

Idaho Mining and Exploration, 2008

Virginia S. Gillerman
E.H. Bennett

Staff Report 09-5
June 2009

Idaho Geological Survey
Morrill Hall, Third Floor
University of Idaho
Moscow, Idaho 83844-3014

Idaho Mining and Exploration, 2008

Virginia S. Gillerman
E.H. Bennett

*Staff Reports present timely information for
public distribution. This publication may not
conform to the agency's standards.*

Staff Report 09-5
June 2009

Idaho Geological Survey
Morrill Hall, Third Floor
University of Idaho
Moscow, Idaho 83844-3014

Contents

Metal Mining	1
Phosphate Industry	3
Other Industrial Minerals	4
Energy	5
Exploration	5
State Activities	8

Illustrations

Figure 1. Idaho non-fuel mineral production	9
Figure 2. Commodity breakdown of USGS mineral value data for Idaho	10
Figure 3. Galena mine, Coeur d'Alene District, Idaho	11
Figure 4. Agrium's D pit at Dry Valley phosphate mine, Caribou County, Idaho	11
Figure 5. Idaho industrial minerals map for 2008, not including phosphate	12
Figure 6. Idaho exploration map in 2008	13
Figure 7. Core drilling, Atlanta Gold, Elmore County, Idaho	14
Figure 8. Massive sulfide and skarn from Thunder Mountain Gold's South Mountain property, Owyhee County, Idaho	14

IDAHO MINING AND EXPLORATION, 2008

Virginia S. Gillerman, Idaho Geological Survey
E.H. Bennett, retired, Idaho Geological Survey

Idaho's mining and exploration industry had a great first half of the year in 2008 with high commodity prices and buoyant optimism, but activity started to slowdown across-the-board in the fall as the nation's economic downturn and tightening credit markets took its toll. In March, 2008, the gold price topped \$1,000 per troy ounce, silver neared \$20 per ounce, and molybdenum took top honors as the state's most valuable commodity with molybdenum oxide prices over \$30 per pound for much of the year. By December, molybdenum oxide was under \$10 per pound and the recession was in full swing. Precious metal prices have shown resilience as a hedge in uncertain times. Silver mining in north Idaho was hard hit as zinc and lead prices dropped 50% in the last half of 2008. Construction activity, especially residential, was down for most of 2008, and the aggregate-related commodities suffered accordingly. Employment in Idaho's mining sector, which had been rising since its low point of 1,759 jobs in 2002, increased to nearly 2,800 jobs in 2008, according to the Idaho Division of Financial Management. Unfortunately, it is projected to contract in 2009. The phosphate chemical plants in southeastern Idaho employ an additional 1000 plus people.

Figure 1 shows Idaho's non-fuel mineral production value, based on the latest revised data from the U.S. Geological Survey. Both the 2006 value of \$779 million and the total for 2007 of \$790 million are down slightly from 2005's revised record of \$896 million. Preliminary estimates of 2008 production value indicate a substantial increase in value to \$1.2 billion, principally due to substantial increases in the unit value of phosphate rock and unit value and quantity of molybdenum produced in 2008. The USGS estimate for 2008 may be a bit optimistic given the downward prices at year's end, but, overall, 2008 was excellent for metals and agricultural commodities, while construction materials may be down 25%. Figure 2 shows the commodity breakdown by percent of value in 2007 and projected for 2008. Molybdenum is the state's highest value commodity. Phosphate slightly trailed construction sand and gravel in 2007 but will surpass it in value in 2008. Overall, the percent of value from metals declined from 72% in 2005 to 54% in 2007.

Metal Mining

Miners and exploration geologists in the Coeur d'Alene district of Shoshone County maintained a frantic pace of activity, even after 120 years of mining and over 1.197 billion ounces of silver produced in Idaho's famous Silver Valley. There seems to be no end to discoveries of rich silver-base metal veins and deposits in the Belt-age metasediments, though the mines are deep and costs high. Three mines were operating, though one, the Sunshine mine, was put back on care and maintenance during the year. Azteca let lapse their option on the Bunker Hill mine.

Hecla Mining produced most of their ore from the Gold Hunter Main, or 30, vein off the 5900 level of the Lucky Friday mine at Mullan. The mine produced 2.9 million ounces of silver in 2008 at a cash cost of about \$6 per ounce silver versus 3.1 million ounces in 2007 at a negative cash cost per ounce of \$0.75 due to byproduct credits. The company was in the process of building for the future with a new tailings facility and mill upgrades. Planning for a deep shaft to access deeper levels was slowed at year's end due to the economy. Exploration was successful in increasing reserves by 26% with drilling on the east and central portions of the vein system down to the 7100 level. Two of the main veins appear to coalesce into a thicker, high grade vein below the 6300 level. In addition, seven core holes were drilled in the "Gap" area above the active Gold Hunter mine and below the shallower, historic workings. Intercepts of multiple veins, some with ore grades and widths, proved the existence of mineralized structures within the previously unexplored 2,500-foot vertical zone. Hecla consolidated its district holdings with the purchase of the Independence Lead property near the Gold Hunter.

