History of the Idaho Almaden Mine, Washington County, Idaho

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Morrill Hall, Third Floor
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Table 1. Companies operating at the Idaho Almaden Mine.

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INTRODUCTORY NOTE

This report was prepared under a cooperative agreement with the U.S. Bureau of Land Management (BLM), Idaho State Office, as part of a project to identify and describe inactive and abandoned mines in the state of Idaho. Work on this project included preparing detailed histories of selected mines on BLM-administered lands in Idaho. The information in this report is from a number of published and unpublished sources in the Idaho Geological Survey's mineral property files. Where not otherwise noted, most of the mine production data is drawn from the U.S. Geological Survey's (USGS) annual volumes on *Mineral Resources of the United States* (1882-1923) and the equivalent volumes produced by the U.S. Bureau of Mines (USBM) (*Mineral Resources of the United States, 1924-1931*, and *Minerals Yearbook*, 1932 to present). Information on underground workings and mine equipment is generally from the annual reports of the Idaho Inspector of Mines (IMIR), published from 1899 to 1979. After 1974, the Mine Inspector's office was known as the Mine Safety Bureau, a section of the Idaho Department of Labor and Industrial Services. Detailed accounts of mine operations are, for the most part, drawn from annual reports made by the companies to the State Inspector of Mines; these reports were required by law and the information contained in them formed the basis of the Mine Inspector's annual reports. Reports of recent developments are taken from the Idaho Geological Survey's (IGS) annual reports on the developments in mining and minerals in Idaho (from 1984 to present) or from similar reports produced by the Survey's predecessor, the Idaho Bureau of Mines and Geology (IBMG) from 1975 to 1984. Other published sources are referenced in the text. A complete bibliography is included at the end of the report. Where direct quotations are taken from source materials, the original spelling and grammar are preserved even in cases where they do not conform to currently accepted usage.
History of the Idaho Almaden Mine, Washington County, Idaho

Victoria E. Mitchell

LOCATION AND GEOLOGY

The Idaho Almaden Mine is in western Washington County, 11 miles west of Weiser. It is located on Nutmeg Mountain at an elevation of 3,500 feet (Figure 1). The mineralized zone covers an area about 1 mile long by ½ mile wide on the summit and upper flanks of the mountain. The Weiser quicksilver mining district, a designation created to describe the Idaho Almaden and related mercury occurrences, covers four square townships surrounding the mine.

The mine is in moderately consolidated sandstones and siltstones of the Miocene Payette Formation (Figure 2). The sedimentary rocks are largely arkosic, but also contain some tuffaceous or diatomaceous beds (Anderson, 1941; Ross, 1956). The structure of the area is characterized by a series of broad-crested, northwest-trending, asymmetrical anticlines (with steeper southwest limbs) and their accompanying synclines (Ross, 1956). The anticline on Nutmeg Mountain is faulted, and the crest is flattened and depressed. It trends N. 35°-45° W. (Anderson, 1941). Kirkham (1931) extended the axis of the Nutmeg anticline for over 30 miles, but other workers show folds in the area as irregular and

---

2Idaho Geological Survey, Main Office at Moscow, University of Idaho, Moscow.
Figure 1. Topographic map of the Idaho Almaden Mine and vicinity (U. S. Geological Survey Holland Gulch 7.5-minute topographic map).
discontinuous (Ross, 1956). Two sets of faults are found at the Idaho Almaden Mine, both of which have relatively small displacements (Anderson, 1941). One set strikes about N. 10° W. and in some places has severely disrupted the sediments. The other set strikes about N. 70° W. and was known as the “East-West Faults” by the mining company. These faults provided conduits for the mineralizing solutions (Requa, 1940). A thin bed of opalitized shale or siliceous sinter, known as “cap rock” by the miners, forms the upper limit of the orebody, and assay results determined the lower limit (Ross, 1956).

The mercury deposits occur within sedimentary rocks that have been more or less replaced by silica, usually in the form of opalite (an aggregate of silica replacement minerals so fine grained that it looks like opal). Replacement ranges from slight, with only the cement of the sandstone replaced by opalitic material, to almost total, with nearly all of the original rock replaced by silica (Ross, 1956). The only ore mineral was cinnabar, which occurred both in a crystalline and in an amorphous form. It was found in the opalite, in a soft white kaolin gangue, in sandstone, and with chalcedony (Mining World, 1939). Most of the cinnabar was so fine grained that it colored the rock a bright red, but individual crystals could only be seen under the microscope (Figures 3 and 4). The mine is an epithermal hot-springs deposit that formed at temperatures between 100° and 150° C. and at near-surface pressure (Anderson, 1941). The ores showed evidence for multiple periods of silicification. Cinnabar was deposited with each wave of mineralizing solutions, but most of the ore was emplaced in the last stage. The cinnabar tended to crystallize after the gangue minerals (Ross, 1954). In most places, the cinnabar veinlets were less than a millimeter in width. Anderson (1941, p. 7-8) described the ore as follows:

The mineralized rock is most heterogeneous in color, structure, and texture, as can be judged from the mineralogic descriptions given above. Some of the silicified rock is banded roughly parallel to the bedding, but the bands are neither uniform in thickness nor persistent (Figure 5). Most of it has the appearance of a breccia of opal fragments, cemented, and in part obscured by chalcedony. Some of the ore is in included masses of partly silicified sandstone and shale, and some of the material is also brecciated. In general, the cinnabar produces irregular and ill-defined splashes, streaks, and mottlings of pink and red against a mottled background of nearly white opal and grayish blue chalcedony. Where exposed to sunlight, the cinnabar is tarnished to a dull blue-black, a fact that has delayed recognition of the presence of the mineral in this locality.

Assays of the cinnabar ore showed that much of it contained about 0.01 ounce of gold per ton, probably in association with pyrite. One small sample assayed 0.16 ounce of gold (Ross, 1956).

**MERCURY ECONOMICS IN THE 1920S AND 1930S**

Mercury economics throughout the 1930s was dominated by international events. The leading mercury producers, both because of the size and the grade of their deposits, were
Figure 3. Hand specimen of ore from the Idaho Almaden Mine, showing irregular banding and variation in colors (photograph by Earl H. Bennett, Idaho Geological Survey).
Figure 4. Photomicrographs of ore from the Idaho Almaden Mine. Cinnabar is the black mineral; both views are with uncrossed nicols and at 46x magnification. C: irregular veinlets of cinnabar in and along fractures in opal. D: cinnabar in grains, granular aggregates, and short discontinuous seams in opal (Anderson, 1941, Plate 3, C and D).
Figure 5. Outcrop of ore at the Idaho Almaden Mine in 1987. Note the irregular banding and the uneven variations in the colors (photograph by Earl H. Bennett, Idaho Geological Survey).
Spain and Italy. These two countries produced about 70 percent of the world's mercury between 1920 and 1934. The average grade of ore at Spain's Almaden Mine in 1935 was said to be about 8 percent (of which about 75 percent was recovered), while the average grade treated from U.S. mines between 1925 and 1935 was 0.5 percent. The grade of the Italian mines was somewhere between 0.7 and 1 percent, or less than the amount of mercury lost per ton of ore produced in Spain. In 1928, Italy and Spain formed the Consorzio Mercurio Europeo to market their mercury. Italy threatened to pull out of the cartel in 1932, but the agreement was renewed and continued in force (with a break between 1936 and 1939). The cartel was inactive during World War II, but resumed its operations in 1946. It was formally disbanded on January 1, 1950.

