Nevada Bureau of Mines and Geology

Special Publication MI-2020

Metals

Industrial Minerals

Oil and Gas

Geothermal

THE NEVADA MINERAL INDUSTRY 2020

Exploration

Development

Mining

Processing

University of Nevada, Reno

Starting in 1979, NBMG has issued annual reports that describe the mineral (precious and base metals and industrial minerals including aggregate), oil and gas, and geothermal activities and accomplishments. This report describes those accomplishments in Nevada for 2019, which includes production, reserve, and resource statistics; exploration and development including drilling for petroleum and geothermal resources, discoveries of orebodies, new mines opened, and expansion and other activities of existing mines; and a directory of mines and mills.

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The Nevada Mineral Industry 2020

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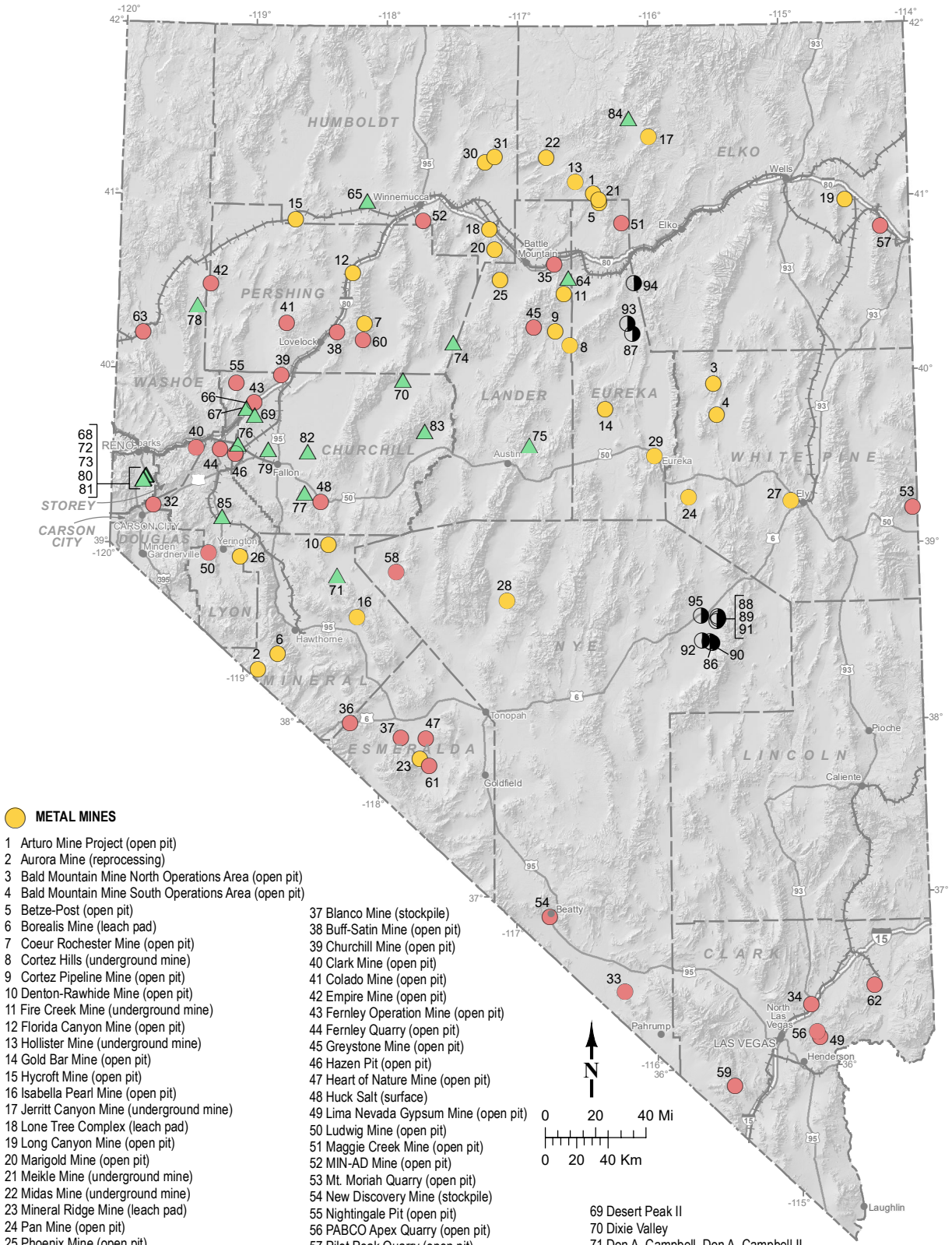

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Major mines, oil fields, and geothermal areas, 2020.

OVERVIEW

by John L. Muntean

This report highlights activities in 2020 in the exploration and production for metals, industrial minerals, geothermal energy, and petroleum. The value of overall mineral and energy production in Nevada in 2020 was $8.043 billion, a 1.75% decrease from 2019 (table 1, fig. 1). Nevada led the nation in the production of gold ($6.784 billion) and barite ($24.1 million). It was also the only state that produced lithium ($28.54 million), magnesite ($8.58 million), and the specialty clays, sepiolite and saponite ($10.92 million). Other commodities mined and produced in Nevada in 2019, in order of value, included copper ($428 million), geothermal energy ($311 million), aggregate (sand, gravel, and crushed stone) ($196.4 million), silver ($127 million), diatomite ($50.86 million), limestone and dolomite (mainly for cement, $38.1 million), gypsum ($41.4 million), silica ($14.3 million), and petroleum ($8.8 million). Locations of many of the sites mentioned in the text of this report are shown on NBMG Open-File Report 2021-01, *Nevada Active Mines and Energy Producers,* which is available at https://pubs.nbmg.unr.edu/NV-active-mines-and-energy-2021-p/of2021-01.htm.

For the fifth year in a row, Nevada led the United States in terms of value of overall nonfuel (excluding oil, gas, coal, uranium, and geothermal) mineral production in 2020. The U.S. Geological Survey estimates the value of Nevada's non-fuel production to be $8.043 billion, accounting for 11.1% of the total value of non-fuel production value in 2020 (U.S. Geological Survey, Mineral Commodity Summaries 2020, http://minerals.usgs.gov/minerals/pubs/mcs/2019/mcs2019.pdf). Arizona was second, given it is the state that produces the most copper. Texas was third, mainly due to its demand for aggregate and cement; California was fourth due to aggregate, diatomite, and borates; and Minnesota was fifth due mainly to production of iron ore. The contributions that mining makes to the economies of Nevada and the U.S. are significant in terms of jobs, commerce, taxes, improvements to the infrastructure, and lowering of the U.S. trade deficit.

Gold production in Nevada in 2020 was just over 4.63 million ounces (144 metric tons or mt), a 4.84% decrease from 2019. Fortunately, the average gold price rose to $1,895/oz in 2020, a 24.4% increase from 2019 (fig. 2), which limited the decrease in the value of gold production to 4% decrease. Gold accounted for 84.3% in the value of Nevada's mineral and energy production, essentially the same as in 2019. Despite the decrease in Nevada gold production, Nevada accounted for 72% of total U.S. gold production in 2020, which is essentially the same percentage as in 2019. Nevada alone accounted for 4.1% of the world's gold production in 2020, which was approximately 112 million ounces (3,200 mt). Only the nations of China, Australia, Russia, and Canada, produced more gold than the state of Nevada.

The section on **Metals** and the accompanying tables in **Major Precious-Metal Deposits** and **Other Metallic Deposits** provide details on exploration, new deposit discoveries, new mine openings, mine closures, additions to reserves, and mine expansions. As has been the case for many years, gold continues to be the leading commodity produced in Nevada. Production of gold in 2020 came mainly from 12 major mining operations that each produced greater than 100,000 ounces (3 mt). The share of Nevada's gold production from the Carlin trend increased from 29% in 2019 to 36% in 2020.

The World Gold Council and U.S. Geological Survey estimate that total world gold production, since the beginning of civilization, has been approximately 6.352 billion ounces (197,576 mt). Nevada and the U.S. have produced a significant portion of the world's gold. Cumulative U.S. production, primarily since 1835, is approximately 622 million ounces (19,346 mt), which is 9.8% of total world production, and Nevada's total production of 248 million ounces (7,713 mt) accounts for 39.8% of total U.S. production and approximately 4% of total world production. Remarkably, 89% of Nevada's gold production has been produced since the Carlin Mine began production in 1965. By the end of 2020, cumulative production from the Carlin trend was 93.4 million ounces (2,877 mt), assuring its place as one of the most productive gold-mining districts in the world.

Nevada continues to be in the midst of the biggest gold boom in U.S. history, as the graph of historical U.S. gold production illustrates (fig. 3). The recent surge in production in the U.S. is largely the result of discoveries of Carlin-type gold deposits and other deposits in which gold occurs primarily in grains that are too small to be visible to the naked eye. These deposits are mostly in Nevada. The U.S. production so far in the current boom, the period since 1981, has been 301 million ounces (9,210 mt). This is significantly greater than the total U.S. production during several past eras, including 1) the California gold rush (1849 to 1859, with 29 million ounces or 900 mt), although some estimates of unreported production may bring that figure up to 70 million ounces (2,200 mt); 2) the Comstock (Nevada) era from 1860 to 1875 with 34 million ounces (1,060 mt); and 3) the period from 1897 to 1920, when Goldfield (Nevada), the Black Hills (South Dakota), Cripple Creek (Colorado), and byproduct gold production from copper mines in Arizona and Utah contributed to cumulative production of 95 million ounces (3,000 mt). Gold production in the United States in the last decade from 2010 through 2019 alone was 71.7 million ounces (2,230 mt). The current boom is larger than previous booms not

only in terms of cumulative production but also in terms of peak annual production and duration. The current boom has lasted at least 42 years versus no more than 24 years for any of the earlier booms.

Table 1. Quantity and Value of Mineral, Geothermal Power, and Petroleum Production in Nevada.

	2020		2019 (revised)		% Change 2019 to 2020	
Commodity	**Quantity**	**Gross Value**	**Quantity**	**Gross Value**	**Quantity**	**Gross Value**
Gold	4,632,690 oz	$6,784,292,287	4,868,086 oz	$6,899,303,927	-4.84%	-1.67%
Copper	154,264,931 lbs	$428,181,067	144,655,766 lbs	$390,912,846	0.07%	9.53%
Silver	6,127,438 oz	$126,969,515	6,282,466 oz	$101,901,599	-0.02%	24.60%
Molybdenum	426,538 lbs	$3,900,000	766,699 lbs	$9,041,968	-0.44%	-56.87%
Aggregate	27,200,000 tons	$196,400,000	39,360,000 tons	$310,000,000	-30.89%	-36.64%
Geothermal	3,922,209 MWh net	$313,310,016	3,885,318 MWh net	$311,010,016	0.95%	-2.40%
Barite	365,585 tons	$24,120,310	429,882 tons	$46,331,297	-0.15%	-47.94%
Petroleum	220,292 barrels	$8,792,325	266,872 barrels	$14,035,529	-17.45	-37.36%
Gypsum	2,416,743 tons	$41,371,950	2,289,351 tons	$28,805,299	0.06%	43.63%
Lithium	6,665,061 lbs	$28,540,089	12,908,794 lbs	$37,014,458	-48.37%	-22.89%
Diatomite	258,922 tons	$50,859,212	429,882 tons	$47,466,527	-39.77%	7.15%
Dolomite	321,000 tons	$4,346,029	320,495 tons	$4,537,427	0.16%	-4.22%
Magnesium compounds	461,947 tons	$8,584,903	324,723 tons	$6,494,420	42.26%	32.19%
Perlite	2,751 tons	$688,199	2,213 tons	$692,241	24.31%	-0.58%
Specialty clays	312,959 tons	$10,924,652	120,536 tons	$13,845,609	159.64%	-21.10%
Salt	18,000 tons	$511,428	24,532 tons	$834,094	-26.63%	-38.68%
Silica sand	1,529,116 tons	$14,329,690	617,553 tons	$19,662,602	147.61%	-27.12%
Total value ($)		$8,046,121,672		$8,241,889,859		

Notes:

$ Values as reported from Department of Taxation to the Nevada Division of Minerals in 2020 and 2019, except for the six commodities listed below.

1. Gold=2020 average of $1895.00/oz and an average price of $1392.60/oz in 2019 (source: Kitco, https://www.kitco.com/).
2. Silver=2020 average price of $20.72/oz and an average price $16.22/oz in 2019 (source: Kitco, https://www.kitco.com/).
3. Copper= average price of $2.80/lb in 2020 and an average price of $2.72/lb in 2019 (source: USGS 2019 and 2020 Mineral Commodity Reports, estimated).
4. Molybdenite=average price of $8.67/lb in 2020 and an average price of $11.80/lb in 2019 (source: USGS 2019 and 2020 Mineral Commodity Reports, estimated).
5. Aggregates=Source: 2020 USGS Mineral Industry Survey.
6. Geothermal net revenue as reported from Department of Taxation to the Nevada Division of Minerals in 2020 and 2019.

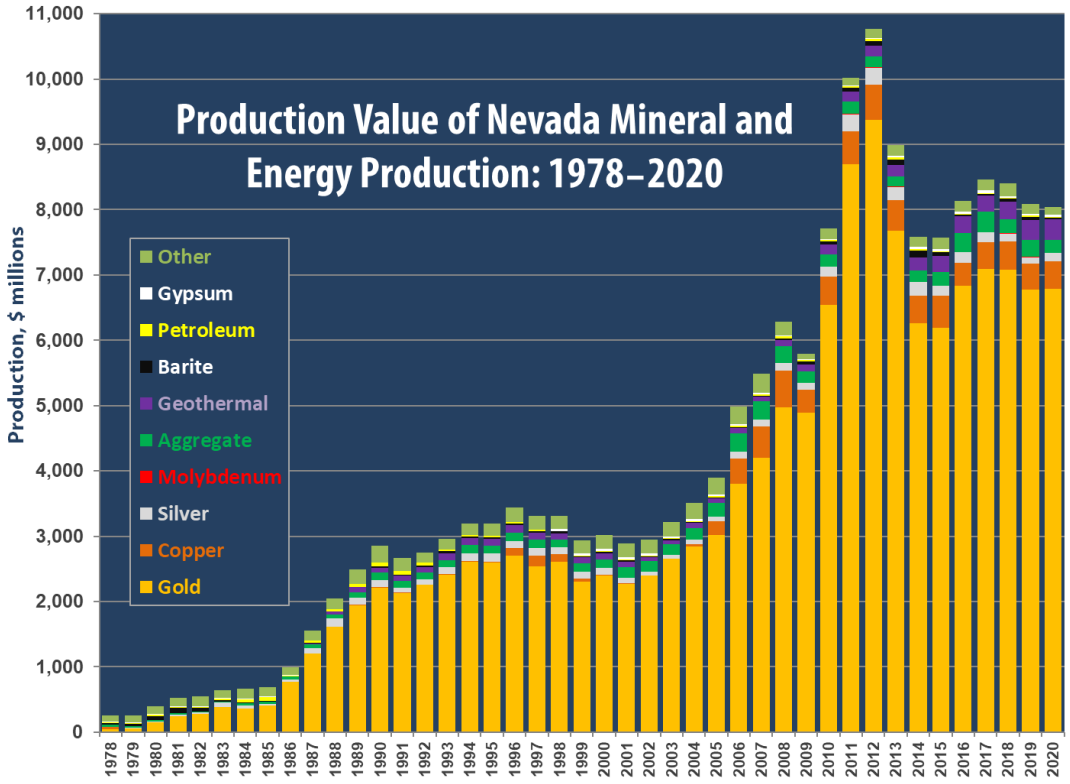


Figure 1. Chart showing relative values of Nevada production of gold, copper, silver, molybdenum, aggregate, geothermal energy, barite, petroleum, gypsum and other minerals from 1978 to 2020. Molybdenum production is only shown for 2011 to 2020.

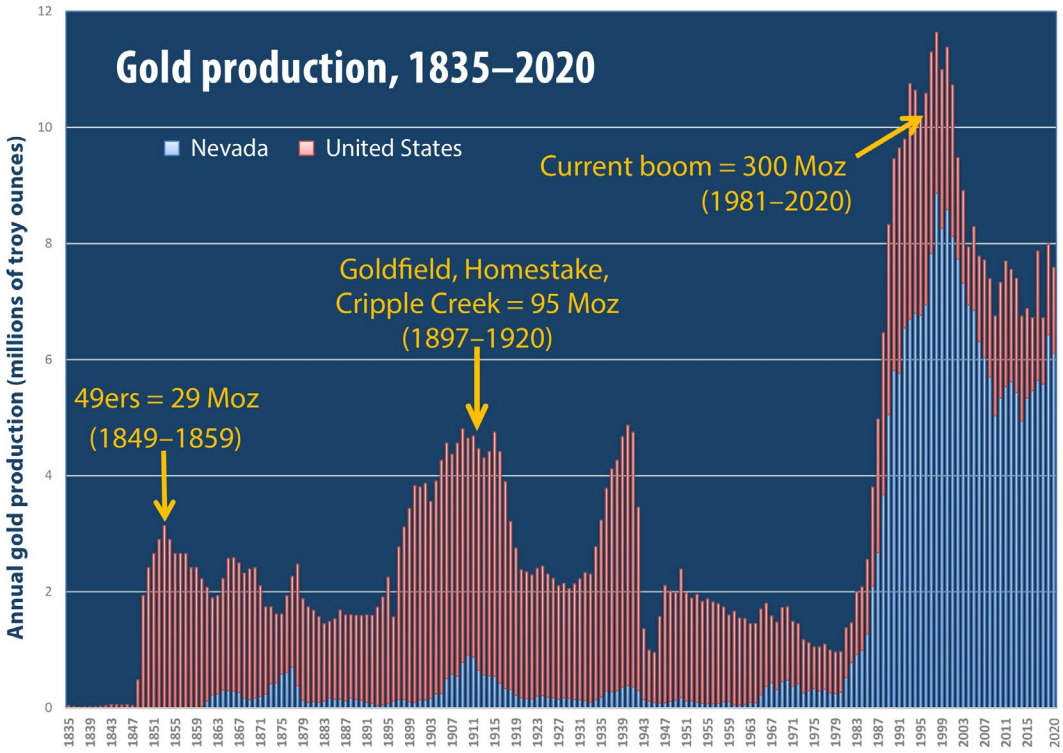


Figure 2. Chart comparing U.S. and Nevada gold production from 1835 to 2020.

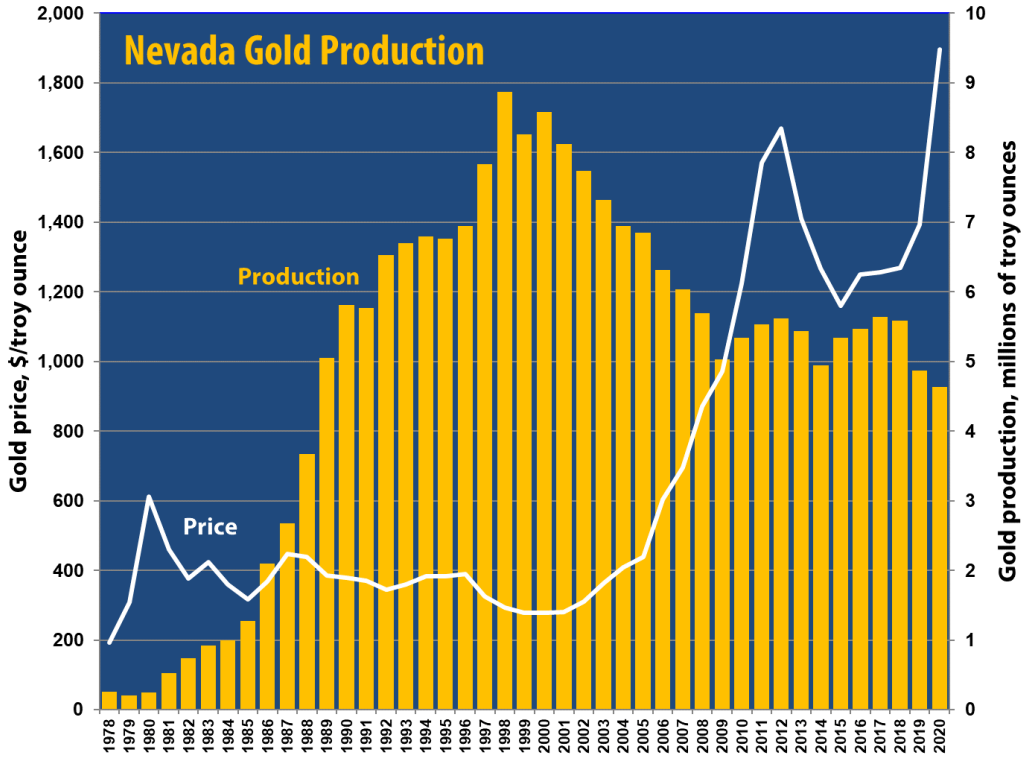


Figure 3. Chart showing Nevada gold production compared to the price of gold from 1978 to 2020.

Barrick Gold Corp. and Newmont Mining Corp. have accounted for the vast majority of Nevada gold production for the last 42 years, particularly from mines on the Carlin trend in northeastern Nevada. The new joint-venture company, which was named Nevada Gold Mines LLC, includes most of their assets in northeastern Nevada, including deposits on the Carlin trend, in the Cortez and Getchell districts, and the Long Canyon and Phoenix deposits. In all, assets in northeastern Nevada include 10 underground and 12 open-pit mines, two autoclave facilities, two roasting facilities, four oxide mills, a flotation plant, and five heap leach facilities. Barrick controls 61.5% of the joint venture and is the operator of the joint venture, and Newmont controls the remaining 38.5% interest. Barrick retained 100% control of its undeveloped high-grade Fourmile deposit in the Cortez district, and Newmont retained 100% control of its undeveloped Fiberline resource located just east of the Twin Creeks Mine. 2021 will be the first year since 1964 that Newmont has not operated a mine in Nevada, which was the year before the original Carlin deposit was put into production.

Nevada Gold Mines produced 3,167,468 ounces (98.5 mt) of gold in 2020. Nevada Gold Mines and Barrick produced 784,521 ounces (24.4 mt) of gold from its underground and open-pit operations at Cortez, including the Cortez Hills open pit and underground mines and the Pipeline open-pit complex. Nevada Gold Mines, produced 860,404 ounces, (26.8 mt) on the Carlin trend that included multiple open pits and underground operations.

Other large gold operations include Kinross Gold Corp.'s Round Mountain mine, 313,454 ounces (9.75 mt) in Nye County, and the Twin Creeks Mine 249,662 ounces, (7.77 mt) and Turquoise Ridge 287,144 ounces, (8.93 mt), both in Humboldt County, by Nevada Gold Mines, Barrick, and Newmont.

Nevada silver production in 2020 totaled 6,127,426 ounces (190.58 mt), a 0.05% decrease from 2019 (fig. 4). About 40% of the silver production was a byproduct of gold and copper mining. With a ratio of value (average price of gold to average price of silver) of 91:1 in 2020, only those deposits with more than 91 times as much silver as gold can be truly considered primary silver deposits. Only one such mine operated in Nevada in 2019, the Coeur Mining Inc.'s Rochester Mine in Pershing County, which had a silver-to-gold production ratio of 90:1 and total silver production of 3,174,529 million ounces (98.74 mt) in 2020. It produced 52% of Nevada's silver in 2020. Nevada silver production in 2019 accounted for 19.6% of the total U.S. production of 32,150,000 million ounces (1,000 mt).

Nevada copper production in 2018 was dominated by the Robinson copper-gold-molybdenum mine, operated by KGHM International Ltd. near Ely in White Pine County. It produced 109.6 million pounds (49,301 mt) of copper (fig 5). Copper was also produced at Newmont's Phoenix Mine near Battle Mountain in Lander County, where the value of 41.95 million pounds (19,032 mt) of produced copper was about 34.5% of the value of the mine's gold production. At Phoenix, copper is produced on site with a solvent

extraction-electrowinning (SX-EW) plant, as well as producing concentrates that are shipped to smelters outside Nevada, similar to KGHM's Robinson Mine. KGHM also produced 426,538 pounds (193.5 mt) of by-product molybdenum from Robinson, the only reported molybdenum production in Nevada in 2020.

Mineral exploration activity in 2020 is summarized in the chapters on **Metals and Industrial Minerals**. Most exploration focused on gold; however, companies also explored for lithium, copper, and silver.

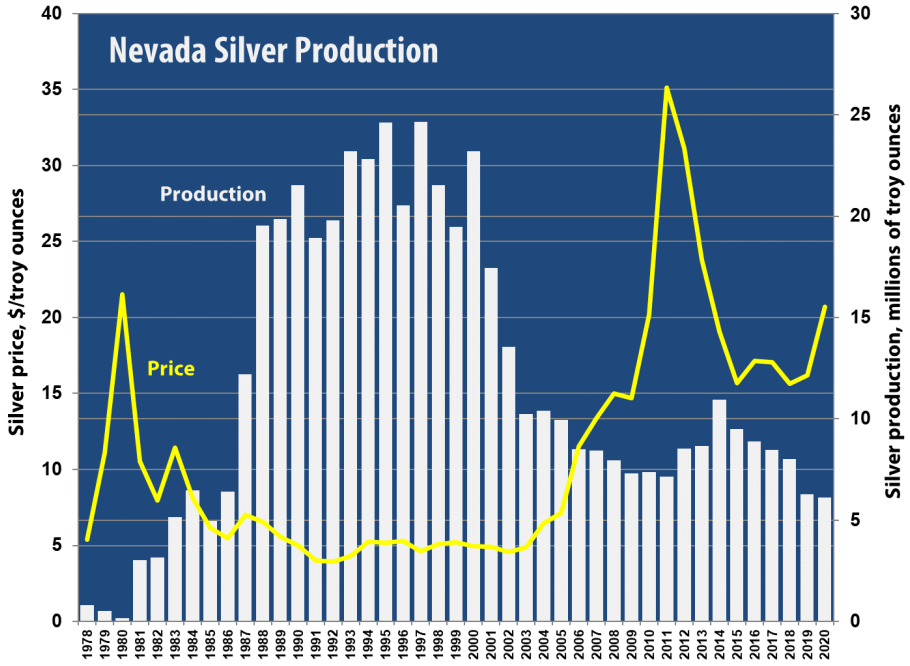


Figure 4. Chart showing Nevada silver production compared to the price of silver from 1978 to 2020.

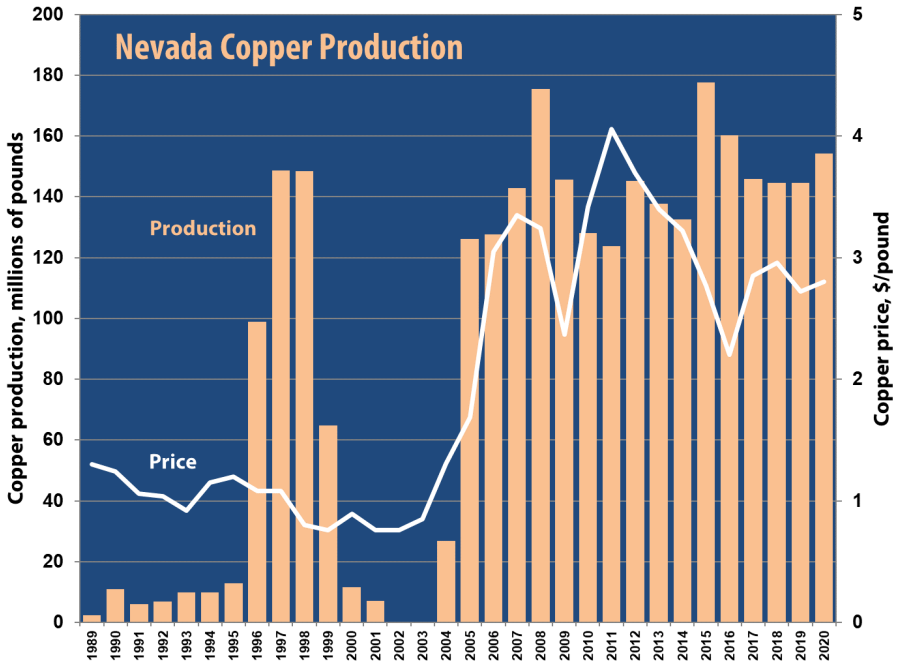


Figure 5. Chart showing Nevada copper production compared to the price of copper from 1989 to 2020.

S&P Global Market Intelligence's survey of 2,500 exploring companies in 2020 revealed that the global aggregate nonferrous budget decreased 11% from $9.8 billion in 2019 to $8.7 billion in 2020. Gold accounted for 52% or over $4.3 billion in US dollars of the total global exploration budget.

The number of drill projects for metals dropped from 98 projects in 2019 to 84 in 2020 (fig. 6). Advanced exploration projects show promise for major developments, particularly for gold along the Carlin and Battle Mountain-Eureka (Cortez) trends in Eureka, Elko, and Lander counties, such as Nevada Gold Mines' large Goldrush deposit and Barrick Gold's new high-grade Fourmile discovery near its Cortez mine. The Beatty area continued to draw a lot of attention in 2020. Corvus Gold continued to drill its Mother Lode and North Bullfrog projects, and Anglo Gold Ashanti drilled its Silicon project, though it was not a major drill program. Anglo Gold Ashanti has yet to release any results of its drilling at Silicon. Gold Standard Ventures Corp. continued to advance its Railroad-Pinion project near the town of Carlin. NuLegacy Gold continued to drill at its Red Hill project located just south of Barrick's Cortez property, drilling some of the highest grade intervals ever encountered at the Red Hill project.

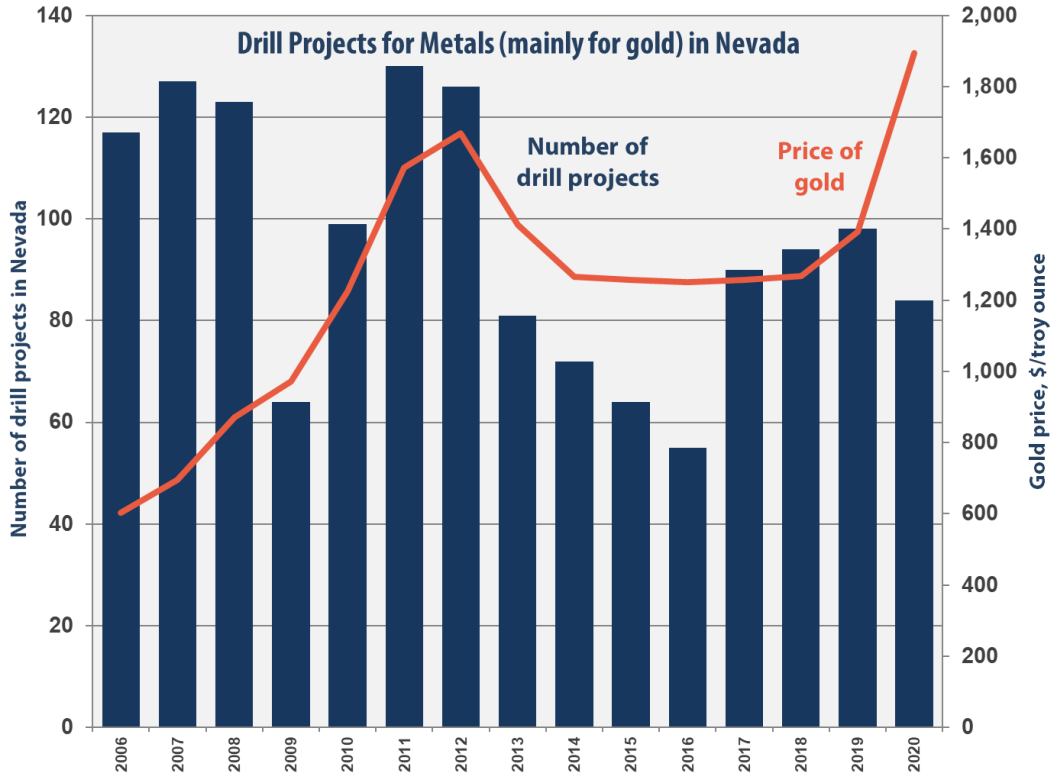


Figure 6. Chart showing number of drill projects targeting metals, mainly gold from 2006 to 2020. For comparison, the chart also shows the average annual price of gold during that period. The number of drill projects shown is a minimum, given that mining companies and privately held companies are not required to report whether they drilled.

The section on **Industrial Minerals** covers developments during 2020 and provides details about important commodities produced from or processed in Nevada, including aggregate, barite, cement, clays, diatomite, dimension stone, dolomite, gypsum, lime, limestone, lithium, magnesium, perlite, potassium alum (kalinite), pozzolan, salt, semiprecious gemstones (opal), silica, and zeolites. Demand for raw materials for construction will likely grow in the future because of Nevada's increasing population and its need for additional highways and housing. Nevada's estimated population in 2020 was 3.104 million a 0.45% increase from 2019 (www.census.gov). Albemarle Corp.'s Silver Peak operation in Clayton Valley in Esmeralda County, where subsurface brines are evaporated on a playa, is the only producer of lithium in the United States. Most exploration projects for industrial minerals in Nevada were focused on lithium, both in brines and in clay deposits. Most of this exploration was in southwestern Nevada, mainly in Clayton Valley and other nearby playas. Companies that conducted exploration drilling in 2019 included Cypress Development Corp., Enertopia Corp., and Ioneer Ltd.

Lithium Americas Corp. continued to move forward in the development of its lithium-rich clay resource at Thacker Pass in the moat sediments of the McDermitt caldera in northern Nevada, near the border with Oregon.

Ioneer Ltd. moved forward on its Rhyolite Ridge lithium-rich clay deposit, located 16 miles (25 km) west of Albemarle's Clayton Valley lithium in brine operation. The deposit also includes significant borate-bearing beds. Boron is expected to contribute 30–50% of the revenue.

One of the reasons for the lithium rush in Nevada is Tesla Motors, Inc., along with its partner Panasonic, Gigafactory 1 at Patrick in Storey County. Construction began in June 2014. As of May 2019, the Gigafactory had achieved a theoretical capacity of 35 gigawatt-hours per year, but utilization levels have resulted in a 24 gigawatt-hour output, according to Panasonic President Kazuhiro Tsuga.