Sterling Mining Company had reopened the Sunshine mine, the district's largest single silver producer, in late 2007. They began production on the 3100 level and the Sterling Tunnel Upper Country access to the Sunshine vein. They also rehabilitated access to West Chance ores on the 2700 level. However, management changes in May and inability to obtain additional financing led to a suspension of production activities on September 16, 2008. The mine remained closed for the remainder of the year, and over 100 employees lost their jobs. Sterling reported 179,240 ounces of silver produced in the first half of 2008, but that was insufficient to fund mine operations and the debt load. The company continued care and maintenance through the remainder of the year.

U.S. Silver achieved much of its goal of returning the Galena mine (Figure 3) to optimal production levels, producing over 1.2 million ounces of silver in the first three quarters before lower metal prices forced cutbacks in the fall. Mining focused on silver-lead ores off the 3000, 3700, and 5200 levels. The mine completed over 15,000 feet of exploration and development drilling on newly discovered veins, including the high-grade 175 vein. Mine reserves have risen 60% since U.S. Silver took over the property. U.S. Silver reduced costs, and at year's end decided to use the No.3 circuit of the Galena mill to process silver-lead ores, rather than the Coeur mill. Silver-copper ores are processed at the Galena, which was near its 900-tpd capacity by year's end. The remaining repair of the Galena shaft, which had been concrete-lined from the 2400 level down to the 3000 level, was postponed due to the economy. In February, the Galena mill was awarded a MSHA Sentinels of Safety certificate for its outstanding record in 2006.

New Jersey Mining Company continued development and minor gold production at their Golden Chest mine near Murray, just north of the main Coeur d'Alene district. Drifting intersected a pod of massive scheelite in one vein, and their North Ramp decline reached the #3 level. The company installed an electrowinning cell at the concentrate leach plant at Kellogg in order to produce dore bars. In addition to the Golden Chest, New Jersey also completed surface facilities at the new No. 3 portal of the newly permitted Silver Strand mine east of Coeur d'Alene.

Thompson Creek Metals mined Phase 6 ore all year at their huge Thompson Creek mine in Custer County and continued stripping on the Phase 7 pushback. Molybdenum prices remained high (over \$30 per pound) until December, and the company started work on a new expansion mine plan; however, they were quick to react and cut back spending when prices fell to under \$10 per pound in a matter of weeks. Production from the Thompson Creek mine in 2008 was 16.765 million pounds of molybdenum oxide and high performance grade molybdenum disulfide, from 11.8 million tons of ore. The mine purchased four new Caterpillar haul trucks and updated the mine plan and resource base. They also installed a GroundProbe radar system to monitor for high wall failures and received the 2008 Bureau of Land Management's Community Outreach and Economic Security Award.

Reclamation work continued to make progress at Hecla's closed Grouse Creek precious metal mine in central Idaho and at Kinross' closed DeLamar and Stone Cabin mines in Owyhee County. The BLM and U.S. Forest Service continued to do physical safety closures and remediate hazards at inactive and abandoned mines and millsites such as the Buckhorn Mill south of Salmon, Idaho.

Phosphate Industry

Agricultural commodity prices soared in 2008, partly due to ethanol subsidies and drought conditions that resulted in additional demand for grains and fertilizers. The result was an excellent year for Idaho's phosphate industry. In addition to the three major mining and processing operations active in southeastern Idaho, there was new exploration by "outsiders." Apatite-bearing ore beds in the Permian-age Phosphoria Formation host rock average about 25-30% P₂O₅, an enrichment of 130 times over the average value of the Earth's crust. Ore from the black, organic-rich shales is processed in three Idaho plants, including the nation's only elemental phosphorus facility. Each plant employs about 500 persons with additional personnel at the mines, making the phosphate industry one of the largest employers in the region.

Monsanto continued to operate their elemental plant in Soda Springs to produce phosphorus for their Roundup herbicide. Over a million tons of ore is mined annually from their South Rasmussen Ridge mine, which is about halfway through its planned life. Concurrent reclamation was ongoing. Drilling was done within the pit and satellite areas, and at the Caldwell Canyon exploration property. Multi-agency permitting was underway on the proposed Blackfoot Bridge mine with extensive testing, modeling and environmental studies. A draft EIS is anticipated to be released by the BLM in the middle to latter part of 2009.

