

EXPLORATION IN IDAHO – 2000

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Idaho's strong industrial minerals industry showed more glitter than the precious metals in 2000. Metal mining and exploration, particularly for silver, gold and molybdenum, suffered from continued weakness of international metal prices. Additional election-year uncertainty relating to access to federal lands, which comprise more than half of the state, also impacted Idaho's mining community. The three silver mines in the Coeur d'Alene District of north Idaho had good years operationally. However, low silver and lead prices evaporated any hope of profits.

Phosphate mining and processing, located in south-eastern Idaho, continued as the dominant mineral industry in the state. Idaho has four large, open-pit mines and four processing plants, all operating at full production. Fertilizer prices were down due to weakness in the agricultural sector. However, demand was high for elemental phosphorus products. Idaho is currently the only domestic producer of elemental phosphorus. It is used in everything from Coca-Cola to Roundup herbicide. Strong markets and the potential of future adjustments in energy pricing were among the reasons Astaris (formerly FMC) and Agrium joined forces to construct a new plant to produce purified phosphoric acid. Simplot and Monsanto were working on permits for new mines. Other industrial markets were good, and new exploration interest was seen for decorative stone, zeolites and clay, as well as aggregate.

Declining gold prices and depleted reserves have forced closure of Idaho's recent generation of gold mines. Meridian Gold's Beartrack Mine in Lemhi County was the last to go. The deposit was initially discovered in 1986 near the old placer diggings at Leesburg. It was put into production by FMC Gold in July 1995 as an open-pit, heap-leach operation. Mining and crushing were completed in March 2000, though leaching will continue.

In 2000, the Beartrack Mine produced 2.24 t (72,237 Oz.) of gold from 839,000 T (925,000 t) of ore, compared with 1999's record production of 4.15 t (133,457 oz.). Through December 2000, Beartrack had poured 640.8 t (581,376 oz.) of gold at cash costs near \$6.43/g (\$200/oz.). In addition, Meridian defined a sulfide resource of about 31 t (1 million oz.) grading 1.5 g/T (0.044 oz./t) beneath the oxide ores and open at depth. Beartrack employed 120 persons during operations, but only 17 were left by the end of the year. They are conducting reclamation and final leaching and gold recovery. The North Pit was backfilled and capped and the Mason-Dixon pit was also reclaimed during 2000. The alignment of pits and waste dumps along the Panther Creek fault zone served as a critical fire break. It helped contain the Clear Creek fire last summer.

US Antimony was also in the reclamation phase of its closure of the small Yellowjacket gold mine in southern Lemhi County. The pit was backfilled with tailings and the mill buildings and equipment dismantled.

In southeast Idaho, reclamation work was also nearing completion at Pegasus Gold's Black Pine Mine in Cassia County. Work included reshaping roads and final heap rinsing.

Kinross Gold's DeLamar and Stone Cabin mines in Owyhee County remained on care and maintenance status after closure at the end of 1998. Earth Resources opened the open-pit mine in 1977. Through 1997, the DeLamar district had produced about 1,080 t (35 million oz.) of silver and 20.6 t (663,200 oz.) of gold from epithermal veins and stockworks in Tertiary rhyolites. Reclamation of the DeLamar pits and Jacobs Gulch waste dump was ongoing.

The Stone Cabin mine was closed in 1998 to preserve the unmined resource. The vat leach mill and cyanide destruction AVR plant have been mothballed at the remote site in southwestern Idaho.

Hecla Mining's Grouse Creek precious metals mine in Custer County has been closed

since April 1997. But the company is still responsible for a large, water-filled tailings impoundment with sporadic low-level cyanide leaks. In October, Hecla signed a voluntary agreement with the U.S. Forest Service (USFS) and the U.S. Environmental