Nevada was once again the leading domestic producer of barite, of which 95% is used for drilling muds in oil wells. Production decreased 0.15% in 2020 (table 1, fig. 8). The barite price is directly tied to the price of oil and gas. Nevada was also a leader in the production of several other industrial minerals. Nevada production of diatomite, which is mainly used in filtration, was second only to California in the U.S. Nevada ranked third in the list of six states that produce 67% of the country's crude gypsum. Premier Magnesia's Gabbs Mine in Nye County is currently the nation's only hard-rock producer of magnesite.

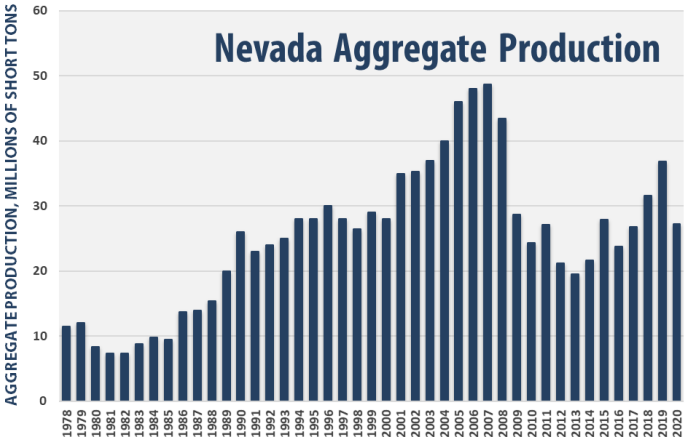


Figure 7. Chart showing Nevada aggregate production from 1978 to 2020.

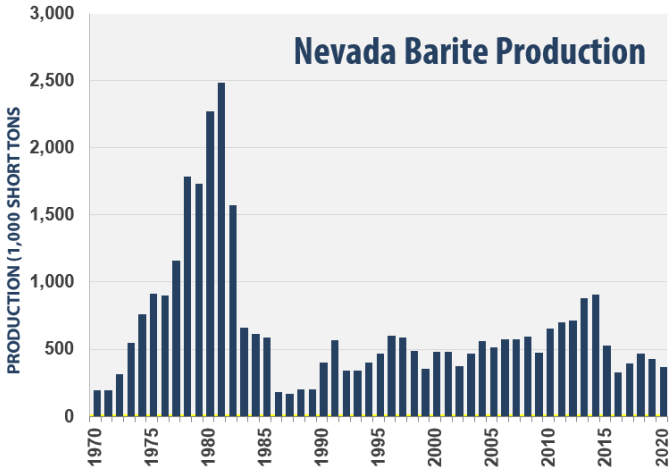


Figure 8. Chart showing Nevada barite production from 1970 to 2020.

The section on **Geothermal Energy** covers updates on exploration, development, and production of geothermal energy in the state in 2020. The total installed geothermal energy capacity in Nevada grew to 786 MWe (megawatts electric) in 2020, representing an 18 MWe increase from 2019. This increase was associated with the repowering of the Steamboat Hills power plant in which the original flash plant was replaced by an Ormat Energy Converter (OEC) binary plant. The total geothermal power generation in Nevada in 2020 was 5,109,775 megawatt-hours (MWh) gross and 3,922,209 MWh net, representing an insignificant increase (~1%) from generation in 2019. Data obtained from the Nevada Department of Taxation indicate that the total gross 2020 proceeds from geothermal operators in Nevada (including the direct-use projects) were $313,310,016 (approximately $2.3 million greater than in 2019). The reported adjusted gross proceeds for 2020 (taking into account the cost of operating and maintaining plants and transmission lines, depreciation of capital investments, amortization of each long-term Power Purchase Agreement (PPA), and other factors) were $143,118,572 (~$16 million increase from 2019). In 2020, the estimated price for geothermal electricity was 8.05 cents/kilowatt-hour (kWh) (calculated by dividing the total gross proceeds by the annual net electricity production)—almost identical to 2019 (8.06 cents/kWh).

In October 2020, the U.S. Bureau of Land Management (BLM) held a geothermal lease sale, with 18 parcels offered equating to 35,232 acres (14,258 ha). This acreage is less than 10% of what was offered in the 2019 geothermal lease sale, which was the largest sale for the BLM in 10 years. In addition to the competitive lease sale, a non-competitive lease sale was held the day after the competitive sale (and is hence known as the 'day after' sale), and two parcels received offers. Between the competitive and non-competitive lease sales, 26,686 acres (10,799 ha) were taken up for geothermal exploration in the state in 2020, which is approximately 16% of the acreage leased in 2019.

Areas of interest for parcels leased in 2020 include:

- The geothermal system adjacent to Gerlach (Ormat Nevada Inc.)
- An area in the Singatze Range, approximately 12 miles (20 km) south of Yerington (Ormat Nevada Inc.)
- Parcels adjacent to the Salt Wells geothermal plant (Western States Environment and Resources LLC; Myint Myint Swe);
- Desert Valley, west of the Blue Mountain geothermal plant (Copland Clean Power LLC);
- Northern Dixie Valley, west of the Sou Hills geothermal prospect (Baseload Power US Holdings Inc.);
- The Alum geothermal prospect, north of Silver Peak and Clayton Valley (Baseload Power US Holdings Inc.; Atlas Exploration and Production LLC); and
- Hot Pot Springs, approximately 6 miles (10 km) north of Valmy (Eavor Inc.).

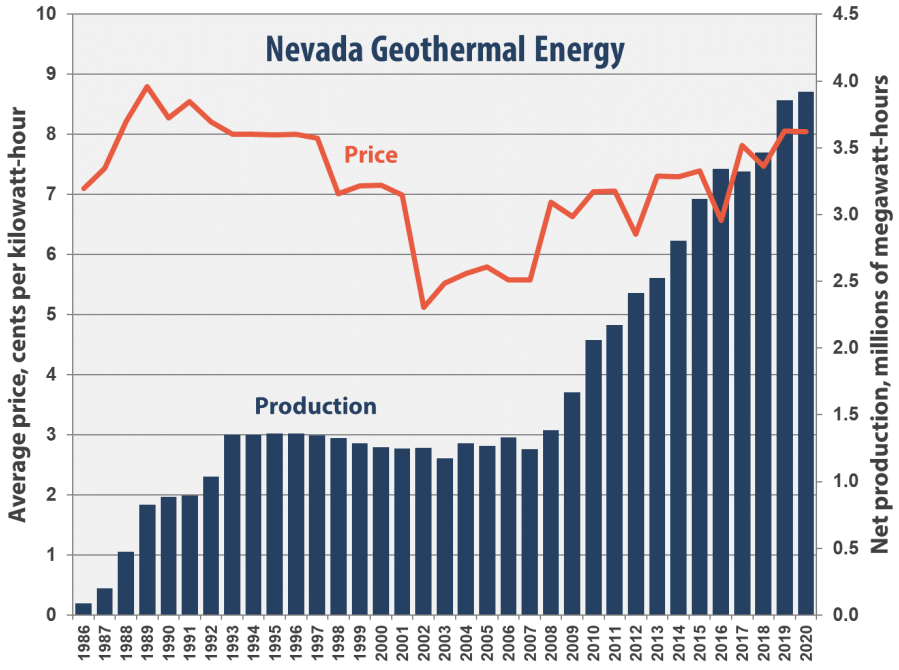


Figure 9. Chart showing net geothermal production in megawatt-hours in comparison to the average price of geothermal power in cents per kilowatt-hour for the period from 1986 to 2020. Note that the average price is based on the total MWh produced and total receipts. Actual price for any individual power plant may vary and is held confidential by the state Energy Office.

The section on **Petroleum**, covers updates on exploration, development, and production of oil and gas in Nevada in 2020. According to the Nevada Division of Minerals, Nevada's net oil production was 222,292 barrels in 2020, a decrease of 0.5% from 2019. Nevada's production accounted for 0.00008% of total domestic production in 2020. Production came from 66 actively producing wells from ten fields in Railroad Valley in Nye County and in three fields in Pine Valley in Eureka County. The sales volume (or gross proceeds) decreased 37% to $8,792,325.87 from $14,035,529.62 in 2019 (2020-2021 Net Proceeds of Minerals Bulletin).

The average price of domestic oil decreased 31% to $39.16 per barrel from an average of $57 per barrel in 2019. On a monthly basis, however, the average price per barrel started the year at $57.52, declined rapidly to $16.55 in April, and then rose erratically afterwards to end the year at $47.02 (Cushing, Oklahoma, West Texas Intermediate Spot Price).

Local economies benefit from mining in Nevada. Construction of new homes, hotels, casinos, other businesses, schools, and roads require local sources of sand, gravel, crushed stone, gypsum, and raw materials for cement, all of which are abundant in Nevada. According to the Nevada Department of Employment, Training, and Rehabilitation, the Nevada mining and natural resources industry employed an average of 12,708 employees in 2020. The average pay for mineral industry employees during this time was $1,984 per week.

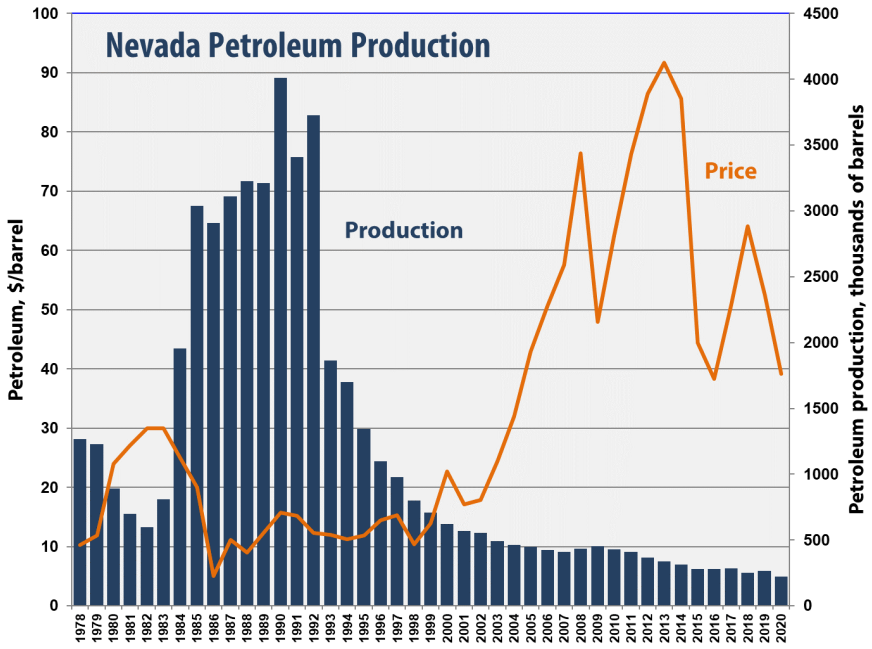


Figure 10. Chart showing Nevada petroleum production from 1978 to 2020.

Additional information about the Nevada mineral industry and the U.S. gold industry, including the contents of selected publications, is readily available online through the Nevada Bureau of Mines and Geology (www.nbmg.unr.edu/) and the Nevada Division of Minerals (http://minerals.state.nv.us/). Useful national and international data on nonfuel minerals can be obtained from the U.S. Geological Survey (http://minerals.usgs.gov/minerals/) and the U.S. Energy Information Administration (www.eia.doe.gov), which provide data on oil and gas, geothermal, solar, wind, hydroelectric, and other energy sources. The Nevada Bureau of Mines and Geology supports several interactive maps on the Web that are backed by periodically updated databases on mineral and energy resources as well as potential exploration activity, land ownership and restrictions, and other geographic information (https://data-nbmg.opendata.arcgis.com/).

CONVERSION FACTORS

1 metric ton = 1.1023113 short ton = 1,000 kilograms = 2,204.6226 pounds = 32,150.7 troy ounces.
31.1035 metric tons = 1 million troy ounces (31.1035 grams = 1 troy ounce).
453.592 grams = 1 pound (avoirdupois) = 16 ounces (avoirdupois) = 14.5833 troy ounces.
34.2857 grams per metric ton = 34.2857 parts per million by weight = 1 troy ounce per short ton.

METALS

by John L. Muntean

PRODUCTION

In 2020, Nevada produced 4,632,690 troy ounces (144,093 kg) of gold, 6,127,438 troy ounces (190,585 kg) of silver, 154,264,931 pounds (69,973 metric tons) of copper, and 426,538 pounds (193.5 metric tons) of molybdenum from 32 active mines, as well as minor production from residual leaching from two inactive mines and very small production from two placer operations. Table 1 shows the production of gold, silver, copper, and molybdenum in 2020 by the producing companies, and table 2 shows the production from each of the mines that were active in 2020. The data are what was reported to the Nevada Division of Minerals and/or what was reported in the companies' annual reports. Remaining mine reserves at the end of 2020 are shown in table 3. The average price of gold in 2020 was $1,895/oz, a 24.4% increase from 2019.

2020 was the first full year of production from the Nevada Gold Mines LLC, a joint venture officially launched in July of 2019 between Barrick Gold Corporation and Newmont-Goldcorp Corporation. Barrick is the operator and controls 61.5%, and Newmont-Goldcorp Corp. controls the remaining 38.5% of the joint venture. The Nevada Gold Mines joint venture, produced 2,642,590 ounces (74,916 kg) of gold, 2,836,197 ounces (2,836,197 kg) of silver and 41,957,856 lbs (19,032 metric tons) of copper. Nevada Gold Mines operated 11 active gold mines, which accounted for accounted for 75% of Nevada's gold production in 2020. The all-in sustaining cost for all of Nevada Gold Mines LLC's production in 2020 was $941/oz and the total cash cost was $702/oz.

Nevada Gold Mines' Carlin trend operations produced 1,665,040 ounces (51,787 kg) of gold, which accounted for 36% of Nevada' gold production. The all-in sustaining cost was $1,041 per ounce and the total cash cost was of $790 per ounce in 2020, compared to approximately 968,000 ounces of gold at total cash costs of $746 per ounce, and all-in sustaining costs of $984 per ounce in 2020. By the end of 2020, cumulative production from the Carlin trend was 94.2 million ounces (9.113 metric tons) since the original Carlin Mine went into production in 1965.

Nevada Gold Mines' production from the Cortez Mine, which includes the Pipeline open pit, the Cortez Hills open pit, and the Cortez Hills underground mine totaled 798,373 ounces (24,851 kg). The all-in sustaining cost for all production from Cortez was $998/oz, and the total cash cost was $678/oz.

Nevada Gold Mines' production from Turquoise Ridge totaled 537,000 oz, (16,702 kg). The all-in sustaining cost was $798/oz, and the total cash cost was $1,064/oz. Nevada Gold Mines' gold production from the Phoenix Mine amounted to 205,000 ounces (6,376 kg). The total cash cost was $649/oz and an all in sustaining cost was $814/oz. Lastly, Nevada Gold Mines' gold production from the Long Canyon Mine amounted to 261,000 ounces (8,118 kg). The total cash cost was $236/oz and the all in sustaining cost was $405/oz.

After Nevada Gold Mines, Nevada's largest gold producers were Kinross Gold Corp. (Round Mountain Mine), SSR Mining (Marigold Mine), and Jerritt Canyon Gold LLC (Jerritt Canyon Mine), all of which produced over 100,000 ounces (3,110 kg) of gold in 2020. The total proven and probable gold reserves at the end of 2020 for all the mines in Nevada that operated in 2020 were 54,787,543 ounces (1,704,083 kg), an increase of 3.2% from 2019.

In 2020, Coeur Mining was again the leading silver producer in Nevada at 3,174,529 ounces (292,994 kg), a 15% decrease from 2019. All of its production came from its low-grade open-pit Rochester Mine, the only primary silver mine in Nevada. Nevada Gold Mines's Phoenix Mine was the second largest producer, mining 1,169,367 ounces (36,371 kg) of silver in 2020. Kinross Gold's Round Mountain Mine was the third largest silver producer at 933,702 ounces (28,578 kg). Reported silver reserves from the seven mines that reported silver production at the end of 2020 totaled 221,096,841 ounces (6,876,880 kg), a 54% increase over reserves reported in 2019. The average price of silver in 2020 was $20.72/oz, a 27.9% increase from the average price in 2019.

KGHM International's Robinson Mine produced 79% of Nevada's copper. Production in 2020 amounted to 109,639,248 pounds (49,731 metric tons), a decrease of 3.1% from 2020. KGHM International also produced 766,699 pounds (348 metric tons) of molybdenum from Robinson in 2018, a 44.4% decrease from 2020.

Nevada Gold Mines LLC's Phoenix Mine and Nevada Copper's underground Pumpkin Hollow made up the balance of Nevada's copper production. The Phoenix Mine produced 30,585,072 pounds (13,873 metric tons), a 3.2% decrease from 2019. Proven and probable reserves of copper at the Phoenix Mine at the end of 2020 were 959,000,000 pounds of copper (449,964 metric tons), a 3.3% decrease from 2019. The Pumpkin Hollow Mine produced 2,667,827 pounds (1,210 metric tons) of copper. The proven and probable reserves at Pumpkin at the end of 2020 were 6,503,000 pounds of copper.

Table 1. 2020 Metallic Mine Production for Nevada by Operating Company

(Nevada Division of Minerals Annual Status and Companies Annual Reports)

Operator	Gold 2020 ounces (kg)	Silver 2020 ounces (kg)	Copper 2020 pounds (metric tons)	Molybdenite 2020 pounds (metric tons)
Nevada Gold Mines LLC (61.5% Barrick Gold, 38.5% Newmont Mining)	3,469,998 (107,929)	1,289,700 (40,114)	41,957,856 (1,210)	
Kinross Gold	503,950 (15,675)	998,257 (31,049)		
SSR Mining	234,443 (7,292)	3,329 (103.5)		
Jerritt Canyon Gold LLC	112,749 (3506)	0		
Coeur Rochester	27,147 (844)	3,174,529 (987,389)		
Florida Canyon Mining	46,866 (1,458)	27,490 (855)		
Fiore Gold	46,516 (144)	0		
KGHM International	38,801 (1,207)	199,382 (6,201)	109,639,248 (49,731.5)	426,538 (193.5)
Hecla Mining	31,800 (989)	37,400 (1,163)		
Gold Resource Corp.	28,542 (888)	26,961 (838.5)		
McEwen Mining	27,910 (868)	0		
Hycroft Mining	27,392 (852)	178,836 (5,562)		
Rawhide Mining	24,078 (749)	159,049 (4,947)		
America's Gold and Silver	5,072 (158)	14,330 (446)		
Ruby Hill Mining	3,252 (101)	5,152 (160)		
Mineral Ridge Gold	2,800 (87)	1,358 (42)		
Manhattan Gulch LLC (placer)	745 (23)	0		
Borealis Mining	310 (9.6)	896 (28)		
Nevada Copper	293 (9.11)	10,757 (334.5)	2,667,827 (1,210)	
Totals	4,632,664 (144,092)	10,760,090 (334,676)	11,234,903 (52.151.5)	426,538 (193.5)

EXPLORATION

Exploration activity in Nevada in 2020 appeared to maintain the pace set in 2019. The vast majority of exploration projects targeted gold. The increase of the average gold price to $1,769 per ounce in 2020 appears to have been the main cause.

Exploration activity, including new claims staked, were reported in most of Nevada's 17 counties. Based on an incomplete download from the Bureau of Land Management's LR2000 database, there were at least 152,000 active claims in 2020 (fig. 1). A minimum of 4,075 new claims were staked in 2020.

Table 5 shows the breakdown of the 2020 drill projects by size of company and drill program. Major to mid-tier companies drilled at least 42 projects in 2020, including Nevada Gold Mines, Kinross, Anglo Gold Ashanti, Newcrest, Coeur Mining Inc., KGHM, Silver Standard Resources, Hecla Mining, Premier Gold Mines, and Gold Resource Corp. The remaining 42 projects were drilled by at least 40 junior companies. Figure 2 shows the location of projects across the state that were drilled in 2020. Possibly, more than the 84 projects were drilled in 2019, especially small drill programs carried out by major or mid-tier companies and privately held companies. Large companies are not required to release much of their exploration results, because exploration commonly does not have a material impact on their businesses.[1]

At least 84 projects were drilled in 2020, compared to a minimum of 98 projects in 2019. The main exploration target in Nevada continued to be gold. Of the 84 projects that were known to have been drilled in 2020, gold was the main target for 75 of the projects. Only 9 drill projects targeted metals other than gold. Two projects targeted vanadium. Four projects focused on copper, including small programs at the Pumpkin Hollow project by Nevada Copper, by KGHM at its Robinson Mine, and by Nevada Gold Mines where it targeted copper and gold at its Phoenix Mine.

There was resurgence of silver exploration in 2020. Four drill projects targeted silver, including Coeur Mining at its Rochester Mine, Ridgeline minerals at its Selena project in White Pine County, and Silver One Resources, Inc. at its Candelaria project.

The most exciting silver projects, though, were in the rejuvenated Tonopah and Comstock districts. Blackrock Silver Corp. continued to discover high grade silver-gold veins at its Tonopah West project, and Summa Silver continued to have success on the east side of the Tonopah district.

Tonogold Resources started drilling on the Comstock with it first deep hole drilled at the south end in the Gold Hill area just south of Virginia City.

First Vanadium Corp. carried out a small drill program at its Carlin vanadium project near the town of Carlin, and Victory Metals carried out a small drill program at its Iron Point project just east of Winnemucca.

Exploration activity is summarized below by county and mining district. Projects that were drilled in 2020 are emphasized.

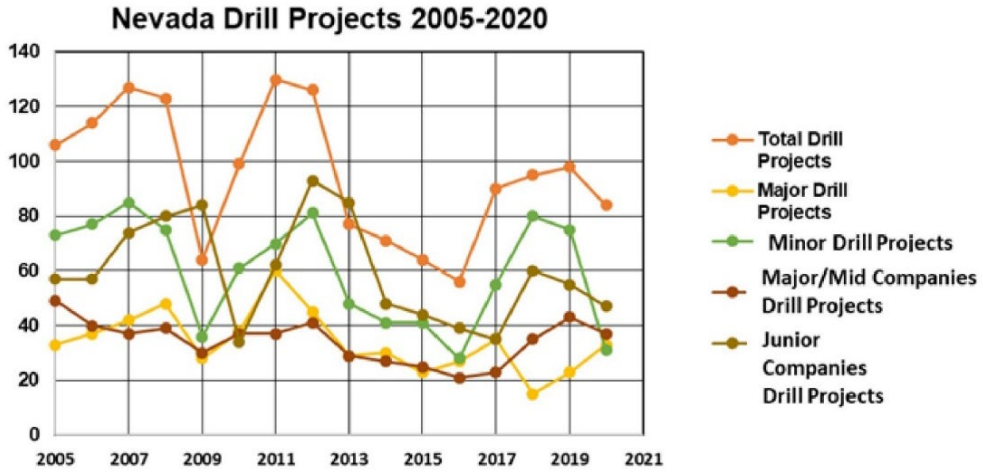


Figure 1. Number of drill projects in Nevada from 2005 to 2020.

[1]The classification of companies into major, mid-tier, or junior in this section of the report is arbitrarily based on gold production and market capitalization. The loose criteria are as follows: 1) major companies produce greater than 1 million ounces of gold worldwide, and have market capitalization of over capitalizations less than $3 billion but more than $500, 2) mid-tier companies produce between 50,000 and 1 million ounces of gold worldwide and/or have market capitalizations less than $500 million, 3) junior companies produce less than 50,000 ounces of gold and/or have market capitalizations less than $500 million.

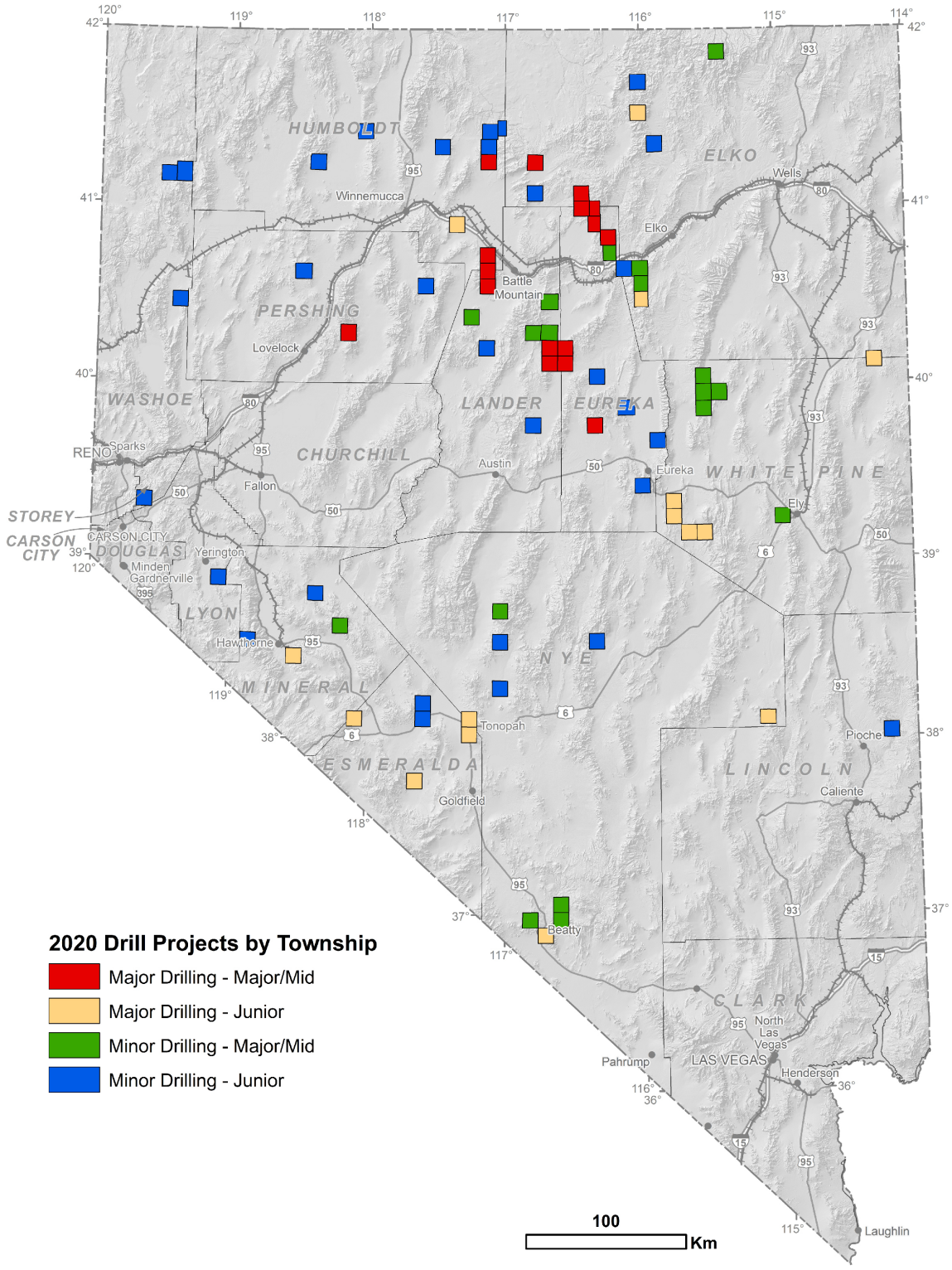


Figure 2. Map showing location of drill projects in 2020 by township.

Table 2. 2020 Metallic Mine Production for Nevada

(Data from Nevada Division of Minerals Annual Status Reports and Company Annual Reports)

Operator	Mine	Gold (2020) (ounces)	Gold (2019) (ounces)	Silver (2020) (ounces)	Silver (2019) (ounces)	Copper (2020) (pounds)	Copper (2019) (pounds)	Molybdenite (2020) pounds	Molybdenite (2019) pounds
Borealis Mining	Borealis	**310**	605	**896**	387				
Coeur Rochester	Rochester	**27,147**	35,401	**3,174,529**	3761060				
Fiore Gold	Pan	**46516**	40,499	**NR**	NR				
Florida Canyon Mining	Florida Canyon	**46866**	43,305	**27,490**	30877				
Americas Gold and Silver	Relief Canyon	**5072**	0	**14,330**	0				
Gold Resource Corp.	Isabella Pearl	**28542**	10,810	**26,961**	9574				
Hecla (Klondex)	Fire Creek	**31,800**	52,616	**37,400**	22998				
Hycroft Mining	Hycroft	**27,392**	8,916	**178,836**	63,279				
Jerritt Canyon Gold LLC	Jerritt Canyon	**117,985**	112,749	**NR**	NR				
KGHM International	Robinson	**38,801**	38,801	**199,382**	67,634	**109,639,248**	113,132,886	**426,538**	766,699
Kinross Gold	Bald Mountain	**190,496**	187,585	**64,555**	32,464				
Kinross Gold	Round Mountain	**313,454**	350,943	**933,702**	921,881				
Manhattan Gulch LLC	Manhattan Gulch	**745**	0	**0**	0				
McEwen Mining	Gold Bar	**27,910**	30,709	**0**	614				
Mineral Ridge Gold	Mineral Ridge	**2,800**	3,863	**1,358**	2,324				
Nevada Copper	Pumpkin Hollow	**293**	0	**10,757**	0	**2,667,827**	0		
Nevada Gold Mines	Arturo JV	**58,877**	21,029	**NR**	NR				
Nevada Gold Mines	Betze Post	**418,195**	493,546	**21,632**	18,781				
Nevada Gold Mines	Carlin Trend Operations	**860,404**	880,615	**9,875**	57,551				
Nevada Gold Mines	Cortez Hills/Pipeline open pits	**421,700**	543,335	**34,613**	35,754				
Nevada Gold Mines	Cortez Hills underground	**362,821**	400,389	**30,800**	26,056				
Nevada Gold Mines	Lone Tree Complex	**12,602**	17,483	**5,291**	NR				
Nevada Gold Mines	Long Canyon	**260,650**	189,965	**NR**	NR				
Nevada Gold Mines	Meikle	**350,336**	331,271	**18,122**	12,606				
Nevada Gold Mines	Phoenix	**187,607**	160,700	**1,169,367**	754,270	**41,957,856**	30,585,072		
Nevada Gold Mines	Turquoise Ridge	**287,144**	406,066	**NR**	56,817				
Nevada Gold Mines	Twin Creeks	**249,662**	237,644	**NR**	108,342				
Rawhide Mining	Denton-Rawhide	**24,078**	14,381	**159,049**	140,187				
Ruby Hill Mining	Ruby Hill	**3,252**	3,356	**5,152**	2,540				
SSR Mining	Marigold	**234,443**	220,227	**3,329**	4,223				
Totals		**4,637,900**	4,836,809	**6,127,426**	6,130,219	**154,957,856**	143,717,958	**426,538**	766,699
		-4.11%		**-0.05%**		**7.34%**		**-44.40%**	
		YOY Change		**YOY Change**		**YOY Change**		**YOY Change**	

Table 3. Nevada Mine Reserves (Proven and Probable) Reported for End of Year 2020

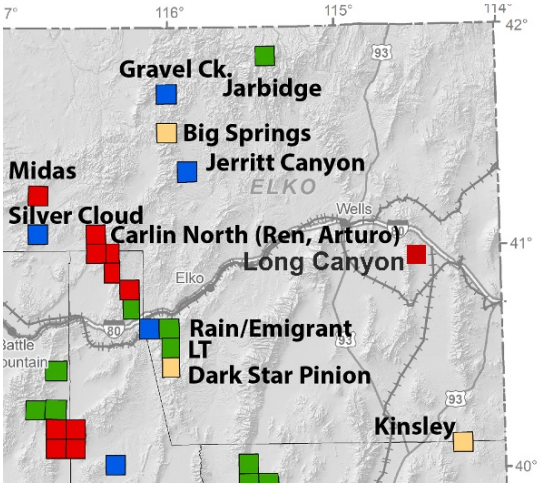
Company	Mine	Gold ounces	Silver ounces	Copper pounds
NV Gold Mines	Carlin Operations (Gold Strike/Arturo) (61.50%)	19,512,195		
NV Gold Mines	Phoenix (61.50%)	2,926,829	34,146,341	845,528,455
NV Gold Mines	Turquoise Ridge & Twin Creeks (61.50%)	12,520,325		
NV Gold Mines	Long Canyon (61.50)	357,724		
NV Gold Mines	Cortez & Goldrush (61.50%)	9,756,098		
Argonaut Gold	Florida Canyon	954,000		
Coeur	Rochester	1,219,000	185,508,000	
Kinross	Round Mountain	2,245,000	1,414,000	
Kinross	Bald Mountain	1,143,000		
SSR	Marigold	3,425,000		
Hecla	Fire Creek	30,600	28,500	
Hecla	Hollister			
KGHM	Robinson			959,000,000
GRC	Isabella Pearl	159,600	1,055,000	
McEwen	Gold Bar	843,000		
Nevada Copper	Pumpkin Hollow	1,170,000	36,035	6,503,000
Fiore Gold	Pan	290,500		
	Totals	**54,249,371**	**221,096,841**	**1,804,528,455**

*All numbers from 2020 annual reports or other regulatory financial filings. Turquoise Ridge now includes Twin Creeks. Carlin now includes Goldstrike and South Arturo.

Table 4. Breakdown of 2020 drill programs for metals in Nevada

2020 Drill Projects	Major/Mid-Tier Companies	Junior Companies	Total
Major Drill Program	17 (16)	16 (3)	33 (19)
Minor Drill Program	20 (26)	31 (53)	51 (82)
Total	37 (23)	47 (56)	84 (98)

For comparison, the number of drill programs in 2019 is shown in parentheses.
Major programs are arbitrarily defined as >25 drill holes.