During the period between 1925 and 1935, U.S. consumption of mercury remained relatively stable, with the total for most years varying between 25,000 and 33,000 flasks\(^2\) (average consumption: about 27,900 flasks). The high was 38,500 flasks in 1929 (during the economic euphoria just prior to the stock market crash) and the low was 16,294 flasks in 1932 (the year that most metals prices hit all-time lows). This deceptive stability in demand masks the widely varying ratios between domestic and imported mercury consumed in the U.S. during this period (Figure 6). In 1925, only 30 percent of the mercury used in the U.S. was produced in the country; by 1935, the situation had reversed, with 31 percent of the mercury supply coming from imports. The U.S. government instituted a 25 cents per pound ($19.00 per 76-pound flask) tariff on mercury in 1922, at a period when domestic mercury production had dropped off severely after the sharp increases in production during World War \(^1\). Under protection of the tariff, domestic production gradually increased its market share of U.S. mercury consumption.

Part of the switch in U.S. sources in the 1930s came from the unsettled political situation abroad. Economic sanctions were imposed on Italy after that country invaded Ethiopia in 1935, but were lifted the following year. By that time, however, fears that the Spanish Civil War would interrupt mercury shipments from Spain were causing even greater uncertainty. In addition, demand rose sharply as all the European countries began massive rearmament programs. The New York price of mercury rose from an average of $59.23 a flask in 1933, to $79.92 in 1936, to $103.94 in 1939. Domestic production increased with the rising prices, but the increases were uneven and (in the words of the 1938 USBM Yearbook, p. 601) "failed to reflect the violent fluctuations in rates of production at individual mines." (Figure 7 shows relationship between price and U.S. mercury production.) The 1939 New York price for mercury went from an average of $77.44 a flask in January to $141.20 in December. In recognition of mercury's importance

\(^1\)A flask equals 76 pounds of mercury. This unit of measurement is based on the containers in which mercury is transported and sold.

\(^2\)This tariff rate was still in effect in the late 1980s for any countries which did not have "most-favored-nation" trading status with the U.S.
Figure 6. Trends in production, consumption, and price of mercury, 1915-1954. The stippled area in the middle graph is the deficit of U.S. production over consumption (the amount of imported mercury needed to fulfill domestic requirements) (USBM Yearbook chapter on mercury, 1954, Figure 1, p. 788).
Figure 7. Relationship between the price of mercury (in constant 1957-1959 dollars) and domestic production of mercury, 1911-1962. Heavy lines show periods when the Idaho Almaden was operating (Bureau of Mines Staff, 1965, Figure 1).
as a strategic material, the U.S. Bureau of Mines began a monthly canvass of mercury producers, dealers, and consumers in September 1939. Government purchase of strategic materials in 1940 contained no provisions for buying mercury, but the USBM began investigating mercury properties in 1939.

HISTORY OF THE IDAHO ALMADELEN MINE

Although placer prospectors had noted the presence of cinnabar in the surrounding area much earlier, the cinnabar deposits on Nutmeg Mountain were not discovered until 1936 (Ross, 1956). Harry Brown, a sheepherder and amateur mineralogist, was searching for lost sheep when he noticed some reddish-streaked rock. The following year, he prospected the area extensively and staked 17 claims, calling the mine Osa Anna after his mother (Argall, 1955).

In 1938, the property (which was known as the Nutmeg Mine) was investigated by Lawrence K. Requa, a Santa Barbara mining engineer, and leased in August for a twenty-year period. Requa and his associates, who included Allan Hoover and Herbert Hoover, Jr. (sons of former U.S. President Herbert Hoover), formed the Idaho Almaden Mines Company (Mining World, 1939). (See Table 1 for companies operating at the mine.) An extensive exploration and development program was conducted throughout the year. This work included trenching, sinking shafts to determine the thickness of the deposit, and drilling. The trenching program included taking samples every 5 feet. A 50-foot shaft sunk in the center of the original outcrop showed that the ore went down 30 feet. Other shafts were driven on the edges of the deposit, including one that was 150 feet deep. The drilling program required drilling 25-foot holes on 100-foot centers and sampling the dry cuttings, which were caught in a canvas around the collar of the hole. Diamond drilling was also tried, but the core recovery rate was only 15-20 percent. The company found that it could get an accurate estimate of its ore reserves by taking a large number of samples (Requa, 1940).

By 1939, the property covered 1 patented claim and 24 unpatented claims, and the company had an option on about 40 acres of deeded land (Requa, 1940; Anderson, 1941; Figure 8). The results of the exploration showed the presence of an orebody 250 feet long by 175 feet wide, with an average depth of 16 feet (Anderson, 1941). (See Table 2 for development work done at the mine, by year.) The company installed a 3'x48' 50 ton-per-day (tpd) Gould rotary furnace and condensing system in the spring of 1939, and production began on May 18, 1939 (Ross, 1956). The furnace operated constantly until December 1942. Output from the mine for the rest of 1939 was sufficient to make it the seventh largest mercury producer in the country. Between May and August, the mine produced 464 flasks of mercury from ore reported to have run between 5 and 15 pounds of mercury to the ton. All the ore produced up to that time had come from a shallow open pit about 200 feet square (Anderson, 1941; Figure 9). When the mine began production,
Table 1. Companies operating at the Idaho Almaden Mine.