J.R. Simplot Company operated the Don phosphoric acid fertilizer plant at Pocatello and mined ore from the large (> 2 million tons per year) Smoky Canyon operation near the Wyoming border. The mine was finishing Panel B, the last of previously approved mine panels. In June, the U.S. Forest Service released the Record of Decision and approval for expansion to Panels F and G. As expected, the decision was immediately appealed, and in November a judge rejected an injunction to stall the expansion. The new mine area is located in a roadless area that will require a contentious crossing over Sage Creek. Local communities joined Simplot to argue in

favor of the 1,300-acre expansion which adds another 14 years of mine-life and preserves jobs. Pre-mine construction and road building will take about two years.

Agrium, a publicly traded Canadian agricultural resources company with significant potash and phosphate operations, had an excellent year as prices for those commodities were more than double 2007 levels, though prices declined drastically in the fourth quarter of 2008. Prices for phosphate fertilizer products, such as those produced at their plant in Conda with ore from the Dry Valley mine, peaked at \$1,200/tonne, in the summer of 2008, but dropped back to more typical levels of \$400/tonne by the end of the year as the economic downturn and winter hit. Agrium was mining the D pit (Figure 4) and reclaiming the B pit at their Dry Valley mine; they received permission to reactivate operations next year at the Central/North Rasmussen Ridge mine.

Rocky Mountain Resources Corp. drilled five holes and reviewed historical drilling (34 holes) by ESI on their Paris Hills phosphate and vanadium project near Paris, Idaho. They estimate an inferred resource of 120 million tons of 23% P_2O_5 within a near-surface portion of the Phosphoria Formation. A vanadium-rich bed (0.79% V_2O_5 plus phosphate) lies directly below the upper phosphate bed. This is the first phosphate exploration project by an outside company (i.e. not the large mine operators) in at least 20 years. However, vanadium was previously produced by Kerr-McGee in the early 1990's using waste slag from Monsanto's plant in Soda Springs. The Phosphoria Formation covers a wide region in Idaho, Utah, Wyoming and Montana; numerous old phosphate mines and prospects are listed in the Idaho Geological Survey database.

Other Industrial Minerals

Idaho hosts a large variety of industrial minerals, many of which are in southern Idaho, including sand and gravel and crushed stone used for aggregate (Figure 5). Modest-sized industrial mineral operations are important for rural economies. Construction sand and gravel, used mainly for aggregate, was rumored to be down 30% or more, in line with national declines. Other commodities fared better but sales were starting to contract. True to its nickname of the "Gem State," Idaho produced gem quality garnet in north Idaho, precious opal at Spencer, and jasper at several locations. Rock-hounding is a popular hobby, and a record 6,500 visitors washed star garnets out of mud in newly remodeled sluice boxes at the U.S. Forest Service Garnet Dig near Fernwood.

Emerald Creek Garnet, owned by WGI Heavy Minerals, had minor cutbacks and declining grades but continued to produce industrial garnets from two wash plants at their mine near Fernwood in northern Idaho. They changed from trommels to flat screens for greater efficiency and announced an extended winter shutdown at year's end. WGI also sold off its interests in India but retained a distribution agreement.

Idaho's dimension stone operators include L and W Stone at the Three Rivers quarry near Clayton in Custer County, four producers of Oakley stone in Cassia County, and Table Rock Sandstone in Boise, plus smaller producers. Demand was down somewhat in the housing

market. The Three Rivers quarry shipped about 10% less as they waited for their final environmental impact statement from the BLM. They experimented with staining the high wall to reduce visibility. Northern Stone Supply, Oakley Valley Stone, American Stone, and Scrivanich Natural Stone mined micaceous quartzite flagstone, known as Oakley stone, for a variety of construction and decorative applications. In Idaho Falls, Idaho Travertine was sold and renamed Rocky Mountain Travertine. In Boise, Hans Borbonus Landscaping operated the Table Rock Sandstone quarry. They used large saws and specialty machines to cut custom stone blocks for the Idaho Capitol Restoration, a \$ 130 million project to add two underground wings and restore the historic building built 100 years ago of Table Rock sandstone.

In eastern Idaho, Ash Grove Cement operated the cement plant at Inkom. Hess Pumice reported production down about 10% overall, with the cultured stone market down considerably. Hess mines pumice from the Wright's Creek mine and processes it at their Malad plant. Other uses include abrasives, personal care, fillers, and horticulture. Hess also owns Idaho Minerals which mined perlite, largely for horticultural uses.