ELKO COUNTY

Aura District

Gravel Creek. In May of 2020, Western Exploration LLC announced the signing of a Subscription Agreement with Agnico Eagle (USA) Ltd. Agnico Eaglewill provide up to nine million dollars of financing to advance the Gravel Creek project located 80 miles (129 km) north of Elko. This was the second private placement that Agnico has made into Western Exploration. The first placement of 7.1 million dollars was made in July of 2017. The 2020 exploration program commenced in June and focused on expanding Gravel Creek along strike to the northwest, down dip along the major controlling structure, as well as up dip along favorable host stratigraphy, toward the previously mined Wood Gulch open-pit mine. Western Exploration was planning for a total 32,800 ft (10,000 m) of core drilling and 16,400 ft (5,000 m) of reverse circulation drilling. No results of the 2020 drilling have been released. (Coral Reef Capital news release, 5/19/2020)

Bootstrap District

Arturo/South Arturo. Nevada Gold Mines LLC carried out a significant underground drill program on its Arturo and South Arturo deposits at the northeastern end of the Carlin trend. The project is a joint venture between I-80 Gold Corp. (formerly Premier Gold Mines) who has 40% Arturo/South Arturo and Nevada Gold Mines LLC, who has the remaining 60%. Work completed in 2020 included a successful expansion drill program at the high grade underground Nino mine located at South Arturo. The 12,467 ft (3,800 m) drill campaign, which was completed in 2020 from underground drilling stations, demonstrated the mine life could be extended. Numerous high grade intercepts included 60 ft (18.3 m) grading 0.86 opt (26.8) g/t gold, 130 ft (39.6 m) grading 0.55 opt (17.1 g/t) gold and 330 ft (100.6 m) grading 0.18 opt (5.73 g/t) gold.

More than 1,067 ft (3,500 m) of drilling were completed on the near surface portion of the planned Phase 1 open pit to increase confidence in the ore reserves and upgrade the mineral resources. The drilling returned higher than expected grade-thicknesses and Barrick has moved heap leach material from Phase 1 into its year-end 2020 mineral reserves. (I-80 Gold Corp. press release, 4/21/2021)

Carlin District

Rain and Emigrant. Nevada Gold Mines LLC carried out small drill programs at the inactive Rain and Emigrant mines in 2020. No results were released.

Carlin Vanadium/Gold. First Vanadium Corp. released a positive Preliminary Economic Assessment for its Carlin Vanadium Project located six miles (9.7 km) south of the town of Carlin. Highlights include 11 years of mining plus 5 years of stockpile feed, with 1 million tons annually of process plant feed at an average grade of 0.71% V_2O_5. Average process recovery rates are expected to be 78%, resulting in an annual average payable production of 11 million pounds of V_2O_5 flake. Total payable production is estimated to be 180 million pounds of V_2O_5 flake. The Life of Mine average cash operating cost per payable V_2O_5 pound is estimated to be $5.17/lb, with it averaging only $4.81/lb V_2O_5, over the first 10 years. Pre-production capital requirements are estimated to be $535 million. The pre-tax net present value (6%) is estimated to be $56 million, and the after Net Present Value (NPV) (6%) is estimated to be $29 million. The pre-tax payback period is estimated to be 7.5 years. Calculations were based on an assumed metal price of $10.65/lb. of V_2O_5.

The PEA is based on an indicated resource of 24.64 million tons grading 0.615% V_2O_5 with a cut-off grade of 0.3% and an inferred resource of 7.19 million tons containing 303 million pounds of V_2O_5 grading 0.520% V_2O_5 with a cut-off grade of 0.3%.

The Carlin Vanadium project contains one of the largest known primary vanadium resources in the United States. The deposit is considered to be syngenetic and is hosted in shale of the Devonian Woodruff Formation. It is stratigraphically controlled and typically follows the strike and dip of the host rock. The vanadium is in the form of metahewetite (CaV_6O_{16} $3(H_2O)$) and is finely and evenly disseminated in the deposit. The average estimated true thickness of the deposit is about 110 ft (33.5 m). The resource area has a 6,000-foot (1,830 m) north-south-trending strike length and a 2,000-foot (610 m) east-west width. The leased Cole Creek Property added another 660 ft (201 m) of strike length to the southern end of the deposit. Union Carbide drilled six holes on the Cole Creek Property in the 1960s, which showed this part of the deposit ranged between 35 ft (10.7 m) to 95 ft (28.9 m) and averaged 61 ft (18.5 m) in thickness with grades ranging from 0.37% to 0.82% V_2O_5 and averaging 0.57% V_2O_5. First Vanadium

commenced drilling the Cole Creek Property in 2020. The company acquired the historical data on this property and was able to extend the mineralization another 330 ft (100.5 m) southward along strike.

First Vanadium Corp. reported the metallurgical test results on nine samples. The vanadium extraction rates ranged between 92% and 98% for both oxidized and unoxidized mineralized material of low, average, and high vanadium grades. The company issued a NI 43-101 technical report with a new resource in early 2019 and was preparing another one as an economic assessment without updated resources to be issued in 2020.

The Carlin Vanadium project consists of 150 unpatented mineral claims covering 2,528 acres (1,023 ha) and 80 acres (32 ha) of fee land that comprises the Cole Creek Property located on the northwestern flank of the Piñon Range.

The Cole Creek property was acquired in January 2019 through a five-year Access and Mineral Lease Agreement. First Vanadium Corp. paid the lessor $50,000 upon signing, and pays another $20,000 annually for the lease of all minerals beneath the surface of the property to be replaced with a 5% net smelter return royalty upon commencement of any mining. First Vanadium Corp. is also required to spend $100,000 on the property within 36 months or pay the lessor any difference should there be a shortfall.

First Vanadium also continued its interest in the gold potential on their land holdings. The company has an option agreement on the original 72 mining claims covering 1,140 acres (385 ha) with Americas Gold Exploration, Inc., and Golden Predator US Holding Corp. to acquire full interest in the Carlin Vanadium Project, which also includes the Black Kettle gold prospect immediately southeast of the vanadium deposit. The agreement includes paying $2,020,000 cash and issuing 2,000,000 shares of common stock in installments over a four-year period plus conducting about $800,000 in exploration and other work commitments over six years. The remaining mining claims were staked by the company in early 2019.

First Vanadium drilled 7 holes targeting gold mineralization in the second half of 2020. The drilling outlined a Carlin-style gold system with dimensions of at least 1,640 ft (500 m) vertically and 4,593 ft (1.4 km) in length. Gold assays have not yet been released. In 2021 First Vanadium Corp. changed its name to Phenom Resources Corp. (Phenom Resources Corp. news releases, 5/11/2020, 12/22/2020; 5/11/2020; Phenom Resources Corp website, https://firstvanadium.com)

Gold Circle District

Midas. Hecla Mining had success in 2020 exploring around its Midas and Hollister epithermal vein deposits. In 2020, surface exploration efforts through the first three quarters of the year focused on target definition within the district through detailed mapping, sampling, alteration mineral spectroscopy, and CSAMT geophysical surveys. This early fieldwork defined 7 high-priority drill targets (Green Racer Sinter, SV1, North Block, Elko Prince, Southern Cross, Jackknife Ridge and G3) that were drill tested in the fourth quarter of 2020. All assay results from this drilling are expected in the first quarter of 2021. Assay results received to date show high-grade intersections from four of the seven targets drilled. In the fourth quarter of 2020, two core rigs focused on offsetting and expanding high-grade mineralization along strike and up and down dip at the Green Racer Sinter discovery. Detailed surface mapping identified geyserite, which is indicative of a true sinter. Sampling of the sinter showed local gold anomalies. In late 2020, Hecla began drilling the sinter and hit significant mineralization in multiple intercepts , including 3.26 opt (101. g/t) gold over 3.9 ft (1.2 m) estimated true thickness. Another intercept in sinter assayed 10.68 opt (332 g/t) gold and 37.6 opt (1,169.5 g/t) silver over one foot (0.3 m). The high grades occur in epithermal quartz-carbonate veins, similar to ones previously mined at Midas. (Hecla Mining Corp. website, www.hecla-mining.com, Hecla Mining press release, 5/18/2021)

Independence Mountains

Big Springs. The 2020 exploration program at Big Springs was designed to form the foundation for the next 18 to 24 months. This foundation is targeted at allowing aggressive growth in the current Big Springs resource base over this period.

The 2020 program was comprehensive. It included gravity and magnetic surveys over the entire Big Springs land package, hyperspectral imaging, field mapping and a 10-hole 3,785 ft (1,154 m) diamond drilling program towards the end of the year.

Results from North Sammy and South Sammy from the first four core holes drilled in 2020 included 18 ft (5.5 m) grading 0.49 opt (15.23 g/t) gold, 15 ft (4.5 m) grading 0.13 opt (3.98 g/t) gold and 36 ft (10.85 m) grading 0.13 opt (3.96 g/t) gold, and 18 ft (5.5 m) grading 0.49 opt (15.23 g/t) gold at North Sammy in the North Shoot zone. The high grade zone at South Sammy was extended and remains open along strike and down dip.

The 2020 diamond drilling program was the first at Big Springs since early 2017, and the first one to test the 401 deposit since 2007. (Anova Metals, Ltd., 2020 4th quarter report, 1/28/2021, Anova Metals, Ltd., website, http://anovametals.com.au)

Jerritt Canyon. Jerritt Canyon Gold LLC carried out a major drill program in 2020, in which drilling focused on seeing if known resources and previously mined deposits could be expanded. A total of 146 reverse circulation holes were completed from April 30, 2000 through December 31, 2020 totaling 98,332 ft (29,972 m). Drilling took place at the following localities/targets with the best gold intercepts in

parentheses: 1) West Generator pit, 30 ft (9.1 m) grading 0.089 opt (2.77 g/t) gold, 2) Murray Mine/West Generator connector, 25 ft (7.6 m) grading 0.254 opt (7.9 g/t), 3)Northeast Saval, 80 ft (24.4m) grading 0.039 opt (1.2 g/t), 4) Burns Basin, 15 ft (4.6 m) grading 0.055 opt (17.1 g/t), 5) Starvation Canyon, 30 ft (9.1 m) grading 0.059 opt (1.8 g/t), 6) Wheeler Fault Zone, 60 ft (18.3 m) grading 0.043 opt (1.3 g/t), 7) Water Pipe II 120 ft (36.6 m) grading 0.052 opt (1.6 g/t), and 8) Pie Creek 40 ft (12.2 m) grading 0.023 opt (0.7 g/t). (First Majestic Silver Corp. website, (https://firstmagestic.com)

Ivanhoe District

Silver Cloud. Blackrock Silver Corp. drilled 18 reverse circulation holes at its Silver Cloud project located north-northeast of Midas. The best intercepts from the three holes that were drilled to test the NW Canyon target were 9.8 ft (3 m) grading 0.007 opt (0.214 g/t) gold and 0.1 opt (3.245 g/t) silver and 15 ft (4.6 m) grading 0.01 opt (0.334 g/t) gold and 0.14 opt (4.320 g/t) silver. The best intercept of the three holes that drilled to test the Quiver target was 50 ft 1(5.2 m) grading 0.007 opt (0.222) g/t gold and 0.026 opt (0.796 g/t) silver. (Blackrock Silver Corp. press releases, 11/9/2020, 3/29/2021)

Jarbidge District

Jarbidge. Newcrest Mining carried out a small drill program at its Jarbidge project. Results were not released. (Newcrest Exploration Project Plan of Operations No. 06-19-01 Mountain City Ranger District, Humboldt-Toiyabe National Forest Elko County, Nevada, 6/27/2019; Newcrest Mining, Ltd., Quarterly Exploration Report, March, 2021, Newcrest Mining, Ltd., website, https://www.newcrest.com.au)

Kinsley District

Kinsley Mountain. New Placer Dome Gold Corp. drilled 39 reverse circulation holes totaling 58,986 ft (17,970 m) and 10 diamond drill core holes totaling 14,305 ft (4,360 m), testing five target areas within the greater resource area at Kinsley.

Highlights included; 1) 0.057 opt (1.76 g/t) gold (oxide) over 62 ft (18.9 m) from surface, including 0.14 opt (4.46 g/t) gold (oxide) over 20 ft (6.1 m) at the Secret Spot prospect; 2) 0.12 opt (3.81 g/t) gold (sulfide) over 38 ft (11.6 m), including 0.36 opt (11.3 g/t) gold (sulfide) over 9.5 ft (2.9 m) at Secret Spot; 3) 0.058 opt (1.77 g/t) gold (oxide) over 83 ft (25.3 m), including 0.088 opt (2.75 g/t) gold over 33 ft (10.1 m) at Secret Spot; 4) 0.017 opt (0.53 g/t) gold (sulfide) over 65 ft (19.8 m) at the Western Flank resource; and 5) 0.02 opt (0.64 g/t) gold (oxide) over 35.1 ft (10.7 m) at the Main Pit North shallow oxide target.

The new discovery at Secret Spot includes multiple at or near surface Dunderberg Shale-hosted oxide gold drill intercepts that warrant follow-up drilling. The Secret Canyon Shale gold (sulfide) intercepts represent the highest grade intervals to date at Secret Spot, suggesting there is potential for similar high-grade intervals at Secret Spot that are similar to the high grades at the Western Flank resource. At Western Flank, discovery of a broad zone of within-pit Hamburg limestone-hosted gold (sulfide) mineralization on the southeast margin of the resource is open to expansion in all directions.

The gold mineralization is Carlin-style and is present as both oxidized and unoxidized mineralization. Gold present in oxidized rocks is associated with silica, calcite, and iron oxides including goethite, limonite, jarosite, hematite, and scorodite. Gold present in the unoxidized rocks consists of micron-sized or smaller particles associated with silica, calcite, and arsenian pyrite, with lesser amounts of arsenopyrite, sphalerite, and cinnabar. In the Dunderberg Shale, the unoxidized mineralization is associated with very fine grained, brownish-gray disseminated pyrite with orpiment and realgar locally present in the Dunderberg Shale in the Western Flank area.

The property consists of 513 unpatented lode claims covering 2,807 acres (1,136 ha) plus six leased patents covering 10,410 acres (4,213 ha). In December, Liberty Gold Corp. signed a definitive purchase option agreement to sell its 79.1% interest in the Kinsley Mountain Gold project to Barrian Mining Corp. Liberty Gold Corp. will receive $7,500,000 to be paid in three stages over a two-year period and retain a 1% Net Smelter Return Royalty. At the end of May 2020, Barrian Mining Corp. changed its name to New Placer Dome Corp. (Liberty Gold Corp., news releases, 12/2/2019; Liberty Gold Corp, website, http://libertygold.ca; Nevada Sunrise Gold Corp. news releases, 11/4/2019; Nevada Sunrise Gold Corp. website, http://www.nevadasunrise.ca; New Placer Dome Corp. news releases, 12/2//2019, 12/9/2019, 5/22/2020; New Placer Dome Corp. website, https://newplacerdome.com)

Pequop District

Long Canyon. Nevada Gold Mines, LLC, (Barrick Gold Corp., 61.5%; Newmont Corp., 38.5%) produced 160,000 ounces (4,536 kg) of gold from its Long Canyon Mine, a 15.7% decrease from 2019. The cost of sales attributable to gold was $1,088 per ounce, the all-in sustaining costs were $681 per ounce and the total cash costs were $333 per ounce.

Long Canyon is a sediment-hosted disseminated gold deposit that is almost entirely oxide ore. The mine was averaging 110,000 tons (99,800 mt) per day grading about 0.062 opt gold. Crushing is not necessary so the mine has no crusher. The ore goes straight from the mine to the leach pad. The processing plant has six carbon columns capable of holding seven or eight tons (six to seven mt) of carbon per tank. Once loaded, the carbon is shipped to the company facility at Carlin, where the gold is stripped and the carbon

regenerated. Mining is still in Phase 1, which is all above the water table.

Approximately $12 million dollar were spent on brownfield exploration and development of new reserves, which included drilling, though no details were released. Nevada Gold Mines has temporarily suspended plans to expand the Long Canyon Mine and says it will conduct hydrologic studies to address concerns that the expansion would dry up nearby springs. Proven and probable reserves at Long Canyon at the end of 2020 stood at 8,875,753 metric tons grading 3.42 g/t (0.099 opt) for approximately 1,070,744 ounces (30,355 kg) of gold. (Newmont Corp. Management Discussion and Analysis, 2/21/2020; Newmont Corp. Audited Annual Financial Statements, 2/21/2020; Newmont 2020 Annual Report, www.newmont.com; Barrick Gold Corp. 2020 Annual Report; Barrick Gold Corp. website, www.barrick.com)

South Railroad District

Railroad-Pinion Project. Gold Standard Ventures Corp. conducted a $23,708,185 exploration program across its Railroad-Pinion project that included $7,948,972 for drilling. The Railroad-Pinion project covers 53,569 acres (21,679 ha). Of this, 29,941 acres (12,117 ha) that contains 1,455 unpatented claims are owned by the company, 207 unpatented claims are leased, and 30 patented claims are either owned or leased by the company. The remaining 23,628 acres (9,562 ha) are private property whereby the company owns between 49.2% to 100% of the mineral rights. The project is divided into North Railroad and South Railroad. North Railroad is mainly in the Railroad mining district and includes the Bald Mountain, LT, North Bullion, POD, and Sweet Hollow deposits. South Railroad is mainly in the Robinson Mountain mining district and includes the Pinion, Dark Star, Dixie, Hidden Star, Jasperoid Wash, and Ski Track deposits. Exploration activities and results for separate deposits are presented below.

Highlights in 2020 included: 1) An updated Pre-Feasibility Study of the South Railroad project, released in February outlining an eight year mine life with an average gold production of 115,000 ounces (3,260 kg) per year at all-in sustaining costs of $707 per ounce, producing an after tax NPV (5%) of $265 million dollars and an internal rate of return of 40% at a gold price of $1,400 per ounce.

In July, Gold Standard Ventures announced a strategic partnership with Orion Mine Finance for $22.5 million dollars. As part of the partnership Orion entered into a silver streaming agreement to purchase 100% of the silver production from the South Railroad project and Jasperoid Wash deposits at a price of 15% of the prevailing price for silver in exchange for $2 million dollars.

Most of Gold Standard Ventures' exploration program in 2020 focused on the resources and prospects in the South Railroad project, including the Pinion and Dark Star deposits, and the LT prospect located near the Plan of Operations Boundary of the South Railroad project.

Gold Standard Venture's program focused on more tightly spaced drilling at the Pinion deposit. In 2020, 60 reverse circulation drill holes and 15 core holes were completed. In November of 2020, Gold Standard Ventures announced the discovery of a higher grade oxide zone at the Pinion deposit with potential to grow. The new zone exhibits thicker breccia as well as exceptional oxide grades. Oxide results from the reverse circulation drilling include: 1) 255 ft (77.7 m) of 0.072 opt (2.24 g/t) gold, including 75 ft (22.9 m) of 0.135 opt (4.21 g/t) gold; 2) 25 ft (38.1 m) of 0.14 opt (4.37 g/t) gold, including 55 ft (16.8 m) of 0.17 opt (5.41 g/t) gold and 3) 85 ft (25.9 m) of 0.12 opt (3.66 g/t) gold, including 40 ft (12.2 m) of 0.21 opt (6.45 g/t) gold.

(Gold Standard Ventures NI 43-101 Technical Reports, 10/24/2019, 2/13/2020; Gold Standard Ventures Corp. Management Discussion and Analysis, 3/30/2020; Gold Standard Ventures Corp. Annual Information Form, 3/30/2020; Gold Standard Ventures website, https://goldstandardv.com)

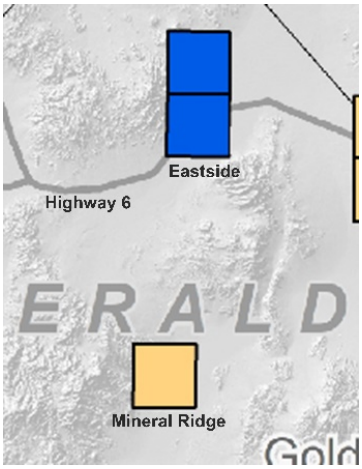
LT. Gold Standard Ventures completed 10 reverse circulation holes at its LT gold oxide discovery. The down-dip test in drill hole LT20-01 intersected 85 ft (25.9 m) of 0.025 opt (0.79 g /t) gold, including 20 ft (6.1 m) of 0.047 opt (1.47 g/t) gold. A strike test to the northeast in drill hole LT20-08 intersected 100 ft (30.5 m) of 0.025 opt (0.78 g/t) gold, including 25 ft (7.6 m) of 0.05 opt (1.58 g/t) gold. An up-dip test in drill hole LT20-02 intersected 50 ft (15.2 m) of 0.031 opt (0.97 g/t) gold. LT20-03, an inclined RC hole approximately 252 ft (77 m) south of LT19-02, intersected 30.5 m of 0.0125 opt (0.39 g/t) gold in shallow oxidized mineralization. (Gold Standard Ventures NI 43-101 Technical Reports, 10/24/2019, 2/13/2020; Gold Standard Ventures Corp. news releases, 11/12/2019, 10/29/2020; Gold Standard Ventures Corp. Management Discussion and Analysis, 3/30/2020; Gold Standard Ventures website, https://goldstandardv.com)

Dark Star. Gold Standard Ventures Corp. completed 9 reverse circulation holes totaling 44,442 ft (13,549 m) and one core hole totaling 997 ft (304 m) at its Dark Star deposit, which is part of South Railroad project. Six of these drill holes targeted and intersected up-dip, near-surface oxide mineralization to the east of the Company's drilling at Main Dark Star. The key highlights from these drill results included: 1) Step out holes DR20-01 through -06 intersected thick intervals of oxide mineralization to the east of the existing drilling at Main Dark Star. These results expanded mineralization to the east beyond the current block model approximately 196 ft (60 m). 2) DR20-09 intersected 760 ft (231.7 m) of 2.66 g/t gold, with mineralization starting just below surface and remaining oxidized to depth. The hole infilled a gap in drilling to tie surface sample results to vertically continuous, >1 g/t gold oxide mineralization at

North Dark Star. Intercepts included 200 ft (61 m) of 0.66 g/t gold. (Gold Standard Ventures NI 43-101 Technical Reports, 10/24/2019, 2/13/2020; Gold Standard Ventures Corp. news releases, 1/22/2019, 2/5/2019, 3/4/2019, 3/26/2019, 4/25/2019, 8/6/2019, 10/9/2019; Gold Standard Ventures Corp. Management Discussion and Analysis, 3/30/2020; Gold Standard Ventures Corp. Annual Information Form, 3/30/2020; Gold Standard Ventures website, https://goldstandardv.com)

Current estimated measured and indicated resources for Dark Star, and Pinion, are as follows: 1) Dark Star 5,857,000 tons grading 0.042 opt (1.31 g/t) gold, that amounts to 246,000 ounces of gold; 2) Pinion 1,304,000 tons, 0.019 opt (0.58 g/t) gold, which amounts to 544,000 ounces of gold; 3) The inferred resource at Jasperoid Wash is 10,569,000 tons, grading 0.01 opt (0.33 g/t) gold, which amounts to 111,000 ounces of gold. (Gold Standard Ventures NI 43-101 Technical Reports, 10/24/2019, 2/13/2020; Gold Standard Ventures. Corp. news release, 8/4/2020; Gold Standard Ventures Corp. Management Discussion and Analysis, 3/30/2020; Gold Standard Ventures Corp. Annual Information Form, 3/30/2020; Gold Standard Ventures website, https://goldstandardv.com)

ESMERALDA COUNTY



Gilbert District

Eastside. On January 27, 2020, Allegiant Gold announced an updated Inferred Resource estimate for its Eastside gold project. The updated resource estimate ("Updated Resource Estimate and NI 43-101 Technical Report, Eastside and Castle Gold-Silver Project Technical Report, Esmeralda County, Nevada") was conducted by Mine Development Associates ("MDA") of Reno, Nevada. Contained pit-constrained Inferred Resources of 996,000 ounces of gold and 7,838,000 ounces of silver were calculated in accordance with NI 43-101, based on drilling through 2019. The MDA Technical Report was subsequently revised, dated November 20, 2020, and was filed on SEDAR. This report builds on and supersedes the NI 43-101 reports of Ristorcelli (December 2016) and Ristorcelli (July 2017) titled "Resource Estimate and Technical Report, Eastside Gold-Silver Project, Esmeralda County, Nevada" prepared for Allegiant with an Effective Date of July 25, 2017.

In September 2020, the Company commenced a 15,000-metre, 80-hole drill program. Drilling started first at the Boss pit within the Castle zone on the south end of the Eastside project. Drill intercepts included: 1) 125 ft (38 m) grading 0.014 opt (0.43 g/t) gold, including 16.4 ft (5 m) grading 0.06 opt (1.85 g/t) gold.; 2) 111.5 ft (34 m) grading 0.023 opt (0.72 g/t gold), including 13 ft (4 m) grading 0.035 opt (1.08 g/t) gold; 3) 15 ft (4.57 m) grading 0.075 opt (2.32 g/t) gold; 4) 36 ft (11 m) grading 0.035 opt (1.10 g/t) gold, including 15 ft (4.57 m) grading 0.064 opt (2.00 g/t) gold; and 5) 5 ft (1.52) m grading 0.124 opt (3.86 g/t) gold. (Allegiant Gold, Ltd., NI 43-101 Technical Report, 12/30/2019; Allegiant Gold, Ltd., Annual Information Form, 7/10/2020; Allegiant Gold, Ltd., Management Discussion and Analysis, 1/17/2020, 2/18/2020; Allegiant Gold, Ltd., news releases, 2/26/2019, 4/17/2019, 6/11/2019, 12/10/2019; Allegiant Gold, Ltd., website, www.allegiantgold.com)

Goldfield District

Gemfield. The Gemfield Mine site is located a half-mile (0.8 km) north of the small town of Goldfield, one of the most prolific and historic gold mining districts in Nevada. The property contains 563 patented and 586 unpatented mining claims across roughly 15,000 acres (6,070 ha). Already fully permitted and shovel-ready, the development is owned by Gemfield Resources, LLC, a portfolio company managed by Waterton Global Resource Management, Inc. (Waterton), a Toronto-based private equity firm. Once the mine turns operational, it is expected to produce over 125,000 ounces of gold annually.

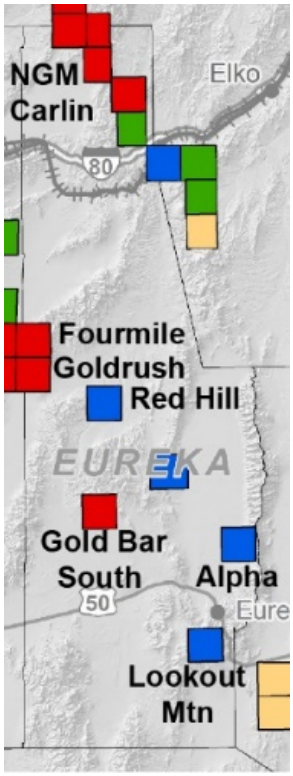
While no details have been released, the company reported that over the last five years, the project has been undergone development and extensive optimization efforts including multiple drilling programs, metallurgical test work, geotechnical engineering, and hydrological studies. The company proposed building and operating a conventional open-pit mine. The proposal includes building the open pit; crushing facilities, conveyors, and associated stockpiles; waste rock disposal areas; overburden stockpile; and related infrastructure. The pit will eventually be 3,500 ft (1,070 m) by 3,300 ft (1,000 m) by 525 ft (160 m) deep. The proposal also calls for 121 additional acres (49 ha) for exploration and drilling. The BLM issued preliminary and final environmental impact statements and a record of decision approving the project. The project required the looping of 2.5 miles (4 km) of US 95 up to a half mile (0.8 km) to the west around the project area, which has been completed. The property contains 563 patented and 586 unpatented mining claims covering about 15,000 acres

(6,070 ha). (BLM Gemfield Mine Project, Environmental Impact Statement, Record of Decision, DOI-BLM-NV-B020-2018-0052-EIS, 7/26/2019)

Silver Peak District

Mineral Ridge. Mineral Ridge Gold LLC, a subsidiary of Scorpio Gold Corp., produced 3,863 ounces of gold and 2,234 ounces of silver from its Mineral Ridge Mine, 50% and 38% decreases, respectively, from 2019. Mining was suspended at Mineral Ridge in early November 2017. On January 4, 2018, the company announced an updated feasibility study outlining positive economics for processing the residual heap leach material and mining of higher-grade mineralization in the existing pits. The study provides ~7.5 years of additional mine life at Mineral Ridge and 250,500 oz. life of project gold sold at a total cash cost of US$805/oz. The company is pursuing financing for the construction of a 4,000 TPD milling facility with CIL recovery and dry stack tailings circuit. (Scorpio Gold Corp. news releases, 3/6/2019, 6/24/2019, 4/22/2020; Scorpio Gold Corp. Management Discussion and Analysis, 4/29/2020; Scorpio Gold Corp. website, https://www.scorpiogold.com)

EUREKA COUNTY



Alpha District

Alpha. Sitka Gold Corp., drilled it first deep hole (AG20-01) at its Alpha gold project located at the south end of the Sulphur Spring Range in Eureka County. It was part of a 12 hole drill program targeting the Garden Valley anticline. Hole AG20-01 was drilled to a depth of 1799 ft (548 m). The hole was successful in penetrating the upper plate of the Roberts Mountain thrust and encountered the Webb Formation. Zones of intense clay were intercepted and were interpreted be associated with fault zones. The fault zones in the Webb Formation hosted the highest gold assays ranging from 40 to 100 ppb gold. The clay alteration overprints earlier sericite-pyrite-quartz alteration, which could be related to the nearby Mount Hope porphyry molybdenum deposit. (Sitka New Releases, 6/18/2020, 6/24/2020, and 9/24/2020).

Antelope District

Gold Bar North Project. McEwen Mining Nevada Inc.'s Gold Bar Mine is an open-pit oxide gold mine with a processing facility, heap leach pad, and gold recovery plant. Gold Bar North is a heap leach operation comprised of the Gold Pick, Gold Ridge, Gold Bar North, and Cabin Creek deposits. The first ingot was poured on February 16, 2019 and commercial production was announced on May 23, 2019, most of which came from the Cabin Creek pits and then transitioned to Gold Pick West. In 2020, the mine produced 27,918 ounces of gold and 691 ounces of silver. The average grade of the 2020 production was 0.025 opt (0.72 g/t) gold. The cash cost per ounce of gold was $2,106 per ounce. $5.1 million was spent on exploration activities in and around the Gold Bar Mine in 2020, both on the Gold Bar North and Gold Bar South portions of the property. Exploration activities focused on targets around the Gold Bar Mine, including drilling at Gold Bar South (former Afgan deposit of the Afgan-Kobeh property) to confirm and upgrade the resource estimation and potentially convert resources to reserves.

In 2020, McEwen completed a 28-hole exploration program at Gold Pick to tighten up the resource estimates. Notable gold intercepts included 1) 70 ft (21.3 m) of 0.047 opt (1.457 g/t) gold; 2) 60 ft (18.3 m) of 0.132 opt (4.107 g/t) gold; 3) 65 ft (19.8 m) of 0.073 opt (2.274 g/t) gold; 4) 60 ft of 0.04 opt (1.244 g/t) gold, 5) 120 ft (36.5 m)of 0.03 opt (1.03 g/t gold); and 80 ft (24.4 m) of 0.067 opt (2.07 g/t) gold.

Most of the defined mineralization is contained in oxidized carbonate host rocks within 500 ft (150 m) of the surface. The mineralization is mainly hosted in the Bartine Member of the Devonian McColley Canyon Formation, which is about 250 to 380 ft (76 to 116 m) thick. Minor amounts of mineralization are also present in the underlying dolomitic limestone within the Kobeh Member of the McColley Canyon Formation, where it is adjacent to apparent feeder structures. (McEwen Mining Inc. website, https://www.mcewenmining.com)

Gold Bar South. Acquired by McEwen Mining in 2016, Gold Bar South is a property that consists of 109 mining claims, located approximately 3.5 miles (5.5 km) southeast of the old Gold Bar Mine, which hosts a near

surface oxide gold deposit. An infill and pit definition drilling program conducted in 2019 at Gold Bar South had 25% of the new drill intersections showing gold grades averaging above 1 g/t. New mineralized structures were identified outside the existing resource, including notable gold intersections such as 0.214 opt (6.66 g/t) over 78.7 ft (24 m), 0.07 opt (2.13 g/t over) 180.4 ft (55 m) and 0.07 opt (2.21 g/t) over 170 ft (51.8 m). Drilling has encountered an area between the NE- and NW- trending faults of higher-grade oxide mineralization of over 2 g/t gold, measured at 50 m wide, 50 m long and 50 m thick. Exploration drilling at Gold Bar South continued into 2020, in order to incorporate the associated satellite pit into the mine plan. (McEwen Mining Inc. website, https: //www.mcewenmining.com)

Carlin Trend

Carlin Complex. On July 1, 2019, Barrick Gold Corp. and Newmont Corp. entered into an agreement creating a joint venture under Nevada Gold Mines, LLC, which combined their respective mining operations, assets, reserves, and talent in Nevada. The properties included are Cortez, Goldstrike, Turquoise ridge, and Goldrush deposits of Barrick Gold Corp. and the Carlin operation, Twin Creeks, Phoenix, Long Canyon, and Lone Tree deposits of Newmont Corp. Nevada Gold Mines, LLC, is operated by Barrick Gold Corp., and ownership is 61.5% Barrick Gold Corp. and 38.5% Newmont Corp. Nevada Gold Mines, LLC, was preparing an NI 43-101 technical report covering the affected properties and included updated reserves and resources. The report was released in early 2020.

The mines of the Barrick Gold Corp.'s Goldstrike operation and Newmont Corp. Carlin operation are now collectively referred to as the Carlin Complex. The Carlin Complex includes the 1) Goldstrike open-pit and underground Meikle Mine, 2) the Leeville underground mine, the Pete Bajo/Fence underground mine, and Exodus underground mines, 3) the Genesis/Tri-Star Complex open pits (Goldstar and Silverstar), 4) the Gold Quarry open pit, and 5) the satellite open-pit deposits (Perry and Green Lantern). It also includes seven processing facilities and associated infrastructure.