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Officer</th>
<th>Date Incorporated</th>
<th>Charter Forfeited</th>
<th>Year(s) at Mine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idaho Almaden Mines Co.</td>
<td>Lawrence K. Requa,</td>
<td>Sept. 2, 1938</td>
<td>Nov. 30, 1943</td>
<td>1938-1942</td>
</tr>
<tr>
<td></td>
<td>President-Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rare Metals Corporation of</td>
<td>Paul Kayser, President</td>
<td>May 29, 1954</td>
<td>merged with El Paso: July 9,</td>
<td>1954-1962</td>
</tr>
<tr>
<td>America</td>
<td></td>
<td></td>
<td>1962.</td>
<td></td>
</tr>
<tr>
<td>Freeport Minerals</td>
<td>René L. Latiolais,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Executive Vice President</td>
<td></td>
<td></td>
<td>exploration:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1983</td>
</tr>
<tr>
<td>Homestake Mining</td>
<td>Harvey M. Conger,</td>
<td>CA: Nov. 5, 1877,</td>
<td></td>
<td>exploration:</td>
</tr>
<tr>
<td></td>
<td>President</td>
<td>ID: July 10, 1973</td>
<td></td>
<td>1983</td>
</tr>
<tr>
<td>Canu Resources Ltd.</td>
<td></td>
<td></td>
<td>merged with Ican</td>
<td>1985-1986</td>
</tr>
<tr>
<td>Ican Resources Ltd./Ican</td>
<td>Guenter J. Liedtke,</td>
<td></td>
<td></td>
<td>1985-</td>
</tr>
<tr>
<td></td>
<td>President</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Granges Exploration Ltd.</td>
<td>Mike Muzylowski,</td>
<td></td>
<td></td>
<td>1987</td>
</tr>
<tr>
<td></td>
<td>President</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amax Gold, Inc.</td>
<td>Timothy J. Haddon,</td>
<td>April 1, 1987</td>
<td>wholly owned subsidiary of</td>
<td>1991-</td>
</tr>
<tr>
<td></td>
<td>President</td>
<td></td>
<td>AMAX, Inc.</td>
<td></td>
</tr>
</tbody>
</table>

the price of mercury was between $80 and $85 a flask. In September, with the formal outbreak of World War II, the price rose sharply, averaging $140 a flask for the rest of the year. The company calculated that their operating costs were $5.40 per ton of ore (Requa, 1940). (At $82.00 a flask, the company could break even on ore that ran 5 pounds of mercury per ton.) Miners were paid $5.00 a day, muckers received $4.50, and firemen working in the plant were paid $4.75 a day.

In the areas where there was little or no cap rock, the ore was mined in 10-foot slices. The ore was mucked by hand (with some hand sorting) into 20-cubic-foot mine cars and trammed 300 feet to the ore bin (Figure 10, top). A crew of one miner and three muckers, working a single shift, could keep the plant supplied with ore (Mining World, 1939). In
Figure 8. Claim map of the Idaho Almaden Mines Company in 1939 (Anderson, 1941, Figure 2).
<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Men Employed</th>
<th>Tunnels (feet)</th>
<th>Sinking (feet)</th>
<th>Drilling (feet)</th>
<th>Surface Work</th>
<th>Operator</th>
</tr>
</thead>
<tbody>
<tr>
<td>1939</td>
<td>16</td>
<td></td>
<td>550</td>
<td></td>
<td>yes¹</td>
<td>Idaho Almaden Mines Co.</td>
</tr>
<tr>
<td>1940</td>
<td>18</td>
<td></td>
<td>200</td>
<td></td>
<td>yes¹</td>
<td>Idaho Almaden Mines Co.</td>
</tr>
<tr>
<td>1941</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td>650'x350'</td>
<td>Idaho Almaden Mines Co.</td>
</tr>
<tr>
<td>1942</td>
<td>28</td>
<td>30</td>
<td>155</td>
<td>700</td>
<td>750</td>
<td>yes¹</td>
</tr>
<tr>
<td>1955</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 Rare Metals Corp.</td>
</tr>
<tr>
<td>1956</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 Rare Metals Corp.</td>
</tr>
<tr>
<td>1957</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4 Rare Metals Corp.</td>
</tr>
<tr>
<td>1958</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5 Rare Metals Corp.</td>
</tr>
<tr>
<td>1956</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6 Rare Metals Corp.</td>
</tr>
<tr>
<td>1960</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7 Rare Metals Corp.</td>
</tr>
<tr>
<td>1961</td>
<td>6</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td>8 Rare Metals Corp.</td>
</tr>
<tr>
<td>1962</td>
<td>96</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9 Rare Metals Corp./El Paso Natural Gas Co.</td>
</tr>
</tbody>
</table>

¹Amount of work done in the open-pit was not given.
²Development included 3,600 feet of diamond drilling and 12,000 feet of wagon drilling between October 1954 and May 1955.
³Amount of development work done during the year was not specified.
⁴The company drilled 57 wagon drill holes totaling 1,737 feet.
⁵The company drilled 76 wagon drill holes totaling 2,788 feet.
⁶The company reported drilling 238 wagon drill holes totaling 4,338 feet. The USBM Yearbook reported that the company drilled 745 holes totaling 23,344 feet and stripped 12,630 tons of waste.
⁷The company reported drilling 1,488 wagon drill holes totaling 43,184 feet and 70 diamond drill holes totaling 2,800 feet. The USBM reported that the company drilled a total of 14,440 feet and moved nearly 44,000 tons of waste rock.
⁸The company drilled 530 wagon drill holes totalling 7,820 feet.
⁹The company also did 20 feet of raising and an unknown amount of drilling.
Figure 9. Summit of Nutmeg Mountain, showing Idaho Almaden Mine in 1939. The mine pit is in the center of the photograph, the mine plant and furnace are to the right, and the mine camp is on the skyline to the left (Anderson, 1941, Plate 1-B).
Figure 10. Operations at the Idaho Almaden Mine in 1939. Top: General view of open pit mining, with muckers loading tram cars by hand. Center: Steel condenser tubes where distilled mercury vapor is returned to liquid. Two wood-stave settling tanks are on right, and furnace building is to left. Bottom: Hoeing condensed mercury mud with lime to dry it. The 3-foot-in-diameter, 48-foot-long Gould furnace is behind the hoeing table (Mining World, 1939, p. 10).
areas where the stripping ratio was more than 2 to 1, the mine was worked by underground methods, with a series of flat stopes extending beneath the cap rock. Where wide orebodies were taken out, square-set timbering was used for support; stools and headboards were used in the narrower stopes. The underground operations allowed the mine crew to escape the extremes of summer and winter weather. With careful mining and the use of mechanical mucking and loading, costs of the underground operation were kept almost as low as those for the open pit (Requa, 1940).

The reduction plant was described in Mining World (1939, p. 10-11) as follows:

The Idaho Almaden plant is equipped with a 50-ton Gould Improved rotary furnace and condensing system, manufactured by the Mutual Engineering Co., South San Francisco. The plant was designed by H. W. Gould Co., and installation was supervised by Gordon I. Gould. The plant is powered with Sterling motors.

