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In spite of an upturn in precious metal markets and prices during 2002, the value of Idaho's mineral production continued its decline. This was due to market conditions, depleted reserves and decreasing interest in domestic mining.

However, a small upturn in exploration interest for industrial minerals and precious metals was welcome news. The preliminary U.S. Geological Survey value for Idaho's nonfuel mineral production in 2002 was \$306.8 million vs. \$346.3 million in 2001. Industrial minerals continued to be an increasing portion of Idaho's total mineral value, compared with declining metallic mineral production in the state.

During 2002, Idaho metallic minerals accounted for 28% of the state's total value. This was a decrease from 30% in 2001 and 41% in 2000. The Sunshine silver mine and several gold mines have closed in recent years, while the industrial minerals sector has been more stable. However, it too has suffered declines in both employment and production during 2002. Phosphate rock, construction sand and gravel, and silver continued as Idaho's leading commodities.

Metal mining

Idaho's famous Coeur d'Alene District in north Idaho had only two operating large mines during 2002, the Sunshine Mine having closed in 2001. The famous Silver Valley has supplied more than 31 kt (1 billion oz) of silver, plus significant lead, zinc and copper since the discovery of rich veins in the 1880s.

The Sunshine Mine was up for sale, but no deal had been struck by year's end for the venerable producer, formerly Shoshone County's largest employer. At one point during 2002, mining employment in Shoshone County was down to 319 jobs, the lowest level in more than 110 years.

Hecla Mining continued operating the Lucky Friday Mine near Mullan at reduced capacity. And, thanks to rising silver prices and cost-cutting measures, Hecla was

able to add back about 40 jobs. Most of the 62.2 t (2 million oz) of silver produced was from the Gold Hunter orebody. This was still a significant drop from the 99.5 t (3.2 million oz) that was produced in 2001, although production costs were sliced significantly as well. Company-wide, Hecla Mining made progress in reducing its debt load. And it produced more gold and silver than in any previous year in its history. This was largely due to its Alaskan and foreign ventures.

The Galena Mine, operated by Coeur Silver Valley, was in full operation during 2002. It achieved record production of 164.8 t (5.3 million oz) of silver, an 18% increase from 2001. The average cash costs declined to 13 cents/g (\$4.25/oz), according to the company's report. Much of that reflects the successful introduction of mechanized mining to selected areas at the Galena, espe-

Drilling at New Jersey Mining's New Jersey gold mine in Idaho's Coeur d'Alene district.



Map of industrial minerals activity in Idaho during 2002.



cially the deep 72 vein. Still, revision to the mine plan and silver price expectations led to a \$19 million writedown on the carrying value of Coeur Silver Valley during the fourth quarter of the year.

Coeur Silver Valley maintained an aggressive exploration and development program at the Galena Mine. It focused on future longhole stoping of the upper portions of the Silver Vein. The company rehabilitated the 2400 and 3000 levels. Shaft stations and muck transfer points were installed and a decline was driven from the 2400 level to reach the vein.

In August, the U.S. Environmental Protection Agency (EPA) signed off on the Record of Decision for a basin-wide cleanup for 30 years of the entire Coeur d'Alene River Basin, costing an estimated \$359 million. The negotiation process involved Idaho's governor and congressional delegation. It resulted in a controversial new Coeur d'Alene Commission to oversee the cleanup. The Commission includes county commissioners, as well as representatives from the EPA, the Tribes, the Idaho Division of Environmental Quality and Washington State.

While the Sunshine Mine closed in 2001, it was not forgotten. The National Institute for Occupational Safety and Health's (NIOSH) Spokane, WA office produced a documentary film on the 1972 Sunshine Mine fire disaster, which killed 91 miners. The NIOSH training film debuted in Wallace in August to an overflow audience filled with former Sunshine miners and their families.

Thompson Creek Mining's large openpit molybdenum mine near Challis in Custer County had a roller-coaster year due to price ups and downs. Production

was about half of the mine's capacity, as about 100 employees shared mining and milling duties. Contractors stripped cover and laid back the highwall to ready the pit for phase five mining as the price rose. But a Labor Day weekend fire broke out on the conveyor from the mine to the mill. It melted 1,220 m (4000 ft) of belt, idling operations for a month. By that time, molybdenum prices had dropped back down. The mine produces a high-performance grade product as well as a standard concentrate.

