Idaho Mining and Exploration, 2013

Virginia S. Gillerman
Earl H. Bennett

Staff Report S-15-2
August 2015

Idaho Geological Survey
Morrill Hall, Third Floor
University of Idaho
875 Perimeter Drive MS 3014
Moscow, Idaho 83844-3014
Phone 208-885-7991
IdahoGeology.org

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

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Contents

Illustrations

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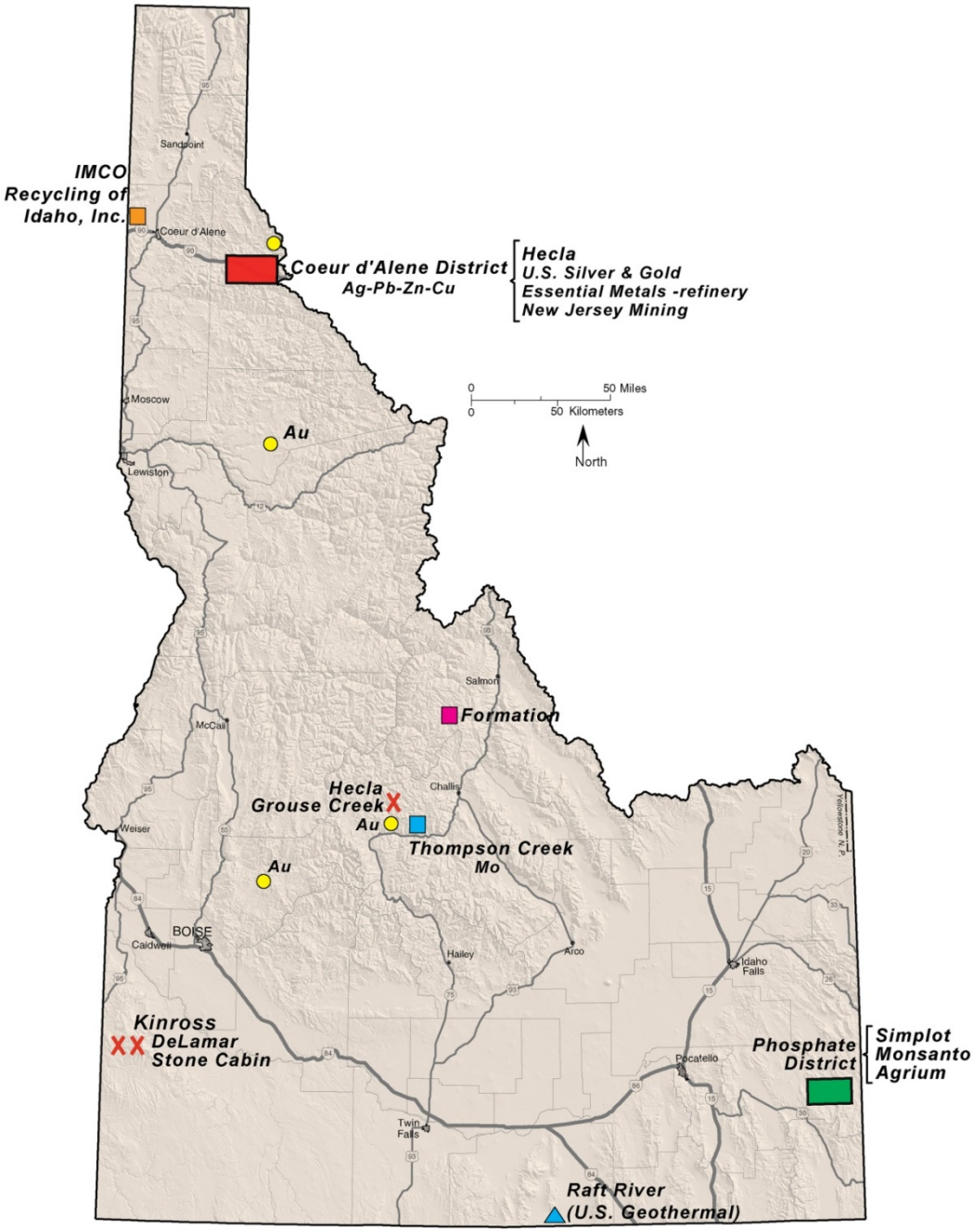
INTRODUCTION

In historical mining terms, 2013 may go down as the end of the global mineral commodity "supercycle." For mining and mineral exploration in Idaho, this meant significantly less activity in exploration for metallic resources and struggles for existing mines as plummeting metal prices cut revenues. Luckily, the picture was brighter in the industrial mineral sector as markets were stable or improved slightly. The Silver Valley in northern Idaho and the Phosphate District in southeastern Idaho continued to be the leading producers, and the re-starting of the Lucky Friday mine was a big boost to communities in Shoshone County. In central Idaho, the large Thompson Creek molybdenum mine produced a near-record tonnage of molybdenum from the bottom of the Phase 7 pit, but molybdenum prices were down sharply. Thompson Creek Metals Company decided to suspend stripping for Phase 8 and soon put the facility on care and maintenance, a major economic downturn to the Custer County region. Mine locations are shown in Figure 1.



ACTIVE MINES AND PLANTS 2013

Figure 1. Location of 2013 mining areas with operator names. Large closed mines in reclamation shown with red "X". Small gold mines indicated by yellow dots. Blue and magenta-colored squares for alloy metals. Red-colored rectangle for silver and base metals; green rectangles for industrial minerals and blue triangles for geothermal plants.

Gold prices made headlines by dropping 5.9% in November alone, and silver fared even worse, dropping 9.1% in November to end the month at $19.93 per troy ounce, a 41% drop since the first of January. Hecla's 2013 annual report tallied their average realized price of silver in 2013 at $ 21.28 per ounce, versus $ 32.11 per ounce in 2012. For gold, Hecla's average realized price in 2013 was $ 1317 per troy ounce, versus $ 1687 in 2012. For molybdenum, Thompson Creek reported a realized sales price in 2013 of $ 10.97 per pound, versus $ 13.48 per pound in 2012 and $3 higher in 2011. The result was a renewed emphasis on cost-cutting measures, including layoffs in the mining sector, although the overall Idaho economy continued to improve. Idaho's Division of Financial Management (DFM) noted the volatile metal prices and estimated a 4% drop in mining sector employment during 2013 with a lesser drop expected in 2014, in spite of an economic upturn increasing demand for non-metallic commodities such as aggregate (Idaho DFM, Idaho Economic Forecast, January, 2014).

The U.S. Geological Survey obtains confidential production records from operating mines, quarries, and gravel pits. Final USGS statistics for 2013 reported the value of non-fuel mineral production for Idaho at $980 million (Figures 2 and 3). This increase over 2012 ($813 million) principally reflects the renewed production from the Lucky Friday mine as commodity prices declined.