As the mine is rather remote from power lines, it was decided to generate power at the plant. This is done with a "Caterpillar" D 4400 diesel connected to a General Electric 25 k. v. s. generator. This takes care of the total connected load of 30-hp. As not over 22-hp. is actually used in operating the plant, there is a considerable safety factor.

Ore from the coarse ore bin passes over a 1½-in. grizzly, over-size going to a 8 by 12 Joshua Hendy jaw crusher. All fine ore feeds to a 14-in. conveyor belt to be elevated to a 30-ton steel ore bin.

An 8-in. shaking feeder introduces ore to the furnace. The kiln is 3 ft. in diameter by 48 ft. long lined with special fire brick and driven by a 3-hp. motor at 1.5 r. p. m. (The furnace is shown in the background of Figure 10, bottom.) It is fired with 18-degree fuel oil feed to the lower end of the furnace under air pressure, giving 1500 degrees temperature at point of combustion. Movement of the ore through the kiln is counter to the air current.

Vaporized quicksilver passes off through a duct at the upper end of the furnace, goes through a Sirocco dust collector and into the condensing system, which consists of 14 steel pipes of 10-gauge material, 16 in. diameter by 24 ft. high [Figure 10, center]. The Idaho Almaden ore has but light sulphur content, so 10-gauge condenser pipe should prove adequate.

After passing through the condenser system, gases pass through two redwood stave settling tanks and then to the stack, which is also of wood stave construction.

Condensed quicksilver is caught in rubber buckets placed in water-seal hoppers under the condenser pipes. As considerable soot comes over into the condenser, the accumulated mud has to be hoed down on an iron table [Figure 10, bottom]. Lime is added to dry up the water and facilitate separation of the metal, which collects in an iron pot, from which it is removed for weighing and bottling.

Cost of the furnace was $30,000. In contrast, the company valued the mine and surface plant at $13,400 and their buildings and equipment at $3,650. Equipment at the mine included seven 20-cubic-foot ore cars, four jackhammers, one tractor, two 105-cubic-foot Gardner Denver compressors (one for backup), and a Gardner Denver HB tugger hoist (used for pulling a scraper to muck out the underground stopes).

By the end of 1939, there were 17 shafts on the property in addition to the quarry and a number of small cuts. The deepest shaft was 155 feet, with levels at 30 and 50 feet. Total underground workings were about 550 feet of shafts and 80 feet of crosscuts.

Mercury prices continued to rise during the first half of 1940, reaching a high of $197.36 a flask in June before falling off to an average monthly price of $164.96 a flask in
December. Domestic production more than doubled due to the high prices, but much of the increased production was exported to countries who usually bought from the international mercury cartel. On July 2, President Roosevelt put certain strategic materials (including mercury) under export control. Mercury exports to Japan dropped from a total of 1,265 flasks in May and June, to 278 flasks in July, to none for the rest of the year. The Idaho Almaden operated continuously throughout 1940, but the average monthly output was lower than the average monthly output for the previous year.

In 1941, mercury consumption in the U.S. was 67 percent higher than it had been the previous year. Domestic production barely matched the increased demand, giving rise to concerns about mercury shortages in the near future. Mercury prices continued to rise throughout the year despite two government warnings to control the price. The average December price was $199.65 a flask. Mercury was added to the list of commodities purchased for the government stockpile in 1941. The USBM and USGS continued to explore mercury properties around the country. The Idaho Almaden Mine was examined by C.P. Ross, but the report was not printed until 1956. The mine produced continuously all year both in the open pit and through flat underground stopes (Figure 11). Late in the summer, the company started a shaft, called the North Shaft, in the hanging wall of the fault that bounded the north side of the workings (Ross, 1956). The developed area was about 650 feet by 350 feet, and the ore zone in this area was between 7 and 25 feet thick.

On January 23, 1942, the Office of Production Management issued Conservation Order M-78, which restricted or discontinued the use of mercury for "nonessential" purposes such as treating hat fur, making marine antifouling paint (presumably for civilian use), turf fungicides, and nonindustrial wall switches for the period from January 15 to March 30. After April 1, all use of mercury for nonessential applications was discontinued unless otherwise specifically authorized by the Director of Priorities. Price controls went into effect in February, and the maximum base price for Idaho mercury was $191 a flask, f.o.b. point of shipment. Mercury production in the U.S. for 1942 was the highest since 1882. Despite the high production and the government restrictions, domestic production fell short of demand in the second half of 1942. The Idaho Almaden Mine operated 362 days during the year. Production through the North Shaft came from a level 75 feet below the collar of the shaft and about 40 feet below the bottom of the main quarry. However, an extensive exploration program failed to locate more ore of satisfactory grade. The mine was closed in December and returned to its original owners (Ross, 1956). At that time, workings at the mine were four tunnels, twenty-four shafts, six raises, fourteen crosscuts, and twelve drifts, for an approximate total development of 3,350 feet. This included 700 feet of shafts, 150 feet of raises, and 2,500 feet of tunnels, crosscuts, and drifts. The company did not list the dimensions of their open pit. Ross (1956, p. 96-97) provides the following summary description of the Idaho Almaden workings:

When the mine was originally opened, the ore that cropped out at the surface was mined in a quarry or open cut which finally attained a length of about 270 feet with a maximum breadth of about 135 feet and a maximum depth of about 30 feet (pl. 7 [Figure 9]). In addition there was a scraped and
Figure 11. Main quarry at the Idaho Almaden Mine on August 22, 1941. Fractures above stope A are labeled ‘f’; sandstone above cap rock is labeled ‘ss’ (Ross, 1956, Plate 7).
trenched area south of the quarry from which no ore was mined except for a sample lot of 204 tons which yielded 2.6 pounds of quicksilver to the ton. Prospecting was mainly by shafts and drill holes which served satisfactorily to indicate the material of mineable grade. Most of the shafts and holes were stopped less than 30 feet from the surface. One shaft was sunk 165 feet in the crushed rock of the fault zone near the west end of the northern margin of the quarry but disclosed only one slab of ore, 6 feet long, at a depth of 100 feet. A sample from this slab yielded 27 pounds to the ton on assay.

It was soon found desirable to undertake underground mining both because the overburden east of the quarry was too deep to remove economically and because of the protection from the weather thus given the miners. As the ore body was irregular, defined by assay limits, and had its greatest dimensions in the horizontal plane, the workings were necessarily unsystematic. In some of the underground work done the ore mined was two sets or more high. Where this was required ... square sets were used. Elsewhere only such stalls and other timbers as were essential for safety were employed. Pillars were left in early stages and removed as mining progressed. In so far as possible mining was selective but eventually so large a portion of the material was removed that the ground above the entire area of underground workings collapsed. Caving is now so complete* that any cinnabar that may remain would be difficult or impossible to obtain.