The Carlin Complex produced 1,024,000 ounces of gold at an average grade of 3.80 g/t in 2020 at a recovery rate of 79%. Income from the production from the Carlin Complex was $244 million. Earnings from the Carlin Complex before interest, taxes, depreciation, and amortization amounted to $289 million. The cost of sales was $917 per ounce. Total cash costs amounted to $740 per ounce, and all in sustaining costs were $1,005 per ounce.

Exploration in 2020 focused on the North Leeville project, targeting the footwall of the Basin Bounding Fault, which channeled hydrothermal fluids and intrusions. The fault likely was the conduit for gold-bearing fluids at the Turf and Four Corners deposits. Drilling also targeted the low-angle Gramma fault, which has thickened favorable host rocks and controlled mineralization. Drilling at North Leeville in the footwall of the Basin Bounding Fault was successful in intercepts with significantly higher grades than what has been typically mined from Leeville. Intercepts included 1) 108 ft (32.9 m) grading 0.543 opt (16.9 g/t gold), 2) 76.4 ft (23.3 m) grading 1.05 opt (32.6 g/t) gold 3) 40 ft (12.3 m) grading 0.589 opt (18.3 g/t) gold. Overall, grades appear to be increasing to the north.

Significant exploration also occurred on the North Carlin trend along the Post-Gen fault corridor. At Battle Star on the south end, an intercept of 9.5 ft (2.9 m) grading 0.55 opt (17.1 g/t) gold was drilled. At the old Deep Star Mine, an intercept of 29.5 ft (9 m) grading 0.412 opt (12.8 g/t) gold was drilled. Drilling of the Dormant target at Deep Post intercepted 100 ft (30.5 m) grading 0.5 opt (15.9 g/t) gold and 26.5 m grading 0.36 opt gold (11.2 g/t).

Drilling southwest of Gold Quarry indicated the system significantly weakens. Drilling also targeted Little Boulder Basin between Gold Quarry and Leeville. Preliminary results indicated extensive alteration and widespread anomalous gold.

Drilling also took place at Silverstar, Goldstar, Perry, Green Lantern, Exodus, and Bajo, and Ren, but no results were released. (Nevada Gold Mines, LLC, NI 43-101 Technical Report on the Carlin Complex, 3/25/2020; Elko Free Press Mining Quarterly, Spring 2019; Elko Daily Free Press, 6/6/2019, 12/6/2019; Newmont Corp. news release, 4/18/2019; Newmont Corp. Management Discussion and Analysis, 4/25/2019, 7/25/2019; Newmont Corp. Form 10-K, 2/21/2020; Newmont Corp. website, https://www.newmont.com)

Cortez District

Cortez Mine Complex. Nevada Gold Mines produced 798,374 ounces of gold from its Cortez Mine complex in 2020. 61.5% (491,000 oz) was credited to Barrick Gold and 38.5% (307,374 oz) was credited to Newmont Goldcorp Corp. Production came from the Cortez Hills open pit, the Pipeline-Crossroads open pits on the west side of Crescent Valley in the Bullion district in Lander County and high-grade ore from the Cortez Hills underground mine from the east side of Crescent Valley in the Cortez district in Eureka County, The average recovery rate from 13,019,000 tons of ore mined was 83%. The average grade of the ore processed was 1.41 g/t gold. Refractory ore was trucked to the autoclaves at the Carlin Mine complex. Total cash costs were $678/oz and all in sustaining costs were $998/oz.

At the Cortez Hills underground mine, drilling from underground platforms continued to test extensions, with a focus on targeting feeder zones below the mine. Drilling targeted a 525 ft (160 m) down-dip offset of known mineralization along a potential feeder structure. The drilling yielded two significant intervals, including 25.6 ft

(7.8 m) at 0.25 opt (7.8 g/t) Au, extending previous mineralization adjacent to the mine, and 28.5 ft (8.7 m) at 0.15 opt (4.8 g/t) Au, supporting the interpretation of a feeder structure along the Hanson fault. The results, along with those reported in the second quarter of 2020, are early stage but conceptually encouraging.

Fourmile. Barrick Gold Corp. carried out a drill program on its Fourmile project, located just north of its Goldrush underground development project. The objective of the drilling included step-out drilling on the Sophia and Dorothy targets to the north-northwest of the Fourmile property. Gold intercepts drilled at Dorothy in 2020 included: 1) 31 feet (9.6 m) grading 2.6 opt (80.1 g/t); 2) 32 ft (9.9 m) grading 1.6 opt (48.4 g/t) gold; and 3) 27.5 ft (8.4 m) grading 0.7 opt (21.6 g/t) gold. Gold mineralization is typically associated with variety of breccias bodies and structural controls. Significant mineralization was found at the intersection of the steeply west-dipping Anna and the moderately west-dipping Sadler reverse fault and associated folds. Near this structural intersection, brecciated, altered carbonate rock hosts high-grade mineralization. This zone remains open both down-dip to the west and along strike. Fourmile and Goldrush combined may be part of a 4.4-mile (7-km) long mineralized system with the mineralization between the two projects being open but under exploration.

Fourmile is not made part of Nevada Gold Mines, LLC, (Barrick Gold Corp. 61.5% and Newmont Corp. 38.5%) It is 100% owned by Barrick. (Barrick Gold Corp. Management Discussion and Analysis, 5/8/2019, 8/12/2019, 11/6/2019, 2/20/2020; Barrick Gold Corp. Q4 2019 Presentation, 2/12/2020; Barrick Gold Corp. Annual report, 3/25/2020; Barrick Gold Corp. Annual Information Form, 3/25/2020; Barrick Gold Corp. website, https://www.barrick.com)

Goldrush. Effective July 1, 2019, the Goldrush complex became part of Nevada Gold Mines, LLC (Barrick Gold Corp. 61.5% and Newmont Corp. 38.5%), with Barrick Gold Corp. as the designated operator. Contractor development of the twin exploration declines at Goldrush were completed. The first ore was exposed in the first quarter of 2021. The Goldrush deposit remains open in a number of directions, and much of the drilling was focused on the area between Fourmile and Goldrush, where the mineralization of both deposits is expected to coalesce.

The declines are located next to the existing Horse Canyon Haul Road in the northern part of Grass Valley and will provide access to the Goldrush ore body in Horse Canyon from the west. The exploration declines can be converted to production declines in the future. The declines reached 4,250 ft (1,296 m) of development by year's end. The plan calls for 13,120 ft (4,000 m) of development expected to be completed by November 2020. Total capital cost of the Goldrush project is estimated to be about $1,000,000,000. The ore is refractory. First production may come in 2021, and the life of the mine is expected to be 21 years. (Barrick Gold Corp. Management Discussion and Analysis, 5/8/2019, 8/12/2019, 11/6/2019, 2/20/2020; Nevada Gold Mines, LLC, NI 43-101 Technical Report on the Carlin Complex, 3/25/2020; Barrick Gold Corp. Annual report, 3/25/2020; Barrick Gold Corp. Annual Information Form, 3/25/2020; Barrick Gold Corp. website, https://www.barrick.com)

Eureka District

Ruby Hill. Ruby Hill Mining Co., LLC, a subsidiary of Waterton Precious Metals Fund II Cayman, LP, produced 3,355 ounces of gold and 2,540 ounces of silver from its Ruby Hill Mine. Mining was never resumed by the company or its predecessor, Barrick Mining Corp., after a wall failure in November 2013. Production was from the leach pads, and no drilling has been reported since 2013. The ore is mainly oxide material, and processing includes on-site gold recovery by zero-discharge heap leach and carbon column facilities. Royal Gold, Inc., owns a 3% net smelter return in the mine. Ruby Hill Mining Co., LLC, was formed in 2015 and is managed by Elko Mining Group, LLC. (Nevada Business Search; Waterton Global Resource Management news release, 12/17/2015; Royal Gold, Inc., website, https://www.royalgold.com; Waterton Global Resource Management website, www.watertonglobal.com)

Lookout Mountain. Timberline Resources Corp. had a successful 2020 drill program on its Lookout Mountain project, located 12 miles (19.3 km) south of the Ruby Hill open pit. Eleven reverse circulation holes were drilled near the Lookout Mountain open pit and three diamond core holes were drilled off to the east in what Timberline calls the Graben zone. Drill intercepts included Hole BHSE-187, a step-out hole drilled approximately 246 ft (75 m) northeast of the existing Lookout Mountain resource, encountered 25 ft (7.62 m) grading 0.14 opt (4.49 g/t) gold, with an interval of 85 ft (26 m) grading 0.07 opt (2.18 g/t) gold. Hole BHSE-184 intercepted 60 ft (18 m) grading 0.03 opt (0.93 g/t) gold, starting at 9.8 ft (3 m) below the surface. Hole BHSE186 intercepted 20 ft (6.1) m of near-surface, gold grading 0.17 opt (5.21 g/t) and 85 ft (25.91 m) grading 0.025 opt (0.77 g/t) gold from 155 ft (47.2 m) downhole. Both of those intercepts were oxidized material. Silver grades up to 2.76 opt (86 g/t) were encountered. Lead up to 0.34%, zinc up to 0.57%, and silver mineralization with anomalous gold and a proximal association with Carlin-type gold mineralization. There is mounting evidence that Lookout Mountain is a close analogue to the multi-million ounce Archimedes-Ruby Hill Mine located at the north end of the Eureka district. (Timberline Resources Corp. Form 10-K, 2020 Annual Report)

Gibellini District

Gibellini, Louis Hill and Bisoni Vanadium Deposits. Silver Elephant Mining Corp announced on May

29, 2018 the results of a preliminary economic assessment study (PEA) by AMEC for its 100% owned Gibellini vanadium project, designed to be an open pit, heap leach operation in Nevada's Battle Mountain region, about 25 miles (40.2 km) south of the town of Eureka. The Gibellini project consists of the Gibellini and the Louie Hill deposits, located 1.25 miles (2 km) south of Gibellini deposit. On September 18, 2020, Silver Elephant acquired the Bisoni deposit which is 8.1 miles (13 km) south of Louie Hill deposit. The Gibellini Vanadium project is designed to be an open pit, heap leach operation in Nevada. Nevada Vanadium holds a 100% interest in the properties by way of a lease agreement and staked claims.

Production will follow roughly 18 months of construction, and plans call for 120 workers during construction and 113 employees when the mine is completed, with about 30 people on site at one time during the 24-hour operations.

This will be the first vanadium mine in the United States, according to the BLM. The open-pit mine also will produce a small amount of uranium in the form of yellowcake as a secondary product. There are very small amounts of naturally occurring uranium in the vanadium mine that will be leached along with the vanadium. The uranium yellowcake will be packaged in lined steel drums "to ensure low risk," and the Nevada Department of Health and Human Services will oversee permitting with the Nuclear Regulatory Commission, the U.S. Environmental Protection Agency, the BLM and the Nevada Division of Environmental Protection for the safety of employees.

The company expects to see nine to ten truckloads of sulfuric acid coming from Carlin per day, and the solid vanadium pentoxide product will require one truck a day to a railhead in Carlin. Yellowcake will be shipped in one truck every two months to a licensed uranium facility. There also will be one or two trucks a week carrying diesel to the site.

The vanadium project is low cost because production will come from a simple heap leach process using sulfuric acid, and there will be no dewatering or pit lake after mining ends because the bottom of the mine is 110 ft (33.5 m) above the water table.

The mine's initial life for the first of five known vanadium targets is seven years, but would be much longer if all the targets go into production. Reclamation bonding will be for 30 years.

The Gibellini project site is on 6,456 acres (2,613 ha) of public land in the southeast corner of Eureka County five miles south of the Fish Creek Ranch, from which Nevada Vanadium will be acquiring water for the project. There is no surface water on the project property. In an agreement with Eureka County, the mine will lease 650 gallons per minute from the Fish Creek Ranch, which in turn will drop one irrigation pivot.

Vanadium is considered a critical metal by the U.S. Geological Survey. It is used for aircraft, missiles and personnel transport; in the production of synthetic rubber, polyester, fiberglass; as a component of catalytic converters; and in batteries, including lithium vanadium batteries for electric vehicles and vanadium redox flow batteries. (Elko Daily Free Press, September, 8, 2020)

Nevada Vanadium, LLC, a subsidiary of Silver Elephant Mining Corp., (formerly Prophecy Development Corp.) announced a drilling program for its Gibellini project and adjacent Louie Hill project, but it was apparently not carried out. Also, no other exploration work was reported. The company submitted a plan of operations to the BLM. The operation will include the pit, waste rock disposal facility, crushing and processing facilities, heap leach pad, stockpile, and support infrastructure. The mine is projected to produce 3,300,000 tons of materialized material annually or 15,700,000 tons of materialized material containing 120,500,000 pounds of vanadium over the seven-year mine life. The project covers 6,456 acres (2,613 ha) on public land and contains from north to south the North Trench prospect, Gibellini deposit, Louie Hill deposit, and Middle Earth, Big Sky, BR-1, and BR-2 prospects, which lie along an 8-mile (13-km), north-northeast-trending vanadium belt. In 2020, the company acquired the Bisoni Vanadium project, which adjoins the Gibellini project along the same belt to the south-southwest. Nevada Vanadium, LLC, was a subsidiary of Prophecy Development Corp. (BLM press release, 7/14/2020; Silver Elephant Mining Corp. news releases, 1/21/2019, 7/8/2019, 1/8/2020, 2/14/2019, 9/24/2019, 3/18/2020, 3/23/2020, 8/24/2020, 8/18/2020; Nevada Vanadium, LLC, website, https://www.nevadavanadium.com; Silver Elephant Mining Corp., website, https://www.silverelef.com)

Mount Hope District

Mount Hope. Mount Hope had been promised since 2008 as one of the world's biggest molybdenum mines, but its majority owner, General Moly Inc, filed for bankruptcy in 2019, calling the venture further into question.

More than a billion pounds of molybdenum were expected from the Nevada, US-based mine, 80% owned by General Moly. The Colorado, US-based exploration firm did not respond for comments on the project's viability on this or earlier occasions this year.

General Moly filed for Chapter 11 bankruptcy protection on Wednesday, November 18, 2019 and changed its top management that day, according to an announcement that also said trading of the company stock ("GMO") was suspended. General Moly also restructured $1.4 million in debt to allow it to continue operating. Bruce Hansen, chief executive officer, resigned and was replaced by Thomas Kim as interim chief executive. (BLM, Mount Hope Project Final Supplemental Environmental Impact Statement, DOI-BLM-NV-B010-2017-0031-EIS 2/2019; BLM, Mount Hope Project Final Supplemental Environmental Impact Statement, DOI-BLM-NV-B010-2017-0031-EIS 8/2019; BLM, Mount Hope Project Final Supplemental Environmental Impact Statement, Record of Decision, DOI-BLM-NV-B010-2017-0031-EIS 9/2019; General Moly Inc. news releases, 7/29/2019, 9/30/2019, General Moly Inc. Form 10-K, 5/4/2020; General Moly Inc. website, http://www.generalmoly.com)

Northern Simpson Park Mountains

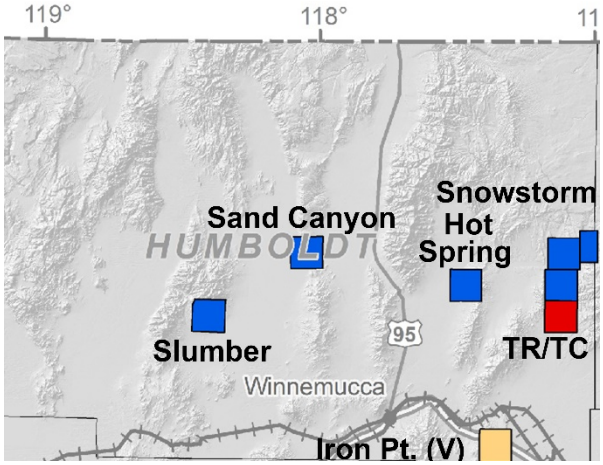
Red Hill. NuLegacy Gold Corp. drilled 4 core holes holes totaling 9,609 ft (2,928 m) on both flanks of the northeast-southwest trending Rift anticline, a buried anticline of Devonian carbonates including the Unit 5 of the Wenban Formation, which hosts much of the mineralization at Nevada Gold Mine LLC's Cortez Mine and the Carlin trend.

Holes RA20-01C and RA20-02C at the north end of the anticline were drilled to depths of 1,919 ft (585 m) and 2,067 ft (630 m), respectively. Assay results from RA2020-01C and RA20-02C returned numerous intercepts of anomalous gold (e.g., 40 ft (12.2 m) of 0.018 opt (0.55g/t gold) at the contact between Wenban Unit 5 and the overlying younger Miocene basalt.

Structurally all four holes encountered numerous high- and low-angle faults and splays with very thick up to 574 ft (175 m) sections of favorable Wenban Unit 5 stratigraphy that was strongly decalcified and silicified.

Holes RA20-03C and RA20-04C were drilled at the south end of the anticline. Anomalous intervals of gold in RA20-04 start at a depth of 2,316 ft (706 m) and extend to 2,831 ft (863 m). Intervals included 10.5 ft (3.2 m) of 0.10 opt (3.0 g/t) gold within 45.5 ft (13.9m) of 1.1 g/t gold, which had a 1.4 m interval of 0.135 opt (4.2 g/t) gold. Indications of a Carlin gold system include brecciation, kaolinite veining, variably decarbonization, silcification have all been observed in the drill core. (NuLegacy Gold Corp. news releases, 6/3/2019, 10/8/2019, 10/21/2019, 2/18/2020; NuLegacy Gold Corp. Management Discussion and Analysis 2/27/2020; NuLegacy Gold Corp. website, https://www.nulegacygold.com)

HUMBOLDT COUNTY



Awakening District

Slumber/Sand Canyon. During the second quarter of 2019 Nevada Gold Corp. entered into an earn-in agreement with Golden Gryphon Exploration for the Sand Canyon project located in northwestern Nevada, where surface work has identified a large system of epithermal veins with potential for gold and silver deposits. Nevada Gold holds an option to earn a 60% interest in the Sand Canyon project by spending $2.5 million in exploration expenses over four years, with guaranteed minimum expenditures of $0.5 million in year one. To continue to earn interest in the project, Nevada Gold must spend at least $0.75 million in each of years two and three and $0.5 million in year four, and drill at least 5,000 ft (1,524 m) of core or 10,000 ft (3,048 m) of reverse circulation or a combination of the two, by the end of the second year. Nevada Gold paid $25,000 cash and $50,000 in reimbursed exploration expenditures to acquire the option and will make staged payments totaling an additional $135,000 ($35,000 in 2020, $50,000 in 2021 and $50,000 in 2022) over the next three anniversaries of the agreement.

Nevada Gold has completed surface exploration activities on the project including mapping and geochemical sampling to identify drill targets. Based on this work it obtained the necessary drill permits and have begun a drilling program, with initial results expected in the second quarter of 2020.

Battle Mountain District

Marigold. Through its subsidiary Marigold Mining Co., SSR Mining, Inc., (formerly Silver Standard Resources, Inc.) produced 234,443 ounces of gold, which was a 6% increase from 2019 and 3,329 ounces of silver from its Marigold Mine. Mining was largely from the Mackay pit. The company mined 85,594,000 tons (74,039,000 mt) of material, at a strip ratio of 2.6 to 1 one at an average grade of 0.012 opt (0.4 g/t) gold. The ore was all oxide. The gold

recovery was 75.4%. The all in sustaining cost was $1,222 per ounce, an 18% increase from 2019.

An important focus of the 2020 exploration program was to identify new Mineral Resources on 29,010 acres (11,740 ha) of adjoining mineral tenures that were acquired between 2015 and 2019. At Valmy, the SSR Mining has been expanding Mineral Resources around these pits since acquisition in 2015. Since acquisition of Trenton Canyon in 2019, the company has been conducting exploration to confirm the validity of the historic drill database and expand known mineralization areas. Following acquisition of Buffalo Valley in 2019, SSR Mining has focused on verifying historical information and assessing the potential for oxide gold mineral resources.

A focus for the company is to increase gold production at Marigold by defining Mineral Resources to support additional stand-alone heap leach facilities in the North Peak area. In 2020, Marigold tested areas south of the currently producing Mackay pit including Valmy, Crossfire, East Basalt, Section 6, and Trenton Canyon.

As a result of land acquisitions, the company is exploring the opportunity for a larger pit concept, encompassing East Basalt, Antler, Battle Cry, and Section 6, which the company refers to as New Millennium.

In 2020, the company completed 11 miles (17.6 km) of seismic geophysical surveys in two lines; one east-west transect, crossing just south of the Basalt and Antler open pits, and a north-south line the length of Marigold and onto the Trenton Canyon ground. Once compiled, the company expects to validate the interpretation with the current core drilling results that have identified the favorable Comus Formation.

This work aims to establish a method of mapping the 3D structure of the main rock assemblages beneath the entire property to identify targets with potential for higher-grade sulfide mineralization.

In the fourth quarter of 2020, a soil sampling program was initiated at the Trenton Canyon property. A total of 9 square miles (14.5 square km) of coverage is planned, with samples collected in a 200-ft (61-m) staggered grid pattern for 3,854 total samples. In the fourth quarter of 2020, the company completed approximately 1 square mile (1.5 square km), collecting 395 samples. This program is expected to be completed in the first quarter of 2021.

The most exciting drilling results in 2020 was the drilling at Trenton Canyon, where four holes completed 984 ft (300 m) north of the South pit discovered a sulfide zone hosted by carbonaceous mudstone located beneath quartzite of the Valmy Formation. The best intercepts from the four holes were 1) 310 ft (94.5 m) grading 0.17 opt (5.19 g/t gold); 2) 270 ft (82.3 m) grading 0.064 opt (1.98 g/t) gold; 3) 255 ft (77.7 m) grading 0.050 opt (1.57 g/t gold); and 4) 325 ft (99.1 m) grading 0.031 opt (0.97 g/t gold). On July 17, 2020, SSR Mining and Alacer Gold Corp. merged. (BLM, Mackay Optimization Project, Draft Environmental Impact Statement, DOI-BLM-NV-W010-2016-0002-EIS, 5/2019; BLM, Mackay Optimization Project, Final Environmental Impact Statement, DOI-BLM-NV-W010-2016-0002-EIS, 9/2019; BLM, Mackay Optimization Project, Record of Decision, DOI-BLM-NV-W010-2016-0002-EIS, 10/2019; SSR Mining, Inc., Management Discussion and Analysis, 2/20/2020; SSR Mining, Inc., new release 6/27/2019; SSR Mining, Inc., Annual Information Form, 3/19/2020; SSR Mining, Inc., website, http://www.ssrmining.com)

Trenton Canyon. In June of 2019, SSR Mining, Inc., acquired the Trenton Canyon and Buffalo Valley properties from Newmont Corp. and Fairmile Gold Mining, Inc., respectively, for $22,000,000. Both properties are adjacent to the Marigold property and, combined, cover about 21,990 acres (8,900 ha). The company spent $2,000,000 on drill testing sulfide targets, completing 64 reverse circulation drill holes totaling 68,306 ft (20,825 m). The most exciting drilling results in 2020 were at Trenton Canyon, where four holes completed 1,000 ft (300 m) north of the South pit in a newly discovered sulfide zone hosted by carbonaceous mudstone located beneath quartzite of the Valmy Formation. The carbonaceous mudstone is potentially correlative with the Comus Formation that hosts most of the ore at Twin Creeks and Turquoise Ridge in the Getchell district. The best intercepts from the four holes were 1) 310 ft (94.5 m) grading 0.167 opt (5.19 g/t gold); 2) 270 ft (82.3 m) grading 0.064 opt (1.98 g/t) gold;, 3) 255 ft (77.7 m) grading 0.050 opt (1.57 g/t) gold; and 4) 325 ft (99.1 m) grading 0.031 opt (0.97 g/t) gold.

The property covers 18,162 acres (7,350 ha) and is immediately south of and along the mineralized trend of the Marigold Mine. Mineralization extends about 3.1 miles (5 km) along a north-south trend and varies between 2,300 ft and 4,900 ft (700 m and 1,500 m) in width. It is hosted in the Pennsylvanian-Permian Edna Mountain Formation, Antler sequence, and Battle Formation and the Ordovician Valmy Formation. The property includes Trenton Canyon South and West open pits and the North Peak open pit. Those deposits last produced in 2007. The infrastructure at Trenton Canyon includes the North Peak heap leach pads and processing facilities. (SSR Mining, Inc., Management Discussion and Analysis, 2/20/2020; SSR Mining, Inc., Annual Information Form, 3/19/2020; SSR Mining, Inc., website, http://www.ssrmining.com)

Iron Point District

Iron Point (vanadium). Victory Metals Inc. released the assay results of 27 holes that were from the third and final set of drill holes as part of its 34,556 ft (10,532 m) 52-hole Phase II drilling program at its Iron Point Vanadium project. These holes targeted the southern portion of the Iron Point mineralized vanadium zone. Twenty-one reverse circulation holes and 6 diamond drill core holes were drilled. Highlights of of the drilling included 1) 98 ft (30 m) grading 0.42% V_2O_5, 2) 95 ft (29 m) grading 0.46% V_2O_5, 3)

57 ft (17.5 m) grading 0.54% V_2O_5, 4) 200 ft (61 m) grading 0.47% V_2O_5, 5) 100 ft (30.5 m) grading 0.50% V_2O_5, 6) 88.6 ft (27 m) grading 0.53% V_2O_5 and 7) 115 ft (35.1 m) grading 0.41 V_2O_5.

The thicker zones of higher-grade mineralization are clustered within an area measuring 985 ft (300 m) in a N-S direction, in places extending from the surface down to a maximum depth of 558 ft (170 m). The shallow nature of this relatively uniform and vertically continuous mineralization provides an attractive open-pit target. (Victory Metals, Inc., Management Discussion and Analysis, 7/29/2019, 6/17/2020; Victory Metals, Inc., Management Discussion and Analysis, 6/17/2020; Victory Metals, Inc., news releases, 2/8/2019, 2/28/2019, 3/6/2019, 4/10/2019, 4/17/2019, 5/27/2019, 9/30/2019, 2/18/2020, 3/3/2020, 4/2/2020; Victory Metals, Inc., website, https://victorymetals.ca)

Jackson Mountains District

Slumber. NV Gold Corp. executed a binding letter of intent with Tim Percival and Darryl Killian allowing the former to enter into a Lease Agreement for an undivided 100% right, title, and interest in the Slumber Gold Property in T39N, R32E. NV Gold Corp. will pay $10,000 upon execution of the lease and then conduct minimum annual work commitments and pay advanced royalties respectively as follows: first anniversary—$25,000 and $25,000; second anniversary—$75,000 and $35,000; third anniversary—$75,000 and $45,000; fifth anniversary and annually afterwards—$100,000 and $50,000. Slumber is located in the Jackson Mountains, 50 miles (80.5 km) northwest of Winnemucca and 21 miles (33.8 km) west of the Sleeper epithermal gold deposit.

The company completed 13 holes holes in 2020. The drilling outlined a new 1,968 ft (600 m)-wide mineralized oxide zone close to the surface with notable drill intercepts that included: 1) 60 ft (18.3 m) grading 0.017 opt (0.52 g/t) gold, and 2) 440 ft (134.2 m) grading 0.004 opt (0.14 g/t) gold starting from the surface.

(NV Gold Corp. Management Discussion and Analysis, 2/28/2021; NV Gold Corp. news release, 5/20/2021, NV Gold Corp. website, http://www.nvgoldcorp.com)

Potosi District

Hot Springs. Bald Eagle Gold Corp. carried out core drilling program on its Hot Springs project in the latter part of 2020. Features of the drill core was consistent with a low-sulfidation epithermal system. Initial near to the surface results showed an intercept from 64 ft (19.5 m) to 216 ft (65.8 m) depth. Precious metal values were encountered over a 118.7 ft (36.2 m) interval, from 97.3 ft (29.7 m) to 216 ft (65.8 m), which averaged 0.020 opt (0.646 g/t) gold with 0.050 opt (1.57 g/t) silver. This included a higher-grade interval of 45.8 ft (14 m), from 124.5 ft (37.0m) to 170.3 ft (51.9 m), which averaged 0.029 opt (0.996 g/t) gold. Hydrothermal alteration in the drill hole was observed to be strongest and best developed between 216 ft (65.8 m) to 609 ft (185.6 m). Significant thicknesses of pervasive argillic alteration are associated with faults and factures and in the sandstone dominant zone of the Harmony Formation. Most of the gold intervals are associated with a zone of iron-oxide-silica-clay vein stockwork. Alteration was varied but consisted dominantly of pervasive to vein halos of argillic alteration and silicification, quartz-sericite-pyrite, veining, and hornfels to skarnoid type alteration. A total of 5 core holes were completed. (Bald Eagle Gold website, https://www.baldeaglegold.com/news/)

Turquoise Ridge. Effective July 1, 2019, the Turquoise Ridge Mine became part of the Turquoise Ridge Complex of Nevada Gold Mines, LLC (Barrick Gold Corp. 61.5% and Newmont Corp. 38.5%), with Barrick Gold Corp. as the designated operator. The Turquoise Ridge underground mine and Twin Creek open pit produced 330,000 ounces in 2020, a 2% decrease from 2019. The average grade of the ore mined was 3.42 g/t gold. The mine also produced 56,617 ounces of silver. Under this new arrangement Turquoise Ridge and Twin Creeks were combined and referred to as Turquoise Ridge. Turquoise Ridge produces high-grade refractory (carbonaceous/sulfide) gold ore from an underground operation. The mine is accessed by two shafts and a system of internal ramps, and utilizes underhand drift-and-fill mining methods with cemented rock fill. The mine was hoisting 2,980 tons (2,700 mt) of ore per day. This is expected to increase following the completion of a third shaft that is under construction. This third shaft is a new production shaft located closer to the current mining areas. It will be sunk conventionally to a total depth of about 3,300 ft (1,000 m) and will have the ability to load skips at two levels. The third shaft will be able to hoist over 3,000 tons per day.

Total cash costs were $711/oz, and the all-in sustaining cost per ounce was $798/oz.

Underground mining at Turquoise Ridge has focused on the gold mineralization hosted in the laminated to thinly bedded silty limestone sedimentary units in the hanging wall of the Getchell fault. The mineralization is controlled by stratigraphy, complex faulting, contact zones with igneous dikes, and broad ponding beneath a thick basalt flow. The underground mineralized zone in the hanging wall starts about 1,300 ft (400 m) below the surface and extends northward from the shafts for 1.125 miles (1.8 km) and continues to more than 3,300 ft (1 km) below the surface.

Exploration is now focusing on the area between the Turquoise Ridge underground mine and the Twin Creeks open pit, where Placer Dome intercepted mineralization at depth. No exploration results were released in 2020. Refractory ore from Turquoise Ridge is processed at the Twin Creeks autoclave. (Nevada Gold Mines, LLC, NI 43-

101 Technical Report on the Turquoise Ridge Complex, 3/25/2020; Barrick Gold Corp. Management Discussion and Analysis, 5/8/2019, 8/12/2019, 11/6/2019, 2/20/2020; Barrick Gold Corp. Annual Information Form, 3/25/2020; Barrick Gold Corp. Annual Report, 3/25/2020; Barrick Gold Corp. website, https://www.barrick.com; Newmont Corp. Form 10-K, 2/21/2020; Newmont Corp. website, https://www.newmontgoldcorp.com)

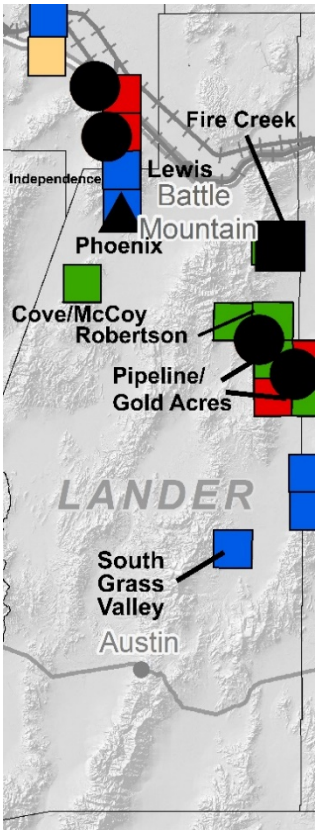
Snowstorm Mountains District

Snowstorm/Goldstorm. Seabridge Gold carried out a 14,744 ft (4,495 m) of reverse circulation drilling in 2020. The program was designed to test magnetotelluric structures in an unexplored area east of previous exploration drilling. Two of the holes intercepted intensely altered intermediate intrusive rocks. Associated with the sheared and altered zones are anomalous gold, arsenic, and silver concentrations. No assays were released. (Seabridge Gold news release, 4/6/2021)

Sulphur District

Hycroft. Hycroft Mining Corp., produced 27,392 ounces of gold at an average grade of 0.014 opt gold and 178,836 ounces of silver at a grade of 0.261 opt from its Hycroft Mine in 2020, nearly triple the amount of gold and silver produced in 2019. Mining was shut down in 2015 after Hycroft Mining Corp. emerged from bankruptcy, and production thereafter was from heap leaching. Mining restarted in April of 2019 with production commencing in August. Presently, the Bay Area, Boneyard, and Brimstone pits are authorized for mining. The most recent mining prior to the 2015 shutdown was conducted from the Bay Area, Brimstone, Central, and Porter pits. Mining is presently only in the Central pit. The ore is crushed and then placed on leach pads while a new pad is under construction. The leached solution then goes to the Brimstone Merrill Crowe processing plant. (Hycroft Mining Corp. Corporate Update Presentation 5/2020; Hycroft Mining Corp. press release, 3/24/2021; Hycroft Mining Corp. website, http://www.hycroftmining.com)

LANDER COUNTY



Battle Mountain District

Independence. Golden Independence Mining Corp. drilled 56 reverse circulation drill holes on its Independence project located on the west boundary of the Nevada Gold Mines' Phoenix Mine property. The drilling should significantly expand the historic oxide resource. Intercepts included: 1) 155 ft (47 m) grading 0.127 opt (3.94 g/t gold); including 5 ft (1.5 m) grading 3.2 opt (99.33 g/t) gold; 2) 45 ft (13.7 m) grading 0.306 opt (9.52 g/t) gold, including 10 ft (3 m) grading 1.1 opt (33.84 g/t) gold; 3) 180 ft (55 m) grading 0.04 opt (1.20 g/t) gold, including 10 ft (3 m) grading 0.25 opt (7.65 g/t) gold; 4) 100 ft (30.5 m) grading 0.052 opt (1.63 g/t) gold, including 10 ft grading 0.274 opt (8.52 g/t) gold; 5) 85 ft (26 m) grading 0.060 opt (1.88 g/t) gold, including 5 ft (1.5 m) grading 0.161 opt (5.01 g/t) gold; 6) 270 ft (82.3 m) grading 0.35 opt (1.10 g/t) gold; 7)160 ft (48.8 m) grading 0.025 opt (0.79 g/t) gold, and 8) 90 ft (27.4 m) grading 0.04 opt (1.24 g/t gold), including 5 ft (1.5 m) grading 0.17 opt (5.26 g/t) gold. Several drill holes intersected significant widths of structurally hosted gold mineralization beneath the oxide zone. (Gold Independence Mining Corp. website: (https://goldenindependence.co/), Golden Independence press releases 12/9/2020 and 12/15/2020)

Lewis. In May of 2020, Gold Standard Ventures Corp. announced an initial mineral resource estimate ("MRE") for its Virgin gold and silver deposit (the "Virgin Deposit") on its 100%-owned/controlled Lewis project in Nevada's Battle Mountain trend.

