

EXPLORATION IN IDAHO – 2001

Gillerman, V.S. and Bennett, E.H.

Idaho Geological Survey

Low commodity prices continued to hurt Idaho's mineral industry during 2001. Other factors included the economic recession, and increasing environmental and regulatory issues.

Industrial minerals have accounted for an increasing percentage of the state's nonfuel mineral production value. During 2000, it totaled \$358 million in raw ore production, according to the U.S. Geological Survey (USGS). From 1998 to 2000, the percent of value contributed by industrial minerals rose from 50% to 59%. This was due to mine closures and lower metal prices. Phosphate, silver, and sand and gravel should repeat as the state's most valuable commodities mined in 2001, with the total value declining.

Metal mining

Since 1884, the Coeur d'Alene Mining District in north Idaho has supplied more than 31.1 kt (1 billion oz.) of silver to the world. The Silver Valley suffered a major loss on Feb. 16, 2001, when Sunshine Mining shut the door and turned off the hoist at its flagship Sunshine Mine. Since its discovery in 1884 by the Blake Brothers, this mine has produced more than 11.4 kt (367 million oz.) of silver and considerable antimony and copper.

Sunshine Mining was reorganized in bankruptcy court in 2000. But low metal prices, exhausted reserves and the closure of the East Helena, Montana smelter forced the final shutdown. The mine produced 16.8 t (542,356 oz.) of silver in just a month's time, before the 130 employees lost their jobs.

Sunshine avoided a lawsuit by negotiating a settlement with the U.S. Environmental Protection Agency (EPA) and the Coeur d'Alene Tribe concerning its share of the cleanup costs for the Coeur d'Alene Basin.

Hecla Mining announced in July that it would cut production significantly at the Lucky Friday Mine, to conserve the silver resource. Only 50 of 190 workers were to be left by year's end. The Lucky Friday Mine produced 99.5 t (3.2 million oz.) of silver during 2001, compared with 155.5 t (5 million oz.) in 2000.

Hecla also settled its cleanup liability for the Coeur d'Alene Basin. The company also settled its liabilities at the former Grouse Creek and Stibnite gold mines in central Idaho.

The Galena Mine, owned and operated by Coeur d'Alene Mines' Silver Valley Resources, was in full production. Silver output totaled 139.9 t (4.5 million oz.) in 2001, a 12% increase from 2000. The company introduced mechanized diesel mining in selected stopes. And it installed a new sand-backfill system. Both of these should help lower cash costs that were up slightly due to poor ground conditions in some areas. The Galena shaft is being rehabilitated. New geological studies and more than 11,900 m (39,000 ft) of diamond drilling have resulted in significant exploration success, targeting

the high-grade 117 vein. Two miners were killed in June by a rockburst, a hazard of these deep underground mines.



Figure 1: Miners at the Galena loading holes in the Silver Vein on the 5500 level.

Cleanup at the Bunker Hill Superfund site was in the final stages. And several smaller remediation projects have also been completed in the Valley. Controversy surrounded the EPA's mining of topsoil needed to cap the Central Impoundment and the proposed expansion of the "Superfund box" and cleanup to the entire Coeur d'Alene Basin. This is strongly opposed by local residents and state officials.

The large Thompson Creek open-pit molybdenum mine in Custer County in central Idaho initiated a reduced work schedule due to low molybdenum prices. Some 72 employees

operated the mine and the mill in crews that worked alternate weeks at each facility.

Production was

about a third of

capacity and use

of the lubricant-grade molybdenum circuit was maximized.



Figure 2: A herd of elk grazes on reclaimed tailings at Thompson Creek Mining's molybdenum mine in central Idaho.

Meridian Gold's Beartrack gold mine in Lemhi County finished mining in 2000. But the mine still produced 576 kg (18,531 oz.) of gold from rinsing of the leach pad during 2001. The gold will pay for most of the reclamation costs. The North Pit has been backfilled and reclaimed. The waste dump was being re-contoured and revegetated. The South Pit will be left as a lake.

Reclamation was nearly complete at US Antimony's Yellowjacket Mine in Lemhi County and at Black Pine Mining's gold mine in Cassia County in southeastern Idaho. Black Pine, a former Pegasus subsidiary, used bacteria to treat the heap. The company then installed an innovative passive-water-treatment system to treat any

leachate from the valley fill pad. A series of Hickenbottom drains limit discharge to treatment cells with iron filings that react out any metals in the water.