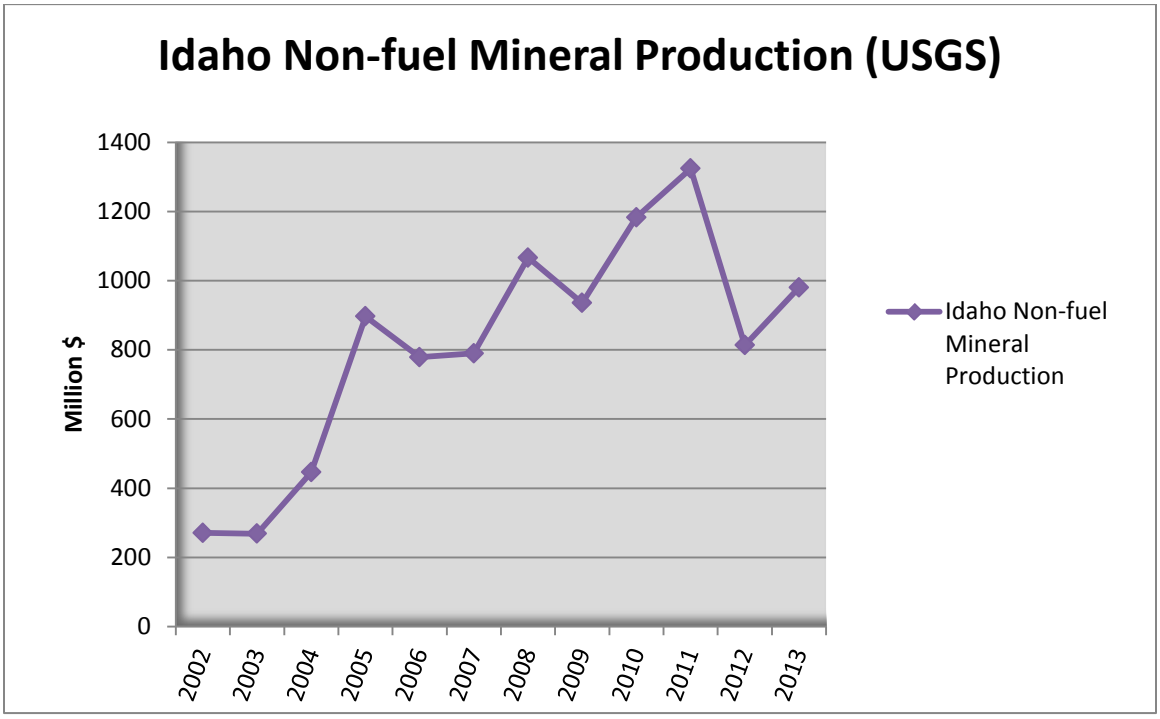


Figure 2. Idaho non-fuel mineral production by year; final data from USGS.

10 of non-fuel mineral production. The principal Idaho minerals, ranked by value, were molybdenum concentrates, phosphate rock, construction sand and gravel, silver, and crushed stone. Nevada and Arizona were the top two states, principally due to their gold and copper mines, respectively. The USGS estimated the value of national non-fuel minerals production at $74.2 billion in 2013.

The economic impact of the mining industry in Idaho was recently assessed in a study sponsored by the Idaho Mining Association (Peterson, 2013). Including standard multiplier effects, the study estimated that in 2012, mining and related processing jobs contributed $1.47 billion to Idaho's gross state product, and the mining industry accounted for $133.7 million in property, sales, excise, and income taxes paid to Idaho.

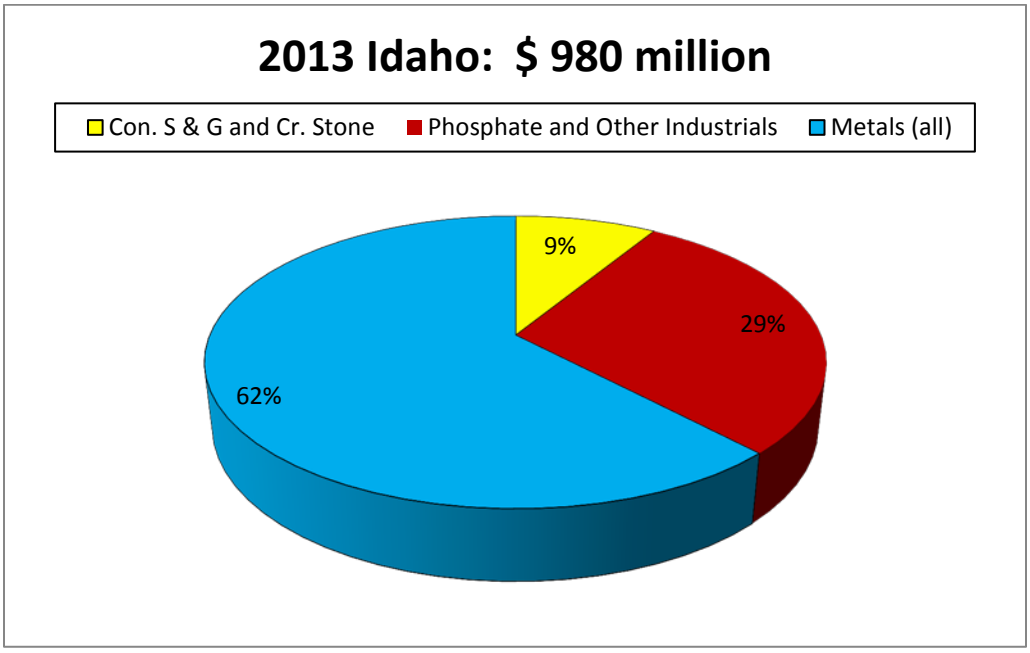


Figure 3. Idaho's 2013 mineral production value by commodity; USGS final data.

METAL MINING

COEUR D'ALENE AREA

The Coeur d'Alene District, also known as the Silver Valley, is one of the world's largest silver producing areas, with a cumulative production of over 1.233 billion troy ounces of silver and substantial amounts of base metals and antimony since mining began in 1884. One single property, the Sunshine mine, produced over 362 million troy ounces of silver before it closed in 2001. The rich quartz-siderite-sulfide veins are hosted in weakly metamorphosed strata of the Mesoproterozoic Belt Supergroup but individual deposits are structurally controlled. Two deep underground mines operated in 2013 in Shoshone County. Hecla restarted production at its Lucky Friday mine near Mullan after a hiatus in 2012 for MSHA-required rehabilitation. Hecla produced a total of 1,459,000 tr. oz. silver at the Lucky Friday during 2013 as production ramped up. The Galena mine complex, operated by U.S. Silver and Gold, extracted 2,120,824 tr. oz. during the year.

The Lucky Friday mine was closed for all of 2012 for cleaning and repair of the Silver Shaft and other rehabilitation work and enhancements. Production resumed in February of 2013, and nearly 90% of the 300-person workforce returned after the 14-month shutdown. Hecla noted that it was virtually a new mine. Full production was achieved in September, and mining and milling costs decreased as the ramp up proceeded. Mining focused on the Gold Hunter (or Lucky Friday Extension) zone of multiple veins between the 4900 and 5900 levels. As part of the rehabilitation, a new bypass was constructed on the 5900 haulage level around the area of weak ground affected by a 2011 rock burst. The haulage tunnel extends between the producing Gold Hunter deposit and the Silver Shaft, nearly a mile to the southeast (Figure 4).