An Inferred Mineral Resource of 7.74 million tonnes grading 0.027 opt gold (0.83 g/t), totaling 205,800 ounces of gold and grading 0.457 opt (14.22 g/t) silver, totaling 3,537,300 ounces of silver (at a lower cutoff of 0.20 g Au/t) (Table 1).

The Lewis project is a separate and unique exploration project located approximately 100 km west of GSV's flagship South Railroad development project. The Lewis project shares a common land boundary with Nevada Gold Mines' Phoenix active gold-silver-copper mine on the Battle Mountain-Eureka trend. The company believes that the Lewis project's inferred mineral resource estimate at the Virgin deposit is a continuation of the Phoenix-Fortitude mineralization currently being mined by Nevada Gold Mines. Open-pit laybacks for the Phoenix Mine's approved environmental impact statement actually cross onto GSV-controlled ground and may include mining all or portions of the Inferred Mineral Resource. The Lewis project has several known mineralized zones and has the potential for new gold and silver discoveries on the 5,340-acre (2,161 ha) project. The Lewis project was acquired by Gold Standard Ventures as part of its purchase of Battle Mountain Gold Inc. completed on June 14, 2017. (Gold Standard Ventures Corp., news release, 5/5/2020, 5/19/2020; Gold Standard Ventures Corp., NI 43-101 Technical Report, 5/1/2020; Gold Standard Ventures Corp. Management Discussion and Analysis, 12/31/2020; Gold Standard Ventures Corp., website, https://goldstandardv.com)

Phoenix. Effective July 1, 2019, the Phoenix Mine became part of Nevada Gold Mines (Barrick Gold Corp. 61.5% and Newmont Corp. 38.5%), with Barrick Gold Corp. as the designated operator. Nevada Gold Mines, LLC produced 204,878 ounces of gold of which 126,000 ounces were credited to Barrick and 78,878 ounces of which were credited to Newmont. Silver production amounted to 1,169,367 ounces of which 719,160 ounces were credited to Barrick, and 450,206 ounces were credited to Newmont. Copper production amounted 41,957,856 pounds of which 25,804,081 pounds were credited to Barrick and 16,153,774 pounds were credited to Newmont.

Phoenix is a skarn-hosted polymetallic deposit, and about half of the ore is non-refractory. The company noted that brownfield exploration and development for new reserves were ongoing, but no drilling results were released. Brownfields exploration at Phoenix focused on the Box Canyon area at south end of the mine property, where there is an opportunity for oxide leach copper ore. Mining of this oxide mineralization could lead to exposing sulfide at depth.

The mill is the largest semi-autogenous grinding (SAG) mill in the United States and the second largest in North America. It is a multi-stage 48,000-ton (42,500-mt) per day beneficiation facility, with a crushing and grinding circuit; a gravity separation facility; a dedicated cyanide leaching facility for gold and silver; a three-stage flotation circuit for concentrating copper, gold, and silver. This is followed by a filtration system; and a cyanide vat-leaching circuit followed by carbon-in-pulp circuit for beneficiating the remaining ore fraction and production of a precious metal dore through carbon stripping, electrowinning, and retorting. (Newmont Corp. Form 10-K, 2/21/2020; Newmont Corp. website, https://www.newmont.com; Barrick Gold Corp. Annual report, 3/25/2020; Barrick Gold Corp. Annual Information Form, 3/25/2020; Barrick Gold Corp. website, https://www.barrick.com)

Buffalo Valley District

Buffalo Valley. In June, SSR Mining, Inc. acquired the Buffalo Valley property from Fairmile Gold Mining, Inc. The property covers 3,830 acres (1,550 ha), with the pit about 7.5 miles (12 km) south-southwest of the Trenton Canyon pits. Similar to the Robertson deposit, Buffalo Valley is an Eocene intrusion-related gold deposit, where much of the gold is in contact metamorphosed sedimentary rocks and locally in skarn. The property includes an open pit that last produced in 1990. No drilling or other field work was reported in 2020, though the company was reviewing and modeling existing data. (SSR Mining, Inc., news releases 6/27/2019, 5/14/2010; SSR Mining, Inc., Management Discussion and Analysis, 2/20/2020; SSR Mining, Inc., Annual Information Form, 3/19/2020; SSR Mining, Inc., website, http://www.ssrmining.com)

Bullion District

Fire Creek. The Klondex Gold and Silver Mining Co., a subsidiary of Hecla Mining Co., mined 31,800 ounces of gold and 37,400 ounces of silver from its Fire Creek Mine. The ore was trucked 165 miles (264 km) to the Midas mill for processing. There has been a lack of investment in mine development, including in the decline system and horizontal drifts. This has resulted in insufficient platforms, which has hampered efforts to explore new targets for replenishing reserves as they are depleted. The company is limiting near-term mining to areas of completed development. Much of the high grade vein ore has been mined. This resulted in a shift of focus to abundant refractory ore that occurs along structures, typically along the extension of quartz veins that have pinched out.

Mining of refractory ore at Fire Creek in areas with existing development was completed in the fourth quarter with most of the material shipped to a third-party processor by February 2021. The bulk test demonstrated that larger scale, more productive mining methods could be applied successfully to this material. Ground conditions were as good or better than expected and water in the test area was readily managed.

The developed oxide resources at Fire Creek will be depleted in the first quarter of 2021. Mining of a 30,000 ton bulk test of refractory (Type 2) ore occurred in the latter half of 2020. The bulk test demonstrated that larger scale, more productive methods could be applied successfully to this material. Ground conditions were as good or better than expected and water in the test area was readily managed. The bulk test refractory ore is being processed by a third party, through a tolling agreement. While the processing is not yet complete, the recovery information to date is following the grade-recovery curve established through bench testing. Metal prices increased significantly since the tolling agreement was signed, and it is no longer attractive for the third party to displace their own feed to toll. Discussions are underway with another processor. With the developed oxide resource depleted and no immediate alternative for the refractory material, Fire Creek is expected to be placed into care and maintenance in the second quarter of 2021. (Hecla Mining Co. 2020 Annual Report; Hecla Mining Co. website, https://www.hecla-mining.com)

Pipeline Complex. Effective July 1, 2019, the Cortez Mine, which includes the Pipeline Complex, became part of Nevada Gold Mines, LLC (Barrick Gold Corp. 61.5% and Newmont Corp. 38.5%), with Barrick Gold Corp. as the designated operator. Production reported to the State of Nevada is combined with that for the Cortez Hills open pit, which together totaled 421,000 ounces of gold and 34,613 ounces of silver. About 93% of the ore is considered non-refractory.

The Pipeline Complex contains the mill for the non-refractory oxide ore mined at the Cortez operation. The mill includes crushing and grinding facilities, carbon in leach circuits, reagent storage areas and a recovery/refining circuit. Mill throughput varies from 10,430 to 15,000 tons (9,500 to 13,500 mt) per day depending upon the hardness of the ore. The recovery rates per ore type were: 62% for oxide, 74% for mill, and 76% for refractory. The grade and metallurgical character of the ore determine the type of processing. Lower grade run-of-mine oxide ore is heap leached at the existing facilities. Higher-grade non-refractory ore is treated in a conventional mill using cyanidation and the carbon in leach process. Refractory ore is stockpiled on site and trucked 100 miles (160 km) to Goldstrike for processing.

The company received a Record of Decision approving amending the Cortez Gold Mines Operations Area plan of operation to begin mining the Deep South deposit. The amendment also involved modifications at the Pipeline and Gold Acres Complexes. These included deepening the Crossroads pit by 200 ft (61 m); laying back parts of the Pipeline, Crossroads, and Gap pit walls; reconfiguring the currently authorized backfill in the Pipeline and Gap pits; modifying the existing Pipeline/South Pipeline Waste Rock Facility; and expanding the existing oxide ore stockpile. The proposed modifications for the Gold Acres Complex included 1) expanding and deepening the Gold Acres pit and developing three satellite pits (Alta, Bellweather, and Pasture); 2) expanding the Gold Acres South Waste Rock Facility; 3) combining the Gold Acres North and Gold Acres East waste rock facilities into one facility. It also includes bringing oxide ore from the South Arturo Mine to the Pipeline mill for processing. (Nevada Gold Mines, LLC, NI 43-101 Technical Report on the Carlin Complex, 3/25/2020; Barrick Gold Corp. LLC, NI 43-101 Technical Report, 3/22/2019; Barrick Gold Corp. Management Discussion and Analysis, 2/20/2020; Barrick Gold Corp. 2020 Annual report; Barrick Gold Corp. 2020 Annual Information Form, 3/19/2021; Barrick Gold Corp. website, https://www.barrick.com)

Robertson. Nevada Gold Mines carried out a major core-drilling program at its Robertson project, which is part of the Cortez Mine Complex. Robertson is an Eocene intrusion-related gold deposit, located about 4.3 miles (7 km) north of the Pipeline-Crossroads open pit. Besides gold, there is minor silver and molybdenum. Much of the gold occurs as native gold that occurs with pyrite and arsenopyrite in quartz veins and biotite veinlets and disseminations in the intrusion. Most of the gold occurs in contact metasedimentary rocks and skarn along the margin of the intrusion. An indicated resource was declared in 2020 of 1.1 Moz of gold at a grade of 0.020 opt (0.63 g/t) gold and an inferred resource of 930,000 ounces at a grade of 0.012 opt (0.4 g/t) was released. Barrick intends on exploring the area between Robertson and the Pipeline/Crossroads open pit. (Barrick Gold Corp. Management Discussion and Analysis, 2/20/2020; Barrick Gold Corp. 2020 Annual report; Barrick Gold Corp. 2020 Annual Information Form, 3/19/2021; Barrick Gold Corp. website, https://www.barrick.com)

Swift. Ridgeline Minerals Corp. drilled three, wide-space diamond drill core holes totaling 7,917 ft (2,413 m) in 2020 at its Swift project located west northwest of the Pipeline open pit near the inactive Elder Creek open pit. Drill holes SW20-001 and SW2-002 successfully confirmed Ridgeline's re-interpreted geologic model and intersected several intervals of Carlin-style mineralization and anomalous alteration with individual assays of up to 0.007 opt (0.22 g/t) gold, 27 opt (860 g/t) silver and 392 ppm arsenic. (Ridgeline Minerals Corp. news release 1/13/2021.)

Callaghan Ranch District

South Grass Valley. Nevada Gold Exploration (NGE) carried out drill programs at five targets at its South Grass Valley project. At the Waterfall target, NGE completed a NE-SW fence of three RC drill holes (SGVR004, SGVR009, and SGVR010) along the northwestern edge of the target, for a total of 3,169 ft (966 m). The three holes encountered a thick section of the projected favorable carbonate host

rocks, including the Clm unit, above large areas of the Grass Valley stock, which confirms their up-dip projection to the west. While the holes did encounter anomalous Carlin-type gold deposit (CTGD) pathfinder geochemistry, the concentrations at Waterfall are considerably lower and less consistent than those drilled at Freddie and Golden Gorge to the east, and are associated with much weaker alteration features. Furthermore, the results of the more-detailed 3D groundwater sampling provided by the RC drilling also show that the high concentrations of gold in groundwater seen in the Golden Gorge area do not continue this far west to Waterfall.

The Golden Gorge target is located to the east of the Grass Valley stock, where NGE's earlier core drilling confirmed the presence of anomalous gold and CTGD pathfinders within silicified and marblized breccias along the intrusive margin. The target is supported by the coincident alignment of the highest gold-in-groundwater concentrations seen at the project, which closely map the interface between the lower-plate bedrock units and the intrusion. NGE's objectives for the RC drilling program were to establish the extent of and test for mineralization within the hornfels aureole on the east flank of the intrusive, as well as to test the western, up-dip extension of favorable alteration and geochemistry features seen in the earlier drilling.

NGE completed seven RC drill holes at the Freddie target area for a total of 4,823 ft (1,470 m). With these holes, NGE was specifically aiming to accurately establish the edge of the intrusive, and then to sample the lower-plate bedrock units along its margin. Additionally, with an improved understanding of importance of the Clm unit based on the drilling results at Freddie, NGE was also aiming to complete the RC drill holes at the Golden Gorge target that were deep enough to sample this unit. NGE began drilling at the western edge of the target, moving eastward. Four of the westernmost holes proved to be located on top of the granite. The other three drill holes (SGVR006, SGVR015, and SGVR016) successfully entered and sampled lower-plate bedrock along the intrusion, with SGVR006 and SGVR015 exhibiting significant hornfels.

In terms of testing for mineralization within the hornfels aureole, while the shallower-than-expected drill holes only sampled a portion of this vertical zone, they encountered significant silicification associated with highly-anomalous Carlin-type pathfinder geochemistry, which most notably included a 170-foot (52 m) interval in SGVR015 averaging 200 ppm arsenic and 145 ppm antimony.

Altogether, the gold and Carlin-type pathfinders in the bedrock and groundwater samples from the RC drilling at Waterfall show significantly lower concentrations compared to those seen to the east. With the improved understanding of the geology at Waterfall it appears that the favorable lower-plate host units at Waterfall were likely separated from hydrothermal fluid flow from the east.

In summary, the RC drilling results do not support additional work in this area. Rather, the results at Waterfall, notably the major contrast in terms of gold and pathfinder concentrations between Waterfall and Golden Gorge, further emphasize the importance of establishing the edge of the intrusion, which marks the boundary between the two target areas, in understanding the controls for mineralization across the project.

At Waterfall, the first-cycle drilling confirmed the presence of a thick section of favorable carbonate host rocks above the Grass Valley stock, and NGE is now completing logging and is waiting for full assays to test for evidence of Carlin-type gold deposits.

At Freddie, initial drilling confirmed that the large Carlin-type hydrothermal system encountered in earlier drilling extends another kilometer to the WNW; however, only one drill hole, located at the western edge of the target, was completed deep enough to test the targeted lithologic units. Assays from this western drill hole, while still highly-anomalous, show decreasing gold and pathfinder budgets, and accordingly, for the second stage of drilling, the company will be looking to complete a series of deeper drill holes back towards the east. (Nevada Exploration, Inc., news release, 5/27/2020 Nevada Exploration, Inc., website, https://www.nevadaexploration.com)

Cortez District

Cortez Hills. Effective July 1, 2019, the Cortez Hills open pit and underground mines at Barrick Gold's Cortez Mine became part of Nevada Gold Mines, LLC (Barrick Gold Corp. 61.5% and Newmont Corp. 38.5%), with Barrick Gold Corp. remaining as the designated operator. Barrick Gold Corp. produced 543,335 ounces of gold and 35,754 ounces of silver from its Pipeline and Cortez Hills open-pit mines. Barrick Gold Corp. also produced 362,821 ounces of gold and 30,800 ounces of silver from its Cortez Hills underground mine. The processing is done at Pipeline Complex oxide mill facility and at the Mill 6 roaster at the Goldstrike facility, which processes refractory ore. Mining at the Cortez Hills open pit ended during the first quarter of 2019. Underground mining is expected to last through 2031.

Mineralization remains open at depth. Cortez Hills consists of the Breccia, Middle, Lower, Renegade, and Deep South zones, and the Pediment deposit. The mineralization extends up to about 4,250 ft (1,300 m) along strike with a maximum width of about 1,380 ft (420 m). The mineralized zone starts about 390 ft (120 m) below surface and continues down to a depth of more than 2,000 ft (600 m), where it remains open at depth. Exploration to fully delineate the extent of the Cortez Hills deposit is ongoing.

Capital expenditures in 2019 were $255,000,000. This included $90,000,000 for sustaining the mine site and $165,000,000 on projects. The Deep South project involves underground development of the Cortez Hills Lower zone and construction of the Rangefront twin declines. The Deep

South zone is a -20° southeast plunging extension of the Lower zone, which extends 2,100 ft (640 m) along strike. It will be mined down to the 3,050-foot (930-m) level. It consists of an upper section that averages 180-ft (55-m) wide and 120-ft (37-m) thick, a central section that averages 200-ft (61-m) wide and 85-ft (26-m) thick, and a lower section, known as Renegade, which averages 120-ft (37-m) long by 160-ft (49-m) wide and 120-ft (37-m) thick. Initial production is anticipated in 2022 or 2023.

The company received a Record of Decision approving amending the Cortez Gold Mines Operations Area plan of operation to begin mining the Deep South deposit. The modifications for the Cortez Hills Complex included expanding the existing underground operations by increasing the depth of mining by 1,300 ft (406 m); constructing additional surface support facilities for the underground operations; extending the Pediment portion of the Cortez Hills pit to create the Pediment East and Pediment South extensions; potentially backfilling the Cortez Hills pit with approximately 63,000,000 tons (57,000,000 metric tons) of waste rock; and constructing a new refractory ore/oxide ore stockpile. The modifications also included expanding and deepening the old Cortez pit by about 200 ft (61 m) and backfilling the northern portion of the Cortez pit and the Ada pit with about 63,000,000 tons (57,000,000 metric tons) of waste rock. (Nevada Gold Mines, LLC, NI 43-101 Technical Report on the Carlin Complex, 3/25/2020; Barrick Gold Corp. Annual report, 3/25/2020; Barrick Gold Corp. Annual Information Form, 3/25/2020; Barrick Gold Corp. website, https://www.barrick.com)

McCoy District

McCoy-Cove. Premier Gold Mines, Ltd., spent $4,200,000 on its McCoy-Cove property. In 2018, Barrick Gold Corp. signed an option agreement with Premier Gold Mines, Ltd., whereby the former could acquire a 60% interest in the McCoy-Cove property. The latter would retain a 100% interest in the Cove deposit part (a.k.a. Cove Carve Out), which includes the Helen, Gap, and CSD deposits. The agreement called for Barrick Gold Corp. to spend $6,000,000 on exploration by June 30, 2019, and another $16,500,000 on exploration by June 30, 2022. Barrick conducted exploration work, including drilling, but terminated the agreement in early 2020.

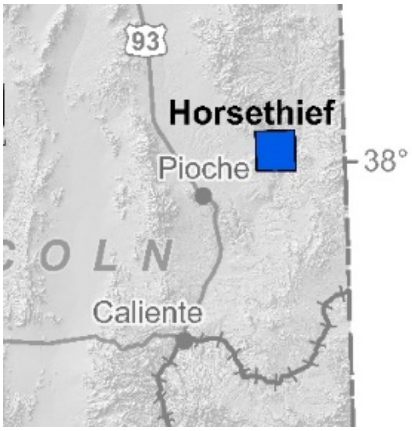
In 2020, Premier drilled 13 holes, two just north of the Cove open-pit and 6 holes southwest of the pit. Five holes were drilled on the Pediment east of the open pit on the Davenport and Lakeside targets, which have lacked substantial drilling. Most drilling in these areas consist of shallow condemnation holes drilled by Echo Bay. A large magnetic high is present at Davenport directly east of the open pit and was drill tested in 2020. Results indicate the magnetic high is a large granodiorite sill. Mesozoic sedimentary rocks are present beneath the granodiorite. Two deep holes drilled at Davenport in 2020 intersected long intervals of geochemically anomalous Carlin-style altered rock. In addition, one hole intersected polymetallic 2201-style mineralization in the Dixie Valley formation. The pediment remains a large, underexplored area on the property capable of containing a large Carlin-style ore body.

On December 16, 2020, Equinox Gold Corp. and Premier Gold Mines Limited announced that the companies entered into a definitive agreement whereby Equinox Gold will acquire all of the outstanding shares of Premier. Concurrently, Premier will spin-out to its shareholders, shares of a newly created US-focused gold production and development company to be called I-80 Gold Corp., and will own the South-Arturo and McCoy-Cove properties and will complete Premier's previously announced acquisition of the Getchell project, all in Nevada.

In January of 2021, I-80 Gold released a preliminary economic assessment of the Cove project. The assessment was based on a gold price base case of $1400/oz and a silver base case of $17/oz. The mine life is estimated to be 8 years. The maximum mining rate is estimated to be 1,222 tons/day. The average gold grade is estimated to be 0.303 opt. The average gold recovery that was used was estimated to be 79% using a roaster and 85% using an autoclave. The total recoverable gold is estimated to be 743,000 ounces. Capital spending over the life of the project is subdivided into three categories. Pre-development spending of $23.9 million encompasses portal construction, exploration decline and drill platform development, delineation drilling, baseline data collection, engineering, and permitting. Construction capital is required for Helen and Gap dewatering, infrastructure and mine development and is projected at $81.9 million over a two-year period commencing in 2024. The cash cost is estimated to be $859/oz and all-in cost is estimated to be $1058/oz. The project after tax net present value is estimated to be $178 million. The projected after tax internal rate of return is estimated to be 36%. The payback period is estimated to be 4.5 years.

Gold recovery will total 743,000 ounces over the eleven and one-half-years of mine production. Material mined for processing averages 0.303 Au opt (9.4 g/t) gold. Full production is reached two years after construction start and averages 1,180 tpd from 2027 through 2033. (Premier Gold Mines, Ltd., Annual Information Form, 3/30/2020; Preliminary Economic Assessment of the Cove Project, Lander County, Nevada, 1/25/2021; Premier Gold Mines, Ltd., website, http://www.premiergoldmines.com)

LINCOLN COUNTY



Pioche District

Horsethief. Alianza Minerals completed a 9,213-ft (2,808-m), 10-hole reverse circulation drilling program over 2.2 square miles (3.5 square km) at the Horsethief Gold property, located northeast of Pioche in Lincoln County. The 2020 drilling followed a successful 2019 drill program that included detailed mapping focused on lithology, structure and alteration of the prospective limestone and dolostone stratigraphy exposed at Horsethief. Signficantly, based on lithological and characteristics and fossil identification, this work confidently assigned the stratigraphic ages ranging from upper Cambrian to lower Ordovician. The carbonate locally hosts jasperoid bodies.

Anomalous gold results over broad intervals from jasperoids developed within Ordovician limestone or dolomite including: 0.004 opt (0.13 g/t) Au over 12.2m and 0.003 opt (0.11 g/t) Au over 19.9m in 20HT-003. Broad intervals of altered/oxidized and weakly anomalous gold mineralized limestone and dolostone at the Cambrian/Ordovician contact with associated pathfinder elements. Broad weakly anomalous gold intervals are associated with a pathfinder element suite of anomalous Mo –Pb–As –Sb+Hg+Mn±Cu±Zn±Te±Bi. Anomalous gold and pathfinder element halos can range from 10 m to 100 in thickness and are often at limestone–dolostone transitions, jasperoid development and at the Cambrain/Ordovician contact. (Alianza news releases 7/2/2020, 8/6/2020, 10/22/2020; Alianza website: https://alianzaminerals.com)

LYON COUNTY

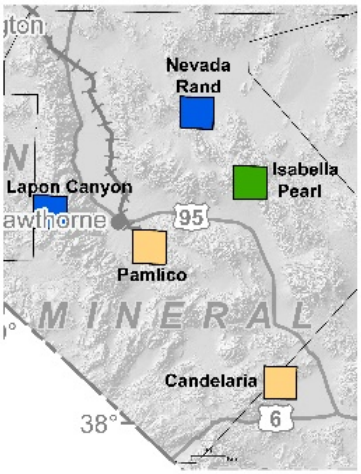
Yerington District

Pumpkin Hollow. Nevada Copper produced 2,667,827 pounds of copper in 2020, along with 10,757 ounces of silver and 293 oz of gold. Geotechnical stability boundaries and properties of significant portions of the underground East North orebody were verified by underground drilling and development drifting. As expected, the resulting geotechnical modeling has confirmed the stability of the East North ore body.

Work to optimize the mine plan for the Underground project to account for the different stope sizes, and related the geotechnical constraints for each area, is continuing and was expected to be completed early in the second quarter of 2021. During 2020 and in early 2021, the company entered into a number of financing transactions to fund the development of the Underground project and to improve its capital structure. Midway through 2020 the company completed the deepening of the Main shaft to its final depth.

Further to this strategy, the company staked a highly prospective land package in 2020 covering approximately 680 acres (275 ha) immediately contiguous to its existing Pumpkin Hollow property and along the eastern boundary of the Tedeboy area. Review of historical aeromagnetic survey data, along with anomalous copper mineralization in surface grab samples, confirmed the prospectivity of this newly acquired property. The company continues to advance its high-priority targets in accordance with cash availability. (Nevada Copper Corp. news releases, 1/16/2020; Nevada Copper Corp. Management Discussion and Analysis, 3/31/2020; Nevada Copper Corp. Annual Information Form, 5/15/2020; Nevada Copper Corp. NI 43-101 Technical Report, 1/21/2019; Nevada Copper Corp. website, https://www.nevadacopper.com)

MINERAL COUNTY



Aurora District

Aurora. In 2020 Klondex Aurora Mines, Inc., a subsidiary of Hecla Mining Co. focused on an exploration potential data review of the district followed by hyperspectral, LiDAR, airborne magnetic/radiometric, gravity, and CSAMT geophysical surveys of the property. In 2021, Hecla decided its exploration focus at Aurora to be focused on detailed mapping, sampling, and alteration mineral spectroscopy to follow up on targets generated by the review and surveys generated in 2020. The property consists of 448 unpatented lode claims, 92 patented claims, and 944 acres (382 ha) of private property covering about 9,928 contiguous acres (4,018 ha). (Elko Hecla Mining Co., Management Discussion and Analysis, 5/7/2020; Hecla Mining Co. 10-K Report, 2/10/2020; Hecla Mining Co. website, https://www.hecla-mining.com)

Borealis District

Borealis. Borealis Mining Co., LLC, produced 310 ounces of gold and 896 ounces of silver from its Borealis oxide heap leach mine. Borealis Mining Co., LLC, was a subsidiary of Gryphon Gold Corp. and is managed by Elko Mining Group, LLC. The operation leached material from existing heap leach pads. No drilling or other exploration work has been reported since 2012. (Nevada Division of Minerals website: https://minerals.nv.gov/Programs/Mining/Mining/)

Candelaria District

Candelaria. Silver One Resources, Inc., commenced a 49,213 foot (15,000 m) drill program in October of 2020. Twenty-five holes were successfully finished, including repeats of five incomplete holes that were abandoned due to technical drilling problems before reaching their targets. The holes drilled and the assays of 13 holes received have expanded the down-dip mineralization an additional 820 ft (250 m) to the north at Mount Diablo and an additional 328 ft (100 m) to the north-northeast of the Northern Belle pit. Drilling is continuing to confirm areas of additional mineralization and to acquire material for ongoing metallurgical studies. Highlights included 0.033 opt (1.032 g/t) silver over 10 ft (3.05 m) within a 40 ft (12.2 m) zone averaging 13 opt (407 g/t) silver and 0.017 opt (0.55 g/t) gold in drill hole SO-C-20-59. Another significant intercept was 407 g/t silver and 0.5 g/t gold over 20 ft (6.1 m) within a 30 ft (9.1 m) zone averaging 9.5 opt (295 g/t) silver and 0.013 opt (0.4 g/t) gold in drill hole SO-C-20-60.

Silver-bearing mineralization is hosted by quartz stockworks along the Lower Candelaria Shear Zone and Pickhandle Gulch thrust fault emplaced during early Cretaceous regional thrust faulting. Several types of veining are present, but the only type known to be of economic importance is mineralized fault zones hosting pyrite and sphalerite and minor galena, chalcopyrite and arsenopyrite in a gangue of altered country rock consisting of quartz and dolomite. Sericitization, silicification and pyritization are common.

The company conducted metallurgical testing on the historic leach pads. The results showed that up to 75% of the total silver contained in composite samples can potentially be recovered by reprocessing the material using very fine grinding in combination with microbubble technology. This is an increase of more than 47%–79% over historic production recoveries. (Silver One Resources, Inc., NI 43-101 Technical Report, 8/6/2020; Silver One Resources, Inc., news releases, 5/21/2019, 7/25/2019, 11/7/2019, 11/18/2019, 3/2/2020; Silver One Resources, Inc., Management Discussion and Analysis, 4/16/2020; Silver One Resources, Inc., website, https://www.silverone.com)

Mount Grant District

Lapon Canyon. Walker River Resources Corp. carried out a major drill program in 2020. At least 53 reverse circulation holes were drilled in 2020. The December 2020 drill program was designed to ascertain granite contacts and their relationships with the altered gold-mineralized alteration zones.

The initial results from the 2020 drill program expanded the gold mineralization at Lapon Canyon, further define the direction and dip of the higher-grade structures and discovered gold mineralization in areas previously unknown to carry gold (i.e. unaltered granite). The December 2020 drill program was designed to ascertain granite contacts and their relationships with the altered gold-mineralized alteration zones. Drill holes LC 20-50 to 53 unexpectedly returned significant gold mineralization and thicknesses, further demonstrating the potential to increase the widths of known mineralization. Hole LC20-53 returned 0.033 opt (1.04 g/t) gold over 195 ft (59.5 m), at a depth starting at 25 ft (7.6 m). Hole LC20-50 returned 0.046

opt (1.42 g/t) gold over 45 ft (13.7 m), at a depth of starting at 39 ft (12 m).

The 2021 drill program will continue to target the higher-grade trends and expand the new gold mineralization previously discovered at the 8,800-foot (2,682-m) elevation, at the Honeypot, and other targets.

The 2020–2021 drill programs at Lapon Canyon consisted of systematic drilling on section for geological modeling purposes, as well as exploration drilling to discover new gold mineralization and extend known gold mineralization. (Walker River Resource news release, 4/27/2021)

Pamlico District

Pamlico. Newrange Gold Corp. drilled 110 reverse circulation core holes at its Pamlico project in 2020. Hole P20-82 in the Merritt zone of the Pamlico project intersected near surface oxide gold mineralization averaging 0.43 opt (14.85 g/t) gold and 0.104 opt (3.57 g/t) silver over the 30 ft (9.15 m) from 175 ft (53.35 m) to 205 ft (62.5 m). This mineralized zone contained a high-grade core returning 1.0 opt (34.11 g/t) gold Au and 0.223 opt (7.64 g/t) silver and lies within a larger 105 ft (32 m) interval assaying 0.14 opt (4.74 g/t) gold and 0.07 opf (2.25 g/t) silver from 145 ft (44.2m) to 250 ft (76.22 m). Hole P20-82 also intersected a shallower zone of mineralization averaging 0.032 opt (1.10 g/t) gold and 0.107 opt (3.67 g/t) silver over the 30 ft (9.15 m) interval from 75 ft (22.86 m) to 105 ft (32 m). A second hole, P20-83, expanded this oxide gold mineralization to the southeast with an intercept from 15 ft (4.57m) to 35 ft (10.67 m) averaging 0.014 opt (0.484 g/t) Au and 0.133 opt (4.57 g/t) silver. Hole P20-82, in particular, expands the footprint of high-grade mineralization by filling in an important gap between older adjacent holes.

To test the same or similar horizon as hosts mineralization in the Merritt zone and Pamlico Ridge will require drilling from on top of the ridges to either side of the canyon. Holes P20-92, 93, 94 and 95 were drilled to the southeast and hole P20-96 was drilled to the northwest, all at a -45 degree inclination and specifically targeted mineralization in northeast striking gold-bearing structures exposed in underground workings and at surface, where sampling returned values ranging from 0.6 to >0.6 opt (20 g/t). Hole P20-94 was lost in a large breccia zone at 205 ft (62.5 m) and could not be completed. Hole P20-97 was drilled to the southwest at an inclination of 45 degrees to test a large northwest-striking, southwest-dipping high-angle fault zone that had returned gold assays from 0.344 opt (11.8 g/t) to more than 0.470 opt (16.1 g/t) in grab samples from exposures in prospect pits and underground workings. Unfortunately, the hole was lost in the large breccia zone before reaching its target.

Drilling results indicate that a relatively flat-lying zone of gold mineralization exists near surface, as evidenced by intercepts in holes P20-93, 96 and 98, all of which correlate with previously drilled hole P20-65. While these intercepts average approximately 0.003 opt (0.1 g/t) gold, they are above 164 ft (50 m) depth and require follow-up drilling. It is interpreted that this zone correlates with the gold mineralization in the underground workings and that holes P20-92, 94 and 95 may have drilled underneath this horizon. The zone appears to dip shallowly to the east and a series of vertical holes will be required to further test the continuity of the mineralization.