Idaho has few active major metal mines since most of the gold mines are closed and are in reclamation. However, Meridian Gold's Beartrack Mine in Lemhi County recovered gold by rinsing its heap leach pad. The company produced 269 kg (8,653 oz) of gold during 2002 and made good progress on reclamation work.

U.S. Antimony completed its planned closure and reclamation work at the Yellowjacket Mine in Lemhi County. And bankrupt Pegasus turned the reclaimed Black Pine Mine site in Cassia County back to the agencies.

In central Idaho, Hecla was working on ways to discharge the millions of gallons of water left in its Grouse Creek tailings impoundment. At the small, underground Rescue gold mine in Warren, Barramundi Gold had a bad year. It started with a heavy snow load that collapsed the roof of the mill building in February. The company made good progress at cleaning up and rebuilding the roof. PacRim Resources is the parent company.

Phosphate industry

Phosphate is Idaho's largest mineral industry. Operations are located in the southeastern corner of the state. However, poor market conditions in the fertilizer business and last year's closure of the Astaris plant in Pocatello resulted in several hundred jobs lost since the end of 2001. Idaho facilities process phosphate rock into phosphoric acid fertilizers, purified phosphoric acid for other uses, and elemental phosphorus.

J.R. Simplot's Smoky Canyon Mine was the largest producer. It extracted more than 1.8 Mt (2 million st) of ore, largely from Panel E. In July 2002, the U.S. Bureau of Land Management (BLM) approved Simplot's supplemental environmental-impact statement to mine the B and C panels further north. And the company started pre-mining activities on the tract, which will provide at least five years of production.

Simplot had an aggressive exploration and development program. Drilling occurred on the Manning Creek and Deer Creek leases. Ore from the mine goes through a 140-km- (87-mile-) long slurry pipeline to the Don Plant in Pocatello. Weak market conditions prompted Simplot to eliminate 85 jobs at the plant and discontinue ammonia production.

The Astaris elemental phosphorus plant closed in 2001 and the plant reverted to FMC, which is responsible for cleanup at the site. Astaris' Dry Valley Mine ceased operations temporarily at year's end due to the plant closure and a large stockpile. The stockpiled ore is being sent to the new Agrium-Astaris purified phosphoric acid (PPA) plant at Conda.

Agrium entered into a 20-year contract to supply the super phosphoric acid feed for the PPA plant from its fertilizer plant at Conda. That plant, though, had to lay-off 40 employees due to market conditions. Agrium also

mined about 1.3 Mt (1.5 million st) from the Central Rasmussen deposit. Agrium worked on reclamation of the South Backfill area and a new mine plan for the North Rasmussen expansion.

Monsanto was mining the final portion of its South Pit at the Enoch Valley Mine. The company is also starting the transition to its new South Rasmussen Ridge property. This property supplied about one-third of Monsanto's 910 kt to 1.3 Mt (1 to 1.5 million st) of ore mined. Exploration work continued at Monsanto's Trail Creek lease.

The Monsanto plant in Soda Springs is the only domestic producer of elemental phosphorus. In July, the company celebrated its 50th year of operation and the grand opening of a new plant administration building.

Simplot, FMC, Agrium, Monsanto and Rhodia worked with governmental agencies on the regional selenium investigation, risk assessment and detailed site investigations at reclaimed mine sites. Scientific studies by the University of Idaho and the U.S. Geological Survey have helped identify where the selenium is hosted in the mine stratigraphy and some possible ways of minimizing its mobilization from old waste dumps.

Other industrial mineral production

Markets continued to be strong for decorative stone and other construction materials. Many industrial minerals operations are important employers in rural areas of Idaho.

Emerald Creek Garnet, in Benewah County, is north Idaho's only major industrial mineral mine, outside of the aggregate producers. In November, the company permanently laid off 17 persons, a third of its work force. This was due to poor market conditions and resulted in a 16% decline in tons shipped.

Emerald Creek's parent company, Western Garnet International, announced in late November that it would change its name to WGI Heavy Minerals. Though Emerald Creek has done award-winning reclamation, the company has suffered major permitting delays from the U.S. Army Corps of Engineers on its proposal to mine in the floodplain of the St. Maries River. WGI has major operations in India, as well as at Emerald Creek. Next door, the U.S. Forest Service also had to go through the full National Environmental Policy Act process to expand its recreational dig site for star garnets. The site gets 2000 visitors each summer. The expansion was opposed by several environmental groups.

