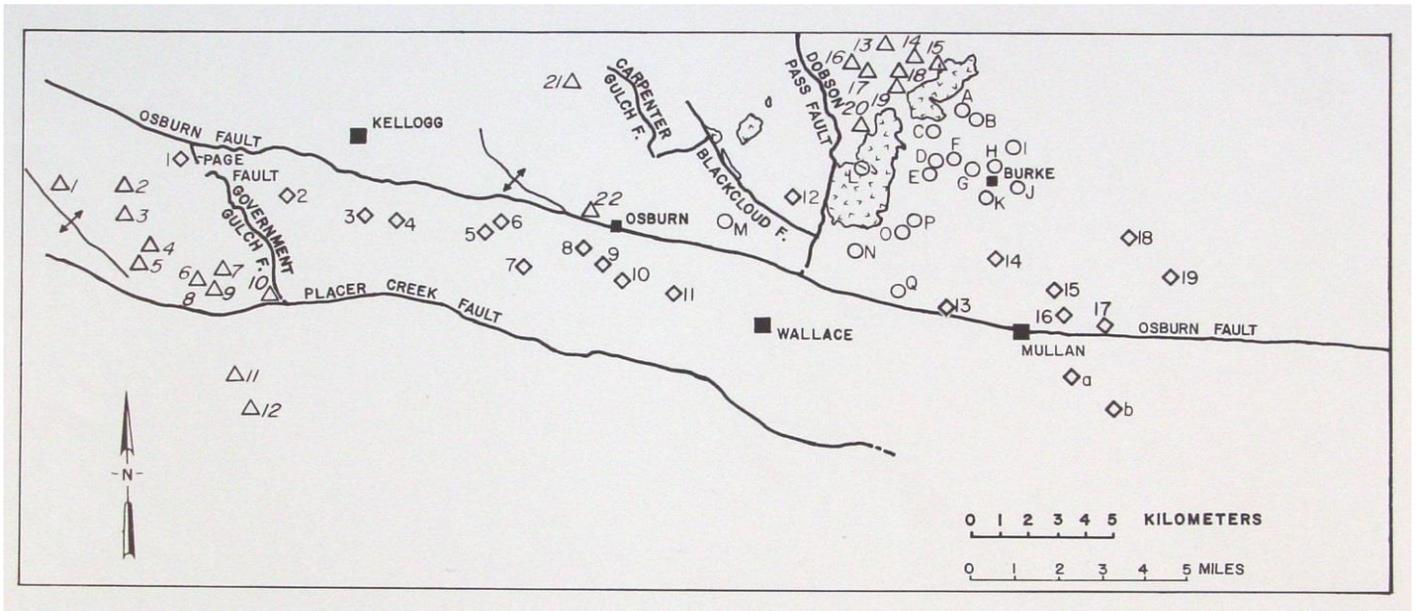
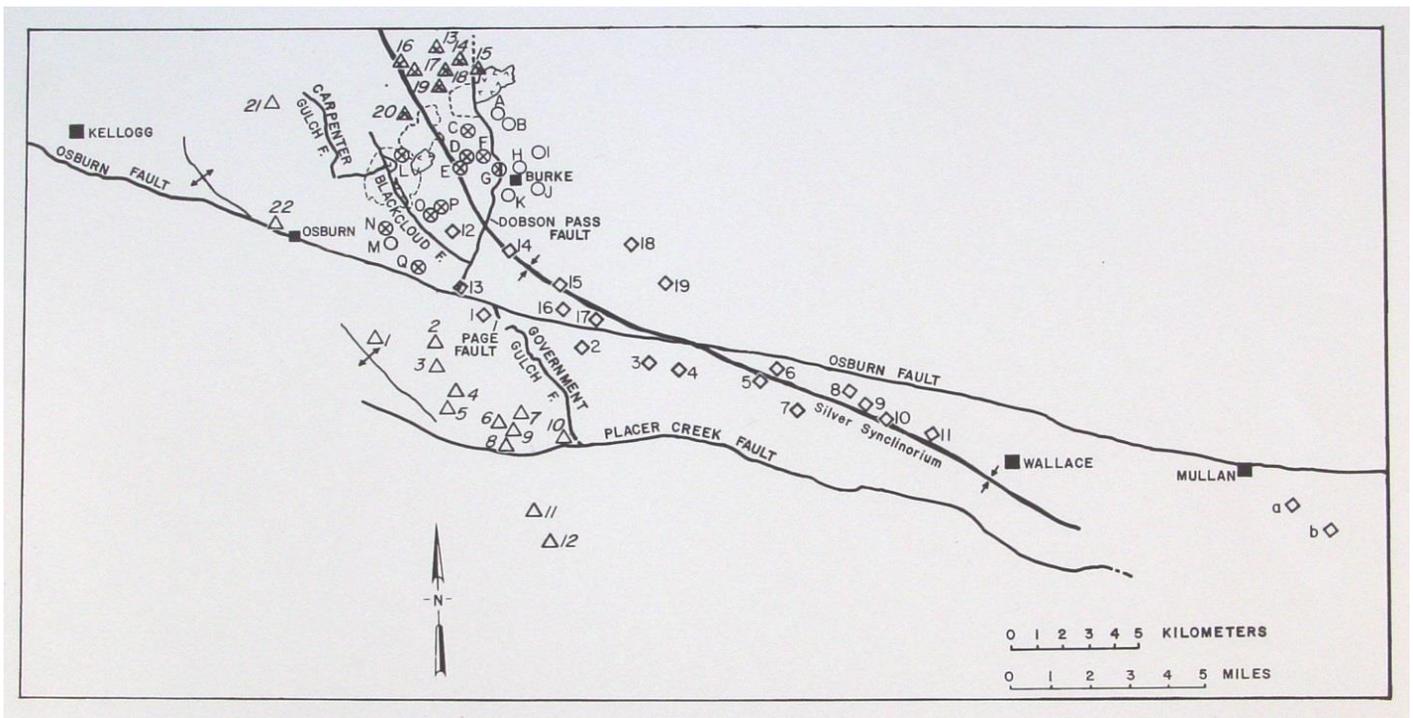


Figure 4. Location of tailings dams built in 1901 and 1902.



A.



B.

**Figure 5. Location of ore deposits in the Coeur d'Alene Mining District before and after movement on the Osburn and Dobson Pass faults. (A) Present location of mines by stratigraphic position. (B) Location of mines by stratigraphic position as they would have been located prior to movement along the Dobson Pass and Osburn faults.**

Figure 3 continued.  
MIDDLE PRICHARD  
DEPOSITS

**Pine Creek Area**

1. Hypotheek
2. Bobby Anderson
3. Amy Matchless
4. Sunset (Liberal King)
5. Lookout Mountain
6. Nabob
7. Sidney
8. Hilarity
9. Little Pittsburg
10. Highland Surprise
11. Douglas
12. Constitution

**Upper Ninemile Creek and  
Sunset Peak Area**

13. Idora, Tuscumbia, and Tough  
Nut
14. Silver Tip
15. Suset Lease
16. Carlisle
17. Amazon-Monitor
18. Nepsic
19. Interstate-Callahan
20. Rex (16 to 1)

**Evolution District**

21. Charles Dickens
22. Evolution

PRICHARD-BURKE  
DEPOSITS

- A. Ambergris, Guelph, and  
Honolulu
- B. Hercules
- C. Tamarack
- D. Union
- E. Standard-Mammoth
- F. Sherman
- G. Hummingbird, Fairview, and  
Wide West
- H. Tiger-Poorman
- I. Ajax
- J. Marsh
- K. Hecla
- L. Success (Granite)
- M. Western Union
- N. Canyon Silver (Formosa)
- O. Helena-Frisco
- P. Black Bear
- Q. Golconda