On the extent of the orebody, Ross (1956, p. 98-99) said:

In the main workings work stopped on the north against fairly well defined fault walls, but the workings from the North Shaft later found ore north of this fault zone. The limits of stopping in the main workings were set solely by the tenor of the material found. The mined material had an average content of close to 6 pounds of quicksilver per ton and a few of the closely spaced samples taken during the operation of the main workings yielded more than 20 pounds to the ton on assay. Mining was stopped when the samples on the periphery of the workings showed an average grade close to 3 pounds to the ton. On the east and south, particularly, the only limits to the ore body are those imposed by decrease in the cinnabar content. Beyond these limits the tenor decreases, but not uniformly.

In the first months of 1943, domestic mercury production could not meet demand, but by September consumption had dropped off. Government purchases kept the price up until the end of the year, but by then, government stockpiles contained an estimated two-years' supply. Conservation Order M-78 was revised in September to permit greater use of mercury in nonessential applications and was completely revoked on February 2, 1944. Mercury was reduced to a War Production Board Group III labor classification, which made it more difficult for the mines to obtain needed manpower, particularly for development work (which was rarely done much in advance of actual mining). The government program for purchasing domestic mercury was halted as of January 31, 1944. Increased supply and the removal of the government supports led the price of mercury to fall to $100.56 a flask in July before recovering to about $128.88 a flask by the end of the year. About one-third of the mercury mines in the country closed during the year; there were 102 producing mercury mines in the U.S. in 1944, compared to 197 three years earlier.

During 1943, some exploration work was done at the Idaho Almaden by representatives of the mine's owners. This consisted mostly of prospecting and excavating

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*This was probably written in 1954.
shallow pits along the northern crest of Nutmeg Mountain. Veinlets on the Sly Park No. 3
claim assayed 20 pounds to the ton, but apparently no further work was done on the
claim. Idaho Almaden Mines Co. removed the furnace and most of the buildings from the
property, leaving the workings to collapse. Little work was done at the mine for the next
decade (Ross, 1956).

Mercury prices continued to fall until 1950, reaching a low of $47.26 a flask in July of
that year. Consumption increased, setting peace-time records in the late 1940s, but most
of the mercury was imported (Figures 6 and 12). By 1950, there were only 16 active
mercury mines in the country, and three properties (only one of which operated all year)
accounted for over 90 percent of the production. Domestic mercury production for 1950
was the lowest ("by far," according to the USBM) in the 100 years that production
records had been kept. The international mercury cartel disbanded, but chaotic market
conditions prevented most buyers from noticing any effect.

The outbreak of the Korean War stimulated an increase in prices, even though the
government stockpile was well supplied. The average price in 1951 was $210.13 a flask
(the price fluctuated between January's low of $195.00 and the March high of $217.33).
Government ceiling prices, put into effect in January, were a factor in stabilizing the price,
although mercury was exempted from price controls in August. The Defense Minerals
Administration decided that mercury mines were ineligible for government production
assistance (i.e., loans, purchase contracts, and tax amortization benefits), but decided that
exploration loans would be granted to projects that met the established specifications.
After awarding exploration contracts in 1952 and early 1953, the Defense Minerals
Exploration Administration (DMEA) removed mercury from the list of materials eligible
for exploration benefits in May 1953. Even so, domestic production increased slowly, with
most of the mercury used in the country coming from imports. Prices, which had averaged
$212.96 a flask in January, fell to the $185 range by the end of the year.

In March 1954, the government reinstated mercury to the list of commodities for
which DMEA assistance was available. (Although the Idaho Almaden never applied for
assistance under this program, it undoubtedly benefited from the stimulus the DMEA
program gave to domestic mercury producers.) In July, the General Services
Administration announced a three-year guaranteed-price program that called for
purchasing 125,000 flasks of domestic mercury at a price of $225 a flask. The average
price of mercury remained above the guarantee price for the first two years of the
program, and government purchases were minimal. The program was extended for
another year, until December 31, 1958.

Between 1952 and 1954, the owners did a small amount of work on the Sly Park
claims. Some work was also done in the vicinity of the main workings (Ross, 1956).

In late July 1954, geologists from Rare Metals Corporation of America, the mining
subsidiary of El Paso Natural Gas Company, examined the Idaho Almaden Mine. On
October 1, 1954, the company acquired a lease and option on the property. They paid
$500 to option the property, plus a 10 percent royalty on gross proceeds, with a
Figure 12. Trends in production, consumption, and the price of mercury, 1945-1970. Note the wide gap between U. S. production and consumption (USBM Yearbook chapter on mercury, 1970, Figure 1, p. 709).
guaranteed minimum of $2,000 per month and a total payment of $360,000. Between October 1954 and March 1955, Rare Metals conducted an extensive exploration campaign. They drilled 68 diamond drill holes (with an average depth of 35 feet, for a total of 1,738 feet) and 451 wagon drill holes (with an average depth of 25 feet, for a total of 15,715 feet), and assayed 4,329 samples (Argall, 1955; Reynolds, 1956). By late 1955, this program had delineated 300,000 tons of 4.0-pound ore in four main orebodies (Figure 13). The "A" orebody joined the original workings to the south and southwest (Figure 14). The ore ranged up to 40 feet thick in places and was beneath ten to twenty feet of waste. This zone was 450 feet long by 350 feet wide and contained 3-pound ore. The "B" orebody was a continuation of the "A" zone that had been faulted upward 25 to 40 feet and offset slightly. The ore averaged 20 feet in thickness and was overlain by 5 to 25 feet of waste. The average grade in this zone was 3-pound ore. The "C" orebody was on the western rim of Nutmeg Mountain on the Sly Park claims. The "D" orebody was a new discovery on the extreme northern tip of Nutmeg Mountain. The average grade in this area was 5 pounds per ton, and the company planned to mine to a depth of 35 feet (Argall, 1955).