Bear River Zeolite, a subsidiary of U.S. Antimony, expected 2008 sales to be up 50% over 2007 thanks to an increased and diversified customer base. Bear River mines a large deposit of high purity zeolite just east of Preston, Idaho. They added a 60-inch vertical roller mill and made other plant improvements during the year.

Energy

U.S. Geothermal successfully operated their new 10 MW binary power plant at the Raft River geothermal project in Cassia County. They announced in October, an award from the U.S. Department of Energy (DOE) to demonstrate the viability of Enhanced Geothermal Systems ("EGS") by using Raft River as a test site. DOE will provide up to \$6 million cost-share as part of the \$9 million effort.

Exploration

Mineral exploration activity was up in 2008 with a number of exciting projects (and a new discovery) around the state (Figure 6). Some projects shut down early as the financial credit crunch hit. Commodities of interest included precious metals, molybdenum, base metals, specialty metals, and industrials. In spite of favorable results on many projects, work plans for 2009 will clearly be contingent on funding.

In north Idaho, i-minerals focused on permitting and their feasibility study of the feldspar-quartz deposit in the Bovill clay district in Latah County. In Bonner County, Shoshone Silver was hit with repairs for a snow-collapsed roof and county permit requirements at their Lakeview mill. They were processing base metal ores. They also struck a deal late in the year with Kimberly Gold Mines to acquire the Rescue mine at Warren.

Azteca Gold Corporation, in a joint venture with Silver Royal Apex, drilled a deep hole and announced a new discovery at year's end on their Two Mile project between Murray and Osburn in the fabulous Coeur d'Alene district. Azteca is the operator and drilled three core holes on the property in 2007, based on anomalies identified in Quantec's Titan-24 distributed array geophysical survey. Starting in July, 2008, Azteca collared DDH-005A as a deepening of a 2007 hole. It was completed in early December to a depth of 8,784 feet. Azteca reported that DDH-005A intersected disseminated mineralization starting at about 5,800 feet, deeper stockwork veining from 7,500 feet down, and finally massive sulfide mineralization up to 50 feet thick near 7,950 feet depth. Mineralization continued to the final depth. A new vertical hole, DDH-006 and a wedge-off hole, DDH-005B, were started in December. Initial assays reported in January, 2009, included a massive zone of 15.5 feet (4.7 m) averaging 40% Zn, 7.4% Pb, and 140.7 g/tonne Ag, ending at a depth of 7,953 feet in DDH-005A. These may be the deepest holes drilled in the district. Geologists have long looked to find a large source for the metals in the deep high-grade veins, and this is a truly exciting find. Host rock is presumably Precambrian Pritchard Formation, inviting comparisons to Sullivan-type ores, though few details are currently available. Drilling is continuing in 2009, and more information is on Azteca's website.

Hecla Mining Company also employed new technology in their Silver Valley regional exploration program. Geologists took 110 years of historic mine maps and had them digitized to create a 3D model of mine workings, including 245 mines and prospects, on Hecla's lands in the district. Using special 3D projection techniques, geologists can generate new exploration targets and ideas. Mapping and sampling of strategic spots was underway.

SNS Silver Corporation completed over 27,000 feet of surface drilling on the South and Upper Alhambra vein systems at the Crescent mine, just across Big Creek west of the Sunshine mine. In addition, they drilled 43,240 feet underground on 1,000-foot centers from the Hooper (main haulage) level of the mine. One intercept (SNS-1002) assayed 17 opt silver over 2 meters. Development drifting was done along the Alhambra vein with additional cross cuts to provide drill platforms. Rehabilitation of the Big Creek #4 or Alhambra level was also started, and mine transport equipment and ventilation were upgraded. Logging and assay results are being compiled into a resource estimate by SRK.

New Jersey Mining Company had multiple project locations in north Idaho and staked new ones during the year. They drilled three holes on the Niagara Cu-Ag deposit, confirming grades of previous drilling and noting a weak gold anomaly. However, the main focus was gold in the Murray district. New Jersey has several properties up the East Fork of Eagle Creek, including the Gold Butte, Golden Reward, and Mineral Ridge claim blocks which are included in their 4,800-acre Toboggan joint venture with Newmont. Outcropping quartz with gold tellurides and potassic alteration and alkaline intrusives are some of the attractive signatures. Newmont's work in 2008 included geologic mapping, rock and soil geochemistry, geophysics, and permitting for a drill program in 2009.

Near Elk City, a joint venture of Premium Exploration and Clearwater Mining picked up the Buffalo Gulch and Petsite properties. Premium initiated discussions with the agencies for an EIS and new mine plan for the Buffalo Gulch deposit which Bema had permitted in 1990 as a

100,000 ounce, oxide gold, open pit. The proposed mine will need to comply with Idaho's newly revised cyanide regulations. Premium also controls the Petsite property, which is along the Orogrande shear zone where past drilling has returned several high grade intercepts and an inferred resource of over 500,000 ounces of gold.