Phosphate industry

Idaho has a diverse industrial minerals industry. But phosphate mining and processing contributes more than \$400 million to the state's economy. Four large phosphate mines are located in Caribou County in southeastern Idaho. Production was about 5 million T (5.5 million t), a decline from 2000. The companies and agencies continued to be concerned about the selenium releases from old waste dumps, particularly after 150 sheep died from drinking at a spring near one of the old mines at Conda. The Idaho Division of Environmental Quality will lead an area-wide risk assessment next year.

JR Simplot reported record production of more than 2.7 million T (3 million t) of ore from its Smoky Canyon Mine in 2001. Simplot mined the E panel and worked on permits for the B and C panels to the north, as well as drilling the newly acquired Manning Creek lease. Ore is pumped through a slurry line to the company's Don Fertilizer plant in Pocatello, where the company upgraded the No. 3 sulfuric acid plant to lower emissions. Agrium, a Canadian company, owns the Rasmussen Ridge Mine. It produced about 1.3 million T (1.5 million t) of phosphate in 2001 from the Central portion of the mine. Ore goes to the phosphoric acid fertilizer plant at Conda.

Fertilizer markets and production were down somewhat during 2001. Agrium and Astaris (formerly FMC) joined forces to build and operate a new wet-purified phosphoric-acid (PPA) plant located at the Agrium facility (Figure 3). The joint venture

plant opened in May 2001. It cost about \$80 million and employs 25 people. The plant uses the standard 27% phosphoric acid product of Agrium's plant as feed. It then concentrates it and purifies it with evaporators, filters, a sulfidizing reactor and a solvent extraction process.

In January 2001, Astaris' elemental phosphorus plant in Pocatello was one of the largest in the world. In February, the company shut down two of the four electrical



furnaces and sold the electricity back to Idaho Power.

This resulted in the laying off of more than half the 400 plus employees. In

Figure 3: Agrium/Astaris plant.

October, Astaris announced that the entire plant would close by the end of the year. The final molten phosphorus pour took place in December. Ore production from Astaris' Dry Valley Mine was cut back. Future ore will go to the Conda plant.

Monsanto was mining in the South Pit of its Enoch Valley Mine. Backfilling and reclamation started in the North Pit. Pre-stripping and site preparation was under way at the new South Rasmussen Ridge property. Monsanto's elemental phosphorus plant at Soda Springs was at full production and the new truck unloading system was completed.

Other industrial mineral production

Construction-related materials, including aggregate and decorative rock, were again in high demand. Limestone, clay, zeolite, landscaping pumice and gemstones are mined in Idaho. Industrial mineral operations are important employers in rural areas of the state.

Idaho was the second largest domestic producer of industrial garnets in 2000. Emerald Creek Garnet, a subsidiary of Western Garnet, operated five wash plants to recover garnets from Emerald and Carpenter Creeks near Fernwood. Business was good. However, permitting on its application to mine in the St. Maries River floodplain was slow, in spite of several excellent reclamation projects completed in the last few years. Idaho star garnet gemstones are mined nearby.

Ash Grove Cement had another excellent year at its plant in Inkom in southeastern Idaho. The plant produced about 236 kT (260,000 t) of clinker. Hess Pumice of Malad in Oneida County had a good year. It produced ultrapure and fine pumice for polishing television screens.

Hess's subsidiary, US Grout, is marketing an ultrafine pumice grout product, useful in mining applications.

Bear River Zeolite, a subsidiary of US Antimony, opened a new small mine in midyear. The quarry accesses a large (more than 180 million T or 200 million t) deposit of K-rich clinoptilolite near Preston in the southeastern corner of Idaho. The zeolite is crushed with jaw and cone crushers, sized and bagged on site for shipment. Customers use the material for water filtration, soil amending, environmental cleanup and other jobs.

Decorative rock was a hot market during 2001. It attracted several new operators and prospectors. L and W Stone owns the Three Rivers Quarry near Clayton. The central Idaho mine supplies a prized, variably colored, argillaceous quartzite. The company expanded to a second pit and put \$1.5 million into new haul trucks and excavators. More than 18 kT (20,000 t) of rock were quarried by the seasonal operation and orders are backlogged. The company is working on an updated plan of operations.

Idaho's popular Oakley stone is a durable and thin-splitting micaceous quartzite. It was quarried by at least four operations in Cassia County south of Oakley. Northern Stone Supply is the largest producer on Middle Mountain. The company had a good year and spent money on improvements. Oakley Valley Stone, Snake River Quartzite and American Stone were also producing.

Other stone producers included Overman's Western Stone in north Idaho, Idaho Travertine's quarry and Idaho Falls cutting plant in eastern Idaho, Table Rock Sandstone in Boise, and Rockworks near Challis. The latter, low-tech operation included a worker collecting lichen-coated talus with the aid of a homemade slide.

