

# THE MINERAL INDUSTRY OF IDAHO

**This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Idaho Geological Survey for collecting information on all nonfuel minerals.**

Idaho ranked 30th among the 50 States in total nonfuel mineral production value<sup>1</sup> in 1997, according to the U.S. Geological Survey (USGS). The State was 27th in 1996. The estimated value for 1997 was \$477 million, a 3% decrease from that of 1996. This followed a 3.7% decrease from 1995 to 1996 (based on final 1996 data). In 1997, the State accounted for more than 1% of the U.S. total nonfuel mineral production value.

Phosphate rock followed by gold, construction sand and gravel, and molybdenum were, by value, Idaho's leading nonfuel minerals in 1997. They accounted for about 72% of the State's total value. In 1997, most of the drop in value resulted from the drop in gold (*table 1*) plus lesser decreases in silver and industrial garnet. All other mineral commodities increased in value except for copper, lead, pumice and pumicite, and vanadium slag, all of which had small decreases. In 1996, most of Idaho's decrease in value was due to low molybdenum prices as compared to the substantially higher market prices for the metal during the first half of 1995 and a small decrease in the metal's production during 1996. Lime also showed a moderate decrease in value. Whereas phosphate rock and gold values significantly increased in 1996, the drop in molybdenum was 30% greater, resulting in a net decrease for the year.

Idaho remained the only State to produce antimony ore and vanadium slag, first of three industrial garnet-producing States, second in phosphate rock, third in lead, fourth in molybdenum, and sixth in feldspar. Idaho also continued as 6th of 13 gold-producing States, was 2d in silver, 5th in perlite, and dropped from 2d to 4th in pumice and pumicite. Additionally, the State was a significant producer of construction and industrial sand and gravel.

The following narrative information was provided by the Idaho Geological Survey<sup>2</sup> (IGS). Production data in the following text are those reported by the IGS, based on its own surveys and estimates. They differ from some production figures reported to the USGS.

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<sup>1</sup>The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending on the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 1997 USGS mineral production data published in this chapter are estimates as of January 1998. For some commodities, for example, construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Call MINES FaxBack at (703) 648-4999 from a fax machine with a touch-tone handset, and request Document # 1000 for a telephone listing of all mineral commodity specialists, or call USGS information at (703) 648-4000 for the specialist's name and number. This telephone listing may be retrieved over the Internet at <http://minerals.er.usgs.gov/minerals/contacts/comdir.html>. All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved by MINES FaxBack or over the Internet at <http://minerals.er.usgs.gov/minerals/>.

<sup>2</sup>Virginia Gillerman, Research Economic Geologist, authored the text of the Idaho mineral industry information submitted by the Idaho Geological Survey.

For the first time in several years, Idaho's silver mines enjoyed a better year than the State's gold properties. By the end of 1997, silver prices were on the way up, but gold and base metal prices were down significantly, with the resulting toll on Idaho properties. Gold production in Idaho during 1997 totaled 10,300 kilograms, a drop from the 1996 record of 10,800 kilograms.

Continuing the trend from last year, Meridian Gold Inc.'s Beartrack Mine was the top gold producer in 1997, with 3,337 kilograms poured. Other major producers were Pegasus Gold Corp.'s Black Pine Mine, which extracted 1,371 kilograms before its scheduled shutdown in December, Kinross Gold Corp.'s DeLamar and Stone Cabin Mines (1,421 kilograms), and Dakota Mining Co.'s Stibnite Mine (472 kilograms). Ore reserves were exhausted at Black Pine, which opened in 1991. Reclamation efforts were underway at yearend. Hecla Mining Co.'s Grouse Creek operation in Custer County shut down in April.

Thompson Creek Mining Co. continued full operations at its Thompson Creek molybdenum mine in Custer County. In an innovative partnership, the company, along with local, State, and Federal agencies and fisheries groups, broke ground on a steelhead-rearing pond on Squaw Creek below the mine. The mine had a record year of production for the property, turning out about 9,100 metric tons of molybdenum concentrate and winning an "Excellence in Annual Operations" award from the Idaho Land Board.

Overall, exploration efforts in the State were down a bit, due largely to the softening metal prices. Industrial minerals and phosphate markets and operations were stable.

Mines in the Coeur d'Alene District of north Idaho have produced over 31,000 tons of silver since 1884. Investments in new technology, cost-cutting procedures, and new geologic work over the past few years have resulted in new ore body discoveries and increased production at a time when silver prices are looking quite favorable. Four deep, underground mines (Sunshine Mining and Refining Co.'s Sunshine Mine, Hecla's Lucky Friday Mine, and Silver Valley Resources Corp.'s Coeur and Galena Mines) extracted some 300 tons of silver in 1997, a 56% increase from the previous year. As a result, employment in Shoshone County has increased.