ATLAS BLOCK

- a. Atlas (Carbonate Hill)
- b. Reindeer Queen

WALLACE DEPOSITS

15. Gold Hunter

REVETT-ST.REGIS DEPOSITS

1. Page
2. Bunker Hill
3. Alhambra

**"Silver Belt"**

4. Crescent
5. Sunshine
6. Polaris
7. Consolidated Silver (Silver  
Summit)
8. Coeur d'Alene (Mineral  
Point)
9. Coeur
10. Rainbow
11. Galena

**Other Revett-St. Regis Deposits**

12. Dayrock
13. Alice
14. Star-Morning
16. Lucky Friday
17. Vindicator

**Stratabound Disseminated  
Copper-Silver Deposits**

18. National
19. Snowstorm

Middle Prichard deposits are shown as   
Prichard-Burke deposits as   
and Revett-St. Regis deposits as   
Mines below the Dobson Pass fault are shown by these symbols:    
The Gem stocks are shown by a barbed pattern.

Figure 5. cont. Explanation



**Figure 6.** This 1930's picture partially explains the geology of the "Silver Belt." The rocks along Big Creek at the Sunshine Mine are folded into a geologic structure called the Big Creek anticline. All of the mines on the south side of the Osburn fault including the Bunker Hill, Crescent, Sunshine, Consolidated Silver, Coeur d'Alene, Coeur and Galena are in similar structures along the Big Creek anticline



**Figure 7.** Dropping the Bunker Hill stacks, May 26, 1996.



**Figure 8. New mill under construction by Bunker Hill Venture in 2007.**



**Figure 9. Opening the Russell Tunnel by Bunker Hill Venture in 2007.**



Figure 10. New Jersey Mining's 350 tpd mill near Big Creek.

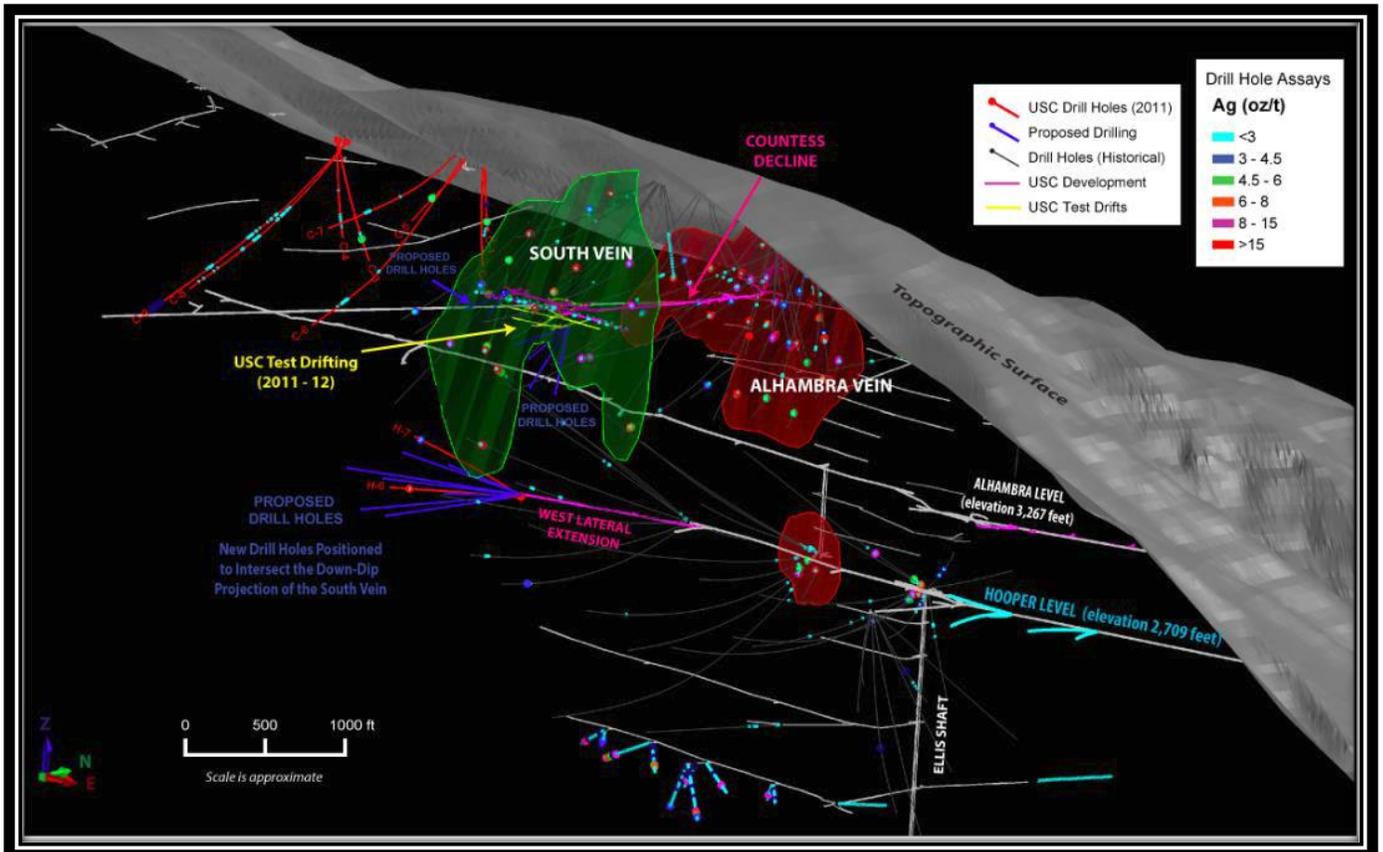


Figure 11. Perspective view of the Crescent Mine, United Mining Group, 2011.



Figure 12. Sunshine Mine.