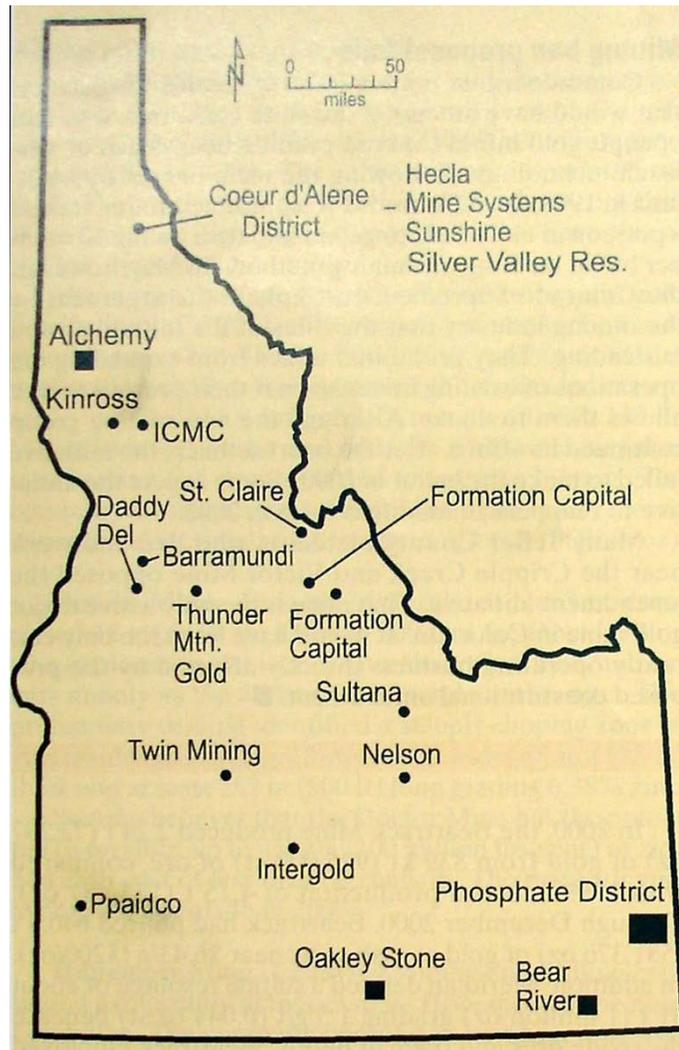


Figure 1: Exploration activity in Idaho during 2000.

Protection Agency (EPA) to dewater and detoxify the tailings pond and construct a water treatment plant.

Legal wrangles also continued over the Stibnite District, The state was supervising final reclamation of facilities and roads from the bankrupt Dakota Mines venture, Last summer, though, forest fires burned some of the previously reclaimed areas, especially near Garnet Creek.

But the big news came from the courtroom. Mobil Oil has spent more than \$5 million in the last few years to remediate the historic Bradley mill tailings. Mobil's attorneys forced the federal government to admit the vital role of the U.S. government in discovering and mining tungsten from Stibnite during World War II. According to an out-of-court settlement, the United States will reimburse Mobil \$1.55 million for the Stibnite cleanup and waive some claims against Mobil. Mobil and its contractors had received awards in 1999 from the state of Idaho for their excellent reclamation work.

Thompson Creek Mining's open-pit mine in Custer County maintained operations. But low molybdenum prices forced layoffs and production cuts. About 100 people were still employed by year's end. Thompson Creek did do some delineation drilling behind the high wall. The company's high-performance, lubricant-grade molybdenum plant has been a positive economic factor.

In September, the U.S. Secretary of Interior signed the mineral patents for 10 km² (2,500 acres) at the Thompson Creek mine and mill, transferring oversight authority to the state. The company also received a long awaited record of decision on its supplemental environmental impact statement. This allows it to operate the pyrite

reduction plant built a couple of years ago, to provide cleaner sand for constructing the tailings dam and reducing the threat of acid generation.

Coeur d'Alene district

The Coeur d'Alene District is known locally as the Silver Valley. It is one of the world's premier silver districts, having mined more than 31.1 kt (1 billion oz.) of silver metal since 1884. Major amounts of lead, zinc, copper and antimony have also been extracted from the galena and tetrahedrite-rich vein systems that cut deformed Proterozoic-age Belt Basin metasediments.

Total silver production in 2000 from the three deep mines was estimated to be more than 399.7 t (12.85 million oz.) of silver, compared with about 404.3 t (13 million oz.) in 1999. However, lower silver and lead prices made it impossible for Hecla Mining, Sunshine Mining and Refining, and Coeur d'Alene Mines to make any money. Realized silver prices hovered around 16 cents/g (\$5.00/oz.) and lower. And byproduct lead prices averaged only in the 20 cent/lb. range.