The company is expanding the drill pattern in this and other areas of the property including step outs on hole P17-10, the highest grade hole in the company's 2017 program that contained multiple high-grade intercepts, including 20 ft (6.1 m) averaging 2.85 opt (97.94 g/t) gold as announced June 19, 2017. Road construction will commence shortly to drill test the upper Good Hope Mine at a similar rhyolite/latite contact zone, where underground channel sampling has identified consistent high-grade results, including 131 ft (40 m) averaging 0.405 opt (13.89 g/t) gold and 2.1 opt (71.19 g/t) silver in the 5690 level of the mine as announced May 14, 2020. The company is also conducting follow-up drilling of hole P20-65 that returned 15 ft (4.6 m) of 0.016 opt (0.535 g/t) gold from surface with additional highly anomalous gold mineralization at depth in Gold Box Canyon. Similar rhyolite/latite contact zones are exposed throughout the canyon and have been heavily prospected by artisanal miners in the past with production evident in three separate series of mine workings. (Newrange Gold Corp. news releases, 1/12/2021, 7/30/2020, 9/21/2020, 10/13/2020; 11/12/2020)

Rand District

Nevada Rand. Goldcliff Resources commenced its first drill program at its Nevada Rand project in the second half of 2020. A total of 7 reverse circulation holes were drilled (2,281 ft/695.2 m). Hole RD-7, the final hole of the program intersected a broad zone of disseminated gold mineralization. A 21-ft (6.4-m) zone averaged 0.008 opt (0.28 g/t) gold with all but two samples ranging from 0.005 opt (0.18 g/t) to 0.035 opt (1.19 g/t) gold. The zone began at a downhole depth of 220 ft (67.06 m). (Goldcliff Resource Corp. news releases, 5/6/2020)

Rawhide District

Denton-Rawhide. Rawhide Mining, LLC, produced 24,078 ounces of gold and 159,049 ounces of silver from its wholly-owned Denton-Rawhide Mine. In 2018, the BLM approved a proposal by Rawhide Mining, LLC, to amend its plan of operation to expand existing facilities at the Denton-Rawhide Mine site and to expand its mining operation onto the Regent property, also referred to as the Regent Hill property. On the Regent property, two open pits (Regent and East Regent), a waste rock storage facility, a stockpile area, and support facilities would be constructed. The

company began mining operations on the Regent property during the second quarter of 2019 with the mineralized material being processed at the company's Rawhide Mine facility 1.5 miles away.

At the Rawhide Mine site, the amendment calls for one waste rock storage facility to be expanded and another one would be mined with the material being placed on the leach pads. Three heap leach pads and two process ponds would be constructed. Exploration will be permitted on targets in the Western Exploration target area referred to as the North Buckskin project, the Toiyabe project, the Black Eagle project, and the Chicago Gulch project. These targets are also on the Buckskin-Rawhide East property, which is being leased by Rawhide Mining, LLC, from Emgold Mining Corp. No information on exploration activity in 2020 was released. (U.S. Bureau of Land Management, Environmental Assessment, DOI-BLM-NV-C010-2018-0015-EA 7/2018; U.S. Bureau of Land Management, Decision Record, DOI-BLM-NV-C010-2018-0015-EA 8/2018; Ely Gold Royalties, news release, 12/18/2019; Ely Gold Royalties, website, https://elygoldinc.com; Emgold Mining Corp., website, https://emgold.com)

Santa Fe District

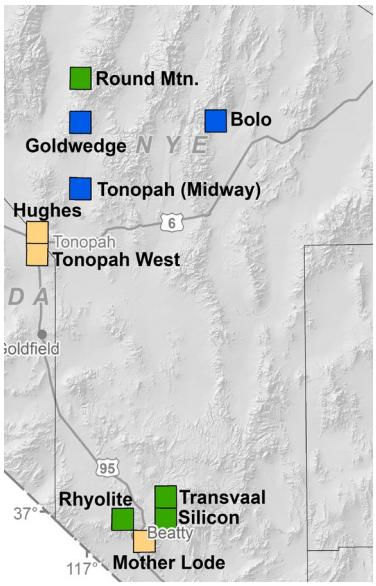
Isabella Pearl. On December 31, 2020, Gold Resource Corp. completed the spin-off of its wholly-owned subsidiary, Fortitude Gold Corporation and its subsidiaries ("FGC"), into a separate, public company. Prior to the spin off of Fortitude Gold Corp. on December 20th, 2020, Gold Resource Corp. produced 28,542 ounces of gold and 26,961 ounces of silver from the Isabella Pearl Mine. The all-in sustaining cost was $1,049 per ounce of gold.

The Isabella Pearl Mine is located in the central portion of the Walker Lane Mineral Belt, a major northwest-trending zone on the western border of Nevada characterized by a series of closely spaced dextral strike-slip faults that were active throughout much of the middle to late Cenozoic period. Volcanic rocks of middle Tertiary age cover much of the property and include intermediate lava flows and ignimbrite ash-flow sheets. The volcanic rocks unconformably overlie Mesozoic strata including Triassic and Jurassic sedimentary units and Cretaceous and Jurassic igneous units. Within the regional Walker Lane tectonic setting, several major fault zones trend through the property and are dominated by various splays and offset branches that host the gold mineralization in the area.

The gold-silver mineralized zones mainly include the Isabella, Pearl, and Civit Cat deposits, collectively referred to as the Isabella Pearl deposit. Alteration and mineral assemblages at Isabella Pearl, including widespread argillic alteration and generally abundant alunite, suggest the deposits belong to the high-sulfidation class of epithermal mineral deposits. K-Ar age determinations indicate the mineralization is about 19 Ma, about 7 to 10 million years younger than the age of the host rocks. This early Miocene age conforms with the age of other high-sulfidation epithermal precious-metal deposits in the Walker Lane (e.g., Goldfield and Paradise Peak).

The property covers 494 mining claims comprising 9,000 acres (3,642 ha). The mine has an estimated life of about 4.5 years. Mid-Tertiary volcanic rocks cover much of the property and consist of intermediate lava flows and ignimbrite ash-flow sheets. Several major fault zones trend through the property and are dominated by various splays and offset branches that host the gold mineralization in the Tertiary rocks. No exploration drilling results from 2020 were released. (Gold Resource Corp. news releases, 1/29/2020; Gold Resource Corp. Form 10-K, 3/2/2020; Gold Resource Corp. website http://www.goldresourcecorp.com)

NYE COUNTY



Bare Mountain District

Mother Lode. Corvus Gold, Inc., drilled 38 holes during its fiscal year (June 2019–May 2020) at Mother Lode under a BLM Notice for a total drilling of 63,780 ft (19,440 m). Sixteen of the holes were drilled as core-tails, RC drilled and cased to between 394–984 ft (120–300 m) and then cored to total depths of 1,968–2,297 ft (600–700 m). A total of 30,932 ft (9,428 m) of core were produced from the core-tail drilling.

Drilling in 2020 at the north end of the Mother Lode deposit intersected a previously unknown new high-grade zone that extends from the Main zone down into the Central Intrusive zone (CIZ target). The first core hole, ML20-159CT, intersected 275 ft (83.9 m) grading 0.079 opt (2.7 g/t) gold and 0.20 opt (6.8 g/t) silver, including 42 ft (12.7 m) grading 0.25 (8.5 g/t) gold and 0.89 opt (30.4 g/t) silver. This new high-grade "feeder" is not part of the previously announced mineral resource estimate and represents a new expansion of the Mother Lode deposit.

The discovery of the new northern high-grade feeder zone appears to be directly related to a dike swarm and associated breccia zone, where hole ML20-159CT has a 6.4 ft (1.96 m)-wide dike/breccia intercept that assayed 0.914 opt (31.34 g/t) gold.

The gold mineralization is Miocene in age and is hosted in a series of shallowly dipping, tuffaceous volcanic sediments and sills as well as the underlying limestone of the Silurian to Devonian Roberts Mountain formation. The mineralization is controlled by a series of high angle, north-northwest-trending structures hosting Miocene dikes and sills and the east-northeast-trending, north-dipping, Fluorspar Canyon detachment fault. The intersection of these two main structural trends resulted in a large damaged zone, opening the way for the intrusive activity thought to be genetically related to the gold system. The north-northwest-trending structural zones host higher grade mineralization in excess of 0.088 opt (3 g/t) gold over widths of 33 ft (10 m) and 130 ft (40 m).

In addition, initial results from Corvus' first follow-up hole at its new Lynnda Strip discovery were returned, a new deposit that will be integrated into the overall Mother Lode mine plan. The initial follow-up RC drill hole from the Lynnda Strip discovery was encouraging with two separate thick oxide intercepts. Hole ML20-168 has an upper intercept of 160 ft (48.8 m) grading 0.026 opt (0.90 g/t) gold, including 55 ft (16.8 m) grading 0.054 opt (1.86 g/t) gold and a lower intercept of 350 ft (106.7 m) grading 0.020 opt (0.71 g/t) gold, including 54.5 ft (16.6 m) grading 0.99 g/t gold and 50 ft (15.2 m) grading 0.078 opt (1.31 g/t) gold ending in mineralization. Further follow-up core holes identified multiple intercepts with strong quartz stockwork veining and a deeper extent of the gold system. (Nevada Mineral Industry MI-1990; Corvus Gold Inc., news releases, 3/19/2019, 4/3/2019, 6/3/2019, 6/11/2019, 11/7/2019, 12/5/2019, 1/14/2020, 1/30/2020; Corvus Gold Inc., NI 43-101 Technical Report, 10/7/2020; Corvus Gold Inc., Form 10-K, 8/9/2019, 8/13/2020; Corvus Gold Inc., website, http://www.corvusgold.com)

Silicon. At Silicon, the Plan of Operations was approved during Q3 2020, and earthworks started for the construction of pads and roads throughout the central Silicon project area. One RC hole was completed to 1,181 ft (360 m) before drilling was stopped. Drilling was restarted in October, with a total of 31,916 ft (9,728 m) of combined diamond and RC drilling completed during the second half of 2020. Core drilling also began at the Merlin target in the southern Silicon project area during the period. No drill results were released.

The project area contains extensive exposures of a shallow acid-sulfate steam-heated alteration cap over the upper portions of a low-sulfidation, epithermal gold system. The property sits on the southwestern margin of the Timber Mountain caldera, and may be underlain by a basement high according to gravity data and the regional geology. The rocks are mainly Miocene volcanic tuffs, much of which have undergone acid leaching, which variably altered them to alunite, kaolinite, chalcedony, opal, and residual silica. Mercury mineralization occurs locally in the steam-heated acid-sulfate cap as cinnabar-bearing chalcedony, opal, and acid-leached residual silica. Local mines include the Silicon Mine, which produced some ceramic silica, and the Thompson Mine, which produced 72 flasks of mercury prior to 1943 and a small amount in the mid-1950s.

The company acquired full interest minus a 1% net smelter return royalty to the Silicon Project consisting of 277 claims covering 5,700 acres (2,307 ha) from Orogen Royalties. The company also owns a further 1,414 claims covering 29,215 acres (11,823 ha) under its own name. (2020 AngloGold Ashanti, Annual Report, 3/20/2021, [Anglo Gold Ashanti website: https://www.anglogoldashanti.com/])

Sterling/Crown Block. In 2020, expansion drilling expenses incurred by Coeur Mining Inc. were $8.9 million. Expensed expansion drilling consisted of 111,000 ft (33,850 m) testing areas around the Sterling/Crown project mineralization in the Crown Block, including Daisy, Secret Pass, and SNA, and discovery of the new C-Horst zone. Capitalized conversion drilling consisted of 13,000 ft (3,950 m) within the Sterling Mine area.

Step-out drilling at both Sterling and Crown has discovered new mineralized zones: (i) El Portón, located to the northeast of the historic Sterling mining area and (ii) C-Horst, located in the northernmost portion of the Crown Block. The new discoveries exhibit oxide-leach characteristics based on initial metallurgical test work and cyanide-fire assay results. C-Horst is likely the southern extension of the Anglo-Ashanti Gold's Silicon epithermal system located to the north. Key highlights include: 1) El Portóno: Hole STR20-018 returned 380 ft (115.8 m) of 0.09 opt (3.0 g/t) gold from 585 ft (178.3 m) drill depth, and Hole STR20-032 returned 250 ft (76.2 m) of 0.04 opt gold (1.4 g/t) from 660 ft (201.2 m) drill depth. 2) C-Horst: Hole CH20-007 returned 320 ft (97.5 m) of 0.04 oz/t (1.4 g/t) gold from 540 ft (164.6 m) drill depth, and Hole CH20-008 returned 265 ft (80.8 m) of 0.03 oz/t (1.1 g/t) gold from 535 ft (163.1 m) drill depth. (Coeur Mining, Inc., news releases, 5/1/2019, 8/7/2019, 11/4/2019, 12/17/2019, 2/18/2020; Coeur Mining Inc. 2020 Annual Report; Coeur Mining, Inc., website, https://www.coeur.com)

Bullfrog District

Rhyolite. Anglo Gold Ashanti N.A. completed 30,440 ft (9,278 m) of reverse circulation and diamond drill core drilling at its Rhyolite project, located north of the Bullfrog open pit. No results were released. (Anglo Gold Ashanti website: https://www.anglogoldashanti.com/)

Manhattan District

Goldwedge. The Goldwedge deposit lies within the Walker Lane Gold Belt and is situated on the southern periphery of the Manhattan caldera, approximately 9.9 miles (16 km) south of the Round Mountain Mine. Scorpio Gold Corp. owns 100% of Goldwedge. The Goldwedge deposit exhibits several styles of gold mineralization from fault breccia and vein-hosted to stratabound replacement style in limestone and in pervasive quartz-sericite-pyrite alteration.

The 2020 drilling program was focused on resource definition in areas where the company's 2014 surface drilling intersected higher-grade mineralization proximal to existing underground workings. The drilling program utilized the company's Atlas Copco 262 skid-mounted drill rig, which was operated by company personnel.

Drill hole GWUG20-001 targeted an area where 2014 surface hole GW14-03 encountered high-grade mineralization proximal to existing underground workings. The hole was collared in the face of crosscut A at the 6,760 ft (2,060 m) elevation and was drilled at 247° azimuth and -10° dip. Drilling intersected several mineralized zones, the most significant being a 25 ft (7.6 m) intersection averaging 0.364 opt (12.47 g/t) gold and 5.14 opt (176.23 g/t) silver, which included 5 ft (1.52 m) grading 1.56 opt (53.49 g/t) gold and 0.5 ft (0.15 m) grading 115.5 opt (3,960 g/t) silver. The mineralized zone lies approximately 98 ft (30 m) below surface and extends immediately southeast from existing underground workings.

Drill hole GWUG20-002 targeted the down-dip extension of the mineralized zone intersected in GWUG20-001. The hole was collared in the same location and at the same azimuth but angled at a -37° dip. Multiple mineralized zones were intersected with the most significant returning 0.162 opt (5.55 g/t gold) and 0.5 opt (17.14 g/t) silver over 3 ft (0.91 m). This hole also intersected 5 ft (1.52 m) grading 50 opt (1,707 g/t) silver from 21 to 26 ft (6.4 to 7.92 m) downhole.

Drill hole GWUG20-003 targeted the southeast extension of the mineralized zone intersected in GWUG20-001. The hole was collared in the same location as the first two holes and drilled at 211° azimuth and a -10° dip. Multiple mineralized zones were encountered with the most significant assay received to date returning 0.150 opt (5.11 g/t) gold over 5 ft (1.52 m). Final assays for this hole were pending.

Scorpio started a bulk sampling program in October 2020 that was designed to drift through an area of high-grade mineralization intersected in 2020 drill hole GWUG20-001, which returned 25 ft (7.6 m) averaging 0.364 opt (12.47 g/t) gold and 5.14 opt (176.23 g/t) silver, including 5 ft (1.52 m) grading 1.56 opt (53.49 g/t) gold and 0.5 ft (0.15m) grading 115.5 opt (3,960 g/t) silver.

The bulk sampling program incorporated a 9 x 9 ft (2.7 x 2.7m) drift driven for 111.5 feet (34 m) to a vertical depth of 111.5 feet (34 m) and a near horizontal length of 11.5 feet (34 m) with chip-channel samples collected along the ribs at 5 foot (1.5 m) intervals. Results from the sampling have confirmed that high-grade gold mineralization is associated with subparallel quartz and calcite veins and veinlets within foliation and bedding (figures 1 and 2). The mineralization appears to be stratabound and is hosted within sheared metamorphosed interbedded limestones, argillites and phyllites of late Cambrian age. This mode of occurrence of mineralization appears to show significant potential.

Significant gold mineralization was encountered in two zones from 30 to 35 ft and 70 to 80 ft (9.2 to 10.7 m and 70 to 24.4 m). Bulk samples from these zones are planned to be collected for metallurgical test work. (Scorpio Gold Corp. news releases, 3/3/2020, 2/17/2021, 7/27/2021, Scorpio Gold Corp. website, https://www.scorpiogold.com)

Round Mountain District

Round Mountain. The Round Mountain Gold Corp. and KG Mining (Round Mountain) Inc., subsidiaries of Kinross Gold Corp., produced 313,954 ounces of gold and 933,702 ounces of silver from its Round Mountain Mine. The average grade of the ore was 0.83 g/t gold. Gold recovery was 83.3%. Mining was conducted at the main Round Mountain pit and the Gold Hill pit north of the main pit, and all of the ore is non-refractory. Round Mountain Gold Corp. mined 20,758,000 tons of ore. Also, 27,304,000 tons (23,975,000 mt) of ore grading 0.033 opt (1.13 g/t) were processed with a recovery rate of 84.9%.

Tonnes of ore mined and processed in 2020 decreased by 8% and 7%, respectively, compared to 2019, primarily due to an increase in capital development activity related to the Phase W project and planned mine sequencing. Mill grade in 2020 decreased by 27%, compared to 2019, also due to mine sequencing. Gold equivalent ounces produced and sold in 2020 decreased by 10% and 12%, respectively, compared to 2019, primarily due to lower mill grade.

In 2020, metal sales increased by 13%, compared to 2019, due to the increase in average metal prices realized, that partially offset the decrease in gold equivalent ounces sold. Production cost of sales decreased by 12%, compared to 2019, largely due to lower gold equivalent ounces sold and lower operating waste mined, partially offset by increases in labor, maintenance costs and royalties due to higher average metal prices.

Gold is recovered using three independent processing operations. These include crushed ore heap leaching on a reusable pad, run-of-mine ore heap leaching on a dedicated pad, and gravity/flotation. Lower grade oxidized ores are placed on the dedicated pad and usually leached for 120 days. The higher grade oxidized ores are crushed and placed on the reusable pad and leached for 60 days. Afterwards it is relocated to the dedicated pad.

$5.6 million was spent on exploration and business development in 2020. Exploration focused on Phase X,

which is the northwest continuation of Phase W mineralization. Notable gold intercepts included 1) 50 ft (15.2 m) grading 0.152 opt (5.22 g/t); 2) 15 ft (4.6 m) grading 0.458 opt (15.73 g/t); 3) 5 ft (1.5 m) grading 0.916 opt (31.40 g/t); 4) 185 ft (56.64 m) grading 0.054 opt (1.86 g/t), including 5 ft (1.5 m) grading 0.78 opt (26.70 g/t) 5) 41.1 m (135 ft) grading 0.016 opt (0.55 g/t); and 6) 290 ft (88.4 m) grading 0.092 opt (3.17 g/t). (Kinross Gold Corp. 2020 Annual Report, 4/2/2020; Kinross Gold Corp. website, https://www.kinross.com)

Rye Patch District

Tonopah (Midway). During the second half of 2020, Viva Gold Corp. made significant progress at its Tonopah project (formerly known as Midway). An 11-hole reverse circulation drill program was completed in November of 2020, totaling 6,600 feet (2,016 m), which clearly demonstrated that the primary northwest mineral trend on the property has not been closed off, but remains open for further extension and drilling. A 5-hole large diameter diamond drill program was also carried in 2020 and early 2021.

TGM2001 intercepted 194 ft (59.1 m) averaging 0.038 opt (1.31 g/t) gold and 0.162 opt (5.56 g/t) silver in a steady sequence of Tertiary volcanics and Ordovician Palmetto argillite at depth in the original Discovery zone, which is located in the phase one Starter pit area.

TGM2002 intercepted 124 ft (37.7 m) averaging 0.098 opt (3.35 g/t) gold and 0.433 opt (14.85 g/t silver), including 27 ft (8.2 m) at 0.184 opt (6.3 g/t) gold and 1 opt (34 g/t) silver, entirely in OPA in the original Dauntless zone of the Central pit area of the project.

TGM2003 intercepted sporadic zones of lower grade gold and silver in TV. Drilling on this hole was stopped approximately 328 ft (100 m), short of its planned depth due to difficult drilling conditions, and the hole did not reach a large targeted zone of mineralization at the Tertiary volcanic-Palmetto argillite contact area. This hole is located in the West pit.

TGM2004 intercepted five zones of lower grade mineralization with a cumulative thickness of 129 ft (39.4 m) averaging 0.015 opt (0.53 g/t) gold and 0.029 opt (1.0 g/t) silver in Tertiary volcanics in the East pit area.

TGM2005 intercepted 8 ft (26 m) at 0.083 opt (2.83 g/t gold) and 0.2 opt (6.8 g/t) silver, including 16 ft (4.9 m) at 0.257 opt (8.81 g/t gold) and 0.468 opt (16.03 g/t) silver, in Tertiary volcanics, and 43 ft (13.1 m) at 0.057 opt (1.94 g/t gold) and 0.128 opt (4.39 g/t) silver, including 16 ft (4.9 m) at 0.12 opt (4.13 g/t) gold and 0.16 opt (5.47 g/t) silver, in Ordovician Palmetto argillite in the Starter pit area.

With the exception of a single outcrop, the surface geology at the property is predominately valley fill. The valley fill covers several rhyolitic to mafic Tertiary volcanic units, which unconformably overlie black argillites of the Ordovician Palmetto formation. The property contains a near surface low-sulfidation epithermal gold system with almost vertical quartz-adularia-gold veins hosted in the argillite and the overlying rhyolitic rocks. The mineralization is also associated with the discontinuity between the Palmetto formation and lower sequence of the Tertiary volcanics. Significant alteration and mineralization is localized within a low-angle zone, which includes and often parallels the erosion surface at the top of the Palmetto formation and with several facies in the Tertiary volcanic rocks, particularly where veins and mineralized structures intersect this contact zone.

The distribution of mineralization and alteration is strongly influenced by the structural geology. The Rye Patch fault system is a complex, oblique-slip fault system containing numerous northwest-trending splays. Subordinate steeply dipping, north-south striking extension fractures are developed between two bounding strike-slip faults. Gold-bearing veins occur in a series of en-échelon clusters along a 1.5-mile (2.4 km) northwest-trending band of mineralization with contact-related gold mineralization also present along this entire band. Two overlapping mineralized trends have been identified. The main trend parallels the Rye Patch fault system, striking west-northwest for at least 10,000 ft (3,000 m) with a 1,650-foot (500-m) width. The mineralization is open along strike and is typically hosted in the lower part of the Tertiary volcanic rocks and locally in the uppermost argillites parallel to the disconformity. The grade ranges between 0.1 ppm to 5 ppm gold. The secondary trend consists of extensional fractures striking north-northwest to north with near-vertical dips. The fractures host veins and hydrothermal breccias with mineralization grading from 1.0 to over 30 ppm gold. These extensional fracture zones are best represented in the Discovery and Dauntless Zones. The vein textures are indicative of high-level, near-surface emplacement and include void fills, crustiform coatings, colloform banding, and comb structures. (Viva Gold Corp. news releases 1/5/2021, 3/16/2021)

Tonopah District

Hughes. Summa Silver Corp. is drilling on the east side of the historic Tonapah vein system. It is drilling in the hanging wall of the Halifax fault where the tailings pile is from Belmont Mine. Historically the Halifax fault was interpreted as a pre-mineral fault. Work and drilling by Echo Bay and others in the 1980s led them to reinterpret the Halifax fault as a post-mineral fault that offset and down-dropped the approximately east-west-striking Belmont vein in the hanging wall of the Halifax fault. Drilling by Echo Bay in the hanging wall intercepted a vein with relatively high silver grades.

After a 30 year hiatus, Summa Silver is revisiting this target. Their 2020 drill program was successful. Drilling in the footwall of the Halifax fault in the Belmont Mine target

area, hole SUM20-19 intersected 8.2 ft (2.5 m) grading 3,760 g/t silver equivalent (1,762 g/t silver and 19.99 g/t gold).

Seven holes were drilled at the Belmont Mine, all of which were widely spaced and targeted different veins. Between 1903 and 1929 the Belmont Mine was a major American silver producer. Summa targeted the Rescue veins and intercepted 2,995 g/t silver equivalent over 2.6 ft (0.8 m) at a downhole depth of 1,241 ft (378.5 m) in hole SUM20-19, which is a 164 ft (50 m) step–out from SUM20-06. In another hole, which was a 164 ft (50 m) step-out form SUM20-20, the hole intersected 6,220 g/t silver equivalent (2,910 g/t silver and 33.1 g/t gold) over 2.3 ft (0.7 m).

At the Belmont Mine target hole SUM20-28, drilled 1,476 ft (450 m) northwest of the Rescue veins, intercepted 2.3 ft (0.7m) of 1,269 g/t silver equivalent (580 g/t silver and 6.89 g/t gold).

One hole is in progress to test the area of hole ET-7, which is located 1.3 km east of the Belmont Mine, where in the 1980s Echo Bay intersected silver and gold mineralization that has not since been pursued.

Drilling in the hanging wall of the Halifax fault resulted in the Ruby discovery and a potential 0.8 mile (1.3 km) extension of the Tonopah district. This could be the vein that Echo Bay tagged in 1988. Intercepts from the Ruby discovery included 1,597 g/t silver equivalent (790 g/t Ag and 8.07 g/t Au) over 1.6 ft (0.5 m) from 2,004 ft (610.8) m within 522 g/t silver equivalent (258 g/t Ag and 2.63 g/t Au) over 6.6. ft (2.0 m) from 2,004 ft (610.8) m in hole SUM20-10. Six zones of mineralization were intersected in SUM20-10 where the most significant hydrothermal alteration on the property seen to date was also drilled. (Summa new releases 12/17/2020, 3/31/2021, 7/21/2021; Summa Silver website: https://summasilver.com/)

Tonopah West. Blackrock Silver's Tonopah West project is a significant landholding within the historic Tonopah silver district with 97 patented and 19 unpatented lode mining claims comprising the property. Blackrock closed the Lease Option to Purchase agreement on April 1, 2020. The historic Tonopah silver district produced 174 million ounces of silver and 1.8 million ounces of gold from 7.45 million tonnes of material.

Blackrock's consolidated land position yielded 2.1 million tons of the total Tonopah gold and silver production making the combined area the second largest producer by tons and gross dollar yield. Five broad target areas have been defined that have significant potential. A 22,966 ft (7,000 m), 16-hole RCV drilling program commenced on June 17, 2020 to test these four target areas. Highlights from the exploration program on the Tonopah West property, as of July 2020, were are as follows: The company is approaching 10,000 meters of drilling in 19 reverse circulation and 2 core drill holes across the Victor, DPB and Discovery targets.

This initial program of 22,966 ft (7,000 m) of drilling, was expanded to 65,616 ft (20,000 m) following the successful targeting of drillholes TW20-001, TW20-003, TW20-005, TW20-006 and TW20-008. On the Victor vein, hole TW20-001 intersected a new vein yielding 9.8 ft (3 m) grading 2,198 g/t silver equivalent (AEq) (using a silver:gold ratio 100:1) using a 400 g/t silver equivalent cut-off grade. Drillhole TW20-001 also extended the Victor vein 30 meters down plunge with the intersection of 965 g/t silver equivalent over 95 ft (29 m). Two additional drillholes were completed at the Victor vein target to test the down plunge extension.

At the Victor vein target, drilling defined a high-grade, multi-vein gold and silver zone within an area of 689 by 492 ft (210 by 150 m) that remains open to the west and down dip. Intercepts included 9.5 ft (2.9 m) grading 19 g/t gold and 1,634 g/t silver in hole TW20-020C. Drillhole TW20-031C intercepted 9.5 ft (2.9 m) grading 1,081 AgEq. This intercept potentially represents a new vein system to the north of the Victor target. This intercept connects with drillhole TW20-021C, which hit 9.8 ft (3.0 m) of 785 g/t AgEq. The two drillholes are separated horizontally by 623 ft (190 m).

Drillhole TW20-017 delivered the highest-grade intercept of the program to date, cutting 4.9 ft (1.5 m) of 26 g/t gold (Au) & 2,030 g/t silver (Ag), (4,643 g/t silver equivalent AgEq) within 10.2 ft (3.1 m) of 14 g/t Au & 1,070 g/t Ag (2,466 g/t AgEq) on the Merton vein, which is part of the DPB Target vein system. TW20-17 delivered a second significant intercept, drilling 5 ft (1.5 m) of 2.8 g/t Au and 220 g/t Ag (506 g/t AgEq), using a silver:gold ratio of 100:1, and a 9.65 opt (300 g/t) silver equivalent cut-off grade.

At the Paymaster vein, hole TW-006 intercepted 15 ft (4.6 m) grading 50.7 opt (1,577 g/t) silver equivalent. Drilling at the Denver vein assayed 11.1 opt (345 g/t) AgEq over 5 ft (1.5 m).

Though hole TW20-007 experienced significant deviation from the targeted Bermuda vein, it still intersected 5 ft (1.5 m) grading 12.4 opt (387 g/t) silver equivalent.

The first drillhole at the New Discovery Target, TW20-006 intercepted 18 opt (562 g/t) AgEq over 5 ft (1.5 m) from the steeply dipping Discovery vein.

Drillhole TW20-016 connected with a 1,640 foot (500 m) step out along the DPB target with multiple significant intercepts including 1) 5 ft (1.5 m) of 17.8 opt (553 g/t AgEq, 3.2 g/t Au, 232 g/t Ag), 2) 5 ft (1.5 m) of 15.7 opt (489 g/t AgEq, 4.8 g/t Au/ 5 g/t Ag), and 3) 5 ft (1.5 m) of 10.35 opt (322 g/t AgEq, 1.78 g/t Au/ 145 g/t Ag). (BlackRock Silver new releases, 4/2/2020, 5/7/2020, 5/19/2020, 5/8/2020, 8/4/2020, 6/8/2020, 9/1/2020, 9/15/2020, 10/8/2020, 11/9/2020, 11/23/2020, and 12/3/2020. Blackrock Silver Corp. website: https://blackrocksilver.com)

Tybo District

Bolo. At its Bolo Gold project, New Placer Dome Gold Corp. completed 10 RC drill holes totaling 10,020 ft (3,054 m). Hole BL20-06 was designed to test the down-dip and south plunging continuity of South Mine Fault Zone gold

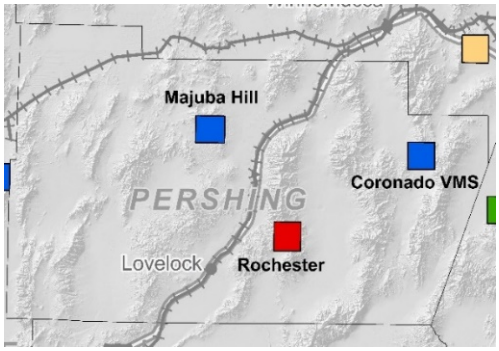
mineralization at depth. The hole intersected 85 ft (26 m) grading 0.03 opt (0.92 g/t) gold, within a broader zone of mineralization averaging 0.013 opt (0.41 g/t) gold over 320 ft (97.5 m). The hole successfully extended mineralization approximately 65 meters vertically beneath hole BL20-05, which returned gold values of 0.017 opt (1.52 g/t) gold Au over 7.62 meters, within a broader zone of 0.54 g/t Au over 320 ft (97.54 m).

Hole BL20-10 collared at the north end of the South Mine Fault Zone and intersected near surface oxide gold grading 1.23 g/t Au over 35 ft (10.67 m), within a broader zone of mineralization averaging 0.81 g/t Au over 65 ft (20 m).

Hole BL20-01 intercepted 125 ft (38 m) grading 0.035 opt (1.08 g/t) gold, including 40 ft (12 m) grading (1.79 g/t) and 25 ft (7.6 m) grading (0.68 g/t) gold. Hole BL20-02 intercepted 80 ft (24.4 m) grading (1.38 g/t) gold, including 20 ft (6 m) grading (4.35 g/t) gold. Hole BL20-03 intercepted 175 ft (53 m) grading (0.24 g/t) gold including 40 ft (12 m) grading (0.61 g/t) gold. Hole BL20-05 intercepted 320 ft (97.5 m) grading (0.54 g/t) gold, including 25 ft (7.6 m) grading (1.52 g/t) gold, 136 ft (41.4 m) grading (0.72 g/t) gold and 30 ft (9 m) grading (0.84 g/t) gold.

Cyanide recoveries of the cuttings ranged from 31% to 90%, with the majority above 80%. (New Placer Dome Corp. news releases, 2/1/2021, 10/20/2020, New Placer Dome Gold Corp. website, https://newplacerdome.com)

PERSHING COUNTY



Antelope District

Majuba Hill. Bam Bam Resources Corp. was successful in advancing its Majuba copper-silver-(gold) project in 2020. Exciting assays started being released in July of 2020 during drilling of the copper oxide zone on the southwest flank of Majuba Hill. Hole MHB-1 intercepted 74 ft (22.5m) from 210 to 285 ft (64 to 87 m) that assayed 0.35% copper and 10.2 ppm silver, including 5 ft (1.5 m) of 1.26% copper and 17.4 ppm silver.

Hole MHB-2 was drilled towards the northeast at a 45˚ inclination to test for extensions of the mineralization outwards from the historic workings. The hole intersected from the surface a 146 foot (44.5 m) downhole interval that assayed 1.41% copper and 97.6 ppm silver. High-grade mineralization in MHB-2 occurs with chalcocite, azurite, and malachite. Cuprite exists in historic drill core.

The copper, silver, and local gold mineralization occur in intrusive rocks with porphyry-style alteration. Three of the five intrusive phases at Majuba contain copper. Copper oxide mineralization at the surface is within quartz-sericite-pyrite alteration. Oxidation at Majuba extends as deep as 800 ft.

Eighteen chip-channel samples were collected along new road cut exposures. Samples assays returned 37 to 16,950 ppm copper and 0.6 to 166 ppm silver. For example, chip sample MHR-403 returned 193 ppm copper and 166 ppm silver over 20 ft.

In October of 2020, a four-hole reverse circulation drill program expanded to the northeast the oxide copper, silver, and gold zones at Majuba Hill. Hole MHB-3 intersected 155 ft (47.2 m) grading 0.68% copper and 28.9 ppm silver. Hole MHB-5 intersected 50 ft (15.2 m) of sulfide mineralization grading 0.72% copper and 19.8 ppm silver.