In 1955, the company let contracts for stripping the overburden from the orebodies, for constructing steel tanks and ore bins, and for installing the plant (Reynolds, 1956). Contractors stripped 87,700 cubic yards of waste rock from three of the four orebodies. Construction of the 175-tpd plant began on June 6 and continued into September. The plant was built partly on the foundations of the Idaho Almaden Mines Co.'s plant. It containing an oil-fired, 5.5- by 90-foot Gould rotary furnace which was said to be the largest in the world (Figure 15). The first mercury (a test lot) was produced on September 15, and dedication ceremonies for the new facility were held September 30. The mine was worked by open-pit methods, with blasting done on 6-foot centers (Reynolds, 1956). Mining operations were mechanized to keep costs down, and five days of mining were sufficient to keep the plant operating three shifts per day, seven days a week (Argall, 1955). Mining and processing operations at the mine were described as follows (Reynolds, 1956, p. 1098-1099):

Ore at the Idaho-Almaden is treated in a Gould rotary kiln and condenser system. The flowsheet of an average plant is comparatively simple, and that at the Idaho-Almaden is no exception [Figure 16]. Broken ore from the pits is trucked to either the grizzly over the coarse ore bin or to storage on a 80x80-ft concrete slab. It is the general practice to store high-grade ore from C and D orebodies on the slab and to blend with the lower grade ore from A and B in order to maintain a relatively uniform feed to the furnace. A rubber-tired Michigan loader transports the ore from the various stockpiles to the grizzly. The coarse ore bin is of 94-in. steel construction with a sloping grizzly bottom having 3-in. openings. Material of -3 in. drops through the grizzly directly onto the conveyor to the fine ore bin. Oversize passes through a 30-in. Symtron vibrating feeder to a 20x30-in. Kue Ken crusher that is set at 3 in. Crushed ore joins the undersize from the grizzly on an 18-in. conveyor belt 186 ft long which discharges into the top of a covered 300-ton circular ore bin with a conical bottom [Figure 17]. Ore is fed from this bin directly into the furnace by a Gould reciprocating feeder. Feed rate is governed by regulating the number of strokes made by this feeder. The feeder is so constructed that the ore forms a seal to prevent
Figure 13. Map of the Idaho Almaden Mine, showing the four orebodies located by Rare Metals Corporation (Lickes, 1957, Figure 3).
Figure 14. Map showing exploration drilling of the 'A' orebody at the Idaho Almaden Mine. Note relationship to the old open pit and the underground workings (Lickes, 1957, Figure 3).
Figure 15. Interior of the Idaho Almaden plant. The kiln is to the right, with the ore feed above it; the dust collector is in the center; and the lower end of the condensing system and the thickener are on the upper left (Idaho Geological Survey file photograph).
Figure 16. Flowsheet of the Idaho Almaden mercury plant (Lickes, 1957, Figure 27).
Figure 17. Idaho Almaden mercury plant. Conveyor runs from the crushing plant to the fine ore bin (Idaho Geological Survey file photograph).
the escape of mercury-laden gases from the furnace. The furnace itself, the world’s largest single-tube mercury kiln, is 90 ft long and 5.5 ft in diam. It is set on a slope of ¾ in. per ft and rotates at 3½ rpm. The furnace is lined with sheets of asbestos 1 in. thick between the steel shell of the kiln and the 6-in. pineite fire brick lining. A new type of low-pressure Hawk burner supplies the heat to the lower end of the kiln. At this time No. 5 Bunker oil is being burned at the rate of 7½ gal per ton of ore. Ore passes through the kiln counterflow to the heat. Contact time in the furnace is about 45 min, during which time the ore is raised to a temperature of about 1200°F. Cinnabar decomposes quite readily when heated to about 600°F. In addition to the mercuric and sulfurous vapors, there is also considerable moisture and water of crystallization from the opalite liberated by the ignition of the ore. These gaseous products, together with varying quantities of soot and dust, are drawn from the feed end of the kiln by a 5-ft Sirroco fan and dust collector. The relatively dust-free gases pass into the condenser system, thence through two redwood tanks and into the atmosphere through a redwood stack. The condenser system consists of 76 pipes 18 in. diam and 18 ft long [Figure 18.] The first four of these pipes are of steel and the remaining 72 of heavy-gage cast iron. The redwood tanks are 12 ft diam and 20 ft high. Stack losses appear to be negligible when the stack temperature is kept below 120°F. The bulk of the mercury condenses in the cast iron pipes.

The mercury, soot, and mud are drawn off into an automatic hoeing machine, where quicklime is added to dry up the mixture and liberate the quicksilver. The mercury then passes through a series of filters into an automatic bottling machine.

Burnt rock is discharged from the main kiln into a fire-brick lined chute that extends down to a second kiln 6 ft diam and 40 ft long. This kiln serves as a conveyer to transport the hot rock out of the mill building and discharge it over the top of a nearly sheer cliff several hundred feet high. Cool air is drawn into this kiln and heated by contact with the burnt ore. Part of the heated air is drawn through a boiler where water is heated. It is planned to circulate this hot water through pipes that were laid in the concrete blending and storage slab to keep the stockpiled ore from freezing during the winter. The hot air that is not passed through the boiler is blown into the fine ore bin, where it preheats and helps dry the ore. This preheating and drying has materially increased furnace capacity and has resulted in a considerable saving in oil consumption.

Total direct cost of furnacing averages $2.60 per ton.

The cost of the furnace was $300,000. El Paso Natural Gas was expected to be a major customer; they used at least $30,000 of mercury a year for seals in natural gas pumping plants (Argall, 1955).

The USBM studied Rare Metals’ operation at the Idaho Almaden in late 1955 and early 1956. For the first part of 1956, operating costs for the mine and plant were $1.05 per ton for mining and $2.61 per ton for treatment, for a total cost per ton of $3.66. Thirty-six percent of the expense was labor (five men were employed in the mine and ten in the plant) and 64 percent was for supplies. The average grade of ore processed between September 1955 and September 1956 was 3.71 pounds per ton and included some material from old dumps. Rock containing less than two pounds of mercury per ton was discarded as waste or used as road ballast, while rock containing up to 2.5 pounds per ton was stored on low-grade stockpiles for later processing (Lickes, 1957).

In 1956, Rare Metals Corporation mined a total of 62,783 tons of ore containing 0.1 percent mercury from the four orebodies (Figure 19). The company processed 59,909 tons through its plant. Reserves were approximately 525,000 tons of ore averaging 3.6 pounds of mercury per ton for a total of over 1.7 million pounds of mercury. The company
Figure 18. Condenser system at the Idaho Almaden Mine. The fine-ore bin is to the left and the redwood-stave scavenger tanks and stack are to the right (Lickes, 1957, Figure 17).
Figure 19. General view of the Idaho Almaden Mine (c. 1956). Pit ‘D’ is in the foreground; the plant is in the upper center, with the ‘A’ pit behind it (Lickes, 1957, Figure 2).
installed new water pumps, a new pumphouse, and a new hoisting machine during the year. Miners received $15.76 per day, miners' helpers were paid $14.88, the assayer received $18.00 per day, and the furnace operators and truck drivers got $14.88.

Mercury production decreased by nearly twenty percent in 1957. The company produced 2,177 flasks from 57,836 tons of ore. The mine was the only large mercury producer in the state. The government purchase program for mercury was originally scheduled to terminate at the end of 1957, but at that time, the government had only purchased 9,428 flask of domestic mercury (out of a maximum commitment of 125,000 flasks). The government extended the program until the end of the following year, during which time an additional 17,463 flasks were purchased. Only during 1958 did the average price of mercury fall below the government's guaranteed purchase price (Pennington, 1960).