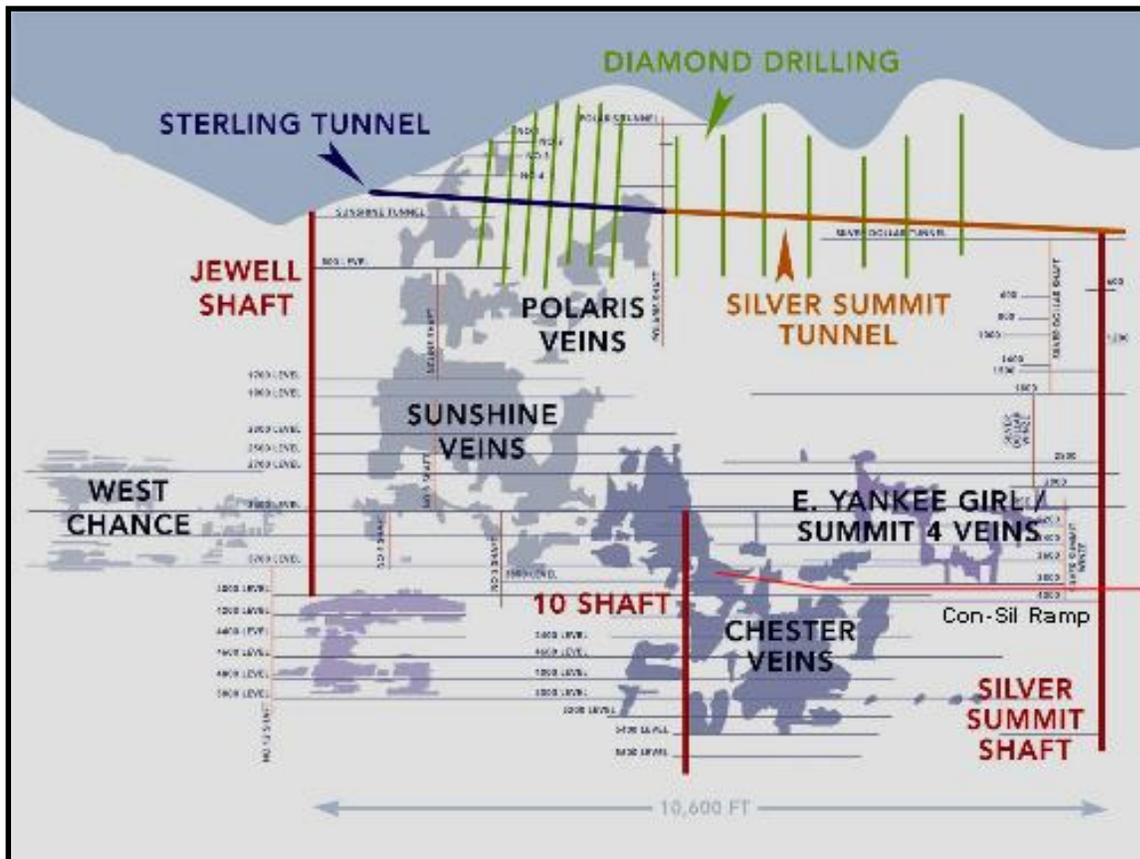


Figure 13. Section of the Sunshine Mine showing Sterling Tunnel and proposed Con-Sil ramp.



**Figure 14. Osburn Flats, 1930, filled with tailings.**



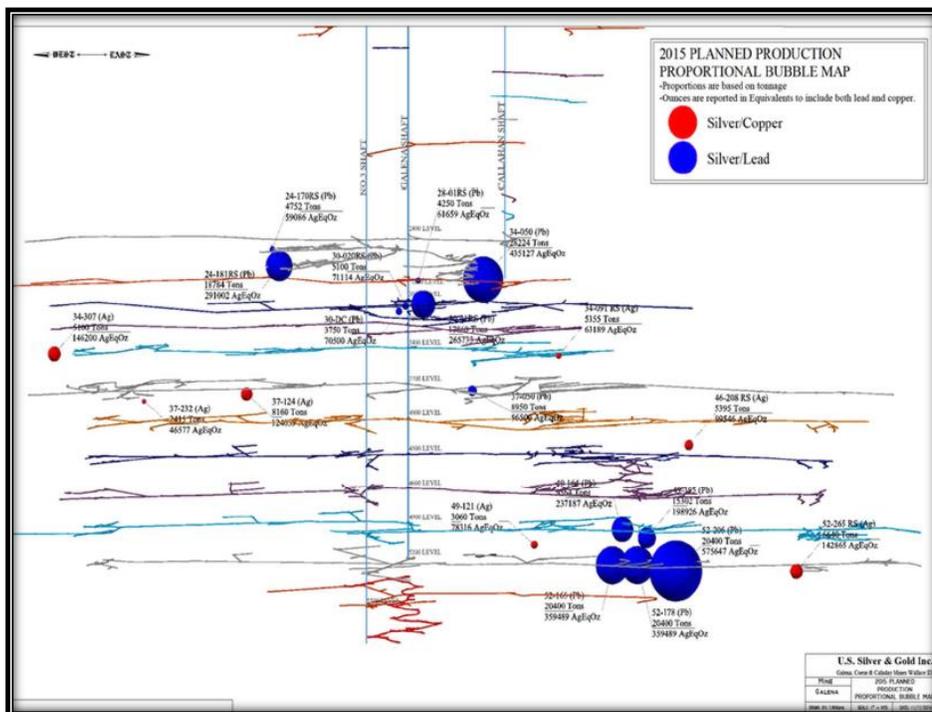
**Figure 15. Osburn Flats, 1993. Tailings removed during WWII.**