In November and December Bam-Bam drilled a deep hole to downhole depth of 2,591 ft (790 m). Detailed logging of the sulfide zones intersected below the oxide zone. MHB-8 found up to 40% sulfides in intervals comprised of pyrite, pyrrhotite, chalcopyrite, and arsenopyrite. Drill hole MHB-8 stepped out 1700 ft (518 m) south from the oxide/enrichment zone to test a deep Induced Polarization (IP) chargeability high. The 1635 foot (499 m) long hole intersected over 1200 ft (366 m) of chalcopyrite in veins, stockworks, and disseminated with tourmaline, below the zone of oxidation and enrichment.

Copper and silver in this chalcopyrite-sulfide zone included: 65 ft (19.8 m) of 0.35% copper and 13.9 ppm silver for a copper equivalent grade of 0.49% copper from 865 to 930 ft (263.7-283.5 m) with 5 ft (1.5 m) of 1.22% copper and 53.1 ppm silver.

The broader interval of copper and silver returned: 470 ft (143.2 m) of 0.1% copper and 4.04 ppm silver for a copper equivalent grade of 0.14% copper from 830 to 1300 ft (253-396 m). (Bam-Bam Resources Corp. news releases 5/19/2020, 7/9/2020, 7/17/2020, 8/21/2020, 9/28/2020, 10/5/2020, 11/23/2020, and 12/23/2020)

Imlay District

Florida Canyon. Argonaut Gold acquired Florida Canyon Mining, Inc through its acquisition of Alio Gold Inc in July 2020. Florida Canyon Mining, Inc., operated the Florida Canyon Mine and produced 46,866 ounces of gold and 27,490 ounces of silver in 2020. The cash cost per gold ounce sold was $936 in 2020. All-in sustaining cost per gold ounce sold was $1,244 in 2020. The plant processed 20,165 tons (18,294 mt) tons of ore per day. Gold deposited on the pad was 60,885 ounces. (Argonaut Gold website: https://www.argonaut.com, Florida Canyon Mining Inc.

Management Discussion and Analysis for the Year Ended December 31, 2020)

Rochester District

Rochester (including Lincoln Hill). Coeur Rochester Inc., a subsidiary of Coeur Mining Inc., produced 3,761,060 ounces of silver and 27,147 ounces of gold from its Rochester Mine. The mined ore averaged 0.46 opt (15.8 g/t) silver and 0.003 opt (0.1 g/t) gold. Depending upon operating experience and metallurgical testing, the ultimate recovery from crushed ore for silver was an estimated 70%. Depending upon the ore leached, the ultimate recovery for gold was 92.5%. The total cost applicable to sales per ounce was $14.34 for silver and $1,251 for gold.

In 2020, expensed expansion drilling was $3.3 million and capitalized conversion drilling was $1.8 million. Expansion drilling consisted of 25,600 ft (7,800 m) of reverse circulation and core drilling, including directional core technology implemented to test the East Rochester mineralization under the Stage I and Stage II leach pads. Key highlights from East Rochester include: 1) 842.8 ft (256.9 m) of 1.3 oz/t (45.4 g/t) silver and 0.009 oz/t (0.3 g/t) gold; 2) 411.6 ft (125.5 m) of 1.0 oz/t (33.6 g/t) silver and 0.009 oz/t (0.3 g/t) gold, and 3) 211.4 ft (64.4 m) of 1.2 oz/t (40.8 g/t) silver and 0.008 oz/t (0.3 g/t) gold.

The capitalized drilling consisted of 26,000 ft (7,925 m) of reverse circulation drilling, focused on infill mainly within the Rochester pit. (BLM, Coeur Rochester and Packard Mines Plan of Operations, Amendment 11, Draft Environmental Impact Statement, DOI-BLM-NV-W010-2019-0008-EIS, 9/2019; BLM, Coeur Rochester and Packard Mines Plan of Operations, Amendment 11, Final Environmental Impact Statement, DOI-BLM-NV-W010-2019-0008-EIS, 2/2020; BLM Record of Decision and Plan of Operations Approval DOI-BLM-NV-W010-2019-008-EIS Plan of Operations Serial Number: NVN-64629 Coeur Rochester and Packard Mines Plan of Operations, Amendment 11, 3/2020; Coeur Mining, Inc., news releases, 5/1/2019, 8/7/2019, 11/4/2019, 12/17/2019, 2/18/2020; Coeur Mining Inc. 10-K Report, 2/19/2020; Coeur Mining Inc. website, https://www.coeur.com)

Tobin and Sonoma Range

Coronado VMS. On December 15, 2020, Nevada Sunrise announced the conclusion of the 2020 Coronado drilling program, which began in the first week of November 2020.

Two diamond drill holes were collared at locations identified by the previous airborne Versatile Time Domain Electromagnetic ("VTEMEM") geophysical survey as optimal for penetration of the interpreted conductor. A total of 822.7 ft (250.76 m) were drilled in the two diamond core holes. Each of the drill holes encountered difficulty penetrating through the overburden and viscous clay layers, and the bedrock targets were not intersected.

DDH-COR20-01 was drilled to 496 ft (151.4 m), at which depth ground conditions made further advance impossible. The drill hole encountered a fault zone composed of clay gouge and breccia at 449.1 ft (136.9 m). Drilling continued through this zone for 47.5 ft (14.48 m) until the hole was abandoned. This fault zone intersection may represent an extension of the thrust fault encountered in the company's previously drilled hole DDH-COR18-01. Formations identified in the core indicate that surface colluvium and the upper part of the Havallah greenstone sequence are situated above the fault as in DDH-COR18-01.

DDH-COR20-02 was drilled through the surface colluvium to a depth of 326.1 ft (99.39 m), at which depth further advance was impeded by a viscous clay layer. This viscous clay is either a layer within the surface colluvium or it may be associated with a fault gouge zone at this depth.

Nevada Sunrise intends to test the Coronado South conductor in a future drilling program with a combination of RC drilling and diamond drilling to penetrate the problematic layers of overburden and continue into bedrock to best intersect the strong VTEMEM airborne conductor detected by the Company in 2018. (Nevada Sunrise website: http://www.nevadasunrise.ca/projects/coronado-vms-project/)

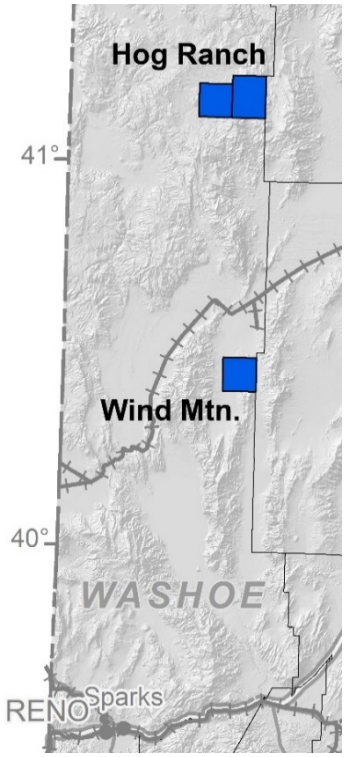
STOREY COUNTY

Comstock District

Comstock Lode. Early in 2019, Tonogold Resources, Inc., and Comstock Mining, Inc., entered into an agreement whereby the former would eventually acquire full interest in the Lucerne project and a 20-year lease that included the right to use, operate, and manage the latter's processing facilities, infrastructure, and mining claims (collectively known as the American Flats Properties). The lease also included full rights to explore, develop, and mine the American Flats claims in Storey County. Through prior agreements, Tonogold Resources, Inc., already owned a 50% interest in Comstock Mining, LLC, the subsidiary controlling the American Flats Properties. In September of

2020 Tonogold commenced it first drill program on the Comstock Lode at the Occidental-Brunswick Lode. The best intercept reported to date was 82 ft (25 m) grading 0.476 op (13.49 g/t) gold and 1.707 opt (48.4 g/t) silver, which included 17 ft (5.18 m) grading 2.041 opt (57.859 g/t) gold and 2.723 opt (77.2 g/t) silver. (Comstock Mining, Inc., press releases, 9/14/2020, 9/22/2020; Comstock Mining, Inc., website, https://www.comstockmining.com; Tonogold Resources, Inc., Annual Financial Statements, 12/31/2019; Tonogold Resources, Inc., press releases, 1/29/2019, 4/9/2019, 11/19/2019, 9/8/2020; Tonogold Resources, Inc., website, http://tonogold.com)

WASHOE COUNTY



Leadville District

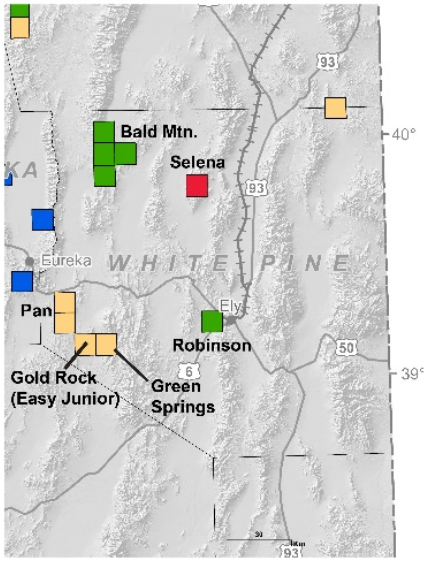
Hog Ranch. Rex Minerals, an Australian company, completed a 10-hole reverse circulation program at its Hog Ranch epithermal project in northern Washoe County. The program was aimed at growing the oxide resource base at the Krista project, upgrading the inferred resource to an indicated resource at its Bells project, and testing one high-grade target at the Cameco project.

Seven holes for 3,465 ft (1,056 m) were drilled at the Bells project during this RC drill program. The drilling program was designed to upgrade Inferred Mineral Resources to Indicated Mineral Resources. Results received to date were from two holes, which confirm the continuity of gold mineralization in the northwest corner of the current Inferred Mineral Resource. Intercepts included 125 ft (38.1 m) grading 0.013 opt (0.45 g/t) gold in hole HR20-006 and 40 ft (12.2 m) grading 0.017 opt (0.58 g/t) gold in hole HR20-007. The drilling results closely match the most proximal historical drill holes and are in line with the existing block model, which defines the current Mineral Resource estimate at the Bells deposit. At Cameco only anomalous gold mineralization values were intersected from its initial drill test. Substantial arsenic and mercury values were intersected over large thicknesses across the geological contact between the volcanic rocks and lacustrine sedimentary rocks. The current interpretation that the size of the "hydrothermal system," which already extends to over 12.4 m^2 (20 km^2) at the Krista project is additionally extensive throughout the Cameco area. This anomalism is interpreted to extend further along a defined gold trend towards the Airport deposit. Three holes for 1,420 ft (433 m) were drilled at the Cameco project during this RC drill program. Rex has identified that the bulk of the higher grade gold mineralization at Cameco exists at the contact position between the volcanic rocks and the overlying lacustrine sediments. (Rex Mineral news release, 9/14/2020, Rex Minerals website, www.rexminerals.com.au)

Wind Mountain. Bravada Gold Corp drilled four reverse circulation holes totaling 4,185 ft (1,275.5 m) in late 2020. The program was focused the "Feeder Target" aimed at finding high-grade veins below the existing Wind Mountain resource.

All four holes intersected thick zones of anomalous gold and silver mineralization in Tertiary sediments. Mineralization encountered in Tertiary sediments is similar to disseminated mineralization elsewhere on the property. However, two quartz-vein zones were intersected, that contain higher grades of gold and silver. Hole WM20-102 is the most interesting, containing 5 ft (1.5 m) of 0.012 opt (0.404 g/t) gold and 7.85 opt (269 g/t) silver within a thicker interval of quartz veining with anomalous gold and silver. (Bravada Gold Corp. news release, 3/11/2021)

WHITE PINE COUNTY



Bald Mountain District

Bald Mountain. Kinross Gold Corp. divides its Bald Mountain Mine property into a north operations area, a Central zone, and a south operations area. Recent production has been from the north operations area. In 2020, gold production totaled 190,496 ounces of gold and 64,444 ounces of silver. The average grade of the mined gold ore was 0.51 g/t. Most of the production came from the north operations.

In 2020 $6.5 million was spent on exploration and development. In the north operations areas, drilling took place at Top, Bida, Duke, Galaxy, Little Bald Mountain, Mooney Basin, Winrock, Wino, Royale, the Numbers area, Redbird, and West Mooney.

In June of 2019, production commenced from the Vantage Complex (Alligator Ridge) in the south operations area. Production from the north operations area and south operations totaled 191,282 ounces (5,950 kg) of gold and 64,555 ounces (2,008 kg) of silver. The average gold grade of ore that was mined was 0.51 g/t.

Notable gold intercepts were 1) 90 ft (27.4 m) of 0.074 opt (2.09 g/t) and 15 ft (4.6 m) of 0.104 opt (2.96 g/t) at Winrock, 2) 85 ft (26 m) of 0.069 opt (1.95 g/t) at Royale, 3) 58.7 ft (17.9 m) of 0.050 opt (1.41 g/t) at Duke, 4) 220 ft (67 m) of 0.015opt (0.43 g/t) at Bida, 5) 188.5 ft (57.5 m) of 0.01 opt (0.31 g/t) at Wino, 6) 95 ft (29 m) of 0.024 opt (0.69 g/t) in the Numbers area, 7) 77.5 ft (23.6 m) of 0.041 opt (1.16 g/t at Galaxy, 8) 70.5 ft (21.5 m) of 0.044 opt (1.24 g/t) and 45 ft (13.7 m) of 0.0189 opt (5.36 g/t) at Redbird. (Kinross Gold Corp. Annual Report, 4/2/2020; Kinross Gold Corp. website, https://www.kinross.com)

Butte Valley District

Selena. Ridgeline Minerals' Selena project is located on the western flank of the Cherry Creek Range near the inactive Golden Butte gold mine and the undeveloped Limousine Butte gold deposit. In 2020 Ridgeline Minerals drilled 14 widely spaced reverse circulation drill holes totaling 3,789 ft (1,155 m). Notable gold and silver intercepts included 1) 30 ft (9.1 m) grading 0.017 opt (0.57 g/t) gold and 0.355 opt (12.17 g/t silver); 2) 15 ft (4.6 m) grading 0.001 opt (0.33 g/t gold) and 3.53 opt (120.93 g/t silver); 3) 20 ft (6.1 m) grading 0.008 opt (0.28 g/t) gold and 0.576 opt (19.75 g/t) silver; 4) 70 ft (21.3 m) grading 0.009 opt (0.30 g/t) gold and 0.454 opt (15.58 g/t) silver; 5) 9.8 ft (3 m) grading 0.012 opt (0.41 g/t gold) and 23.1 opt (792.30 g/t) silver; and 6) 29.8 ft (9.1 m) grading 0.015 opt (0.51 g/t gold) and 1.19 opt (40.83 g/t) silver. The high silver values are likely related to the nearby covered Butte Valley porphyry copper-molybdenum system. (Ridgeline Minerals news release 9/15/2020)

Pancake District

Pan. GRP Pan, LLC, a subsidiary of Fiore Gold, Ltd, produced 46,516 ounces of gold in 2020 from its Pan Mine, a 15% increase from 2019. Mining was conducted from both the North Pan zone and the South Pan zone. During the fiscal year that ended in September, 14,046,689 tons of rock were mined of which 5,081,729 tons were ore grading 0.015 opt, a 22% increase in rock mined. The strip ratio was 1.8, a 50% increase from 2018. The all-in sustaining cost per ounce of gold was $961.

At Pan, a 71,330 ft (21,741 m) drilling program was completed, which was aimed at expanding the resource and reserve base and adding to the overall mine life. The program targeted conversion of inferred resources that exists within and adjacent to the existing reserve pits as well as expanding the overall resource base. The drilling results were incorporated into an updated reserve, resource and life of mine plan. The updated mineral reserve estimate represents a 6% increase in contained gold ounces and fully replaces reserves mined since the last reserve update in September 2018. The updated Measured and Indicated resource contains 427,400 ounces (13,294 kg) of gold, which represents 99% of the resource estimate at the company's inception, while the life of mine plan extends the Pan mine life by two years into 2025 at a mining rate of 14,000 ore tons per day.

A total of 154 reverse circulation holes were drilled in the first half of 2020. The goals were to 1) expand the know mineralization and geological understanding of the current resource, 2) increase the known mineralization at the newly discovered Banshee zone, 3) expand the resource between Red Hill and North Pan in order to merge both pits, 4) identify mineralization at the Mustang exploration target, and 5) Sterilization drilling of the current and proposed waste dump sites.

Notable intercepts included 1) 105 ft (32 m) grading 0.022 opt gold (0.745 g/t) and 100 ft (30.5 m) grading 0.761 g/t gold (0.023 g/t) and 2) 30 ft (9.1 m) grading 1.459 g/t gold (0.043 opt) at Red Hill.

At Banshee, intercepts included 30 ft (9.1 m) grading 0.043 opt gold (1.459 g/t and 90 ft (27.4 m) grading 0.022 opt gold (0.738 g/t).

At Campbell, 50 ft (15.2 m) grading 0.040 opt (1.355 g/t) was intercept and 10 ft (3 m) grading 0.046 opt gold (1.563 g/t) were encountered.

The Pan deposit is a Carlin-type, sediment hosted, gold-only system consisting of three main zones of mineralization—North, Central, and South Pan. These zones have been traced over 6,000 ft (1,800 m) along the north-south trending Branham fault. The mineralization is entirely oxide and crops out at the surface. North Pan mainly consists of a large body of silicified solution breccia along the western margin of the Branham fault. The mineralization extends westward from the breccia body along the generally flat-lying contact between the Devonian–Mississippian Pilot Shale and Devonian Devils Gate Limestone. Central Pan consists of several smaller pods of mineralization mostly along the Pilot Shale-Devils Gate Limestone contact but also along a series of west-northwest trending open folds and north-south secondary faults. South Pan is mainly hosted in strongly clay-altered and mineralized solution breccias within the Branham fault zone and in clay-altered sediments along the Pilot Shale-Devils Gate Limestone contact, which dip southeastward away from the Branham fault. (Pan Gold Project NI 43-101 Technical Report 6/30/2020; Fiore Gold, Ltd, website, http://fioregold.com)

Robinson District

Robinson. The Robinson Nevada Mining Co. produced 109,639,248 pounds of copper (51,316 mt), and 426,538 pounds (348 mt) of molybdenite. Material containing molybdenite is stockpiled, and molybdenum is produced when the stockpiles are large enough to process it in the mill. The mine also produced 51,277 ounces (1,595 kg) of gold and 67,634 (2,104 kg) ounces of silver as by-products. Concentrates from the mill are trucked to the Wendover Bulk Transshipment Co. rail yard at Wendover, Utah, and loaded into Union Pacific train cars. Some is sent to a smelter in Salt Lake City, while the rest is sent to the Port of Vancouver for shipment overseas. Prior to the imposition of tariffs, much of the concentrates were shipped to China with some going to India, Japan, and elsewhere. All mining at Robinson is on 21,000 acres (8,500 ha) of mostly private and some public land. The Robinson Nevada Mining Co. and the Wendover Bulk Transshipment Co. are subsidiaries of Robinson Holdings (USA), Ltd., which in turn is a subsidiary of KGHM International, Ltd., headquartered in Lubin, Poland.

Mining was from the third layback of the Ruth East pit and the fourth layback of Ruth West. The ore is considered non-refractory. Development of a fifth layback in Ruth West will begin after the start of 2020 and extend the operation out to 2025.

The company inherited the legacy of over a century's worth of mining activities and associated environmental problems and conducts an on-going reclamation program. One such site is the old Keystone Waste Rock Dump with associated acid mine drainage. A recent environmental assessment allowed for an over-dumping program. The company started over-dumping with non-acid generating waste rock to encapsulate the acid generating rock. This deprives it of water and oxygen needed for the reaction that results in acid mine drainage.

KGHM has an on-going exploration drilling program to provide information for the geologic model, better define the ore body, and provide metallurgical samples. No results from any drilling in 2020 were released (KGHM International, 2020 Annual Report, 2020, 3/17/2020; KGHM International, website, https://kghm.com/en)

White Pine District

Gold Rock (Easy Junior). Fiore Gold, Ltd, completed 105 reverse circulation holes, 20 HQ core holes, and 15 PQ metallurgical core holes on its Gold Rock (formerly Easy Junior) property. The deposit is a Carlin-style disseminated gold-only deposit hosted in limestone and siltstone of the Mississippian Joana Limestone and the overlying Chainman Shale. Mineralization is localized in the apex and limbs of the slightly overturned, fault-bounded Easy Junior anticline. The mineralization is mainly in the Joana Limestone and to a lesser extent in the Chainman Shale. Scattered, minor mineralization also occurs in the underlying Devonian Pilot Shale. The known resource to date trends N12E to N15E along a strike length of over 11,000 ft (3,350 m). The mineralization may be open to the north and south. The Easy Junior (a.k.a. Nighthawk Ridge) open pit last produced in 1997. Three Resource pit shells were identified in 2018. The northern shell trends north-northeast over 5,600 ft (1,715 m) and is up to 1,500 ft (460 m) wide. It is centered over the old Easy Junior pit. The central shell trends north-northeast over 2,000 ft (660 m) and is up to 1,100 ft (335 m) wide. The southern shell trends almost north-south over 1,000 ft (330 m) and is up to 345 ft (105 m) wide.

The drilling program was designed to expand the existing resource, upgrade inferred resources to measured and indicated, and collect samples for orebody characterization and metallurgical testing. One of the priority targets was the area between the north and central Resource pit shells, which was not included in the current resource due to limited, widely spaced, vertical drilling that generally stopped in the upper portion of the mineralization. The deposit also remains open to the north

and south of the existing resource area, where the drilling density drops off rapidly.

Significant oxide gold intercepts from the 2020 drill program included 1) 160 ft (48.8 m) grading 0.063 opt (2.17 g/t) gold, 2) 135 ft (41.2 m) grading 0.028 opt (0.97 g/t) and 3) 125 ft (38.1 m) grading 0.032 opt (1.11 g/t) gold.

Fiore Gold released a pre-feasibility report in April of 2020. Highlights included: 1) Pre-tax NPV of $49.7 million and a 22.8% IRR at a base case gold price of $1,400/oz, 2) the updated resource estimate shows a 69% increase in indicated resource to 403,000 ounces of gold, in addition to the inferred resource of 84,300 ounces of gold, 3) a mine life of 6.5 years with total production of 362,750 ounces of gold with LOM cash costs of $903/ounce of gold. (Fiore Gold, Ltd, news releases, 11/24/2020, 7/14/2020; Fiore Gold, Ltd, NI 43-101 Technical Report on the Preliminary, Economic Assessment of the Gold Rock project, White Pine County, Nevada USA 3/31/2020; Fiore Gold, Ltd, website, http://fioregold.com)

Green Springs. Contact Gold Corp. spent $2,602,535 on exploration at Green Springs in 2020, which included $1,829,957 on drilling, assaying, and geochemistry. The company completed 41 holes totaling 18,980 ft (5,785 m) across the Alpha, Bravo, Charlie, Echo, Golf and Zulu zones, which lie outside of the old producing pits. The pits last produced between 1988 through 1991.

Gold intercepts from the six holes drilled in the Alpha zone included 1) 95 ft (28.96 m) grading 0.039 opt (1.34 g/t), including 50 ft (15.24 m) grading 0.034 opt (1.15 g/t), and 2) 115 ft (35.05 m) grading 0.049 opt (1.68 g/t), including 130 ft (39.63 m) grading 0.042 opt (1.45 g/t) gold, and 70 feet (21.34 m) grading 0.060 opt (2.09 g/t) and 65 feet (19.81 m) grading 0.074 opt (2.55 g/t); and 3) 150 ft (45.72 m) grading 0.025 opt (0.86 g/t), including 30 ft (9.14 m) grading 0.053 opt (1.82 g/t). The Alpha zone is a zone of shallow, generally less than 300 ft (90 m) in depth, gold mineralization hosted along the lower contact of the Devonian to Mississippian Pilot Shale with the underlying Devonian Guilmette Limestone. The mineralization covers an area of about 1600 ft (500 m) by 800 ft (250 m).

Gold intercepts from Echo zone, the highest grade zone of oxide gold mineralization encountered in drilling at Green Springs, included 1) 115 ft (35.05 m) grading 0.065 opt (2.24 g/t) oxide gold, including 75 ft (22.86 m) grading 0.092 opt (3.14 g/t) gold and 2) 58 ft (17.68 m) grading 0.043 opt (1.49 g/t) gold and 3) 50 ft (15.24 m) grading 0.111 opt (3.79 g/t) gold. The gold mineralization is hosted at the Chainman Shale-Joanna Limestone contact, within highly altered shale and jasperoid. Mineralization at Echo remains open to the east and south.

Gold intercepts from 2 holes at the Charlie zone included 10 ft (3.05 m) grading 0.008 opt (0.28 g/t) and 10 ft (3.05) m grading 0.004 opt (0.15 g/t) gold, which was hosted by the Pilot Shale. Both holes at Charlie were drilled from the bottom of the past producing open pit to target the Pilot Shale at the intersection of major northwest and east-west striking faults, delivering a significant gold intercept a the Pilot-Guilmette Limestone contact. The intercept underscored how underexplored the lower Pilot Shale horizon is.

Drilling at the Golf zone was designed to test the near surface intervals of Chainman Shale-hosted gold mineralization and the Pilot Shale-Chainman Shale – Guillmette Limestone contact, known to host significant gold mineralization at the Alpha, Echo, and Bravo zones. Intercepts included 1) 15 ft (4.57 m) grading 0.008 opt (0.29 g/t) oxide gold and 2) 25 ft (7.62 m) grading 0.024 opt (0.83 g/t) oxide gold that included 15 ft (4.57 m) grading 0.034 opt (1.17 g/t) gold.

Contact Gold's initial drill program at the Zulu zone, located 200 m south of the Echo zone intercepted 85 ft (25.9 m) grading 0.033 opt (1.14 g/t) oxide gold. Significant gold intercepts from the hole drilled in the Bravo zone included 75 ft (23 m) grading 0.03 opt (1.02 g/t) in oxide including 35 ft (10.67 m) grading 0.052 opt (1.79 g/t). The Bravo zone lies 2,500 ft (750 m) north of the past-producing Charlie pit and 2,950 ft (900 m) southwest of the Alpha zone. It lies at the northern end of the north-south Green Springs trend at a structural intersection with a major northeast striking fault extending to the Alpha zone. The core is an elongated east-northeast-striking zone with currently unquantified higher-grade gold values in a 660-foot (200-meter) by 280-foot (85-meter) area. (Contact Gold Corp. news releases, 11/16/2020, 11/23/2020, 1/12/2021, 1/20/2021, 1/26/2021, 2/9/2021, 2/23/2021, 3/24/2021, 4/14/2021, Contact Gold Corp. Annual Information Form, 3/31/2020; Contact Gold Corp. website, http://www.contactgold.com)

Griffon. In December, Fremont Gold, Ltd, entered into a purchase option agreement with Pilot Gold (USA), Inc., a subsidiary of Liberty Gold Corp. whereby the former can acquire full interest in the past-producing Griffon gold project, minus a 1% net smelter return. The terms are Fremont Gold, Ltd, will pay $25,000 upon executing the agreement and pay $25,000 and issue 2,500,000 common shares to Liberty Gold Corp. following TSX Venture Exchange approval of the Agreement. Fremont Gold, Ltd, will then pay $50,000 and issue enough common shares to bring Liberty Gold's ownership of Fremont Gold to 9.9% on the first anniversary of the agreement. Fremont Gold, Ltd, will then pay $50,000 on the second anniversary, $75,000 on the third anniversary, and $100,000 on the fourth anniversary. Fremont Gold, Ltd, commenced drilling the property in 2020.

Fremont had a successful drill program in in 2020 completing 9 holes totaling 7,463 ft (2,275 m). Drill Hole GF-20-3 intersected a significant interval of near surface oxide gold mineralization that was 165 ft (50.3 m) of 0.031 opt (1.05 g/t) gold starting at a downhole depth of 165 ft (29 m). The hole was located on the southwest rim of the old, abandoned Hammer Ridge open pit. (Fremont Gold, Ltd,

news releases, 12/18/2019, 6/25/2020; Fremont Gold, Ltd., Management Discussion and Analysis, 2/27/2020; Fremont Gold, Ltd, website, https://fremontgold.net)

INDUSTRIAL MINERALS

by David A. Davis

The total value of industrial minerals produced in Nevada was estimated to be at least $416,250,622, a 10% decrease from the previous year. Minus the value of aggregate, the total value was about $219,850,622, a 6% increase from the previous year. In decreasing order of estimated value, aggregate was the only industrial mineral with a production value of more than $100,000,000, and diatomite was the only other industrial mineral with a production value of more than $50,000,000. Industrial minerals with production values of $10,000,000 to $50,000,000 were gypsum, lime and limestone, lithium, barite, silica, and clay. Industrial mineral commodities with production values of $1,000,000 to $10,000,000 were magnesia and dolomite. Industrial mineral commodities with production values of less than $1,000,000 were perlite, salt, potassium sulfate, pozzolan, and gemstones. Zeolite was processed in Nevada but mined in California, and as such was not included in the estimate of total value of industrial minerals. Data used for these estimates, and data reported for individual commodities below, were obtained from the Nevada Division of Minerals (NDOM), the Nevada Department of Taxation (NDT), the U.S. Bureau of Land Management (BLM), the U.S. Geological Survey (USGS), or directly from companies that produced the commodities. Data are given in short tons unless otherwise noted. Unless otherwise noted, individual and compiled state production data are from NDOM. The gross proceeds are from NDT. USGS data (mostly domestic production, consumption, prices, and trends) cited are from commodity reports on the agency's website at https://www.usgs.gov/centers/nmic/commodity-statistics-and-information.

Aggregate (Sand and Gravel, Crushed Stone)

The estimated domestic production of construction sand and gravel was 1,059,000,000 tons (961,000,000 mt), valued at $9,220,000,000, a 0.1% decrease and 3% increase respectively from the previous year. The estimated apparent consumption was 1,064,000,000 tons (965,000,000 mt), a 0.2% decrease from the previous year. The estimated domestic production of crushed stone was 1,610,000,000 tons (1,460,000,000 mt) valued at $17,900,000,000, a 2% decrease and 0.6% increase respectively from the previous year. The estimated apparent consumption was 1,675,000,000 tons (1,520,000,000 mt), a 2% decrease from the previous year.

The first quarter of 2020 saw production increases of 6.1% in sand and gravel and 1.5% in crushed stone from the first quarter of 2019. However, the second and third quarters saw sharp production decreases that were only partially made up by a rebound in the fourth quarter. The decreases were due to measures taken to mitigate the spread of the COVID-19 pandemic.

The main perennial concern of the aggregate industry continued to be with environmental, health, and safety regulations. These and local zoning regulations and land development alternatives have resulted in the forced closure or moving of operations from large population centers, and the trend is expected to continue. This has also resulted in local shortages and increased transportation costs.

The average price of construction sand and gravel increased 3% to $8.70 per ton ($9.59 per tonne) from $8.46 per ton ($9.32 per tonne) in 2019. The average price of crushed stone increased 2% to $11.06 per ton ($12.19 per tonne) from $10.85 per ton ($11.96 per tonne) in 2019.

In Nevada an estimated 15,400,000 tons (14,000,000 mt) of construction sand and gravel valued at $95,400,000 and 11,800,000 tons (10,700,000 mt) of crushed stone valued at $101,000,000 were used. The amount sold or used and the value of construction sand and gravel decreased 28% and 26%, respectively. Crushed stone decreased 46% and 44% respectively from the previous year. The amount sold and used and value for 2019 was readjusted to an estimated 21,490,000 tons (19,500,000 mt) of construction sand and gravel valued at $129,000,000 and 17,870,000 tons (19,700,000 mt) of crushed stone valued at $181,000,000. The total estimated 2020 value of $196,400,000, was a 37% decrease from 2019.

An estimated 15,900,000 tons (14,400,000 mt) of construction aggregate were produced in the Las Vegas area with sand and gravel operations accounting for about two-thirds of the aggregate production. The Lone Mountain area in northwest Las Vegas accounted for over a quarter of the production and continued to be the area's most important source of sand and gravel. Significant production also came from sand and gravel pits and stone quarries south and northeast of Las Vegas and in Ivanpah Valley south-southwest of Las Vegas. Portable crushers at construction sites were also important producers of base aggregate in Las Vegas.

The largest producers in the Las Vegas area in descending order of production were as follows. At over 5,000,000 tons (4,500,000 mt), Las Vegas Paving is the largest producer. The company produced asphalt concrete and mined sand and gravel from their Blue Diamond and Lone Mountain pits and some crushed stone from the Apex Landfill pit. Aggregate Industries, through its subsidiary Frehner Inc., mined and crushed over 2,000,000 tons (1,800,000 mt) of limestone from its Sloan property a few miles south of Las Vegas. Nevada Ready Mix, a subsidiary of the Mitsubishi Corp., mined over 1,500,000 tons (13,600,000 mt) of aggregate, mostly from a complex of pits in alluvium in the Lone Mountain area with minor production coming from quarries in adjacent bedrock.

The remaining companies produced less 1,000,000 tons (900,000 mt) each. Impact Sand and Gravel, Inc., under CTC Crushing LLC, mined sand and gravel from its Boulder Ranch and Jericho pits at the north end of Eldorado Valley. Their other pits, such as Cactus and Inspirada, which the company has mined in the past, have not been mined since 2014. Wells Cargo mined mostly sand and gravel from its mining operations at Lone Mountain and some from its North (Spring Mountain) pit. Mining from the latter pit has been decreasing over the past few years as it straddles Spring Mountain Road between South Buffalo Way and South Tenaya Way and is now surrounded by residential housing and some businesses. These operations alone accounted for over 40% of the aggregate production in the Las Vegas area.

Other major producers include the following: Mel Clark, Inc., mined sand and gravel from Lone Mountain. Boulder Sand and Gravel, Inc., mined sand and gravel from its Pole Line pit. Community pits and other aggregate mining facilities administered by the BLM and operated by a number of companies, including some of those already mentioned, annually account for between 10% and 20% of the total production of the Las Vegas and adjacent southern Nevada area.