Hecla Mining operates the Lucky Friday Mine at Mullan. Some production comes from the original galena-rich vein of the Lucky Friday deposit. But most of the ore mined in 2000 was from the Gold Hunter deposit. It is connected to the Silver Shaft by a 1.6 km (1 mile) long haulage tunnel on the 4900 level. The Gold Hunter veins contain more tetrahedrite. Mining is conducted by ramps accessing underhand and overhand stopes.

Silver production in 2000 at the Lucky Friday increased from 138.1 t (4.4 million oz.) in 1999 to 155.8 t (5,011,507 oz.) of silver. This made 2000 the second highest

production year since the mine opened. However, economics forced the company to take a \$31.2-million writedown on the value of the mine in 2000.

Hecla was also attempting to sell its K-T Clay division to raise money to pay down debt and the costs of environmental work at Grouse Creek and the Bunker Hill Superfund site. A negotiated \$68 million sale of the clay division to Zemex fell through near year's end and Hecla was pursuing court proceedings.

Financial conditions at Sunshine Mining and Refining were even worse. The company filed for Chapter 11 bankruptcy and reorganization in August, though exploration had already been suspended at its Sunshine Mine near Kellogg. The mine has produced more than 10.9 kt (350 million oz.) of silver since its discovery in 1884 from a tetrahedrite-quartz blowout on the ridge above Big Creek. Mining continued through last year on the West Chance vein but reserves were dwindling. Production in 2000 at the Sunshine Mine was down to 120 t (3.88 million oz.) of silver from 153 kt (169,036 t) of ore milled. This was a significant decrease from the 161 t (5.2 million Oz.) produced in 1999.

Coeur, The Precious Metals Co., had better news at its Galena Mine, operated by the now Coeur- owned Silver Valley Resources. Production was on its way towards a 155.5 t (5 million oz./year) target. After shaft repairs at the first of the year, costs were lowered to less than 13 cents/g (\$4.00/oz.) for the third quarter of the year.

Exploration in 2000 at the Galena Mine was successful in extending the 72 and 117 veins at depth in the mine. A districtwide, geologically based exploration program was conducted. It intercepted a potential new ore shoot on the 294 vein that graded 819

g/T (23.9 oz./t) silver in the West Argentine area. A second mineralized zone was also discovered on the Polaris Fault outside of the current workings.

Other north Idaho areas

Exploration for metals was limited by low metal prices and regulatory issues. These included the proposed new Roadless Policy on National Forest lands and the new 3809 rules affecting U.S. Bureau of Land Management (BLM) land in Idaho. Consequently, only a few exploration projects were active. Near Elk City in Idaho County, Idaho Consolidated Metals (ICM) held its ground on four gold properties in the Orogrande and Elk City mining districts. The four properties cover the 42 km (26 mile) Orogrande shear zone. From north to south, they include Buffalo Gulch, Deadwood, Petsite/Friday, and Dixie. Buffalo Gulch contains a drilled-out 6.5 t (210,000 oz.) oxide resource plus exploration potential at depth.

The Petsite property had been explored through a joint venture with Kinross Gold. In September, ICM announced that for \$100,000 in cash, it had acquired Kinross Gold's 70% interest in Petsite. It has a resource of 16.5 t (532,000 oz.) of gold. Approximately \$1.7 million of work has been done on Petsite in the last several years. This included drilling, geophysics and geochemistry.

Deadwood and Dixie are reconnaissance-level targets. ICM now controls 100% of the Orogrande shear zone. The company would like a joint venture partner to help explore and develop the Elk City properties further when gold markets improve.

Salmon area

Exploration near Salmon in Lemhi County centered on the Blackbird district, 70 road km (45 road miles) southwest of Salmon. Formation Capital continued work on its Idaho cobalt project, formerly called the Sunshine project, located in the Idaho cobalt belt. Mineralization is contained in sedimentary exhalative horizons within the Proterozoic-age metamorphosed sediments of the Yellowjacket Formation. Copper and gold, in addition to cobalt, are concentrated in the bedded zones. Formation's 137 unpatented claims surround the patented core of the district, which includes Noranda's Blackbird Mine. The Idaho cobalt belt is one of only two high-grade cobalt reserves in the nation.