Most of Idaho's industrial minerals are located in southern Idaho, including the Ash Grove cement plant at Inkom. It ships about 227 kt/a (250,000 stpy) of clinker. Ash Grove agreed with the state to install air pollution equipment and make other improvements.

At Malad, Hess Pumice had a good year, though the company did note a slowdown in demand for its ultrafine, ultrapure pumice powder used to grind television screens. Hess Pumice's Idaho Minerals per-lite expansion plant operated spo-

radically. And the grout business reflected a slowdown in heavy construction projects. Hess employs 65 people at the Malad facility.

Several small calcium carbonate mines operate in southern Idaho. At Dubois, the newly renamed Thermal Mines of Idaho, formerly Wilson and Sons, mines travertine from a deposit at Lidy Hot Springs. The high purity product is an excellent feed-grade cattle supplement. The company ships about 13.6 kt/a (15,000 stpy) and is seeking new markets. The mine also produces bentonite.

U.S. Antimony is a major owner of Bear River Zeolite. It opened a mine during 2002 near Preston in the southeastern corner of Idaho. The company added a new screening and grinding facility this year. Sales were picking up and Bear River was aggressively expanding from wholesale into retail markets for the high-potassium clinoptilolite. The product is excellent for soil amendments and filtration uses.

Business was good in the stone markets, especially for higher end dimension stone. L and W Stone shipped more than 22.6 kt (25,000 st) of prized, multicolored argillaceous quartzite from its Three Rivers quarry near Clayton in central Idaho. Trucks transport the pallets of split rock to the plant in California. About 50 employees worked at the expanding site, for which the BLM was requiring that a formal plan of operations be written.

At least three companies — Northern Stone Supply, Oakley Valley Stone and American Stone — produced Oakley Stone from near Middle Mountain in south-central Idaho. The micaceous quartzite is suited as a building material because it splits into durable, thin slabs for facing and paving stone.

Table Rock Sandstone is a silicified sandstone in the historic quarry above Boise. The sandstone was mined for landscaping rock but some material quarried last winter will go to the newly remodeled Boise Airport. Cutting was done by Idaho Travertine in Idaho Falls. The company was also cutting 45 kt (100 million lbs) of Alabama limestone for a temple in Nauvoo, IL. International Stone, of Boise, mined local "Wind Drift" sandstone for landscaping purposes. And Mountain West Products, of Rexburg, produced red, black and gold pumice for landscaping use.

L and W Stone shipped more than 22.6 kt (25,000 st) of multicolored argillaceous quartzite from its Three Rivers Quarry (shown here) in central Idaho.



Map of exploration activities in Idaho during 2002.



Consolidations and corporate sales continued to change Idaho's aggregate business. In Boise, the large Monroc operation was sold in February to Staker and Parsons of Ogden, UT. Monroc's operations included several gravel pits and a concrete plant. Staker and Parsons renamed Monroc the Idaho Concrete Co. Staker and Parsons are part of the Oldcastle group, an Irish construction conglomerate. Oldcastle already owns several aggregate producers in southern Idaho and in the Rathdrum-Coeur d'Alene region of north Idaho. The latter area is underlain by large gravel deposits from the Missoula Floods.

Exploration

The increase in precious metal prices and the attractiveness of industrial minerals in today's market prompted a significant increase in exploration, primarily for gold. Junior companies and prospectors were the most prominent.

J.R. Simplot was the most active explorer in the phosphate field. At another ongoing industrial minerals project, Alchemy Ventures hired a new president, Roger Kaufman, with industrial minerals experience, and Alchemy spent the year regrouping. The company holds 14 state lease applications in Latah County. And it continued testing the feldspar resource and the clay, which has been mined previously for fire bricks.