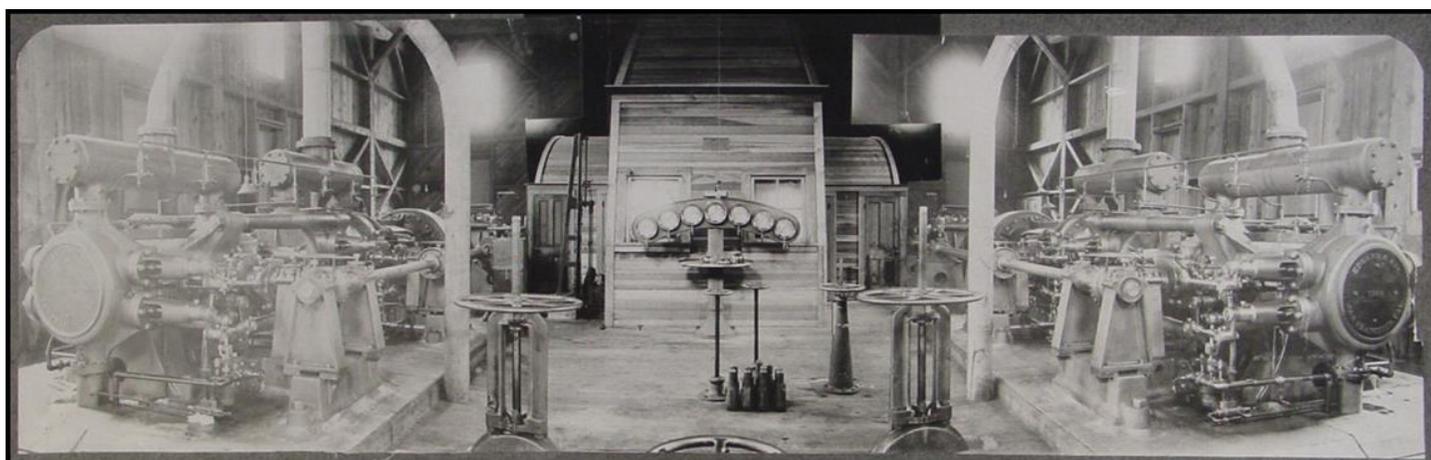
**Figure 16. Coeur Mine.**



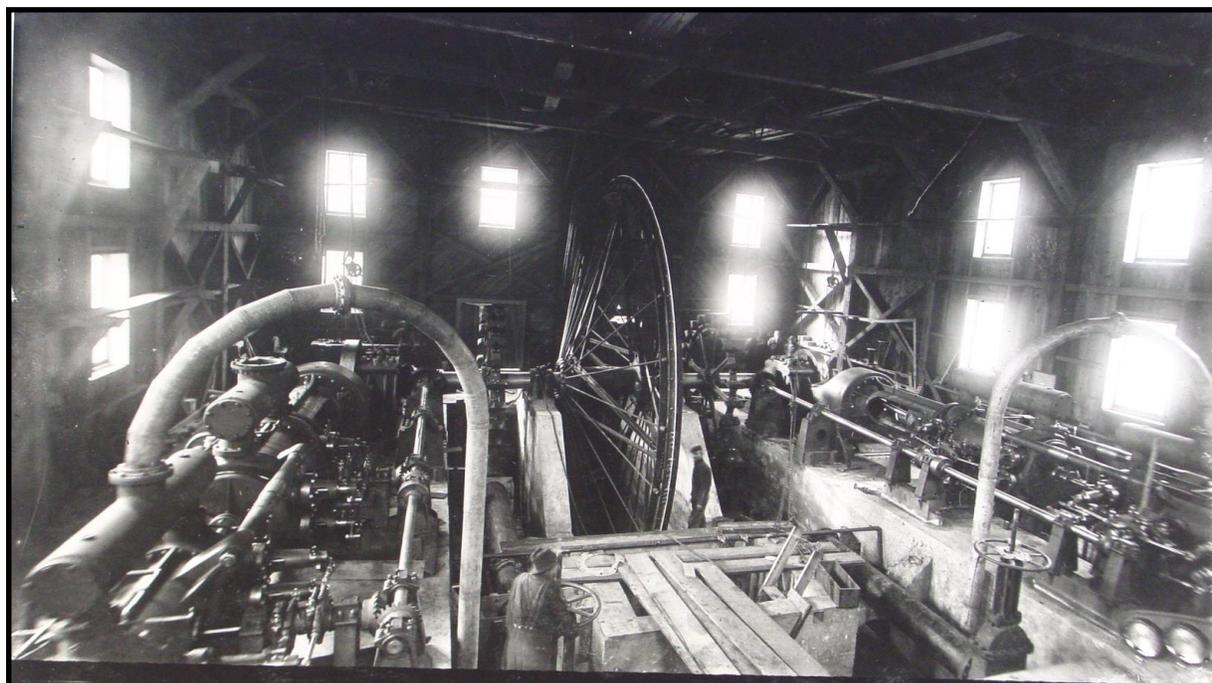
**Figure.17 Galena Mine.**



**Figure 18. Production areas in the Galena mine in 2015.**



**Figure 19. Grouse Creek Compressor.