Production from the West Chance vein system in the Sunshine Mine boosted silver production to 132 tons in 1997, the highest since 1990. Exploration of the new galena-rich West Chance vein is delineating a resource of 1,900 tons of silver for Sunshine Mining and Refining Co. Hecla Mining Co. approved spending \$16 million to develop the Gold Hunter ore body, which is about 1 mile north of the 1,495-meter level of the Lucky Friday Mine in Mullan. A development drift on the 1,556-meter level was completed early in the year. Over 59 tons of silver were produced from Lucky Friday in 1997, and that may triple when Gold Hunter comes on line. The Lucky Friday mill is being expanded

to handle the extra production, which should start in mid-1998.

Silver Valley Resources Corp., a joint venture of ASARCO Incorporated and Coeur d'Alene Mines Corp., operated both the Coeur and Galena Mines, which were restarted in 1996 after an extended closure. In May, the Galena Mine reached full production of 540 tons of ore per day. Production from the two mines totaled 107 tons of silver. A computer model was used to compile vast amounts of historical mine data at the Galena Mine. New vein discoveries include the 123 vein and 258 vein. Silver Valley also obtained leases on several claim blocks near the Galena and Caladay properties.

Cyprus Amax Minerals Co. put a major effort into exploration of the Petsite Project at Orogrande near Elk City in Idaho County. Petsite is a joint venture project between Cyprus Amax and Idaho Consolidated Metals Corp. (ICMC). Cyprus Amax drilled 90 reverse circulation and 11 core holes on the property, which is 1 of 3 ICMC projects along the gold-bearing Orogrande shear zone. Cyprus also drilled 14 reverse circulation holes at the Deadwood property along the Orogrande shear zone closer to Elk City.

ICMC retained 100% control of the Buffalo Gulch properties, located northwest of Elk City. Idaho Gold Corp., a subsidiary of Bema Gold, delineated and permitted a heap leachable deposit at Buffalo Gulch several years ago. In 1997, ICMC geologists completed a stream sediment, rock chip, and deep soil geochemical survey, as well as 24 line-miles of IP-Resistivity, looking for extensions of the Orogrande shear zone in the heavily forested terrain.

Bear Creek Mining, a small holding company based in Washington State, acquired and trenched the Mary Kay (Black Pine) workings just south of Elk City. They applied for permits to reopen the portal of the underground gold mine.

Meridian Gold Co. had an active year at its Beartrack Mine in Lemhi County near the historic site of Leesburg. The company expanded the leach pad significantly to accommodate the 3,370 kilograms extracted from some 4.1 million tons of ore. The mine was recognized as one of the six safest mines in the Nation by the Mine Safety and Health Administration. The company had an expanded exploration program, which included approximately 40 drill holes in the mine area.

Meridian spent \$1 million to purchase the Arnett Creek property a few miles southwest of Beartrack and the Ditch Creek property, near North Fork, from Ghana-based Ashanti Goldfields, Inc. Meridian drilled 11 core holes on the Haidee claims at Arnett Creek. Meridian also purchased the Musgrove property from Atlas Mining Corp. for \$200,000. In 1997, the Beartrack crew drilled 13 reverse circulation step out holes at Musgrove, which is 17 miles southwest of the mine.

Formation Capital Corp. continued its major effort on the Sunshine project near the Blackbird Mine in the Idaho Cobalt Belt of Lemhi County. Drilling focused on evaluation of the Ram zone discovered last year by soil geochemistry and mapping. The copper-cobalt-gold mineralization continues for over 427 meters along strike and 183 meters down dip, with the zone open in both directions. Work in 1997 completed 190 meters of trenching and 20 diamond drill holes totaling 3,674 meters. Drill intercepts reveal multiple ore horizons. Evaluation of the results and a new reserve calculation for this project are underway.

United States Antimony Corp. went underground at the Yellowjacket Mine, reducing gold production as the company focused on development work in the sulfide ore. Elsewhere in the region, Phelps Dodge Corp. mapped and drilled six reverse circulation holes, totaling 975 meters, on a copper target at Indian Creek. No additional work is planned.

Palouse Resources, a company based in Spokane, WA, staked claims and explored northeast of Ulysses Mountain near Sage Creek on a Proterozoic stratiform gold target. They did geologic mapping, geochemistry and ground magnetics surveys, and drilled two shallow Winkie core holes.

BHP Minerals Ltd. drilled four holes on the Blue Jay porphyry copper target in the Leadore District in southern Lemhi County.