Formation has done extensive grassroots exploration and drilling since 1993 at the project. Most of the work in 2000 was involved in off-site activities, such as financing, feasibility, and permitting studies. This was done in preparation for submitting a plan of operations for an underground mine to the Salmon-Challis National Forest. More than 4,047 km² (1 million acres) burned in Idaho last summer, as a number of disastrous forest fires covered the state. The largest fire in the nation was the Clear Creek Fire, which started in wilderness just north of the Blackbird District. The Formation crew and local residents had to evacuate. Steep hills of trees over the main RAM ore zone were torched, and miners at Beartrack and Yellowjacket mines were also forced to evacuate.

Last year, Formation drilled eight metallurgical test holes in the RAM zone, finishing just before the fire hit. The large diameter core was used to compile a bulk concentrate of the ore zone, where cobaltite is the ore mineral. In October, the company

entered into an agreement to purchase a hydrometallurgical refinery for use in processing an Idaho cobalt concentrate. The refinery would use a pressure-leach process in autoclaves, facilitating easy recovery of precious metal byproducts.

Feasibility studies by Mine Development Associates of Reno, Nevada, were based on the more than 100 diamond drill holes on the project. Results have indicated good economics for a proposed small, underground mine with a nine-year mine life. There is a proven-to-inferred reserve of 1.9 million T (2.1 million t) grading 0.68% cobalt, 0.54% copper, and 0.7 g/T (0.02 oz./t) gold. The zone is open at depth and along strike. Several other surface targets in the district have yet to be drilled and the expansion potential is high.

West central Idaho

Thunder Mountain Gold continued to hold its patented property at the old Dewey Mine east of Yellow Pine. The company had announced plans to open the Thunder Mountain Mine on a cherry stem into the central Idaho wilderness. SAIC was doing the environmental impact statement, but activity was minimal.

At Warren, Jim Striker sold his interest in the high-grade Rescue gold mine and mill to Barramundi Gold USA, a subsidiary of Barramundi Gold. Barramundi was sampling and exploring the high-grade vein structures. The systematically spaced ore shoots average about 22.2 g/T (0.65 oz./t) gold and are open to depth. Barramundi also holds other veins in the district and is looking at upgrading the small gravity mill at the

Rescue. The Rescue vein is an east-west striking quartz vein hosted in granodiorite. Some 9 kT (10,000 t) of 35 g/T (1 oz./t) gold ore have been outlined.

East central and south central Idaho

Intergold Gold's ordeal with its Blackhawk property in Lincoln County was not quite over. In January 2000, Strathcona Mineral Services announced the results of an audit of Intergold's property and sampling. Strathcona concluded that gold and silver are not present in economic quantities in the rhyolitic lavas on the property. Intergold's lawsuit against Dames and Moore, Auric Labs, and its own consultant was ongoing. Strathcona's negative results matched previous sampling conducted by the Idaho Geological Survey in 1998.

Due to the poor metal markets, several seriously tested precious metal properties remained dormant. Twin Gold continued to hold its 40.4 t (1.3-million oz.) gold resource near Atlanta, though the Trail Creek fire burned the mine area, the old Talache Mill, and the core storage shed. There was also no action at the Kilgore property in Clark County in eastern Idaho.

At Mackay in Butte County, Sultana Resources, a local Idaho group, acquired the claims at the historic Empire Mine. The group announced plans to start a copper leaching operation. The copper-gold ore is hosted in a copper skarn. It was most recently explored by Cambior, which drilled out a significant copper-zinc resource. The group was drafting plans for a solvent extraction plant and a 10-year mine life, though much feasibility work remained to be done.

Industrial minerals

Four open-pit mines extracted more than 5.4 million T (6 million t) of phosphate ore from the Phosphoria Formation in southeastern Idaho. J.R. Simplot was the largest producer with about 2.7 million T (3 million t) mined from the upper E pit at the Smoky Canyon Mine. The company was also working on a supplemental environmental-impact statement (EIS). Simplot was high bidder on new leases for the Manning Creek and Dairy Syncline tracts, as well as exploring elsewhere. Simplot's ore goes by slurry line from the mine near the Wyoming border to its fertilizer plant in Pocatello, Idaho.

Solutia changed its name back to Monsanto and expected to ship some 1 million dry T (1.2 million dry t) from the Enoch Valley Mine to its elemental phosphorus plant at Soda Springs. The company was building a new facility to ship special tanks of elemental phosphorus to a new Roundup plant in Brazil.