Figure 4. Hecla's Lucky Friday mine and the Silver Shaft.

Hecla was experimenting with new geotechnical modelling and mining techniques to reduce strain around the 30 vein, a major producer. The Lucky Friday uses ramp access in the hanging wall of the orebody with underhand cut-and-fill mining techniques. They have also completed definition drilling to upgrade the resource. The mill produces both lead and zinc concentrates which are shipped to Teck Cominco's smelter in Trail, British Columbia, Canada.

With the resumption of access via the Silver Shaft, development work and shaft-sinking resumed on the #4 shaft project at the Lucky Friday (Figure 5). The internal winze is designed to extend from the 4900 to 8800 level in order to access the deep discoveries on the Gold Hunter vein system. The shaft is an 18-foot diameter, cement-lined shaft. The project was estimated to be completed in 2016 and at the end of 2013, approximately $134 million of the $215 million project had been invested.

Figure 5. The #4 shaft sinking, Lucky Friday mine, from Hecla presentation, Nov. 2013.

The Galena mine and associated complex, which includes the nearby Coeur mine and Caladay property, was operated by U.S. Silver and Gold. The company was created by the 2012 merger of U.S. Silver Corporation and RX Gold & Silver, Inc., which owned the Drumlummon gold mine in Montana. The drop in precious metal prices hit the company hard, and the Galena implemented a "Small Mine Plan" in order to save money. As part of that, staff was reduced by 30% at the mine, a lay-off of 126 people. Operationally, the mine reduced the number of active stopes, increased cut-off grade, put the Coeur on care and maintenance, and initiated other measures to reduce costs and improve operations. The company had an intensive exploration and development program in the first part of the year with 58,511 feet drilled through the third quarter on a number of targets. One focus was potential bulk mining plans for the deep Caladay zone of silver-copper mineralization (Figure 6). The mine used mills at both the Galena and Coeur properties.

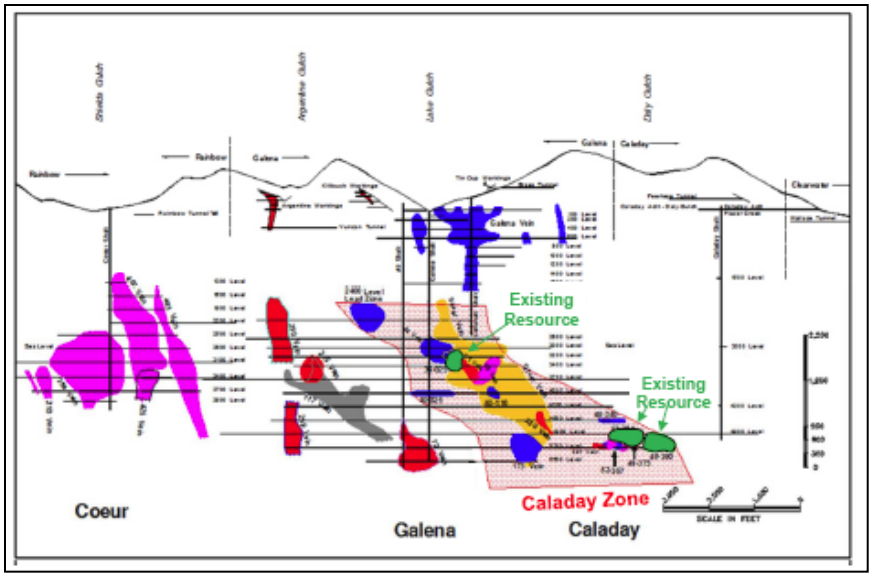


Figure 6. Longitudinal section of the Galena complex with veins and target areas.

The historic Sunshine mine remained closed, and the owner, Sunshine Silver Mines Corporation, was reported to be quietly working on exploration and refurbishing the underground mine. Apparently the late 2012 SEC-filed notice of an intention of a public offering was postponed.

OTHER METAL MINING

Thompson Creek Metals operated the large open pit Thompson Creek molybdenum mine in Custer County all year, producing ore from the Phase 7 pit, as planned (Figure 7). However, the company had suspended stripping for Phase 8 which was to be a major pushback of both east and west high walls to deepen the pit and extend mine life. The company had reported a proven and probable reserve of 203.3 million pounds Mo at a grade of 0.077% Mo based on a long-term price of $12/lb. A new mine plan and cost reductions were implemented at Thompson Creek. The mine is a major economic driver for the community of Challis and Custer County. The suspension reflected both the dropping molybdenum price in the second half of 2013 and a decision to conserve cash for the company's newly constructed Mt. Milligan mine in British Columbia. The Thompson Creek mine produced 16.2 million lbs. of molybdenum oxide in 2012 and a larger 21.368 million lbs. in 2013 according to their annual reports. However, as a consequence of the price drop from $ 12 a pound in January to nearly $ 9 per pound of

molybdenum oxide in July, the operation laid off about 100 workers. Permitting for the Phase 8 continued, as a small part of that project would affect federal land, but the critical stripping of overburden ended, and the company said it was considering options for the future.

Figure 7. View of Thompson Creek mine and high wall, July 2013.

PHOSPHATE MINING

Phosphorus is one of the building blocks in living cells and a critical agricultural commodity. The Idaho Phosphate District is located in southeastern Idaho and exploits the Permian-age Phosphoria Formation. The Phosphoria Formation extends into neighboring states, but Idaho hosts facies containing some of the highest grade of phosphate rock, nearly 30% P_2O_5 by weight. The organic-rich, phosphatic black shale records deposition in an ancient marine basin, where the enriched phosphorus was derived from petrified remains of abundant animals and plants. The Meade Peak Member was mined in three, large open pit operations in Caribou County, Idaho (Figure 8). Each mine sends its ore to a dedicated processing plant where the ore is converted into a commercially marketable product: phosphoric acid fertilizer at Agrium's and Simplot's plants or elemental phosphorus at Monsanto's plant (Figure 8). Each plant employs 350 to 400 workers with the mines each employing approximately another 100 people. The mines are located on a mix of federal, state, and private land but administered principally by the BLM and State. Overall, 2013 was a good year, though phosphate prices declined significantly in the second half of 2013, down from their 2012 peak (http://www.infomine.com/investment/metal-prices/phosphate-rock/5-year/).