Formation Capital Corporation waited anxiously for a record of decision (ROD) by the Salmon-Challis National Forest on their Idaho Cobalt Project. The proposed underground cobalt-copper-gold mine is located in the historic Blackbird mining district of Lemhi County. A new feasibility study was positive, and it updated reserves (diluted, proven and probable) on the RAM deposit to 2.636 million tons @ 0.559% cobalt, 0.596% copper and 0.014 ounces per ton gold utilizing a 0.2% cobalt cut-off for a ten year mine life. In addition, there are inferred resources of 1.122 million tons and major exploration potential. The depressed economic climate adds to typical mine development financing concerns but also lowers construction costs and allows extra time for design and engineering work. The company went ahead with purchases of key mill equipment and key staff hiring. The ROD was issued in June and then remanded by the Forest Service for revisions. Formation has been negotiating with several environmental groups and reached agreements to resolve their concerns on water quality. The only appeal expected on issuance of the final ROD in early 2009 is that of other mining companies, including a major cobalt producer, in the Blackbird Mine Site Group, which was responsible for clean-up of the historic mine site.

In other projects of north-central Idaho, Bear Lake Gold, a combination of Maximus Ventures and NFX Gold, picked up the Unity Mine at Warren from Unity Gold-Silver Mines, Inc. Bear Lake did 1,018 meters of surface drilling to test the extensions of the Little Giant and Rescue veins, which are narrow, but rich, gold-quartz veins cutting granodiorite. Faulting and drilling problems reportedly hampered the effort; though one intercept of over 4 g/t gold was reported. Journey Resources compiled past data from their Musgrove gold property in Lemhi County into a GIS database and a new NI 43-101 inferred mineral resource of 8 million tones at 1.22 g/t gold. Some targets have not yet been drilled. Journey and Trio Gold also settled a legal dispute in March with the underlying owners of the Empire project near Mackay and released all interest in the Empire deposit.

Thorium Energy, Inc. staked claims and did additional sampling at their Lemhi Pass and Diamond Creek properties which host some of the nation's largest thorium and rare earth resources. Interest has been peaked by renewed global interest in thorium fuel cycles and the rare earth market, currently controlled by China. The Lemhi Pass district straddles the Continental Divide in Idaho and Montana.

Gentor Resources, Inc. completed 21,000 feet of drilling on the molybdenum-tungsten-silver deposit at the private Ima mine near Patterson in remote Lemhi County. They announced an inferred mineral resource estimate of 5.7 million tons grading 0.15% Mo overall. Lack of funds terminated the drill program in May. Angle hole 30 intersected the deep granite at 1702 feet depth, and the first 368 feet into the granite averaged 0.28% MoS₂ with a silver credit.

Also in eastern Idaho, Otis Capital drilled at the Kilgore gold target in Clark County, and Doe Run Mining drilled a lead prospect at Birch Creek.

Mosquito Consolidated Gold Mines, Ltd. drilled 11 diamond core holes, totaling over 26,700 feet, on the giant CUMO molybdenum-copper deposit in Boise County in southwestern Idaho. Two of the holes were terminated early due to winter and two others due to faulting.

Mineralization in the porphyry complex starts near surface and is quite continuous over a large vertical and horizontal extent. Assay results for Hole 39-08, the best yet on the property, were 2378 feet (724m) of 0.101 % MoS₂ and 0.05% Cu, and the hole ended in mineralization at a fault zone. Results were being compiled at year's end. Initial metallurgical reports were favorable. Geologic work has shown a definite and traceable metal zoning pattern with an upper Cu-Ag zone, then a Cu-Mo shell around the Mo zone. The deposit was originally discovered by Amax Exploration in 1963.

Southern Idaho precious metal projects included Hell and High Water's development work on a "high gravel placer" in Boise County; Hydrothermal Metals' exploration in the Raft River geothermal area; Freegold Ventures' work at the Idaho-Almaden hot spring, gold-mercury deposit in Washington County; Otis Capital's drilling of the Milestone hot spring property in Owyhee County; and Silver Falcon's attempt to mill waste dumps and tailings from War Eagle Mountain in Owyhee County.