Monsanto started pre-stripping on the South Rasmussen deposit, but it was awaiting a special use permit for an access road across USFS land. Trees from the new deposit area were transplanted onto reclaimed portions of the Enoch Valley site.

As part of its joint venture with Solutia/Monsanto, FMC's phosphate operations changed its name to Astaris LLC in April 2000. Astaris operates the Dry Valley Mine. The group received permits to expand to the C and D pit areas after revising the EIS to incorporate better controls to prevent selenium releases from the waste rock.

Astaris announced in March an additional \$68 million would be spent on air quality controls at its large elemental phosphorus plant in Pocatello. However, with power costs increasing, the company shut down two of the four electric furnaces.

Astaris is also in a joint venture with Agrium to build a new purified phosphoric acid plant adjoining Agrium's phosphoric acid fertilizer plant at Conda. The \$100 million-plus facility will use a solvent-extraction process and be completed in the summer of 2001. The plant will be able to produce 72.5 kT/a (80,000 stpy) of purified grade phosphoric acid. Construction will also provide a 25% capacity boost to Agrium's fertilizer plant.

Agrium and contractor Washington Group shipped some 1.43 million T (1.58 million t) from the Central Rasmussen Mine. They did delineation drilling and turned in a mine plan to start permitting for the North Rasmussen tract. The mine plan is unique in having no external waste dumps. This is a feature that should minimize chances for selenium mobilization from the waste shales.

Other industrial mineral operations also had good years. Emerald Creek Garnet in Benewah County is one of the nation's leading suppliers of industrial garnets. They are used as abrasives, water jets, and in oil field drilling. Markets were booming and production increased to near 32 kT (35,000 t). Emerald Creek, which received a state reclamation award in 1999, was working to permit a new lease on the St. Maries River flood plain.

Hess Pumice in Malad in southeastern Idaho also saw steady business for its ultrapure and ultrafine polishing powder, which is exported to the Pacific Rim. The

company bought the Idaho Minerals perlite mine and plant in 1999. Last year, Hess Pumice operated the perlite expander plant to make horticultural and insulation products.

Mountain West Colorado Aggregate changed its name to Mountain West Products after being acquired by a new owner. The Rexburg-based company supplies a variety of landscaping materials, including gold, black, and red pumice from three pits in Idaho.

Unimin operates a silica sand pit and plant near Emmett. The sand is used in glassmaking, water filtration and other uses. Emmett employees were nationally recognized by the Wildlife Habitat Council for developing a special management plan for the endangered Aase's onion plant, and building bird nesting platforms.

With decorative stone markets booming, there was much new interest in Oakley stone from south-central Idaho. The thin slabs of silver- to gold-colored micaceous quartzite make attractive tiles and paving or facing stone.

Long-time producers included Northern Stone Supply, Oakley Valley Stone and Rodriguez. Last year, a local resident started Diamondfield Quartzite to reactivate an old quarry at Warm Springs, under an agreement with Interstate Rock Products of Washington. American Stone, a Utah company, worked the Fish Creek quarry.

US Antimony switched from metals to industrial minerals. Its subsidiary, Bear River Zeolite, was exploring a large, potassium-rich clinoptilolite deposit near Preston. The zeolite is hosted in old Lake Bonneville lake beds. The company hoped to be producing in 2001.

Alchemy Ventures also switched from metals to industrial mineral exploration. The company was exploring the Helmar-Bovill clay district of Latah County in north

Idaho. A large area in that region is underlain by clays derived from residual weathering of granitic rocks and local transport into Tertiary lake beds associated with the Columbia River Basalts.

Other mining news

In early October, Boise hosted the regional meeting of the National Science Teachers Association (NSTA) (ME, March 2001, p. 68). It was the first time NSTA had met in Idaho. The Boise Section of SME sponsored and organized a Minerals Education exhibit for the meeting. Many partners, including the national Minerals Education Coalition, SME, the Idaho Mining Association, Idaho Geological Survey, and a number of mining companies and other agencies made the exhibit possible. Rock boxes, mineral education material, and mining literature was handed out to 700 teachers and others who visited the booth.

Publication lists and locations of new mapping and information from the Idaho Geological Survey can be viewed on its new Web site www.idahogeology.org.