In 1958 the mine was again the largest mercury-producer in the state. The company mined and treated slightly more than 56,000 tons of ore averaging 0.173 percent mercury. During the year, 2,114 flasks of mercury were produced. The company installed a cone classifier and a flotation unit to treat the mud from the condenser tower.

Production in 1959 was again smaller than the previous year. Rare Metals Corporation recovered 1,736 flasks from 55,230 tons of ore containing 0.158 percent mercury. Some of this ore was from the company's low-grade stockpiles; only 54,989 tons of ore was mined during the year. Exploration and development work included 745 drill holes totaling 23,344 feet. In addition, 12,630 tons of waste was stripped from the open pit.

The company mined over 55,000 tons of ore and moved nearly 44,000 tons of waste rock during 1960. The mercury output from the mine was 11 percent less than the previous year. The company did 20,544 feet of wagon drilling during the year, although the USBM reported only 14,440 feet of exploration and development drilling. The average grade of ore treated in Idaho during 1960 contained 2.1 pounds of mercury per ton, as opposed to 2.6 pounds per ton the previous year. (Although this average figure includes other mines, the Idaho Almaden was by far largest producer in the state.) In addition, the price of mercury (which had been declining since 1955) fell to an average price of $210.76, further decreasing the value of the mine's output.

Rare Metals Corporation closed the Idaho-Almaden mine and mill on December 5, 1961, due to the low price of mercury and depleted reserves. In the eleven months before the closure, the company furnaced over 53,000 tons of ore and recovered 1,073 flasks of mercury.

On July 9, 1962, El Paso Natural Gas purchased the outstanding shares of Rare Metals Corporation stock and dissolved the company. The mining division of El Paso conducted an extensive exploratory drilling at the Idaho Almaden in an effort to discover enough ore of sufficient grade to reopen the mine.

There was no activity at the Idaho Almaden in 1963. Mercury prices hit a low of $182.00 a flask in July, then started slowly back upward. USBM studies of U.S. mercury reserves classified Idaho's mercury deposits as uneconomic at prices of less than $300 a
flask (assuming 1961 extraction costs and technologies). In August 1964, in response to the Gulf of Tonkin incident and the official start of the Vietnam war, mercury prices increased sharply. The trend continued for the rest of the year. By December 1964, the average monthly price was $484.55, and the average price for the year was $125 a flask higher than the 1963 price. El Paso Natural Gas Co. began rehabilitating the Idaho Almaden late in 1964 to prepare for resuming production early in 1965.

The mine reopened on March 1, 1965. El Paso employed fifteen men at the mine. Ore was mined from three pits and contained between 1.9 and 2.2 pounds of mercury per ton. In July, the company began constructing a plant to produce pozzolan1 as a byproduct of their mercury operation. The plant would process calcined opalite, a waste product from furnacing mercury ore, to make pozzolan for use as a concrete additive for dam construction projects. The plant was 80 percent complete by the end of the year.

In 1966, the Idaho Almaden produced 1,133 flasks of mercury from 58,550 tons of ore. In addition, El Paso began shipping pozzolan from its new plant. Thirty-two thousand tons was shipped for use on dam construction projects in the Pacific Northwest. The material came from two of the five pits that the company was operating.

Production of mercury fell during 1967, but the average market price rose to $489 a flask. Idaho's production was mostly from the Idaho Almaden mine. El Paso Natural Gas also shipped 35,000 tons of pozzolan, mostly for use on dam construction projects.

In 1968, the company mined 64,073 tons of ore, from which 1,042 flasks of mercury were recovered. Only 5,000 tons of pozzolan was shipped. This decrease from the previous year's production was due to completion of a dam project that had been a major customer.

The Idaho Almaden was the only mercury producer in the state in 1969. Output decreased slightly from the previous year, and a total of 1,012 flasks were produced. The total value of the mercury was placed at $511,100. After peaking at an average annual price of $536 a flask in 1968, the price declined to $505 a flask in 1969. The company continued producing pozzolan from calcined opalite, but shipped only 1,100 tons in 1969.

Mercury production in 1970 was 1,038 flasks, slightly above the 1969 production. The Idaho Almaden was the only active mercury mine in the state. Production was valued at $423,000, a 17 percent decline that resulted from a drop in the average annual price to $408 a flask. Pozzolan was apparently not produced during the year.

In 1971, the mine produced 1,057 flasks of mercury valued at $309,077. The price of mercury continued to decline, with the price for 1971 averaging $292 a flask. The price fell to $217 a flask in 1972, and the mine closed early in the year after furnacing 161

1Pozzolan is finely ground siliceous material (such as diatomaceous earth, opaline chert, or certain volcanic tuffs) which is added to portland cement in proportions between 15 and 40 percent by weight to strengthen the concrete or counteract the adverse effects of certain types of aggregate. Portland-pozzolan cements are highly resistant to penetration and corrosion by salt water (AGI Dictionary of Geologic Terms).
flasks. The company estimated that $400 a flask would be needed to sustain operations. The mine has not been mined for mercury since 1972. (Figure 20 shows the plant site in 1986).

In 1983, Freeport Minerals and Homestake Mining drilled several holes at the Idaho Almaden mine, looking for hot spring-related gold and mercury deposits. In 1985, Canu Resources Ltd. and Ican Resources Ltd. signed an agreement with Homestake on the project. Canu and Ican agreed to spend $2 million over the next seven years to earn a 100 percent working interest in the property. They drilled 103 holes and identified two near-surface zones in the mass-minable, hot-springs-type gold deposit. The work outlined 12.5 million tons of ore with an estimated average grade of 0.035 ounce per ton (opt) of gold.

Drilling continued at the Idaho Almaden in 1986 (Figure 21). The Canu-Ican venture completed over 230 holes by June. The main mineralized zone was 600 and 800 feet wide, 50 to 150 feet thick, and 1,800 feet long. Drilling outlined reserves of 18 million tons averaging 0.035 to 0.045 opt gold. A new zone, called the K zone, was discovered. It was about 1,200 feet long and had ore grades comparable to the main zone. The orebody required virtually no stripping and was a good candidate for a heap-leach operation. In October, Ican and Canu merged to form Ican Minerals.

Ican Minerals drilled 36 holes at the mine in 1987, for a total of 540 holes completed. Reserves of about 25 million tons of 0.028 to 0.03 opt gold were blocked out. Ican ran mill tests on the ore, which was difficult to leach because of extensive silicification. A 10,000-ton pilot heap leach test was planned for the site. Expected recovery was 55 percent. Also during the year, Granges Exploration signed an option agreement with Ican Minerals Ltd. on the property.