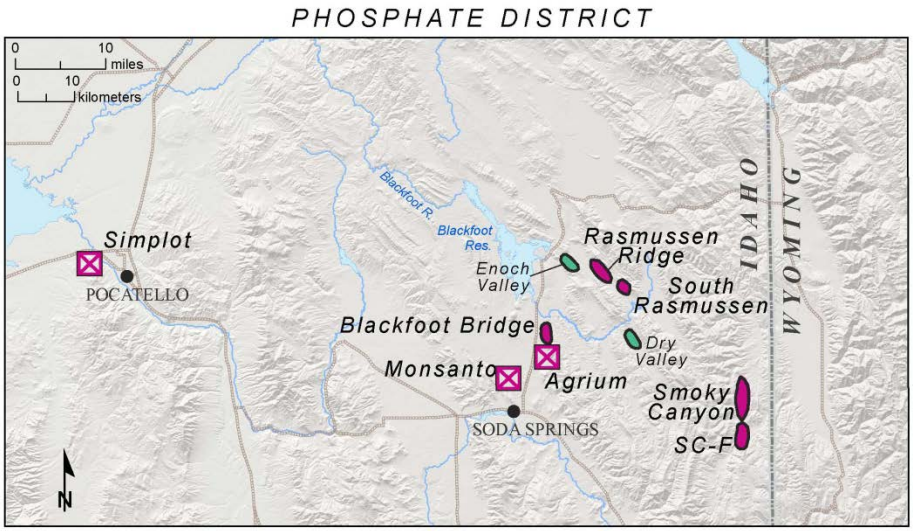


Figure 8. Map of the Idaho Phosphate District. Squares indicate processing plants. Active mines shown in magenta; recently closed and reclaimed mines in green.

Monsanto finished production at their South Rasmussen mine in May of 2013 (Figure 9). The mine had been in operation for about ten years. The company was constructing the new Blackfoot Bridge mine which was the sole producer in the second half of the year. Overall, the South Rasmussen mine supplied about 2/3 of the ore for the year and Blackfoot Bridge, which has a higher stripping ratio, produced the remainder. Waste stripping and mining started at the North Pit of the new Blackfoot Bridge mine, an overview of which is shown in Figure 10. The company also completed 2,600 feet of stream bank restoration and wetland pond creation, optimized the design of the new GCLL (geosynthetic clay liner) system for capping overburden piles and did other projects. At the output end, a new mobile tipple system was purchased to provide loadout facilities as the orebody is mined along strike.

Monsanto's phosphate ore is trucked by triple trailers to the elemental plant at Soda Springs, and the haulage from the new mine is relatively short. The plant was in full production; the phosphorus is used principally in their popular herbicide Round-up™.

Figure 9. Ultimate pit at South Rasmussen mine, September 2013.

Figure 10. Overview of Monsanto's new Blackfoot Bridge mine, August 2013.

J.R. Simplot Company operated the large Smoky Canyon mine near the Wyoming border all year. Mining was underway in panel B and panel F (Manning Creek lease); waste rock from panel F was placed as backfill in panel E. Simplot was constructing a new haul road to access the unmined panel G (Deer Creek lease; Figure 11). They were also working on cover systems and lysimeter tests at panel E. The ore is transferred by slurry line to the Don fertilizer plant in Pocatello, which uses 1.6-1.8 million short tons per year of phosphate rock to manufacture over a million tons of dry and liquid phosphate fertilizers, feed phosphate, and purified phosphoric acid.

Agrium, a Canadian agrichemical firm, is the only public company of the three producers. Agrium's 2013 annual report noted the decline in phosphate product (ex.: diammonium phosphate or "DAP") prices in the second half of the year. The company reported a realized sales price of $638/tonne in 2013 versus $728 per tonne in 2012. Agrium's phosphoric acid fertilizer plant at Conda sourced its feed rock from their North Rasmussen Ridge mine. Agrium was backfilling panel A and mining in panel B (Figure 12). They also were completing reclamation projects at the Central Rasmussen Ridge mine.

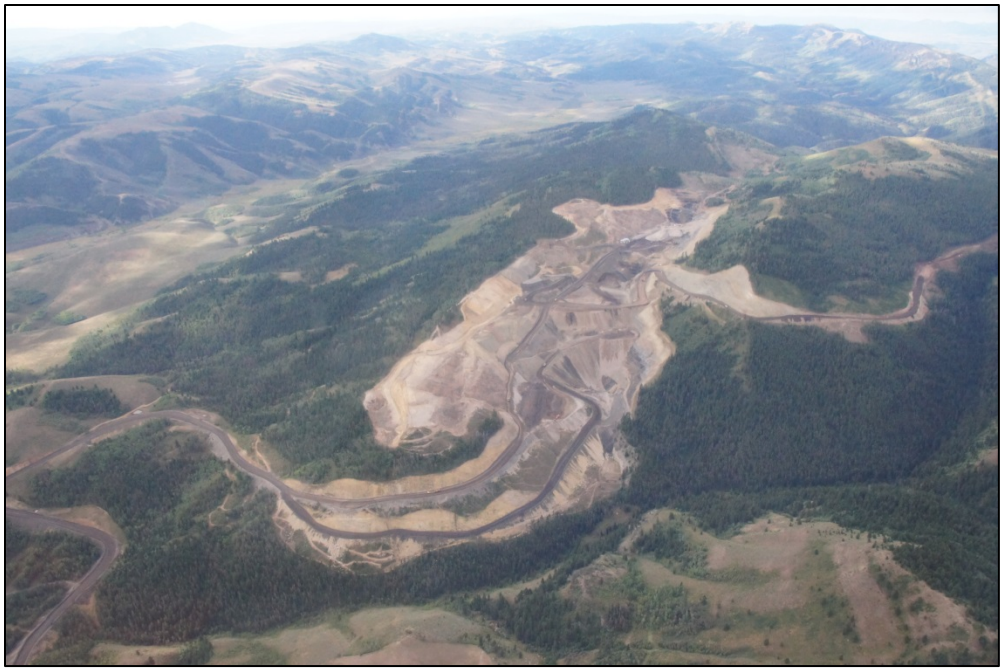


Figure 11. Panel F at Smoky Canyon mine with road to panel G on right, August 2013.

Figure 12. Placing backfill in panel A at North Rasmussen Ridge mine, July 2013.