Atlanta Gold Corporation revised their plan for development of the Atlanta gold-silver project in Elmore County. Due to local concerns about cyanide and the original bulk mining, open pit mine plan, Atlanta refocused early in 2008 on an underground mine and mini-pit scenario with non-cyanide milling on-site. The company drilled 57 holes (Figure 7) to test the eastern pit area and extensions of the Monarch shear zone at surface and underground. They also did 25 surface trenches, encountering the mineralized shear in 22 of them and ore grade gold in many. Contractors started a new portal, the Monarch Decline, but were having problems with bad ground. The new mine plan will be designed for more selective mining and reducing the environmental footprint. Results of 2008 work were being compiled for an updated NI 43-101 report and additional work in 2009.

Thunder Mountain Gold drilled two core holes at their South Mountain property in Owyhee County, intersecting skarn and massive sulfide similar to that mined on the Sonneman and Laxey levels. A 17.5-foot intercept in hole DMEA-2 assayed 0.129 ounces/ton gold with significant Ag, Zn, Cu and Pb; while an upper zone assayed over 7.7% zinc with other metal credits in well-mineralized skarn (Figure 8). The company also did reconnaissance work and plans additional exploration in 2009.

State Activities

The Idaho Geological Survey (IGS) put out 17 new publications in 2008. The Survey also is nearing completion on a major effort to scan and post online most of the old IGS or IBMG (Idaho Bureau of Mines and Geology) publications. Over 500 publications and over 330 geologic maps are now downloadable at www.idahogeology.org. Other activities during the year included the annual teacher workshop, new USGS Statemap-sponsored geologic mapping, and research on geology and geochronology of the Lemhi Pass thorium and rare earth deposits.

The final technical report by Virginia Gillerman for the Lemhi Pass USGS MRERP grant is available on the USGS website.

ILLUSTRATIONS

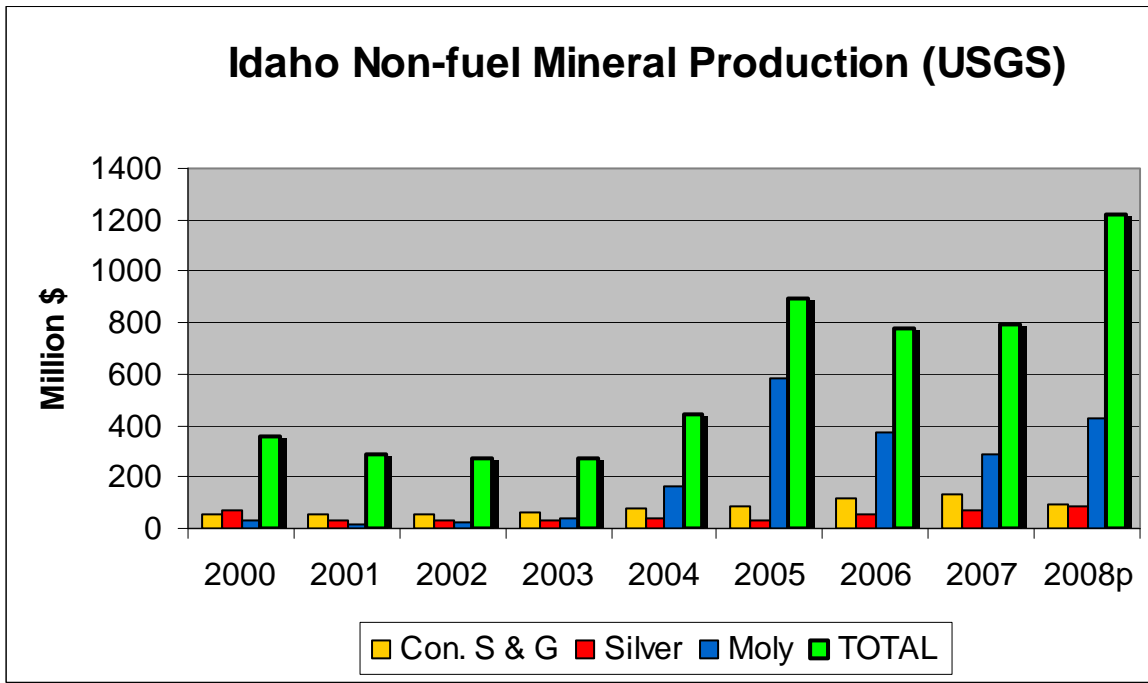


Figure 1. Idaho non-fuel mineral production.