**



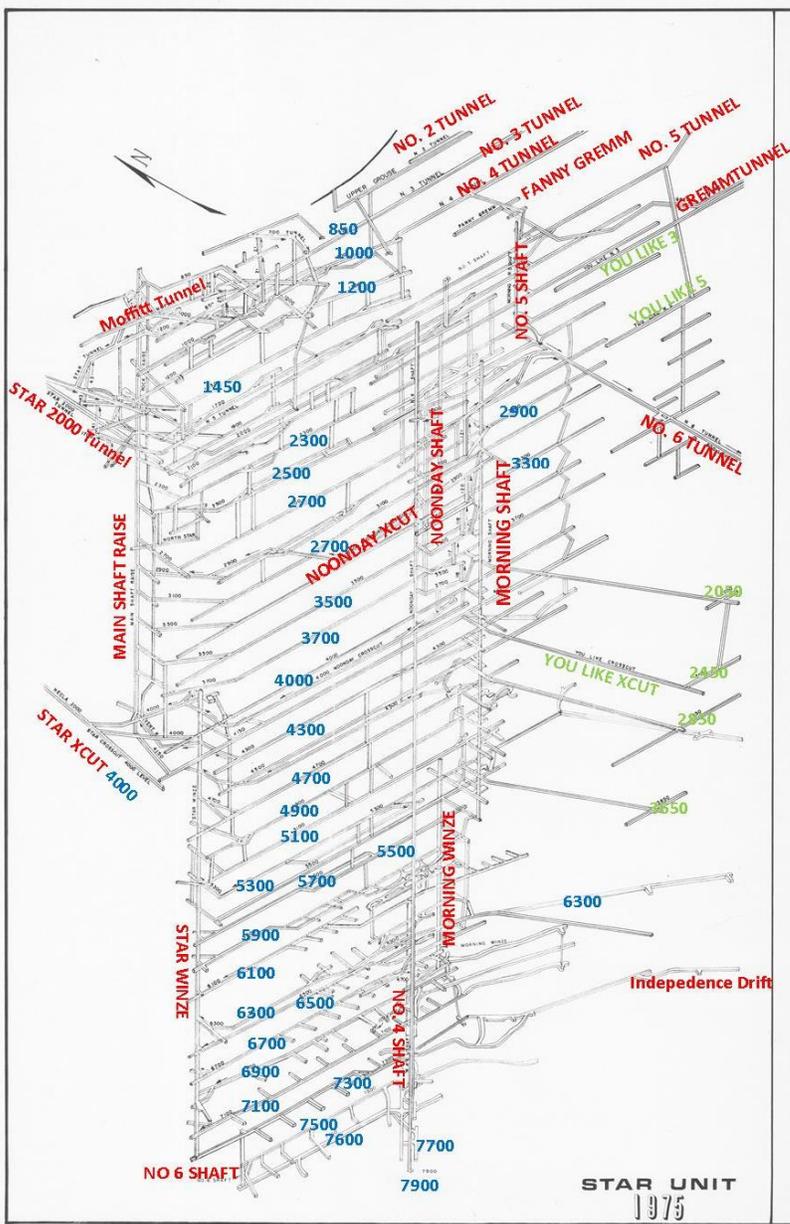
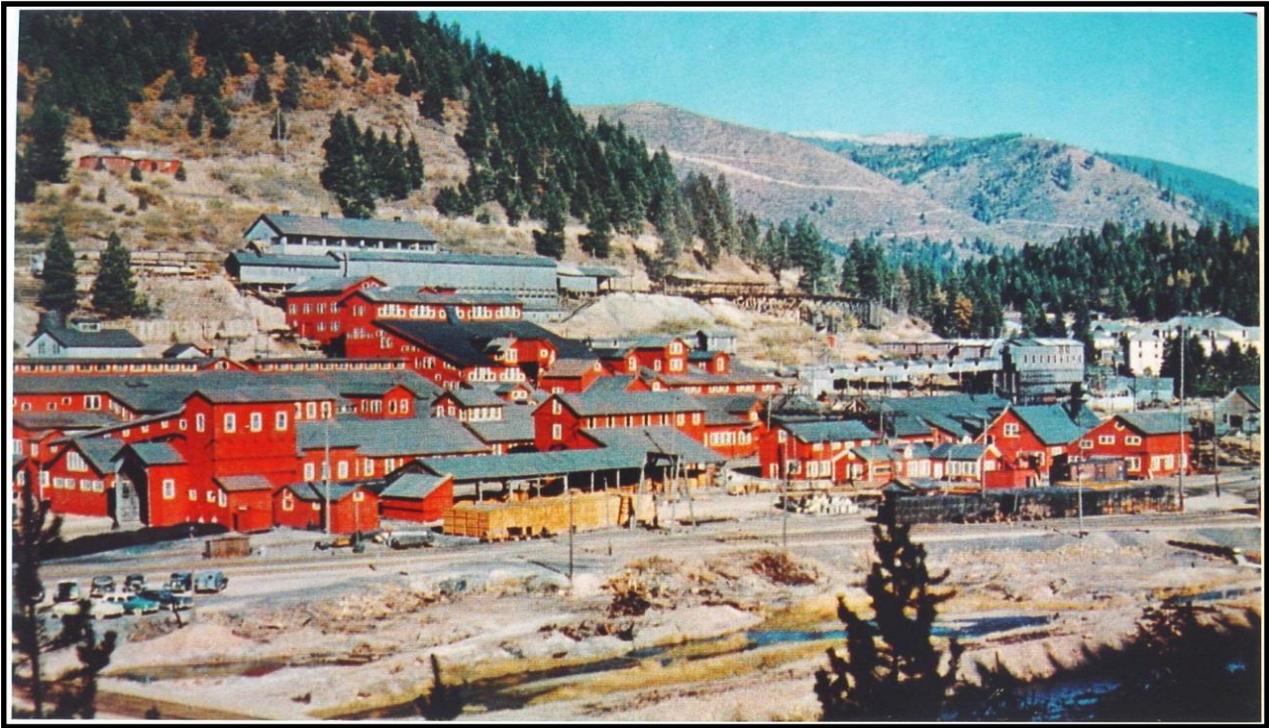


Figure 20. Upper- Morning Mill at Mullan, c. 1950. Lower- Projection of the Star-Morning Mine workings. 4,900 ft. long, 7,900 ft. deep.