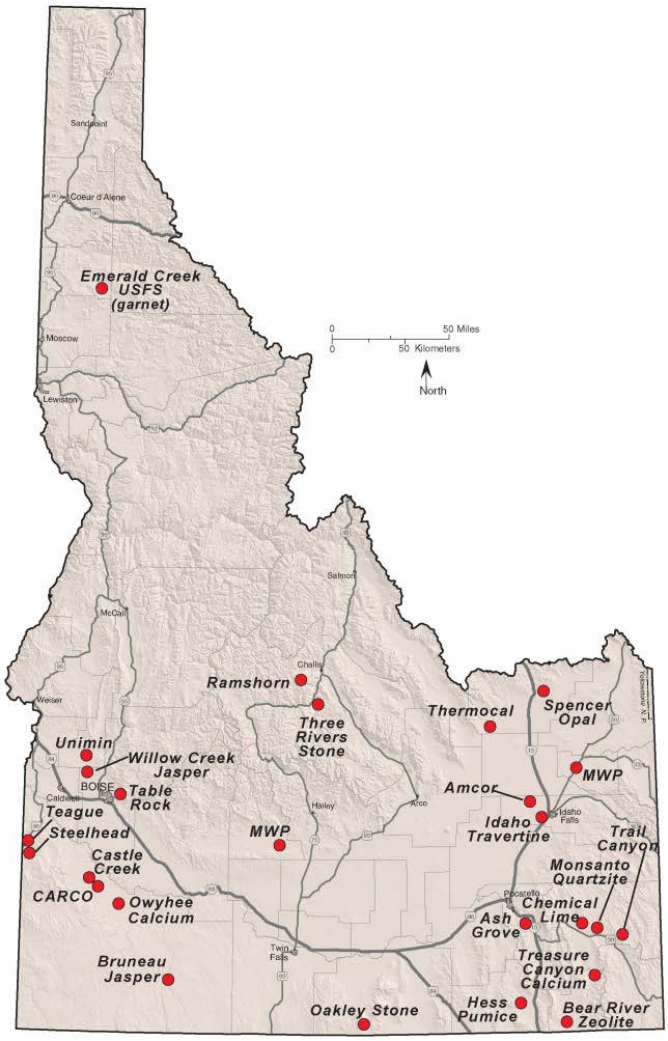
Four companies, including the three active producers, were in the process of permitting new mine plans or conducting exploration in 2013. Simplot continued to collect baseline data and was drilling groundwater monitoring wells at its Dairy Syncline property, which includes 2,133 acres of National Forest land. Monsanto started exploration drilling at its North Caldwell Canyon property after their Environmental Assessment was approved in May. Agrium was working on three separate properties. At the 420-acre, mixed ownership Rasmussen Valley site, Agrium was working on the scoping and baseline data collection, modelling water quality, and reviewing wildlife impacts of a potential mine there. A Draft Environmental Impact Statement (DEIS) was anticipated to be released in 2014. At the 1,051-acre Husky/North Dry Ridge property, the company was collecting and analyzing baseline data, and conducting drilling for geochemical and groundwater characterization to be incorporated into a planned 2016 DEIS. Agrium also had a new exploration drilling plan at the Freeman Ridge/Diamond Creek property.

Paris Hills Agricom, Inc., a wholly-owned subsidiary of Stonegate Agricom, Ltd., continued permitting activities at their Paris Hills project near Bloomington in Bear Lake County. They completed extensive exploration drilling in the 2010-2012 period, as well as putting in groundwater monitoring wells and working on feasibility studies for an underground phosphate mine in 2013. Two phosphate horizons are known and the proposed mine plan would extract the Lower Phosphate Zone using continuous mining equipment in a room and pillar mine. Mineral leases covered both private and state land on the 1,010-hectares property. An updated 43-101 report was released in July, 2013. It calculated a proven and probable mineral reserve on the horizontal limb of the Lower Zone as totaling 16.7 million tonnes with a grade of 29.5% P_2O_5. The company reported that as of the end of 2013, over $44 million had been spent on the southeastern Idaho project.

OTHER INDUSTRIAL MINERALS

Figure 13 shows the location of Idaho's non-phosphate industrial mineral operations in 2013. They are scattered over southern Idaho for the most part. For clarity, sand and gravel and crushed rock pits are not shown. However, the largest concentration of aggregate production in Idaho corresponded to two zones of coincident high demand due to interstate highways and urban centers and favorable Quaternary units: the Treasure Valley in southern Idaho and the Post Falls Rathdrum Prairie area in northern Idaho. Most operators reported that as the economy rebounded, markets in 2013 were improving and business was better than the prior year. Construction-related commodities, such as aggregate and building stone, probably benefitted the most from the economic upturn.

Concrete ready-mix use was up in the Boise Valley, and significant aggregate use in northern Idaho was required for improvement projects on Highway 95 near Sandpoint.



INDUSTRIALS 2013

Figure 13. Map of industrial mineral operations.

Emerald Creek Garnet, owned by Opta Minerals, Inc., since 2012, was one of four industrial garnet producers in the country. The company worked alluvial deposits on Emerald and Carpenter Creeks and in the St. Maries River floodplain in Benewah County. Garnets are concentrated in a jig system and sent to a washing plant. The company did minor exploration as well. The Panhandle National Forest continued to operate their very popular Emerald Creek Garnet rock hounding area for tourists.

Dimension stone producers included Table Rock Sandstone near Boise, Idaho Travertine and the Oakley Stone quarries on Middle Mountain in Cassia County (Figure 14). Gerhard Borbonus Landscaping quarried and cut the Table Rock sandstone from the historic quarry northeast of Boise (Figure 15). In eastern Idaho, Idaho Travertine's ten employees were cutting travertine from their Fall Creek and Medicine Lodge quarries for various jobs from Hawaii to Montana. The travertine is used for custom exterior and interior finishing. The cutting and finishing plant in Idaho Falls hosts gang and wire saws and polishers designed for the very large slabs of stone. They had a decent year with the reduced crew. Northern Stone Supply is the largest of four producers of Oakley Stone in south-central Idaho. Demand was up about 10% for the durable miceaceous quartzite flagstone and the good weather enabled work in the quarries from April 1 to November 15. However, another key Idaho dimension stone producer, the Three Rivers quarry in Custer County was inactive as owner L & W Stone was in bankruptcy proceedings.

Figure 14. Sawtooth Stone quarry in Cassia County, 2013.

Figure 15. Table Rock quarry, November, 2013.

Hess Pumice Products showed continued growth in operations at its mine and plant facilities in Malad in Oneida County (Figure 16). The company was improving their ultrafine cementitious grouts and pozzolans and had a joint venture with Creative Mines to develop a crafted stone product and specialty mortar/plaster veneer finishes. The company supplies pumice, grouts and perlite to a variety of industries including the paint filler market and construction industry.

Unimin reported a good year at their silica sand operation near Emmett in Gem County. Volume was up slightly, particularly for the construction and wallboard markets. U.S. Antimony continued to operate the Bear River Zeolite mine near Preston.

Figure 16. Hess Pumice plant (top) and Wright's Creek mine (bottom).