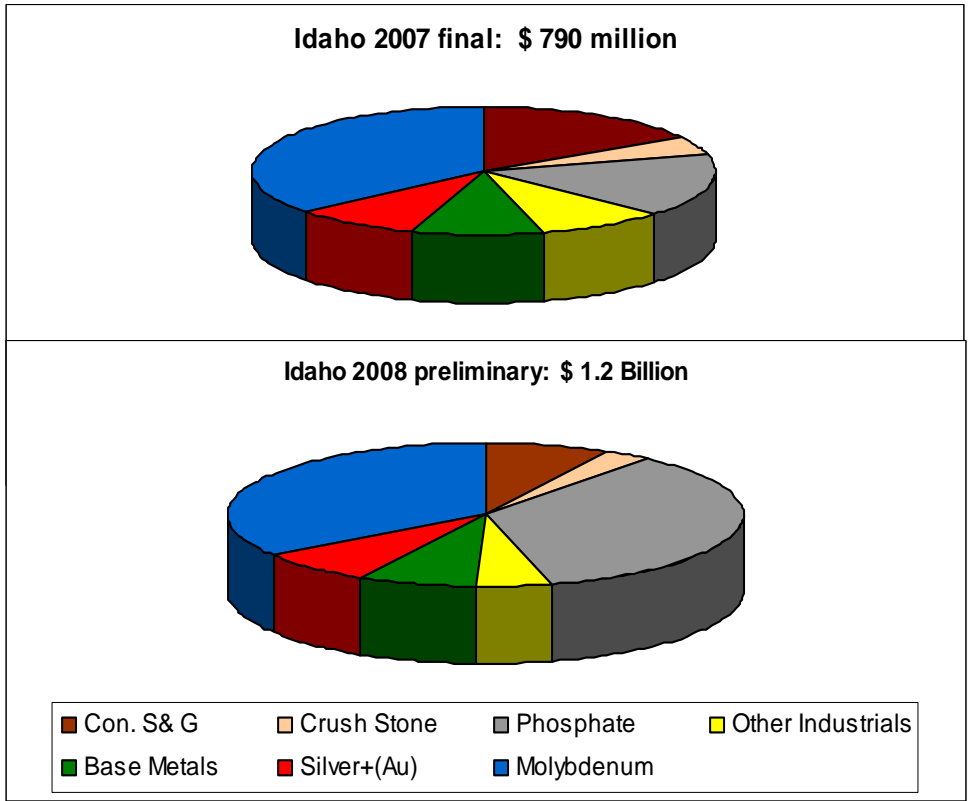


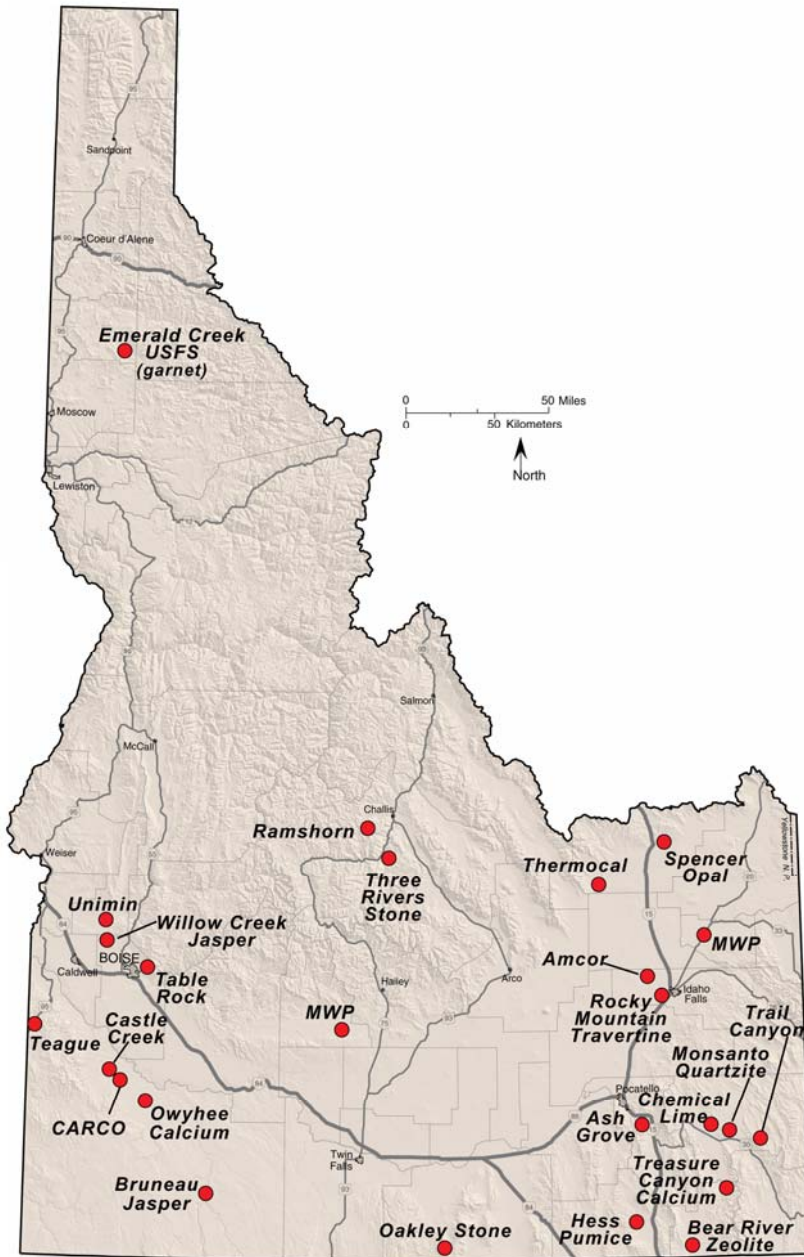
Figure 2. Commodity breakdown of USGS mineral value data for Idaho.