Exploration

Exploration suffered during 2001. Only a few projects were ongoing, including some for industrial minerals. In the Coeur d'Alene district, a group of local businessmen formed Sullivan Mining. In October, they announced plans to construct a new hydrometallurgical zinc plant with a "clean" autoclave and to reopen the Bunker Hill Mine.

Also in north Idaho, New Jersey Mining, a subsidiary of Mine Systems Design, drilled a gold target at the New Jersey Mine in the Coeur d'Alene district. Two diamond

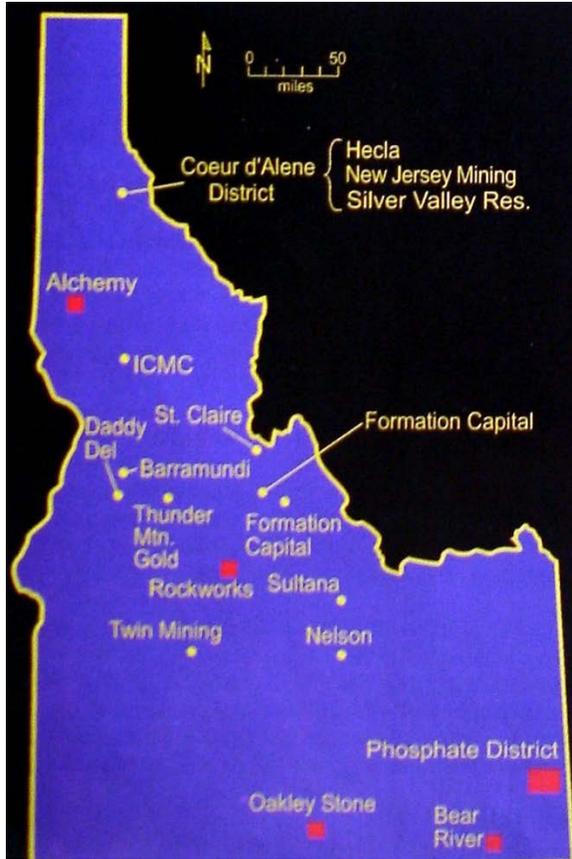


Figure 4: Map of exploration projects in Idaho during 2001.

drill holes tested an induced-polarization/resistivity target and intersected a wide, silicified zone with gold values to 2.1 g/T (0.061 oz./t). The company also acquired the Silver Strand Mine, a former precious metals producer.

At the Rescue Mine near Warren, Barramundi Gold covered the mill and added a gold wheel and Wilfley table to the circuit. A six-man crew added more than 122 m (400 ft.) of drift and raises on the lower level. They also made safety improvements and mined some of

the high-grade, gold-quartz vein for milling. Financial problems terminated the work in the fall.

The US Forest Service (USFS) approved additional work on the Daddy Del placer project on the South Fork of the Salmon River west of Yellow Pine. The operators dug five exploration pits in September on the high bench gravels.

Alchemy Ventures and its subsidiary, Alchemy KaOlin, have been evaluating the Helmar-Bovill clay district of Latah County. The company controls 16 state

exploration leases. Last winter, Alchemy drilled 41 core holes, totaling 2,130 m (7,000 ft.). Alchemy took a 11.8 kt (2 t) bulk sample and is evaluating the clay as well as possible byproducts, like silica and feldspar. Alchemy would like to start a pilot plant. However, the Idaho Department of Lands requested additional analysis of resource value and mining feasibility. Alchemy is hoping that the clay will be especially interesting to Pacific Rim customers who currently import Georgia clay.

Formation Capital submitted its mine plan to the USFS in January 2001 to start permitting under the National Environmental Protection Act process for a small underground cobalt mine at its Idaho cobalt project in Lemhi County. Baseline environmental monitoring and multiple technical studies needed for the permitting process were progressing during the year. The company also held several public meetings and agency tours. It drilled large diameter core for metallurgical testing and obtained an option on the Sunshine refinery. That hydrometallurgical facility would enable Formation Capital to conduct its own processing of concentrates. A resource update lists diluted proven and probable reserves for the project to be 991 kT (1.1 million t) grading 0.625% cobalt, 0.49% copper and 0.7 g/T (0.018 oz./t) gold.

State mapping activities

The Idaho Geological Survey (IGS), in cooperation with the USGS, published color geologic maps for the Boise Basin and Atlanta mining districts as a Boise Basin special map and the Idaho City 100K sheet. Through the Statemap program, the IGS also released new mapping in the Coeur d'Alene-Rathdrum, Moscow-Lewiston, Pocatello and

Sun Valley urban corridors. A digital geologic map of the St. Maries 100K sheet has been released.