Figure 21. Silver shaft and mill of the Lucky Friday Mine

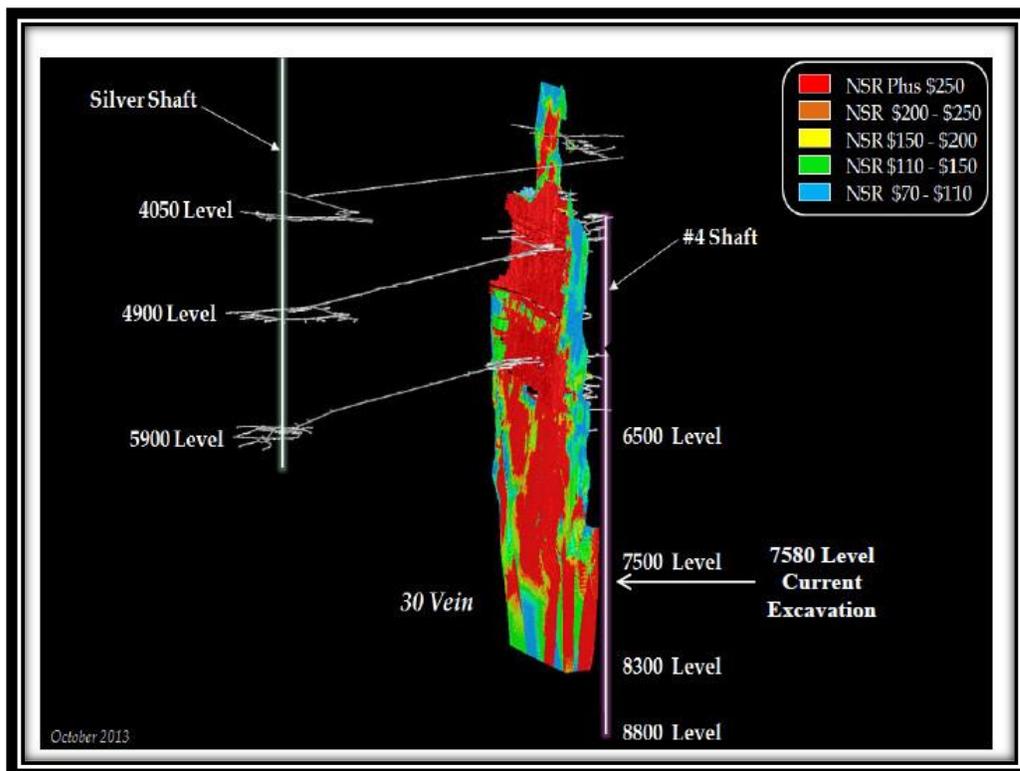


Figure 22. Projection of Lucky Friday Expansion workings and the new #4 shaft, 2014.



Figure 23. Standard-Mammoth Mill, 1907.

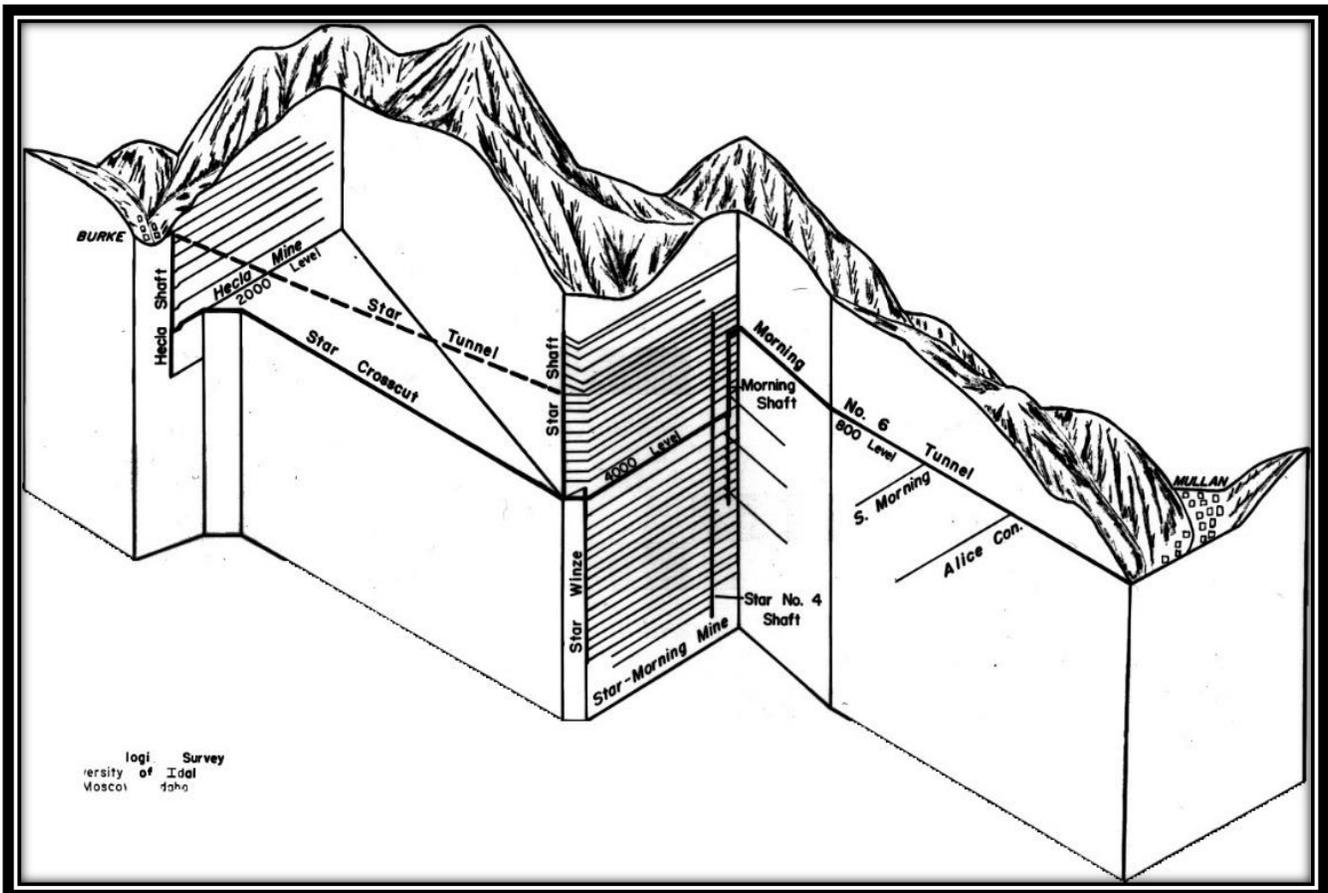
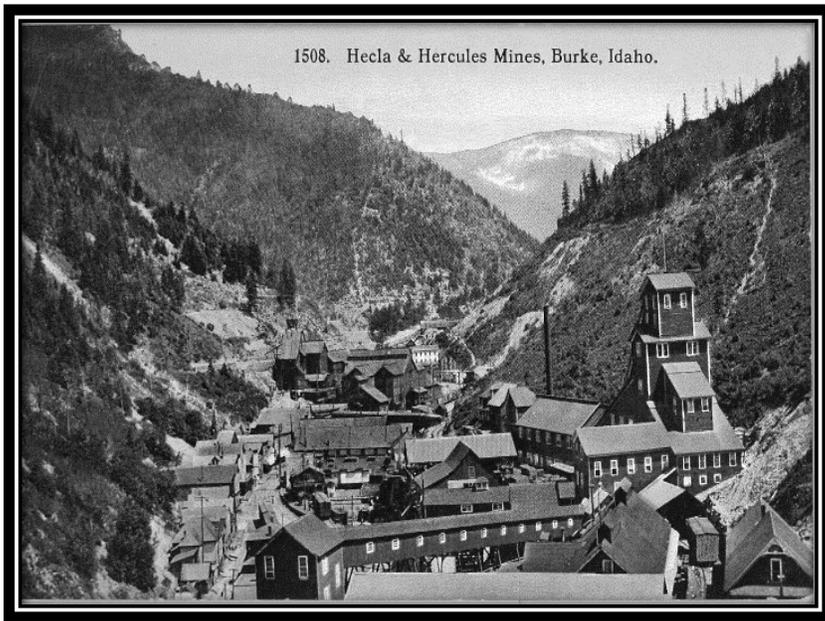
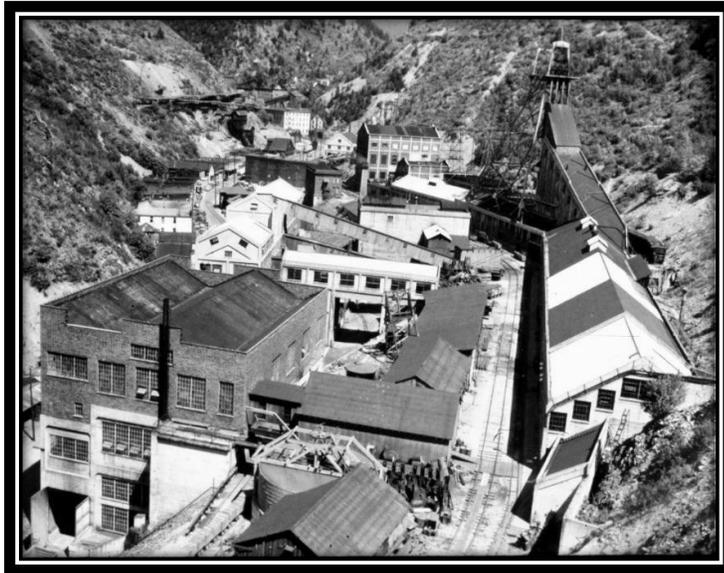