In 1988, Ican continued drilling at the mine. Ican’s geologic summary indicated that the mine was at the very top of a “classic” hot springs deposit, and that most of the mineralization might be expected at depths of 300 to 800 feet (Figures 22, 23, and 24). Five steeply dipping quartz veins and vein breccias had been located on the property that showed values of 0.25, 0.130, 0.186, and 0.086 opt. Silicification dropped off at 200 to 250 feet in most of the drill holes, but continued downward in the feeder breccias and veins (Ican Minerals, 1988).

The company drilled four holes in 1990, including two 700-foot-deep holes to test for a feeder at depth. The main zone in the deposit was 250 feet deep and contained 40 million tons of 0.025 opt gold.

Amex Exploration leased the Idaho Almaden from Ican in 1991. The mine had reserves of 30 million tons of 0.03 opt gold, but the gold was encapsulated in silica. To process it, the ore would have to be milled, adding significantly to the cost of the operation. Amex did surface mapping and sampling during the summer and drilled three core holes. The company also obtained permits to drill eight holes on BLM ground in January 1992. This sparked a miniature staking rush along the ridges going west from the Idaho Almaden to the Snake River.

In 1992, Amex drilled five or six core and reverse circulation holes, totaling 21,000 feet, at the mine and conducted a feasibility study on processing methods. The only work
Figure 20. Site of the Idaho Almaden mercury plant in 1986. All other equipment has been removed from the site (photograph by Earl H. Bennett, Idaho Geological Survey).
Figure 21. Main pit at the Idaho Almaden Mine in 1986. The two drill rigs over the hill on the left side of the picture are part of Ican/Canu’s exploration program (photograph by Earl H. Bennett, Idaho Geological Survey).
Figure 22. Proposed plan for Ican Minerals' Almaden project (Ican Minerals Ltd. 1988 Annual Report to the Shareholders, Figure 1).
Figure 23. Plan view of Ican Minerals' Almaden project, showing faults, alteration zone, and selected sample locations (Ican Minerals Ltd. 1988 Annual Report to the Shareholders, Figure 2, p. 4).
Figure 24. Trench samples, resistivity pseudosection, and interpretive cross section of Ican Minerals' Almaden project. Section lines are shown on Figure 23 (Ican Minerals Ltd. 1988 Annual Report to the Shareholders, Figure 2, p. 5).
Amax did during 1993 year was metallurgical modeling and new reserve calculations. The company also evaluated the environmental risks created by mercury in the rock and waste of former mining operations. This is a matter of concern, since mercury is one of the hazardous chemicals targeted for cleanup under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980. It is also subject to a number of Environmental Protection Agency regulations on the amount of mercury that can be released into the environment. During the year, Amax merged with Cyprus Minerals and, like many other mining companies, was moving its efforts overseas.

Between 1939 and 1962, the Idaho Almaden Mine produced approximately 22,596 flasks of mercury from a minimum of 506,615 tons of ore (Table 3). A reasonable estimate for tonnage produced is closer to 861,000 tons, obtained by extrapolating tonnage for the years when no numbers were reported. In addition, the mine produced 73,100 tons of pozzolan between 1966 and 1969. These figures are inexact due to inconsistencies in how the data were reported in the available literature.
### Table 3. Production from the Idaho Almaden Mine (compiled from best available sources).

<table>
<thead>
<tr>
<th>Year</th>
<th>Ore (tons)</th>
<th>Mercury (lbs)</th>
<th>Ore Grade (pounds/ton)</th>
<th>Reference</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1939</td>
<td>8,457</td>
<td>1,040</td>
<td>9.36</td>
<td>Ross, 1956.</td>
<td>from USBM records.</td>
</tr>
<tr>
<td>1940</td>
<td>14,491</td>
<td>1,097</td>
<td>5.75</td>
<td>Ross, 1956.</td>
<td>from USBM records.</td>
</tr>
<tr>
<td>1941</td>
<td>15,748</td>
<td>991</td>
<td>4.78</td>
<td>Ross, 1956.</td>
<td>from USBM records.</td>
</tr>
<tr>
<td>1942</td>
<td>14,134</td>
<td>830</td>
<td>4.45</td>
<td>Ross, 1956.</td>
<td>from USBM records.</td>
</tr>
<tr>
<td>1957</td>
<td>57,836</td>
<td>2,177</td>
<td>1</td>
<td>USBM Yearbook.</td>
<td></td>
</tr>
<tr>
<td>1958</td>
<td>56,000+</td>
<td>2,114</td>
<td>0.173%</td>
<td>USBM Yearbook.</td>
<td>mercury given as a percentage rather than pounds per ton.</td>
</tr>
<tr>
<td>1959</td>
<td>55,230+</td>
<td>1,736</td>
<td>0.158%</td>
<td>USBM Yearbook.</td>
<td>mercury given as a percentage rather than pounds per ton.</td>
</tr>
<tr>
<td>1960</td>
<td>55,000+</td>
<td>1,504+</td>
<td>2.1</td>
<td>USBM Yearbook.</td>
<td></td>
</tr>
<tr>
<td>1961</td>
<td>53,000+</td>
<td>1,073</td>
<td>1</td>
<td>USBM Yearbook.</td>
<td></td>
</tr>
<tr>
<td>1965</td>
<td>6</td>
<td>1,059</td>
<td>1.9-2.2</td>
<td>USBM Yearbook.</td>
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<tr>
<td>1966</td>
<td>58,550</td>
<td>1,133</td>
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<td>1967</td>
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<td>1968</td>
<td>64,073</td>
<td>1,042</td>
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<td>Total</td>
<td>506,615+</td>
<td>22,596.34</td>
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</table>

1 Grade of ore not given.
2 Amount of ore furnace during the year; 54,989 tons of ore was mined.
3 Average grade for all mercury ores produced in the state was 2.6 pounds per ton; no separate grade given for Idaho Almaden ores.
4 Amount estimated. Production was 11 percent less than previous year.
5 Average grade for all mercury ores produced in the state; no separate grade given for Idaho Almaden ores.
6 Amount of ore mined was not given.
7 Amount of mercury produced not given; estimated on the basis of a 21 percent reduction over the previous year.
8 If the tonnages produced are extrapolated to include the years for which there is no data, tonnage of ore mined is probably closer to 860,000 tons.
REFERENCES


Argall, G.R., Jr., Rare Metals makes history with . . . : Mining World, v. 17, no. 13, p. 56-60.


Idaho Geological Survey mineral property files (includes copies of company reports to the Idaho Inspector of Mines).