Figure 3. Galena mine, Coeur d'Alene District, Idaho.

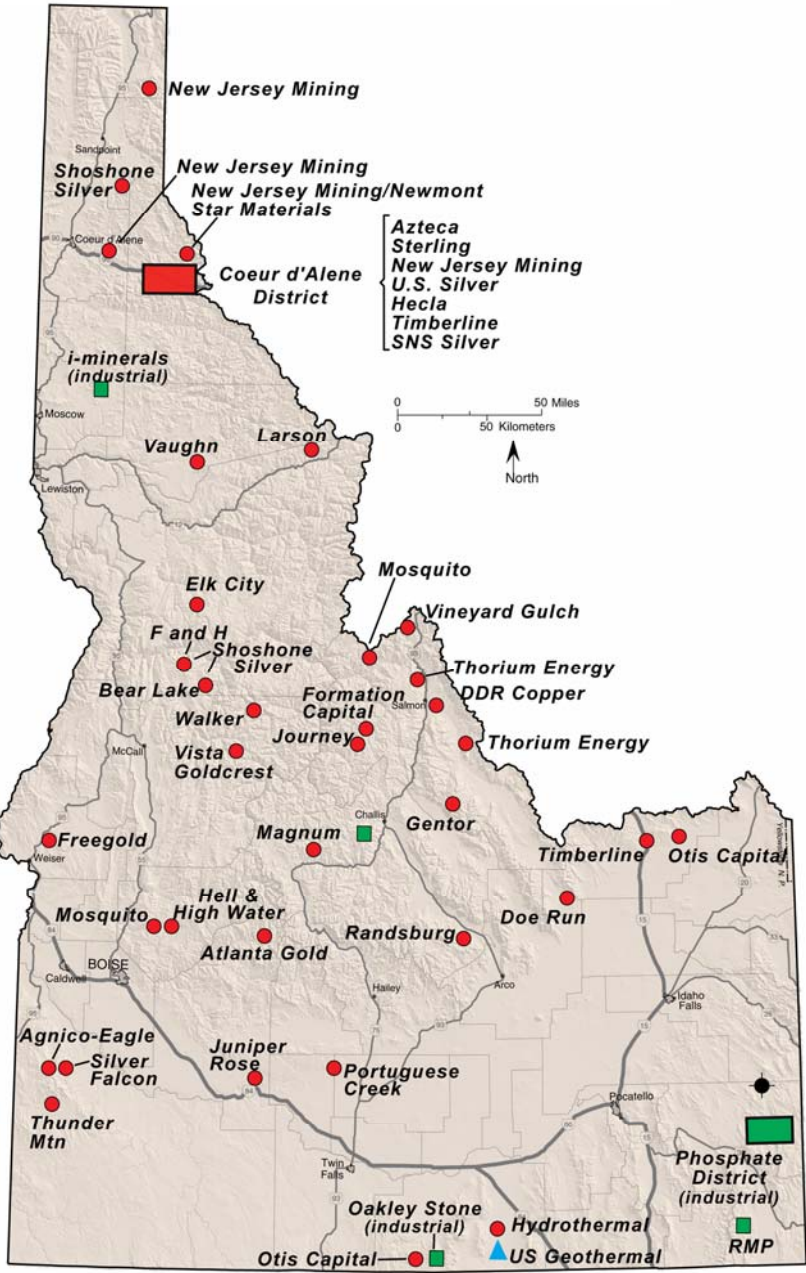


Figure 4. Agrium's D pit at Dry Valley phosphate mine, Caribou County, Idaho.



INDUSTRIALS 2008

Figure 5. Idaho industrial minerals map for 2008, not including phosphate.



EXPLORATION 2008

Figure 6. Idaho exploration map in 2008.



Figure 7. Core drilling, Atlanta Gold, Elmore County, Idaho.



Figure 8. Massive sulfide and skarn from Thunder Mountain Gold's South Mountain property, Owyhee County, Idaho.