New Jersey Mining (NJM) had several exciting projects in north Idaho, centered on the Coeur d'Alene District. The company drilled 1,700 m (5,580 ft) of core

in 13 holes to test the Coleman gold-quartz vein system at the New Jersey Mine near Kellogg. The best intercept was 12 m (40 ft) of 2.7 g/t (0.08 oz/st) gold. This occurred north of the pit area. The veins extend several hundred meters along strike and down dip. NJM also drilled, from underground, the high-grade silver-gold veins hosted in Revett quartzites at the Silver Strand Mine. All five holes, totaling 250 m (820 ft), intersected the well-mineralized vein. The best intercept was in DDH02-03. It cut 1.61 m (5.3 ft) of 15.6 g/t (0.45 oz/st) gold and 316 g/t (9.2 oz/st) silver. The vein is open to the east and at depth. NJM is initiating the permitting process for a seasonal operation with ore to be shipped to the New Jersey mill at Kellogg. The company also ran a geophysical survey at a third property.

Idaho Consolidated Metals changed its name to Beartooth Platinum. The company also made an agreement on its Petsite gold property with Camden Capital. Camden drilled five core holes at the Orogrande site and did hit the high-grade zone identified by Cyprus Amax in 1997. Camden intersected the vein at fairly shallow depth on patented claims on the Friday-Petsite property.

Near Gibbonsville in Lemhi County, prospector Kent Roche used an underground drill from the surface to test for gold mineralization at the Moon Adit. Results were disappointing so he moved northward to Johnson Gulch. Gradient Geophysics had run an induced polarization/resistivity survey there, outlining a large anomaly. Roche drilled four core holes, some to considerable depth and exposing much brecciated rock. Limited geochemical results were available. The area is near the Ditch Creek project that AGR drilled several years ago.

In the Blackbird District southwest of Salmon, Formation Capital continued permitting studies for an underground cobalt-copper-gold mine at its Idaho Cobalt project. The proposed mine plan calls for producing 1.5 kt/a (3.3 million lbs/year) of cobalt. It would be the nation's only cobalt mine. Formation bought the Big Creek hydrometallurgical facility near Kellogg from Sunshine Mining. The Big Creek plant operated successfully for 12 years, using a variety of leach processes on the Sunshine silver-copper ore. And it could be adapted to treat the cobalt ores.

American Independence Mines and Minerals submitted a plan of operations to re-open the Golden Hand Mine, near Edwardsburg in central Idaho. The mine is a cherry stem into the Frank Church River of No Return Wilderness. The proposal is generating some concern from environmental groups. The Payette National Forest is preparing the environmental impact statement, due out in 2003.

At Florence, Windjammer Gold excavated a small pit to explore for a lode gold source of 31-t (1-million-oz) placer gold production from the district. The area was drilled by Gold Fields in 1990.

Another placer gold project involved the Rose Hill Mine at King Hill on the Snake River. Juniper Rose applied to reopen the mine. Previous mining during the 1940s worked a high gravel terrace. The company did some test sampling at the Elmore County site.

Also in the Snake River Plain country, Portuguese Creek Management, a private company, drilled 12 shallow core holes looking for gold in the Tertiary rhyolites near Gooding. Terrain there is similar to and nearby the ill-fated Blackhawk project of a few years ago.

Southwestern Idaho also saw renewed activity. Nevada Contact, a subsidiary of Agnico-Eagle, picked up the War Eagle property in Owyhee County. The land is along the extension of the rich, epithermal precious metal veins of the DeLamar District. Geologists conducted mapping and sampling at War Eagle Mountain. They also conducted reconnaissance work elsewhere in the state.

State mapping activities

The Idaho Geological Survey (IGS) released several new color surficial and bedrock geologic maps. They included compilations for the Hamilton, Coeur d'Alene and Missoula West 1 x 2 degree sheets.

IGS has additional projects near Kooskia and

Orofino in north Idaho, the Wood River valley, and the Twin Falls region. Mapping has been part of the State-map cooperative program with the U.S. Geological Survey. Many of these maps are available as digital files on the IGS Web site (www.idahogeology.org).

Inventories of select abandoned and inactive mines in Idaho were completed in the Challis region and Boise National Forest. IGS geologists also taught a summer teacher workshop in the Salmon area. A day was spent looking at the thorium and copper deposits near Lemhi Pass. Recent age dates were reported by V.S. Gillerman and colleagues at the Geological Society of America 2002 Annual Meeting. The age dates have shown that the mineralization is Precambrian but has seen subsequent Paleozoic to Mesozoic reworking. ■