ENERGY

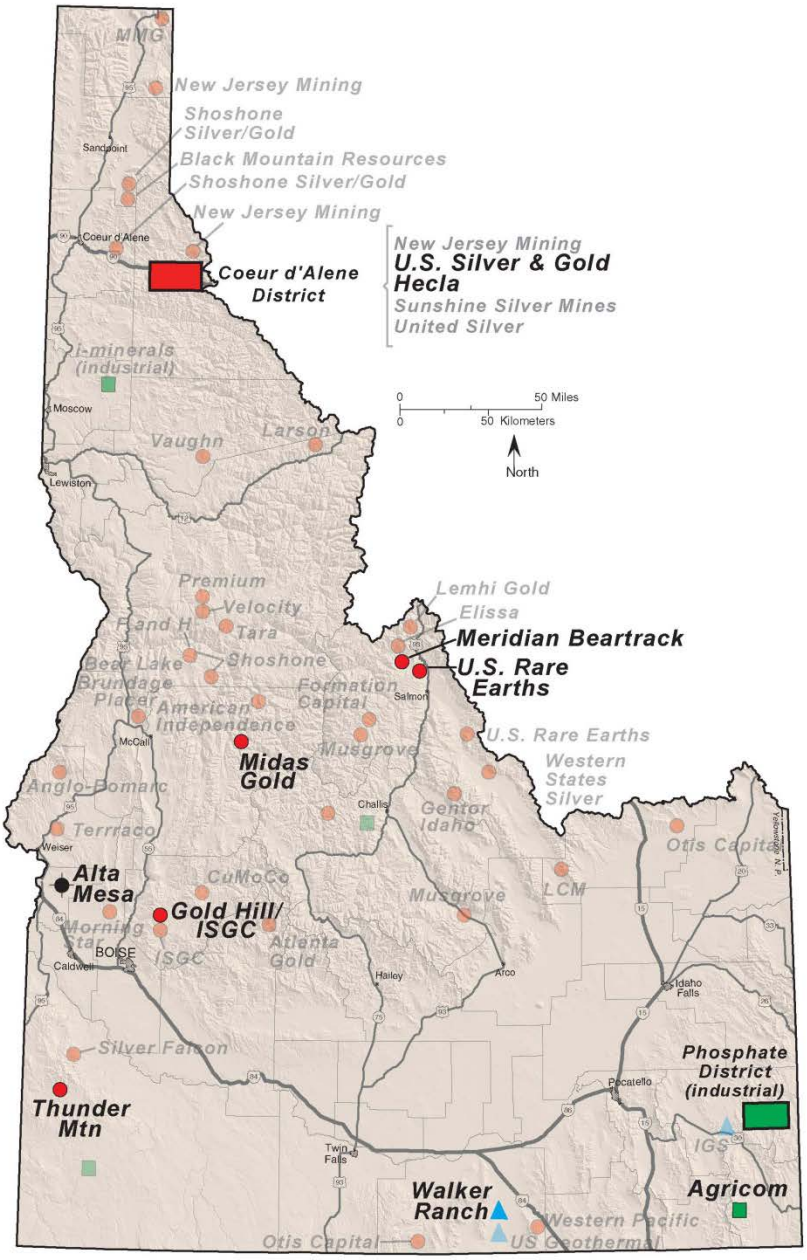
US Geothermal Inc. was producing electrical power from their 13 MW binary geothermal plant in the Raft River valley in southern Idaho just north of the Utah border. Another company, Walker Ranch LLC, part of the Agua Caliente group, drilled two geothermal

exploration wells to about 4000 to 5000 feet depth in the Raft River valley area; they were rumored to be successful. The geothermal resource appears to be related to faulting and lies within Idaho's Basin and Range province. As part of a US Department of Energy funded project, the Idaho Geological Survey had drilled four thermal gradient wells in southeastern Idaho in late 2012. Three of the holes, with depths down to approximately 450', were logged in 2013 to determine the temperature gradients. The information is available through the National Geothermal Data System (NGDS) website.

Alta Mesa Idaho continued exploration for oil, gas, and condensate in the western Snake River Plain region near New Plymouth in Payette County. The private company, a subsidiary of Houston-based Alta Mesa Holdings LP, has partnered with Snake River Oil and Gas. Two new wells were drilled in 2013, and a 3-D seismic survey started. The Willow and Hamilton fields were initially discovered in 2010 by Bridge Resources. Alta Mesa is working on permits for pipelines and other facilities. The Payette County Planning and Zoning Commission approved a conditional use permit for a hydrocarbon liquid treatment facility and dehydrator, close to an existing Idaho Power gas-fired power plant and an existing interstate gas pipeline. Other companies were exploring and leasing in the region. In July, Idaho reconstituted its Oil and Gas Conservation Commission to appoint members with more specific knowledge and interest in oil and gas development. The state also modernized its regulations pertaining to hydrocarbon exploration and production.

EXPLORATION

Active mineral exploration in Idaho slowed down in 2013, as compared to 2012 as a consequence of the sharply falling metal prices and increasing difficulty that companies had in obtaining investment funds. As a consequence, the number of projects conducting actual on-the-ground work and spending exploration dollars was down for the year (Figure 17). In addition, companies expressed concern about rising costs and longer permitting timelines needed for work. Some companies used the lull to recalculate resources and update feasibility documents. The most active projects are highlighted in Figure 17.



EXPLORATION 2013

Figure 17. Mineral exploration projects in Idaho, 2013. Properties in bold lettering were the most active metals projects.

Some of the regulatory issues included new concerns over judicial cases requiring analysis of the impact to ground water from exploration drilling, a new EPA requirement for an NPDES permit from recreational suction dredge miners, and apparent general slowdowns in the offices of busy government regulators.

INDUSTRIAL MINERALS

The Helmer-Bovill project of i-minerals in Latah County continued to move forward as the company conducted exploration and evaluation of the halloysite clay resource and accompanying feldspar and quartz potential at the historic clay producing district in northern Idaho. I-minerals completed 17 new drill holes in the Kelly's Hump area, intersecting thick zones of halloysite in nine of the holes. The unique nanotube structure of halloysite allows for specialty high tech applications, such as extended release containers for pharmaceuticals and other agents. Metallurgical studies on concentrating and separating the halloysite were underway at nearby University of Idaho. The company acquired new state leases and mined a test run of quartz-feldspar tailings from the historic Simplot clay operation. The tailings were trucked to Lewiston for ceramics use.

NORTH IDAHO

In metals exploration in north Idaho, Hecla Mining started the year with a winter, underground drilling program at the Star mine, part of Hecla's large land package in the Silver Valley. The Star is a little over a mile northwest of the Lucky Friday mine's active workings. Drilling at the 2000 level of the Star targeted two parallel veins, the Noonday and As You Like It veins, which are subparallel to the huge Star-Morning veins which were mined historically down to 8000 feet. A total of 19 holes for 10,700 feet were drilled in 2013. One intercept of 5.3 feet from the Noonday vein assayed 8.1 oz./ton silver, 7.4% lead, and 7.9% zinc, hosted in veins cutting the usual Belt Supergroup siltstones and fine-grained quartzites.

On the western end of the Silver Valley, United Silver Corporation held on to the Crescent mine property, located between the productive Sunshine and Bunker Hill mines. The company filed a preliminary economic assessment (PEA) and updated 43-101 compliant resource report. Calculated returns on the six million ounce silver resource were very sensitive to silver prices. In recent years, the Crescent was re-opened and a

new tunnel driven from the west to access the South and Alhambra veins for drilling and sampling.

New Jersey Mining was in a joint venture with Marathon Gold Corporation at the Golden Chest mine in Murray, Idaho, to the north of the Silver Valley. Placer gold discoveries at Murray in the 1880s brought the initial prospectors into the Silver Valley. The Golden Chest mine is a small underground mine exploiting several gold-quartz veins in metasedimentary rocks. In January, New Jersey released a new 43-101 report based on 24,140 meters of drilling. The new resource estimate was 477,000 ounces, a 25% increase from before and with an improved grade of 1.71 g/t gold in both open pit and underground mining configurations. As reported in 2012, some sections of the Popcorn vein assayed 22.8 g/t gold over half a meter, considerably higher than the average deposit grade. New Jersey owns a precious metal mill at Kellogg. Fred Brackebusch, long-time president of New Jersey, retired and Del Steiner took over as CEO.