Figure 24. Projection of underground workings between Burke and Mullan.

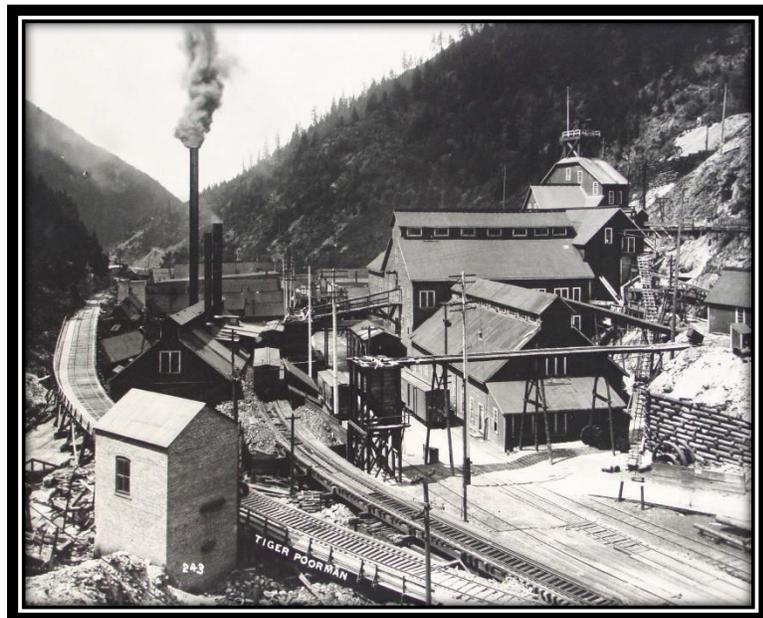


1508. Hecla & Hercules Mines, Burke, Idaho.

**Figure 25. Burke, Hecla Mine, pre-1923 fire.**

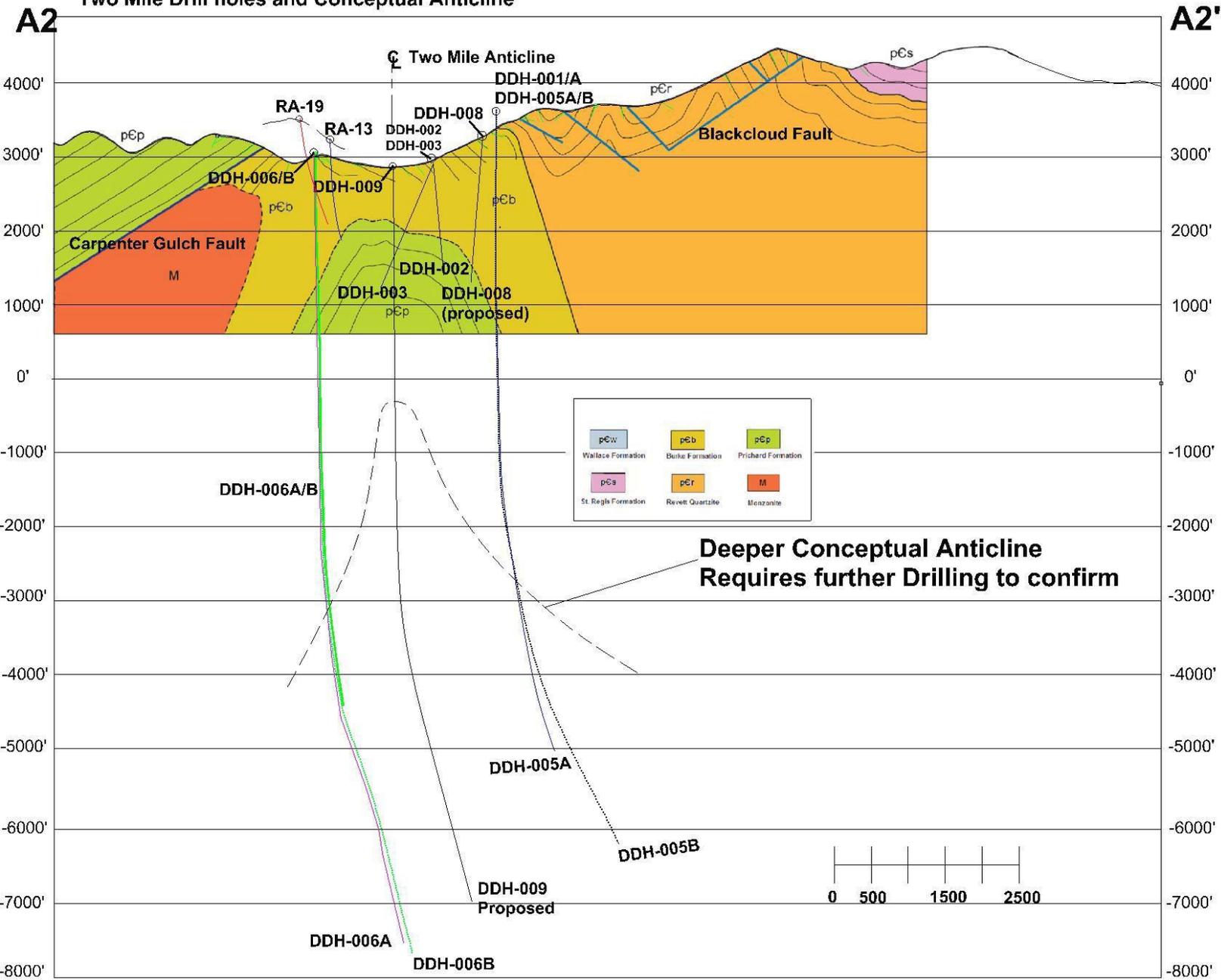


**Figure 26. Burke-Hecla Mine, post-1923 fire.**



**Figure 27. Tiger-Poorman Mine, c.1906.**

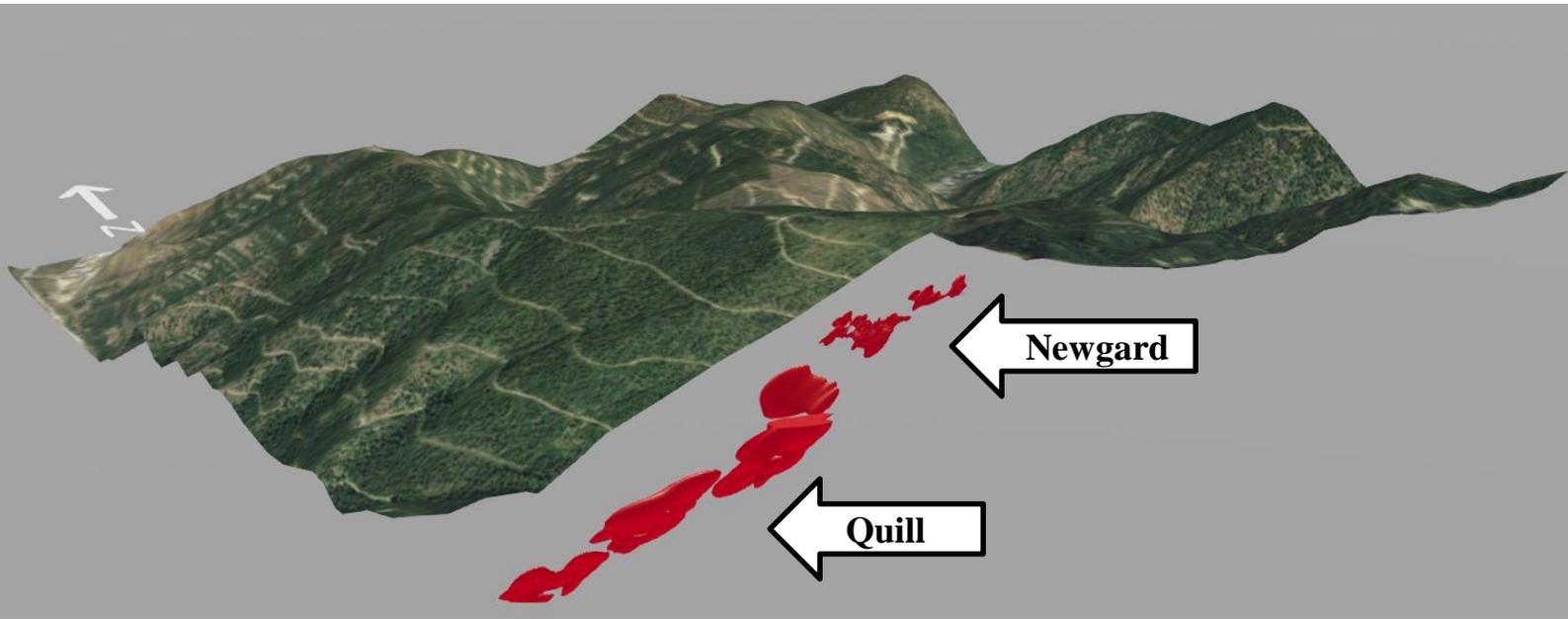
**Section A2 - A2'**  
**Cross Section based on USGS Report 478, plate 3**  
**Two Mile Drill holes and Conceptual Anticline**



**Figure 28. AZTECA- Twomile drilling project. (from Company Report by Jennifer Thompson, 2010).**



**Figure 29. New Jersey Mining- Golden Chest Mine-adit and open pit, 2017. Company photo.**



**Figure 30. Bunker Hill Mine projection showing Quill and Newgard ore bodies. Image from Curia Geoscience (curiageo.com).**