Early in the year, Dakota Mining Corp. and USMX Inc. completed a merger, with Dakota taking over USMX's properties including the Dewey project in the Thunder Mountain Mining District, 32 kilometers east of Dakota's Stibnite Mine. Dakota completed mining of the Stibnite pit, and current reserves are depleted. Permitting work continued for the Thunder Mountain Mine, which is expected to be the focus of Dakota's future production in the area.

At Warren, CSC Mining Co. expanded the settling pond and reconstructed a road at the K Mine. Development work included 214 meters of new drift and 61 meters of raise on the high-grade gold vein.

Cambior Exploration Inc.'s Sultana copper-gold project near Mackay in Custer County was shut down in July after drilling eight additional core holes. During the 1995-97 program they drilled 7,350 meters in 47 core holes into the copper-gold skarn. The operator, Cambiex Exploration Inc., a subsidiary of Cambior Inc., announced an increase in the geologic resource estimate to 17 million tons at 0.49% copper, 0.19% zinc, 13.5 grams per ton Ag, and 0.48 grams per ton Au, with an additional 9 million tons of zinc-copper mineralization in the oxidized skarn. The company was evaluating its options at yearend.

Phelps Dodge Corp. drilled four holes in Copper Basin, southwest of Mackay, in Custer County. In February, Atlanta Gold Corp. and Voisey Bay Resources, Inc., agreed to form a new company, Twin Gold Corp., which would include Atlanta's property in Elmore County along the Middle Fork of the Boise River. Twin Gold signed an agreement with Quest International Resources Co. in July giving Quest a 20% interest in the Atlanta property for its \$3.8 million investment in the mine area since 1993. Twin Gold is the project operator and is working on feasibility studies, permitting, and seeking financing for additional exploration.

International Freegold Minerals Development Inc. completed a feasibility study in July for the Idaho-Almaden project east of Weiser in Washington County. Freegold acquired an interest in the property in May 1996, when it reached an agreement with owners Ican Minerals Ltd., Ican Minerals Inc., and Canu Resources Inc. Idaho's largest mercury producer hosts 39 million tons of low-grade gold mineralization formed in a Tertiary hot springs system.

The Kilgore precious metal project of Echo Bay Mines, Ltd. was also inactive in 1997. Echo Bay did a major amount of work in 1995 and 1996, delineating a significant resource. The

company is said to be interested in selling its interest.

Phosphate continued to be Idaho's largest mineral industry with over \$600 million in processed mineral value in 1997. Idaho's four mines, FMC's Dry Valley Mine, J. R. Simplot Co.'s Smoky Canyon Mine, Rhone-Poulenc Basic Chemical Co.'s Rasmussen Ridge Mine, and Solutia Inc.'s Enoch Valley Mine, extracted over 6.5 million tons of ore during the year. Markets and production were good, and there were several corporate changes. In midyear, Monsanto spun off its chemicals division, which includes the phosphate operations, and renamed it Solutia Inc. FMC and Solutia operate elemental phosphorus plants, the only such plants in the United States, at Pocatello and Soda Springs, respectively. FMC announced in October that it would invest \$73 million in new pollution control equipment at the Pocatello plant. Boise-based J.R. Simplot Co. and Agrium Inc., a Canadian agribusiness, operate fertilizer plants at Pocatello and Conda, respectively. Simplot acquired the assets and phosphate reserves of Alumet.

Agrium announced plans to purchase the Rasmussen Ridge operation from Rhone-Poulenc at yearend. Rhone-Poulenc's mine had been supplying ore feed to the Agrium phosphoric acid fertilizer plant, which enjoyed a record year.

Strong demand for construction sand and gravel continued, fueled by Idaho's rapid population growth and development, particularly in the urban areas. Idaho's most unique aggregate operation is G & B Redi-Mix Co.'s pit near Star. Adjacent to the Boise River, the pit is actually a pond and gravel is extracted using a floating dredge. The dredging operation is more environmentally sound than a conventional pit.

Elsewhere, Ash Grove Cement Co. had an excellent year, increasing production 10%. The quarry and plant is at Inkom. Near Oakley, the Rodriguez Oakley Stone quarry reopened. Golconda Resources, Ltd. ended its diamond exploration project near McCall in Valley County. Bulk testing failed to find any diamonds, although indicator minerals were found.