Near Dixie, Tara Minerals collected bulk samples on its Ponderosa project. Black Mountain Resources reported results from its 2012 drilling on the Conjecture mine project in the Lakeview Mining District of Bonner County. The company installed a new culvert as the portal for the Graham Adit and decline. The diamond drill program totaled 1,800 meters in 16 holes and some intercepts graded 300 to over 1,100 g/t silver (8 to 32 oz. per short ton). Shoshone Silver/Gold Mining Company maintained its property position at the Rescue mine and mill near Warren in Idaho County but did not conduct any work there. Historic production from the Warren district was nearly a million ounces of gold, principally placer.

Premium Exploration was quiet as management had financing concerns, and little new work was done at their Orogrande/Petsite property in Idaho County. Petsite is part of the Orogrande shear zone which hosts gold mineralization in several locations along a length of tens of kilometers. In April, the company reported a new resource for the Friday deposit: 647,000 ounces of gold in the indicated category, or 20.1 Mt at a grade of 1.0 g/t gold, plus another 590,000 ounces inferred, or 20.9 Mt at 0.88 g/t gold.

CENTRAL AND EASTERN IDAHO

Lemhi County and the region around the town of Salmon was the site of several exploration projects. Formation Capital Corporation endured a frustrating year looking for the completion of financing to construct their fully permitted Idaho Cobalt Project, a proposed underground cobalt-copper-gold mine. Formation's project is located in the Blackbird Mining District, approximately 25 miles southwest of Salmon near the old townsite of Cobalt. Formation started exploring in the region in the 1990's and discovered a new deposit, named the RAM, in the late 1990's. An Environmental Impact Statement and underground mine plan was subsequently approved by the U.S. Forest

Service in 2009, but financing for the wholly-owned project has been elusive. In 2013, the company progressed on the pre-development work plan by obtaining needed environmental permits, purchasing crushing and mill equipment, and doing roadwork and earthwork excavations for facilities (Figure 18). Still, without financing and due to declining cobalt and other prices, the company announced on May 2, 2013, that they would defer underground development and officially put the site on "care and maintenance." By November, the high elevation site was "buttoned down" for winter. Formation also downsized staff and sold their precious metals refinery in Kellogg.

Figure 18. A view in September, 2013, of the Idaho Cobalt Project, Lemhi County.

Idaho State Gold Corporation (ISGC), a private company, bought the remaining 51% interest in the Lemhi Gold Project north of Salmon for a reported $7.65 million from their joint venture partner, Northern Vertex. ISGC continued with environmental baseline studies and a monitoring well at the property which is located several miles north of North Fork. Initially called the Humbug or Ditch Creek property, it was discovered by American Gold Resources (AGR) in an area of poor exposure upstream of old placer tailings along the Trans Challis Fault System. Gold is thought to be structurally controlled and hosted in a quartz-carbonate-sulfide gangue. The joint venture had drilled 34,000 feet in 40 core and 14 RC holes, in addition to 277 previous drill holes, but very little information has been released.

In Clark County, Otis Gold submitted a plan for 1,550 meters of road building to access an area of favorable drill results (121 meters of over 1 g/t gold) from the prior year at their Kilgore gold project. The company was trying to cut costs.

Meridian Gold Company was back to explore at their reclaimed Beartrack mine in Lemhi County. The heap leach mine operated from 1994-2000, producing over 600,000 troy ounces and it closed at time of record low Au prices, below $ 400 per troy ounce. The mine won the BLM's national Hard Rock mine reclamation award a few years after closure. In 2012 they completed 21,000' of drilling in 13 holes below the reclaimed pits (Figure 19). Meridian was back in 2013 for additional drilling all summer to see what was left at depth below the oxidized pits. Gold is hosted in silicified stockwork and breccia zones along the Panther Creek fault, part of the Trans Challis system and the oxidized deposit was mined in two main pits along the fault. The company also gave an excellent tour as part of the Tobacco Root Geological Society (TRGS) meeting held in Salmon in August (Figure 20).

Figure 19. Drilling at Meridian Gold's reclaimed Beartrack mine, August, 2013.

Figure 20. Geologist Mark Hawksworth presenting the geologic overview at the Beartrack mine, Lemhi County, to TRGS field trip attendees.

In the Beaverhead Mountains near the Idaho/Montana border, U.S. Rare Earths, a private company, was exploring their 13,000 acres of mining claims in the Lemhi Pass District of Idaho and Montana and in the North Fork area to the northwest. The company had new management and financial resources from Texas. A key asset is the Last Chance mine, located in Montana, but only a half mile from the Idaho border. The district hosts a series of rare earth and thorium bearing veins that are unusually enriched in neodymium, a critical rare earth element used in high-powered neodymium-iron-boron permanent magnets used in motors and cell phones, as well as other uses. In late 2012, the company initiated a short drill program, but came back in early 2013 with a Phase I program of systematic trenching and channel sampling over a 202-foot length of the Last Chance REE-Th-Fe vein (Figure 21). In June, they drilled several core holes to intersect the vein, one of the largest in the district. In November, USRE reported favorable results from the 1500 feet of diamond drilling and announced a Phase II program at the Last Chance. They also reported favorable assays from mapping and sampling work at the North Fork area in Idaho.

Figure 21. U.S. Rare Earths trench sampling and drilling at Last Chance mine, Lemhi Pass District.

Midas Gold, Inc., had the largest exploration project in the state, located in the historic Stibnite Mining District and officially titled the Golden Meadows project. Over the past few years, Midas has united the district under single ownership, drilled 123 holes totaling 11,650 meters, conducted metallurgical testing, drilled a gold resource in the historic tailings pile and started a number of geological and exploration studies in the complex gold-antimony-tungsten-mercury district of Valley County. Midas had a reduced drilling footprint in 2013 as the project moved into development and permitting activities with considerable attention devoted to public relations and environmental restoration at the site. Geologically, three main deposit areas have been outlined plus a number of exploration targets (Figure 22). Gold mineralization is structurally controlled along the north-south Meadow Creek Fault and northeast-trending splays and hosted in granitic and metasedimentary lithologies. As part of the project, Midas set up a full meteorological station at the site; they were also conducting biological surveys and monitoring water quality for environmental characterization. New resource calculations and engineering studies were also underway.