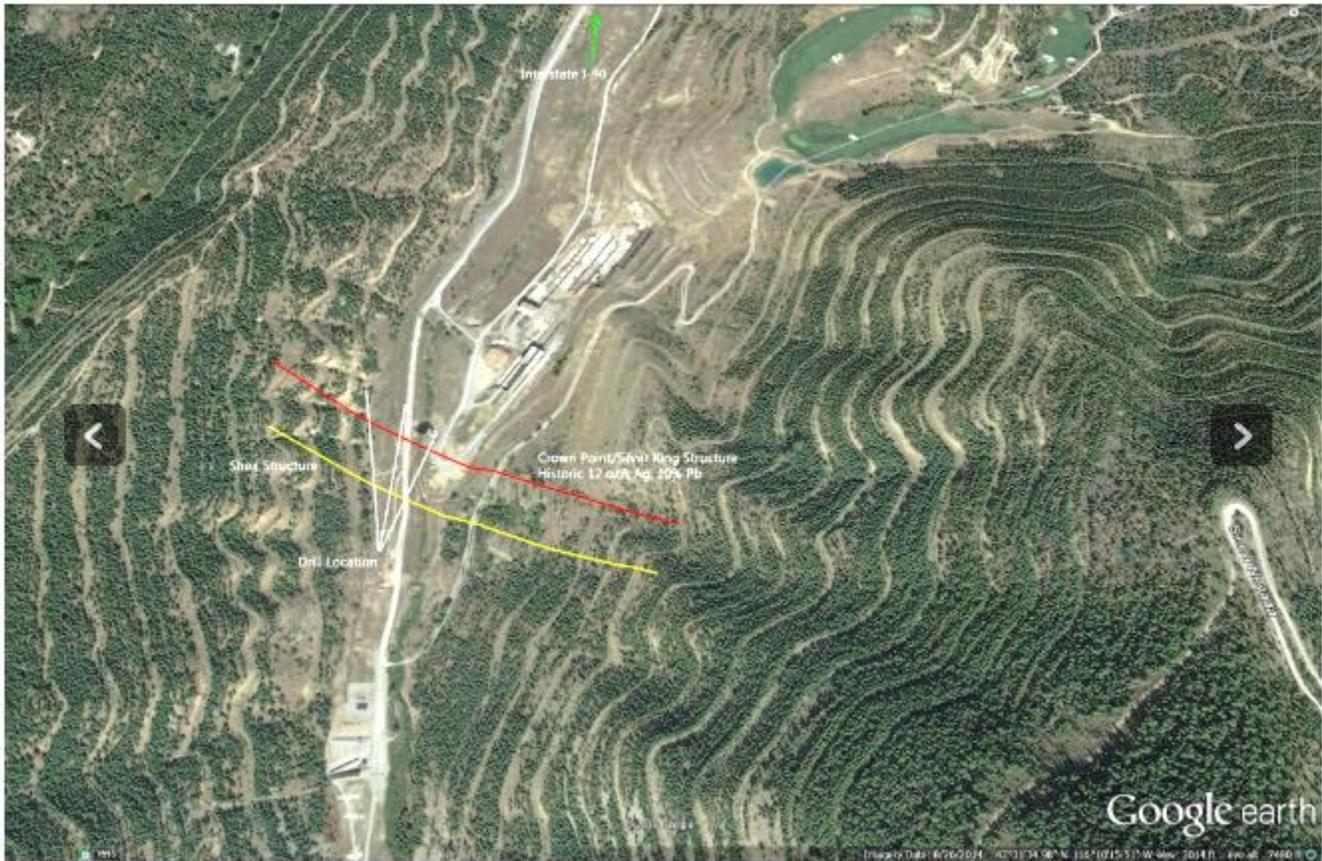
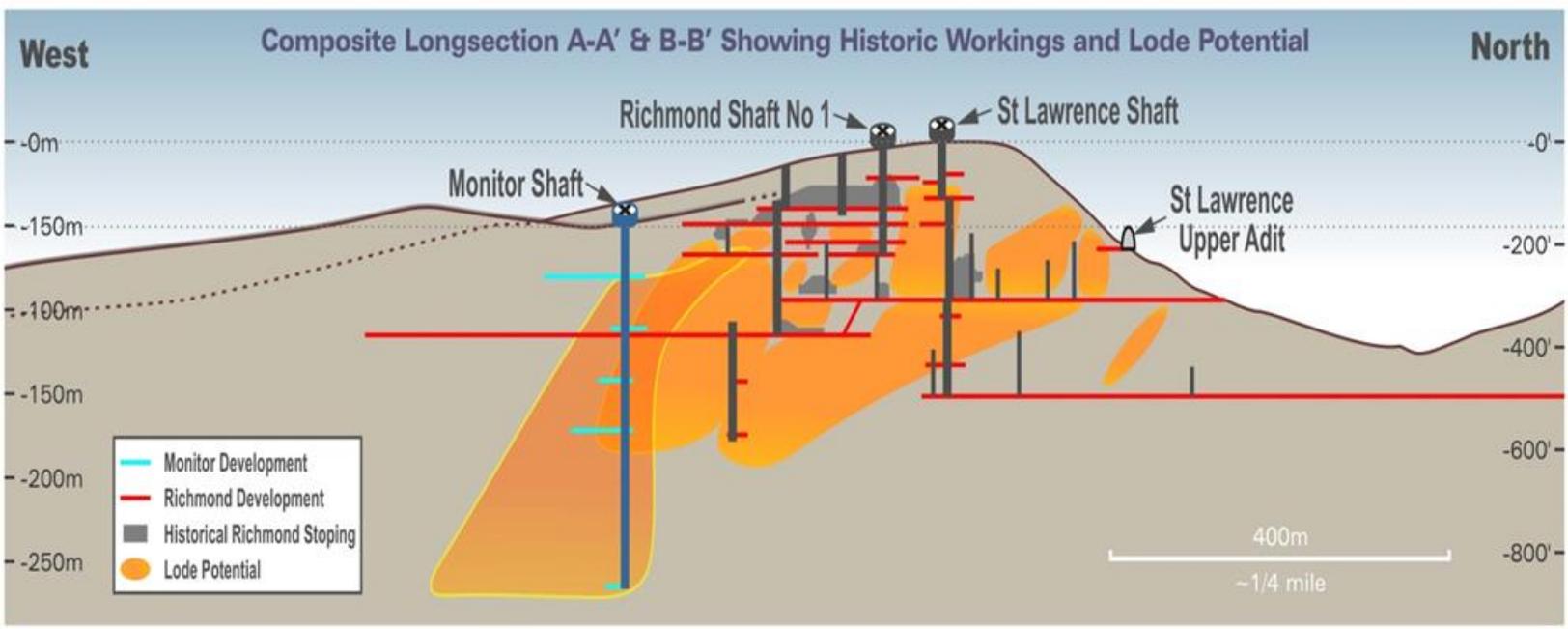
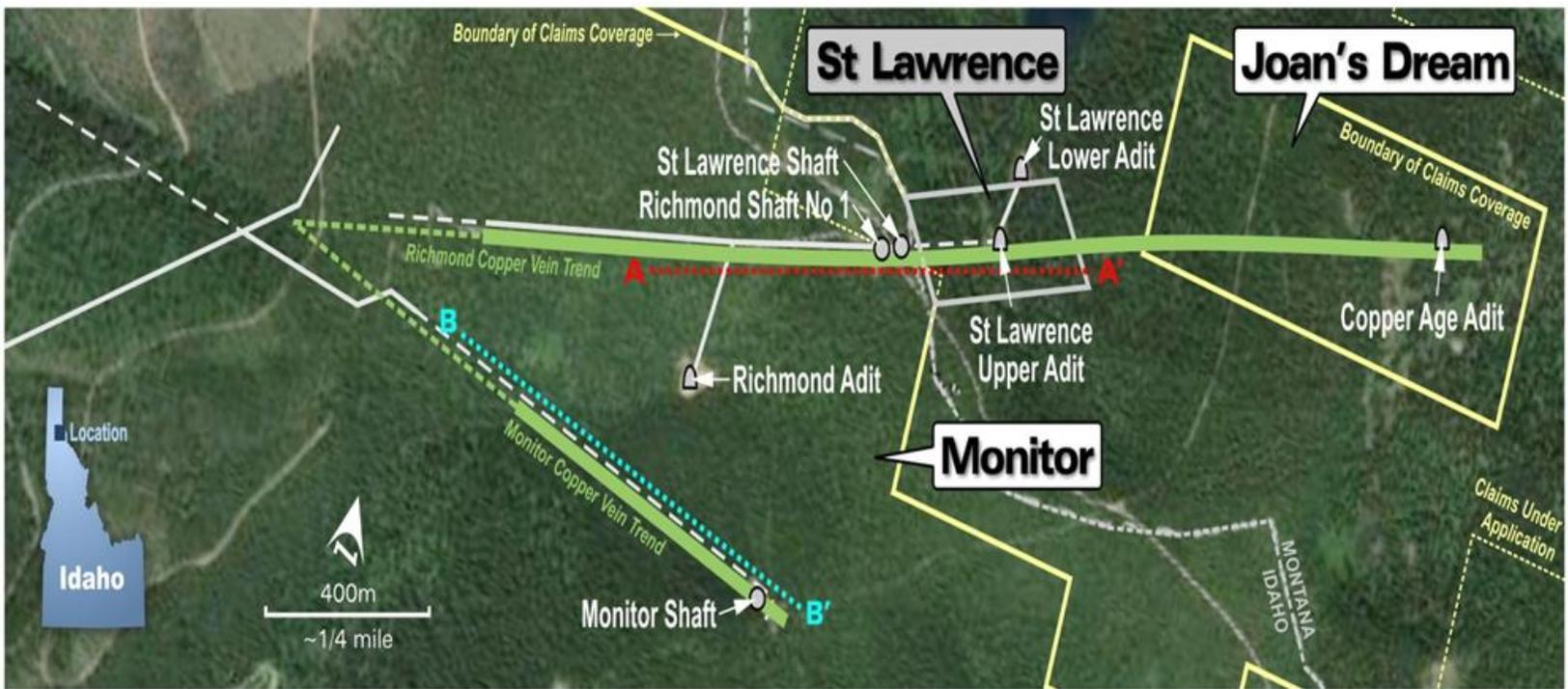


Figure 31. “Bridging the Gap Project”- Bayhorse Silver



**Figure 32. Map and long section of the Monitor project. TransAtlantic Mining diagram.**