TABLE 1  
NONFUEL RAW MINERAL PRODUCTION IN IDAHO 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1995		1996		1997 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Antimony metric tons	262	W	242	W	W	W
Clays, common	1	10	--	--	--	--
Gemstones	NA	346	NA	347	NA	352
Gold 3/ kilograms	8,850	110,000	10,800 r/	135,000 r/	10,300	111,000
Pumice and pumicite metric tons	W	W	159,000	1,340	W	W
Sand and gravel:						
Construction	13,200	43,500	14,700	46,100	16,400	52,800
Industrial	501	8,720	646	8,510	663	8,540
Silver 3/ metric tons	182	30,200	229	38,300	W	W
Stone, crushed 4/	3,210	14,000	3,960	20,200	4,500	23,600
Combined value of cement, copper, feldspar, garnet (industrial), lead, lime, molybdenum, perlite [crude (1997)], phosphate rock, stone [crushed miscellaneous, dimension quartzite (1995), dimension quartzite and miscellaneous (1996-97)], vanadium, zinc, and values indicated by symbol W	XX	303,000	XX	242,000	XX	280,000
Total	XX	510,000	XX	492,000 r/	XX	477,000

p/ Preliminary. r/ Revised. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to three significant digits; may not add to totals shown.

3/ Recoverable content of ores, etc.

4/ Excludes certain stones; value included with "Combined value" data.

TABLE 2  
IDAHO: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1995 2/				1996 2/			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	7 r/	869 r/	\$3,370 r/	\$3.87	7	1,370	\$7,920	\$5.80
Granite	8	611	3,370	5.52	7	549	3,060	5.57
Traprock	31 r/	1,400 r/	5,720 r/	4.10	27	1,680	6,150	3.66
Shell	1	8	42	5.25	--	--	--	--
Quartzite	7	328	1,500	4.58	10	371	3,110	8.40
Total	XX	3,210	14,000	4.36	XX	3,960	20,200	5.11

r/ Revised. XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Excludes miscellaneous stone from State total to avoid disclosing company proprietary data.

TABLE 3  
IDAHO: CRUSHED STONE SOLD OR USED BY PRODUCERS  
IN 1996, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
<b>Coarse aggregate (+1 1/2 inch):</b>			
Filter stone	6	\$30	\$5.00
Other coarse aggregate 3/	241	745	3.09
<b>Coarse aggregate, graded:</b>			
Concrete aggregate, coarse	W	W	2.15
Bituminous aggregate, coarse	189	670	3.54
Bituminous surface-treatment aggregate	W	W	2.46
Railroad ballast	W	W	9.00
<b>Fine aggregate (-3/8 inch):</b>			
Stone sand, concrete	39	152	3.90
Stone sand, bituminous mix or seal	136	537	3.95
<b>Coarse and fine aggregates:</b>			
Graded road base or subbase	202	537	2.66
Unpaved road surfacing	815	3,350	4.11
Crusher run or fill or waste	32	121	3.78
Other coarse and fine aggregates	110	423	3.85
Other construction materials	256	606	2.37
<b>Agricultural:</b>			
Agricultural limestone	(4/)	(4/)	2.87
Poultry grit and mineral food	6	21	3.50
Other agricultural uses	18	61	3.39
<b>Chemical and metallurgical:</b>			
Cement manufacture	(4/)	(4/)	2.76
Lime manufacture	(4/)	(4/)	12.13
Flux stone	(4/)	(4/)	11.04
Sulfur oxide removal	(5/)	2	3.31
<b>Special:</b>			
Mine dusting or acid water treatment	(5/)	(5/)	4.07
Other fillers or extenders	18	254	14.11
<b>Unspecified: 6/</b>			
Actual	267	2,310	8.65
Estimated	70	206	2.94
<b>Total</b>	<b>3,960</b>	<b>20,200</b>	<b>5.11</b>

W Withheld to avoid disclosing company proprietary data; included with "Other construction materials."

1/ Includes granite, limestone, quartzite, shell, and traprock; excludes miscellaneous stone from State total to avoid disclosing company proprietary data.

2/ Data are rounded to three significant digits, except for unit value; may not add to totals shown.

3/ Includes riprap and jetty stone.

4/ Withheld to avoid disclosing company proprietary data; included in "Total."

5/ Less than 1/2 unit.

6/ Includes production reported without a breakdown by end use and estimates for nonrespondents.

TABLE 4  
IDAHO: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1996,  
BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Value per ton
Concrete aggregate (including concrete sand)	2,310	\$9,950	\$4.32
Plaster and gunitite sands	23	56	2.43
Concrete products (blocks, bricks, pipe, decorative, etc.)	55	189	3.44
Asphaltic concrete aggregates and other bituminous mixtures	1,020	3,390	3.34
Road base and coverings	5,180	16,100	3.10
Fill	610	1,470	2.40
Snow and ice control	73	497	6.81
Other miscellaneous uses 2/	135	524	3.88
Unspecified: 3/			
Actual	1,190	3,580	3.02
Estimated	4,100	10,300	2.52
Total or average	14,700	46,100	3.14

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes filtration and railroad ballast.

3/ Includes production reported without a breakdown by end use and estimates for nonrespondents.