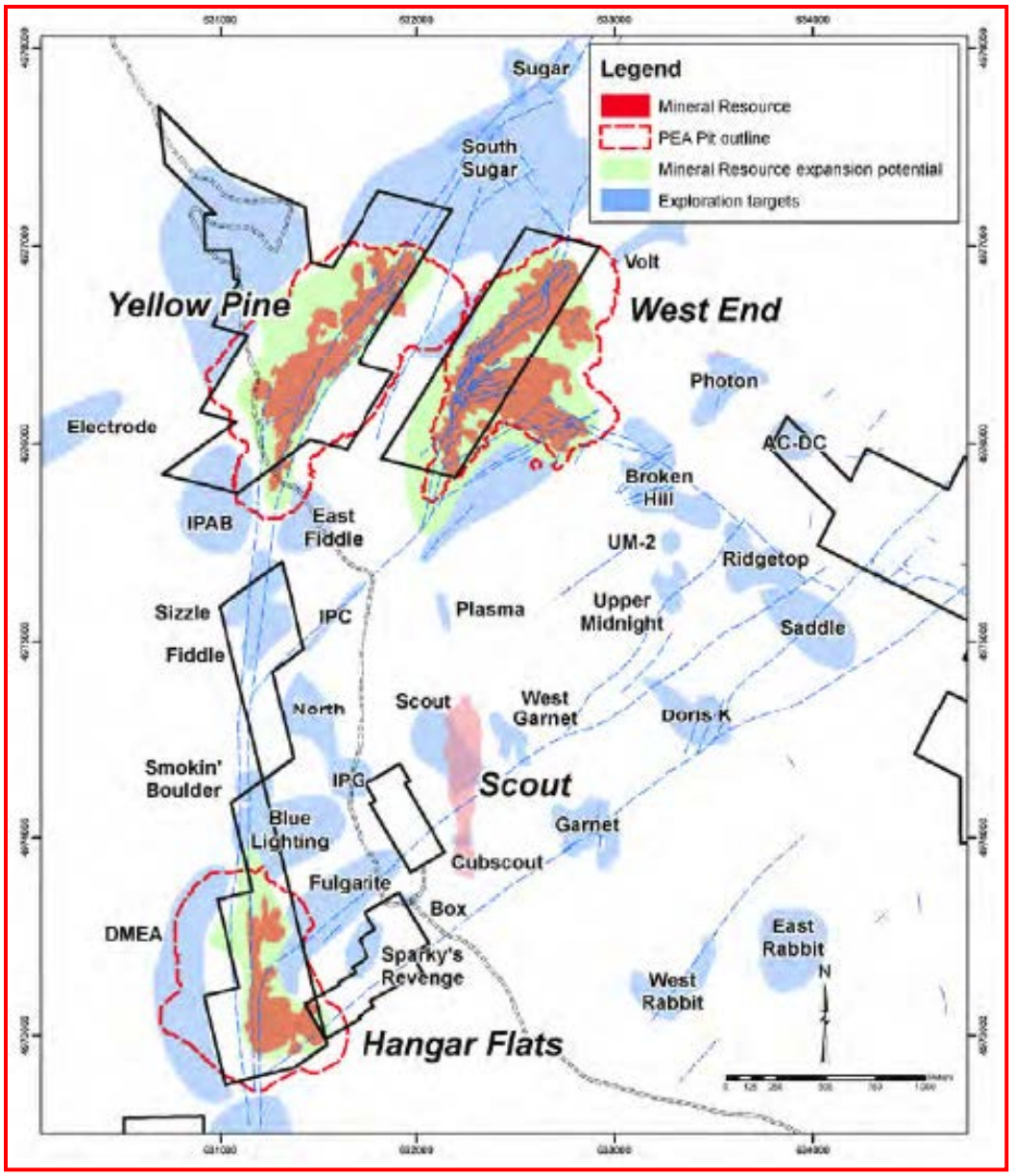


Figure 22. Midas' 2013 map of mineralized zones and the three major deposits: Yellow Pine, West End, and Hangar Flats. Faults shown as dashed blue lines.

SOUTHWESTERN IDAHO

Atlanta Gold conducted a soil sampling program over the Main Shear at the Atlanta deposit in Elmore County. They were testing to see if the soils were amenable to gravity separation for gold. In November, the company also registered a new company, HydroClean LLC Water Resources, to market a new, proprietary arsenic removal system. The new process has reduced the 2000 ppb arsenic in the 900 level tunnel effluent waters down to single digit ppb values of arsenic, which is less than the drinking water standard.

Terraco Gold continued to work quietly on the Idaho Almaden/Nutmeg Mountain gold project in Washington County.

After two years of corporate conflict at Mosquito Consolidated, a new management team focused on a new company name, American CuMo Mining Corporation (CuMoCo) and exploration of its main asset, the giant Cumo porphyry molybdenum and copper deposit in Boise County. The company has drilled the over 2 billion ton molybdenum deposit for the past several years. In August, the U.S. Forest Service released its Supplemental Environmental Assessment (SEA) with stipulations and procedures for avoiding ground water quality impacts during exploration drilling. The SEA was a result of a court decision following litigation by environmental groups challenging the original Forest Service document.

In the Boise Basin, a joint venture of Gold Hill Mining and Idaho State Gold Company, was removing the historic cable-tram waste dumps and stockpiles at the Gold Hill mine site, once the region's largest lode producer until it closed in the 1930's. The material was transported to a custom placer mill with screens, jigs, and screws designed to separate out any free gold and sulfides (Figure 23). After reprocessing the Gold Hill dumps, the companies were investigating and evaluating similar opportunities in the region. Overall production from the Boise Basin was about 2.7 million ounces of gold, mostly placer.

Figure 23. Gravity separation plant in the Boise Basin, 2013.

Thunder Mountain Gold conducted underground development work at their South Mountain project in Owyhee County in a joint venture with ISR Capital, an investor group. The large private parcel covers the two main adits explored in the past by the DMEA program for high grade, polymetallic zinc-rich skarn ore bodies. Widman Mining was the contractor for rehabilitation of the upper Laxey Portal and lower Sonneman level; they had a crew of a dozen miners working two shifts. The company was stockpiling ore from the nine DMEA ore zones and preparing to drill over the winter (Figure 24). They also cleared an area for a millsite and did a ground magnetics survey. The deposits are especially noted for the occurrence of black crystals of ilvaite, a calcium-iron hydrated silicate, specimens of which are in the Smithsonian Museum.

Figure 24. Stockpiling ore from underground at South Mountain in November, 2013.

STATE ACTIVITIES

Sales of the new state geologic map published in 2012 were brisk during the year, and many of the colorful maps were distributed to classrooms across the state. Geologic mapping under the Statemap program of the USGS was focused in the Fairfield region, Rexburg, Salmon and Weiser areas. Mapping and geochronology and alteration research continued in the Stibnite quadrangle with support from Midas Gold. GIS work and final report-writing were major tasks on the aggregate research project supported by the Idaho Transportation Department. The DOE supported geothermal data compilation effort was winding down with final reports and data assimilation providing new ideas on geothermal potential in southeastern Idaho. Data preservation work and scanning of mine maps and documents for online availability continued with support from the Idaho Department of Lands and the USGS. In late 2013, the Idaho Geological Survey announced a search for a new State Geologist and Director of the Survey.