The Lone Mountain Community pit covers 4,053 acres (1,640 ha), of which 1,620 acres (656 ha) are in the current mine plan, and 620 acres have currently been disturbed. Annual production at the Lone Mountain area peaked at more than 10,000,000 tons (9,000,000 mt) in 2005 and 2006, but declined rapidly from 2007 onward with the construction downturn. Production for 2020, was at least 4,000,000 tons (3,600,000 mt).

The Cind-R-Lite Block Company shipped lightweight aggregate to the Las Vegas market from their cinder operation in a Quaternary basaltic cinder cone near Amargosa Valley in Nye County. The estimated production was over 520,000 tons (480,000 mt) of cinder. Most of the material shipped was minus 3/8-inch aggregate for the manufacture of cinder blocks and pavers. Cind-R-Lite has two manufacturing sites in the Las Vegas Valley and one in Amargosa Valley.

An estimated 8,200,000 tons (7,400,000 mt) of construction aggregate were produced in the Reno-Sparks-Carson City area with crushed rock accounting for almost 60% of the aggregate production. This figure is at the low end of the 60%–80% range common for the last 30 years. The area also includes Douglas, Lyon, and Storey counties. The largest producers in rough order were as follows. At over 1,000,000 tons (900,000 mt), CEMEX was the largest producer, though its production is combined from two operations. The company produced crushed rhyolite from the Sierra Stone Quarry near Lockwood and sand and gravel from the Paiute pit, which is currently leased from the Pyramid Lake Paiute Tribe near Wadsworth. Rilite Aggregate Co. was the second largest producer, and mined sand and light weight aggregate southeast of Reno. Martin Marietta Materials, Inc., was the third largest producer, and operated the Spanish Springs (Rocky Ridge) Quarry north of Sparks, which mined crushed granitic rock and some decomposed granite. Granite Construction Co. was the fourth largest single producer. The company produces crushed andesite and granitic rock from its Lockwood Quarry and some sand and gravel from the Wade pit near Wadsworth. CEMEX, Rilite Aggregate Co., Martin Marietta Materials, Inc., and Granite Construction Co. each produced between 500,000 tons (450,000 mt) and 1,000,000 tons (900,000 mt).

Of the smaller producers, Basalite Concrete Products mined lightweight aggregate, which is an important component of crushed rock production in the area. Q and D Construction, Inc., produced aggregate from its Mustang pit, which it recently acquired from Sierra Nevada Construction Co., and Gopher Construction, Inc., produced aggregate from its Trico pit in Storey County. A small amount of decorative rock and sand and cinder for deicing was mined from the Black and Red Cinder pits northeast of Carson City. Bing Materials, which has operated a pit in Douglas County since 1977, is expecting to close at the end of 2021 due to exhaustion of the resource.

Over 3,000,000 tons (2,700,000 mt) of aggregate were produced outside of the major metropolitan areas, much of it from BLM administered pits on public lands. Over 80% of the aggregate was sand and gravel. Elko County produced over 1,000,000 tons (900,000 mt), and Eureka County produced over 600,000 tons (540,000 mt). Nye County produced over 350,000 tons (142,000 mt), most of which came from the Pahrump area to supply the Las Vegas area demand. The remaining counties produced less than 200,000 tons (180,000 mt) each.

Aggregate Industries completed a $58,600,000 project commenced in 2018 to widen a 6-mile (10-km) stretch of State Route 160 between Mountain Springs and Pahrump. The project also blasted out 100,756 cubic yards (77,033 cubic meters) of dirt; laid down 133,440 tons (121,056 mt) of road base; and placed 590 boulders, 14,000 cubic yards (10,700 cubic meters) of rip-rap, and 1,706 tons (1,548 mt) decorative rock. The project also included rehabilitating 22 miles (35 km) of deteriorating highway between the Nye County line and Mountain Springs. (NDOT Completes $59 Million S.R. 160 Widening in Southwest Clark County, Nevada Department of Transportation news release, 11/17/2020; NDOT Awards $59 Million Blue Diamond Road Widening Contract, Nevada Department of Transportation news release, 7/19/2018)

Las Vegas Paving Corp. continued work on the $73,000,000 "Centennial Bowl" interchange upgrade project, which commenced in January 2019 and was expected to last 450 days. This site is where U.S. Highway 95 meets the 215 Beltway in northwest Las Vegas. The contract for the construction part of the project is $61,500,000 and originally involved removing part of the Oso Blanca Road ramp and the old north-to-west loop to make room for three new freeway flyover ramp connections. The project also

involved building a two-lane flyover bridge to connect north-to-west freeway traffic. At 75 ft (23 m) tall by 39 ft (12 m) wide by 2,635 ft (800 m) in length, this is Nevada's second longest bridge. The project also included 400,000 cubic yards (306,000 cubic meters) of earthwork and 1,134 cubic yards (867 cubic meters) of riprap landscaping. The flyover bridge was completed and opened in September, and the east-to-south ramp was completed and opened in early October. The entire project is expected to be completed in Spring 2021. (NDOT Breaks Ground on $73 Million "Centennial Bowl" upgrade in Las Vegas, Nevada Department of Transportation news release, 1/22/2019; New "Centennial Bowl" East-to-South Ramp Opens in Northwest Las Vegas, Nevada Department of Transportation news release, 10/2/2020; "Centennial Bowl" Closure in Effect Monday Night, Mick Kelly, News and Talk Radio 840, 12/7/2020; Centennial Bowl flyover to Open Monday at Noon in Northwest Las Vegas, 8News Now, 9/25/2020)

In July, Granite Construction Co. completed $50,000,000 project commenced in 2019 to wide U.S. Highway 50 between Carson City and Silver Springs. U.S. Highway 50 was widened from two to four lanes between Roy's Road in Stagecoach and the U.S. 95 Alternate junction in Silver Springs, a distance of about 10 miles (16 km). The project also involved building a roundabout at the junction of U.S. Highways 50 and 95A in Silver Springs; building eight frontage roads tying local access roads into major intersections for safer designated turns to and from the highway. The project involved excavating 400,000 cubic yards (306,000 cubic meters) of dirt. (NDOT begins widening of U.S. Highway 50 West of Silver Springs, Brett Fisher, 01/11/2019; Fernley Leader Courier, Highway 50 widening project in final phase, Amy Alonzo, 3/13/2019; NDOT Substantially Completes Widening of U.S. 50 West of Silver Springs, Nevada Department of Transportation news release, 7/17/2020).

The Nevada Department of Transportation awarded a $99,000,000 construction contract to Fisher Sand and Gravel for improvements to Interstate 15 and the 215 Beltway in North Las Vegas. The project involves building two massive cast-in-place concrete dual lane flyovers, new I-15 southbound on-ramps and off-ramps at Tropical Parkway, widening over a half-mile (0.8 km) of the Beltway from four to six travel lanes, extending Tropical Parkway to Centennial Parkway, and replacing Range Road as an east-west surface connection with a new eastbound 215 Beltway off-ramp to the new Centennial Parkway and Range Road intersection. The project is expected to be completed in 2022. (NDOT Awards $99 Million Contract for I-15/215 Interchange in North Las Vegas, Nevada Department of Transportation news release, 1/14/2020)

The Nevada Department of Transportation awarded a 6-month, $17,100,000 project to Road and Highway Builders, LLC, that will enhance a 32-mile (51 km) U.S. Highway 95 between Mile Markers 72 and 104, or about from 12 miles (20 km) north of Beatty to 4 miles (6.5 km) south of the Nye/Esmeralda County line. The project will include placing new asphalt pavement and turn lanes, creating a new 2-mile (3-km) long northbound passing lane. About 20,000 cubic yards (15,300 cubic meters) of dirt will be moved and 400 cubic yards (306 cubic meters) of riprap will be installed. (Nevada Dept. of Transportation News Release, NDOT Awards $17 Million U.S. Highway 95 Improvement Project in Nye County, Nevada Department of Transportation news release, 8/11/2020)

The BLM issued preliminary and final environmental assessments and a record of decision approving the extension of the Flat Top pit gravel operation by Hiskett and Sons, LLC, over a 40-year period. The project area is mostly in section 20 and small parts of sections 19 and 29, T16N, R29E, in Churchill County. Up to 6,900,000 tons (6,360,000 mt) of material may eventually be removed. Up to 191 acres (77 ha) may be disturbed with mining occurring in several five-year phases progressing from north to south. Material would be crushed and stockpiled on site until transported for use in infrastructure and other needs in an area with a growing population and economic future. Processing will be through screens and jaw and cone crushers, and material will be moved between the processing equipment and stockpiles by means of conveyors. The proposed area is mainly underlain by younger Quaternary aeolian, alluvial fan, and playa deposits; older lacustrine and associated beach deposits; and minor Miocene rhyolite breccias and sand and gravel deposits. (BLM, Preliminary Environmental Assessment, Hiskett and Sons, LLC, Flat Top Gravel Pit Expansion, DOI-BLM-NV-C010-2020-0015-EA, February 2020; BLM, Final Environmental Assessment, Hiskett and Sons, LLC, Flat Top Gravel Pit Expansion, DOI-BLM-NV-C010-2020-0015-EA, April 2020; BLM, Finding of No Significant Impact, Hiskett and Sons, LLC, Flat Top Gravel Pit Expansion, Churchill County, Nevada, DOI-BLM-NV-C0l0-2020-0015-EA, 5/4/2020; BLM, Decision Record, Hiskett and Sons, LLC, Flat Top Gravel Pit Expansion, Churchill County, Nevada, DOI-BLM-NV-C0l0-2020-0015-EA, 5/4/2020)

The U.S. Bureau of Indian Affairs issued a Draft Final Environmental Assessment concerning the proposed Painted Rock Mine aggregate operation in the northwest quarter, section 6, T13N, R21E, in Douglas County. The land is administered by the U.S. Bureau of Indian Affairs for the Washoe Tribe. Knox Excavating, Inc., would be the leasee and operator and submitted a plan of operation in 2019. The company proposes to mine structural fill, decomposed granite, and other construction aggregates over a 40-year period. The project area covers 148.8 acres (60.2 ha) with 145 acres (56.7 ha) to eventually be disturbed. Mining would proceed in phases from south to north and eventually remove 44,900,000 tons (40,700,000 mt) of material. The initial phase would disturb up to 50 acres (20.2 ha) and mine up to 5,700,000 tons (5,200,000 mt). Full production was expected by year five and average 500,000

tones (454,000 mt) annually. Processing would involve screening and stacking and a portable crusher may be used when necessary. The processed material would be sold from stockpiles on site. The project area is underlain by the Tertiary Sunrise Pass formation consisting of sand, gravel, sandstone and conglomerate, which overlie a Jurassic quartz monzodiorite. (U.S. Bureau of Indian Affairs, Draft Final Environmental Assessment, Knox Excavating, Inc., Painted Rock Mine, Douglas County, Nevada, 8/2020)

Barite

All domestic mine production came from Nevada, and the USGS withheld domestic production and consumption figures to avoid disclosing company proprietary data. Both, however, decreased after rising annually since 2016. In recent years, production has accounted for between 12% and 22% of consumption. The difference was made up by imports mainly from China and some from India, Morocco, and Mexico. For the 2016–2019 period, China provided 47% and India provided 20% of the barite imported into the United States.

More than 90% of the barite sold in the United States is used as a weighting agent for drilling with the rest used as filler, extender, or weighing agents in paints, plastics, and rubber; in high-density cement shielding around x-ray units in hospitals and nuclear facilities; and for medical uses.

The estimated average price of barite was $163 per ton ($180 per tonne), a 0.6% increase from 2019. With most demand being for oil and gas drilling, the drill rig count has traditionally acted as a barometer of where production is headed, though the demand can be underestimated due to some rigs completing multiple holes from a single pad. An average of 20% of the rigs were used in drilling for gas, up from almost 18% in 2019. The average national rig count was 345 for oil and gas and 85 for gas, decreases of 63% and 49%, respectively. The rig count continued the 2019 decline by starting the year at 796 and declining 69% to 244 in August before rebounding some to 351 at year's end. The average oil price decreased 31% to $39.16 per barrel from an average of $56.99 per barrel in 2019. After increasing through the last half of 2019, prices decreased 71% from $57.52 to $16.55 in April and generally rose again to end the year at $47.02 per barrel (Cushing, Oklahoma, West Texas Intermediate Spot Price, FOB). These decreases were largely due to COVID-19 pandemic related travel restrictions and the resulting reduced demand for gasoline, diesel fuel, and jet fuel. (Baker Hughes Oilfield Operations, Inc., website: https://www.bhge.com)

Nevada's barite production comes from five operations, though two operations only sold from stockpiles. They shipped 227,347 tons (206,248 mt), a 47% decrease from 2019, with gross proceeds of $24,120,310.90, a decrease of 51% from 2019. Mine production was 138,238 tons (125,409 mt), a 76% decrease from 2019. The most recent peak of 811,334 tons (736,042 mt) shipped came in 2012 during high demand for oil and gas drilling and the fracking boom. Over the years, production reported by the NDOM has differed from that reported by the USGS. The difference is because the USGS reports run-of-mine, flotation, or other beneficiated material that is sold or used by the producer, while the NDOM reports only shipped barite, which may include some material from stockpiles.

M-I SWACO, a subsidiary of Schlumberger, Ltd., was the largest Nevada barite producer. The company processed 101,000 tons (916,000 mt) barite concentrate from the Greystone and Mountain Springs Mines at the Battle Mountain grinding plant in Lander County. The company then shipped the same amount of ground barite from the Battle Mountain grinding plant.

M-I SWACO mined 15,300 tons (13,880 mt) mined at the Greystone Mine, a 93% decrease from the previous year. The company processed 57,045 tons (51,751 mt) of ore and shipped 10,528 tons (9,551 mt) of jig product from the adjacent beneficiation plant to the Battle Mountain grinding plant. Conventional open-pit mining with front-end loaders are used to remove the barite ore with concurrent reclamation. The ore is either stockpiled at an adjacent mill site or trucked to the plant. The plant consists of a three-stage crushing and screening circuit and a jig circuit for gravity separation to do the concentrating. Barite concentrates intended for use as a drilling mud must contain between 65% and 75% $BaSO_4$ with a specific gravity greater than 4.1. The barite of the Greystone Mine is hosted in the Middle to Late Devonian Slaven Chert, which consists of black chert with minor argillite and shale.

M-I SWACO mined 69,265 tons (62,837 mt) its Mountain Springs Mine between January 14 and July 29. The mine was temporarily shut down after that period. The company also processed 124,926 tons (113,332 mt) or ore and shipped 50,583 tons of jig product from the beneficiation plant adjacent to the mine to the Battle Mountain grinding plant. Like at the Greystone Mine, the barite and Mountain Springs is also hosted in the Devonian Slaven Chert. (NBMG Bulletin 98; M-I SWACO, website, https://www.slb.com)

National Oilwell Varco shipped 25,386 tons (23,030 mt) of ground barite from its Dry Creek jig plant and Osino grinding plant, a 24% decrease from the previous year. At the jig plant barite is crushed, washed, sorted, and concentrated, and then is stockpiled for later hauling to Osino for grinding. The company's Big Ledge Mine was shut down in 2014 with production coming from stockpiles. The barite at the Big Ledge Mine occurs in argillite and chert of the Ordovician Valmy Formation.

The BLM conducted a period for public comment to identify issues to be analyzed in an environmental assessment on a plan of operations amendment submitted by National Oilwell Varco for the permanent closure of the Big Ledge Mine pit. The entire project consists of the Big Ledge Mine and the Dry Creek Stormy Creek mill sites. The proposed closure activities would only take place at the Big

Ledge Mine. The proposed closure would include backfilling the pit and eliminating the pit lake. Related actions would include management of acid rock, initial pumping of water from the pit lake via a buried pipeline to lined evaporation, and continued operation and closure of the West waste rock facility catchment pond. It would also include management of post-pit water drawdown solids in the open pit, managing salts in lined evaporation ponds resulting from evaporation, filling the open pit with oxide rock after the pit water has been drawn down, and continued closure monitoring (Bureau of Land Management Seeks Public Comment on the Big Ledge Mine Closure Plan Amendment, BLM Press Release, 9/22/2020; National Oilwell Varco, website, https://www.nov.com).

Due to the depressed market, Baker Hughes Oilfield Operations, Inc., permanently shut down its Argenta Mine on August 31, 2019, with 18,000 tons (16,300 mt) stockpiled from the previous year production being processed in 2020. The Slaven Mine produced 53,673 tons (48,692 mt) of which 39,750 tons (36,061 mt) were processed, decreases of 75% and 51%, respectively, from 2019. The Argenta mill processed and shipped 39,750 tons (36,061 mt) a 51% increase from 2019.

Prior to the shutdown of the Argenta Mine, mining was conducted from the Cuna pit and F-Pit North. The Yuba pit had been idled earlier but could be returned to active operation, if needed. The Argenta, Velvet, and F pits were mined historically but have since been completely back-filled. The mine and mill cover 592 acres (240 ha) of which 121 acres (50 ha) are public land administered by the BLM. The mill facility utilizes gravity separation to produce a concentrated barite product for use as drilling mud. The facility is capable of processing up to 315,360 tons (286,100 mt) annually. The barite in the Argenta and Slaven Mines is hosted in the Devonian Slaven Chert. (NBMG Bulletin 98; Nevada Bureau of Mining Regulation and Reclamation, Fact Sheet, Argenta Mine and Mill, 3/8/2021; Baker Hughes Oilfield Operations, Inc., website, https://www.bhge.com)

Baroid Drilling Fluids proposed an expansion of the Rossi Mine and a final environmental impact statement, a record of decision approving the project, and a reclamation permit were issued. The proposed action includes: 1) Continued surface exploration drilling throughout the project area, 2) Expansion of the plan of operations boundary/project area, 3) Expansion of three existing pits, 4) Development of a new pit, 5) Expansion of an existing waste rock disposal facility and 6) Construction of three new facilities; and expansion, development, or improvement of new and existing infrastructure and ancillary support facilities. The proposed action would extend mining operations and surface exploration for an additional 8 years. (NBMG Bulletin 98; Nevada Bureau of Mining Regulation and Reclamation, Reclamation Permit 0257, 6/2/2020; BLM, Rossi Mine Expansion Project, Final Environmental Impact Statement, DOI-BLM-NV-E020-2015-0041-EIS, 5/28/2019; BLM, Rossi Mine Expansion Project, Record of Decision, DOI-BLM-NV-E020-2015-0041-EIS, 9/5/2019; Halliburton Co. website, http://www.halliburton.com)

Progressive Contracting, Inc., of St. George, Utah, temporarily shut down its Maggie Creek Mine (a.k.a Carlin Mine) and plant on December 20, 2019 and did not mine or ship barite in 2020. (NBMG Bulletin 98; NBMG MI-2015; Maggie Creek Plant Fact Sheet, 4/4/2018; Associated General Contractors of Utah, website, https://www.agc-utah.org/list/member/progressive-contracting-inc-st-george-17952)

Though no exploration or construction work have been divulged, Baker Hughes, Inc., had submitted a Plan of Operation to the BLM for the company's Scruffy Oz project covering 2,180 acres (882 ha), mostly in portions of the eastern part of T31N, R46E and the western part of T31N, R47E in the Argenta mining district. The project also includes the rights to barite on the adjacent Shoshone Pediment property owned by Bravada Gold Corp. The Plan of Operation allows for up to 300,000 (272,000 mt) tons of barite to be mined annually from three open pits for up to 5 years. Two of the open pits are located on the Shoshone Pediment property, where most of the known barite mineralization occurs. Permitting for these two pits was underway, though mine construction is now uncertain due to COVID-19 pandemic and crash in oil prices in early in the year, which have since recovered. The barite occurs in beds at least 10 feet (3 meters) thick hosted in black chert, limestone, and argillite of the Devonian Slaven Chert. (NBMG Bulletin 98; Mine Permit Submitted for Bravada's Shoshone Pediment Barite-Royalty Property in Nevada; Provides Corporate Update, http://finance.yahoo.com/news/mine-permit-submitted-bravadas-shoshone-220303848.html, 6/1/2016; Bravada Gold Corp., Corporate Presentation, 7/2021; Bravada Gold Corp., Management Discussion and Analysis, 11/25/2020; Bravada Gold Corp., website, http://www.bravadagold.com)

In its Notice of Final Decision, the Nevada Bureau of Mining Regulation and Reclamation issued Reclamation Permit 0257 for the Ann Barite project of Halliburton Energy Services, Inc. This permit authorizes 1912 acres (774 ha) of surface disturbance on private lands and public lands administered by the BLM. The U.S. Forest Service is working with the BLM on permitting the project. The project covers about 2,500 acres (1,000 ha) in T12-13N, R46E in the Northumberland district, Nye County. The company proposes the construction of open pits, waste rock dumps, a jig plant for the production of barite concentrate, access roadways, and support facilities. The barite will initially be stockpiled at a staging area along U.S. 50 and then transported to the Dunphy mill for processing. The barite is hosted in Devonian dark gray chert, grayish-orange claystone, and light gray mudstone that are possibly correlative with the Slaven Chert. (Nevada Bureau of Mining Regulation and Reclamation, Reclamation Permit 0257, web posting 6/2/2020; Eureka County Natural

Resources Advisory Commission, public meeting minutes, 6/20/2017, 1/17/2019; Elko Free Press, 6/10/2017; NBMG Bulletin 98)

The descriptions of 181 Nevada barite deposits are compiled in NBMG Bulletin 98, *Barite in Nevada*, 1984, by Keith Papke. A collection of Nevada barite samples acquired by Keith Papke is also available at the NBMG Great Basin Science Sample and Records Library. A list of 60 deposits with a description of a few are compiled in NBMG Bulletin 65, *Minerals and Water Resources of Nevada*, 1964, prepared by U.S. Geological Survey and Nevada Bureau of Mines and Geology.

Cement

Domestic cement production was an estimated 98,400,000 tons (89,300,000 mt), valued at $17,500,000,000. Production includes 95,900,000 tons (87,000,000 mt) of portland cement and 2,500,000 tons (2,300,000 mt) of masonry cement. Estimated apparent consumption decreased 1% to 112,400,000 tons (102,000,000 mt) with the difference between production and consumption made up by imports from Canada, Turkey, Greece, China, and others. Imports (hydraulic cement and clinker) increased 3% to 18,100,000 tons (16,400,000 mt) from the previous year. Production, consumption, and prices are driven by construction. The estimated average mill price increased 0.8% to $112.50 per ton ($124.00 per tonne) from the previous year, the eighth annual increase since 2011.

Despite economic disruptions due to the COVID-19 pandemic, the value of construction increased 4% during the first nine months of 2020 as compared to the same period in 2019 with residential construction spending increasing faster than nonresidential construction spending. The top three cement consumers in decreasing order were Texas, California, and Florida. Supplying the increased construction demands has been a challenge due to local shortages and increasing prices of lumber, hardware, and cement.

The only cement producer in Nevada is Nevada Cement Co. (a subsidiary of Eagle Materials, Inc. of Dallas, Texas), which has a plant in Fernley in Lyon County. The plant produced 517,398 tons (469,380 mt) of cement, a 9% increase from 2019. The plant has two kilns, a long dry kiln installed in 1964 and a one-stage preheater installed in 1969. The plant's annual capacity is 500,000 tons (450,000 mt) of cement and 560,000 tons (510,000 mt) of clinker. The plant produces 1) Type I/II, low alkali, moderate sulfate-resistant cement; 2) Type II/V, low alkali, high sulfate-resistant cement; 3) IP portland-pozzolan moderate sulfate-resistant cement; and 4) Class N pozzolan. The company serves markets in northern Nevada and California and has a rail terminal in Sacramento.

The cement is manufactured from limestone mined from three areas, pozzolan from the nearby Mustache pit, and clay from the Terraced Hills north of Pyramid Lake. A small amount of gypsum from an undisclosed source is also added during the clinker stage of production. Iron oxide from stockpiles at the Barth Mine in northern Eureka County were used in the past, though that operation did not produce iron oxides in 2020. About 81% of the limestone comes from the Churchill Quarry in the Trinity Range about 40 miles (64 km) east of the plant and the remainder comes from the Fernley Quarry a few miles south of Fernley, and the Relief Canyon Quarry near the Relief Canyon Mine in the southern Humboldt Range about 70 miles (110 km) northeast of the plant. Overall, the company has at least 50 years of limestone reserves.

The gross proceeds were $7,953,826, a 1% increase from 2019. The gross proceeds of the mines are also included in those sections below. Overall, for their fiscal year ending March 31, 2021, Eagle Materials reported their total cement sales volume increased and overall cement sales revenue both increased 26% from 2019. Their average price was $111.19 per ton ($100.78 per tonne), a 1% increase from 2019. Eagle Materials also recently acquired 3D Concrete, Inc., which leases the Dayton Materials pit from Granite Construction and operates the WS-2 pit near Battle Mountain. (Eagle Materials Inc., 10-K Report, 5/21/2021; Eagle Materials Inc., website, http://www.eaglematerials.com; Nevada Cement Co., website, http://www.nevadacement.com)

Clay

Domestic clay production decreased 3% in 2020 to an estimated 27,600,000 tons (25,000,000 mt) with a sales value of $1,600,000,000. The USGS divides output into ball clay, bentonite, common clay, fire clay, fuller's earth, and kaolin. Estimated apparent consumption decreased 0.9% to 24,300,000,000 tons (22,000,000 mt) from the previous year. The difference between production and consumption was mainly attributable to exports, mainly to Canada, China, Japan, and Mexico. Nevada has never been a large clay producer, and the state's 2020 clay production only accounts for 0.4% of domestic production. The state's production (not including clay produced from stockpiles) increased 59% in 2020 to 191,689 tons (173,899 mt). The gross proceeds for all Nevada clay production decreased 19% in 2020 to $11,152,387.

IMV Nevada, a subsidiary of Lhoist North America, mined 168,400 tons (152,800 mt) and shipped 115,250 tons (95,400 mt) of sepiolite from its Amargosa Valley Clay Mine, a 44% increase in mining and a 9% decrease in shipping from the previous year. The company mined 15,700 tons (14,200 mt) and shipped 10,909 tons (9,897 mt) of calcium bentonite, a 47% increase in shipping. The company also mined 2,700 tons (2,450 mt) and shipped 1,693 1,226 tons (1,536 mt) of saponite clay, a 38% increase. No bentonite or saponite were mined in 2019, when production was from stockpiles. The operation covers 10,000 acres (4,047 ha) of mining claims of which 5,000

acres (2,023 ha) are patented and owned outright by IMV. The company maintains an exploration plan with a rolling 10-year outlook that continues to identify new ore reserves for future production. Through 2020, prices remained the same as in 2019, but starting January 1, 2021, prices were set to increase 12% on the company's lime, limestone, and clay products to cover the rising costs of critical materials and services. The company had focused on continued improvement and cost savings, but was only able to partially offset increases in energy prices and the costs of compliance with regulatory requirements.

The bentonite is a white to off-white, calcium-based montmorillonite with an unusually well-developed dioctahedral crystalline structure and an extremely high cation exchange capacity. Saponite is similar to sodium bentonite (montmorillonite) except that magnesium has replaced all or most of the aluminum and exchangeable sodium. It is a swelling clay with a trioctahedral structure, a flat tubular mica-like crystal and a low cation exchange capacity that imparts thixotropy to aqueous solutions. Saponite has the same uses as bentonite but is more stable due to a much lower cation exchange capacity. Sepiolite is a hydrous magnesium silicate. It is structurally similar to bentonite and saponite, but the crystals are much more highly ordered and contain very few of the imperfections, which affects cation exchange capacity. The nearly perfect crystal structure, which forms long "ribbons", contributes to high thermal stability, and helps impart viscosity to aqueous suspensions. Unlike bentonite and saponite, sepiolite is unaffected by electrolytes and can gel salt solutions. Sepiolite is more efficient in asbestos replacement and reinforcing systems and is also an excellent binder. The clays occur in shallow, flat-lying deposits in Pliocene lacustrine rocks in the Ash Meadows-Amargosa Flat area of Nye County. It is processed at the company's Amargosa Valley plant, and clay products are exported worldwide for use in drilling mud, construction, and animal feed. The sepiolite and saponite deposits have unusual geology and are considered to have originated in a Pliocene playa with an area of at least 22 square miles (57 square km). The sepiolite, which yields most of the profits for the operation, occurs in an almost continuous bed with an average thickness of about seven feet (2 m). IMV Nevada is the only commercial producer of sepiolite and saponite in North America. (Lhoist North America, news release, 11/9/2020; Lhoist North America, website, https://www.lhoist.com/us_en/imv-nevada)

Two companies intermittently mine and ship minor amounts of Nevada smectite from several sites for use in high-value specialty products. At its White Caps mill near Beatty in Nye County, Vanderbilt Minerals Co. processes small amounts of clay stockpiled from several deposits in Nevada, Arizona, and California. The company mined its New Discovery Mine just south of Beatty in 2017. The mine temporarily shut down on March 31, 2017, but smectite was processed and shipped from stockpiles in 2018 through 2020. The company mined the Blanco Mine located about 40 miles (64 km) west-southwest of Tonopah in the Coaldale mining district in Esmeralda County in 2017 but not since. The mine was temporarily shut down on May 1, 2017, but smectite was processed and shipped from stockpiles in 2018 through 2020. The company mined its Buff-Satin property about 10 miles (16 km) northeast of Lovelock in the Willard mining district in Pershing County in 2019 but not in 2020. The company shipped 2,443 tons (2,216 mt) after processing from stockpiles from all of the mines, a 23% decrease from the previous year. The clay at the New Discovery Mine is derived from altered perlite and periltic pitchstone interbedded in Tertiary tuff-breccia. The clay at the Blanco Mine is derived from altered tuff and tuffaceous sedimentary rocks of the late Miocene to early Pliocene Esmeralda Formation. The clay at the Satin and Buff Mines is derived from late Miocene to early Pliocene altered welded and non-welded tuffs. (Vanderbilt Minerals Co., website, www.vanderbiltminerals.com)

The American Colloid Co. intermittently produces calcium bentonite from its Nassau property in Coal Canyon in the Willard mining district for use in specialty clay products. The company mined the deposit in 2016 but not since. However the company did ship 356 tons (323 mt), a 41% decrease from the previous year. Shipping was from stockpiles both onsite and offsite. The clay is hosted in altered rhyolite tuff-breccia of probable Miocene-Pliocene age. (American Colloid Co., website, https://www.mineralstech.com/business-segments/performance-materials/american-colloid-company)

The Nevada Cement Co., mined 4,889 tons (4,435 mt) of halloysite from its company-owned Flanagan pit in the Terraced Hills about 8 miles (13 km) northwest of Pyramid Lake. The company mines halloysite on an as-needed basis. No mining occurred in 2019, but the company did mine 30,000 tons (27,200 mt) in 2018. Because of its high alumina content, halloysite is used in the production of portland cement at the Nevada Cement Co. plant at Fernley. The halloysite occurs in partly altered, lapilli tuff in a pyroclastic unit separating late Miocene to Pliocene andesitic and basaltic flows. (Nevada Cement Co., website, http://www.nevadacement.com)

PMMR Corp. (Precious Minerals Mining and Refining Corp.) mined about 1,500 tons (1,360 mt) of material from East Walker Clay Mine in the Washington mining district in Lyon County. The company sells a volcanically derived clay-based mineral under the trade name Orykta™ as a soil and animal feed additive and shipped 5,000 tons (4,536 mt) of product. The difference between mining and shipping was made up from stockpiles. The two main components reported in Orykta™ are natrojarosite and gypsum. The company's 1998 approved plan of operation allowed for annual production of up to 36,500 tons (33,100 mt). (Bill Minor, CEO, oral communication, 9/1/2020; Precious

Minerals Mining and Refining Corp. website, https://www.oryktamineralgoods.com)

Lithium Nevada Corp., a subsidiary of Lithium Americas Corp. (formerly Western Lithium USA Corp.) owns the Nevada Lithium and Thacker Pass projects. The properties are within the McDermitt caldera, and contain high-lithium clays, including hectorite, with significant amounts of clay formed by hydrothermal alteration of volcaniclastic sedimentary rocks making up the moat deposits in the western part of the caldera. Also, Cypress Development Corp., which owns the Clayton Valley Lithium project containing of the Glory and Angel claim blocks, was experimenting with extracting lithium from lithium rich clay on its property. Several other companies were exploring properties containing lithium-bearing clay in Clayton Valley and the surrounding areas. All of these sites are discussed in detail in the lithium section.

The descriptions of 31 Nevada clay deposits are compiled in NBMG Bulletin 76, *Montmorillonite, Bentonite, and Fuller's Earth Deposits in Nevada*, 1970, by Keith Papke. A collection of Nevada clay samples acquired by Keith Papke is also available at the Nevada Bureau of Mines and Geology Great Basin Science Sample and Records Library. Brief descriptions of 20 deposits are compiled in NBMG Bulletin 65, *Minerals and Water Resources of Nevada*, 1964, prepared by U.S. Geological Survey and Nevada Bureau of Mines and Geology.

Diatomite

At 35% of the total, the United States is the world's largest producer of diatomite. Domestic production increased 0.3% in 2020 to an estimated 700,000 tons (770,000 mt) valued at $260,000,000. This was the first increase after production decreased 20% in 2019 from its all-time high of 1,055,000 tons (957,000 mt) in 2018. Estimated apparent consumption increased 1% in 2020 to 794,000 tons (720,000 mt), which was also an increase after consumption decreased 21% in 2019. Exports decreased 1% to 74,000 tons (67,000 mt). Production was from six companies with 12 mining areas and nine processing facilities in California, Nevada, Oregon, and Washington. About 60% of the diatomite is used in filtration products. The rest is used absorbents, fillers, light weight aggregates, specialized pharmaceuticals, biomedical purposes, nontoxic insecticides, and other applications. The estimated average free on board plant price remained the same as in 2019 at $308 per ton ($340 per mt). Nevada produced 416,231 tons (377,602 mt) of diatomite, a 50% decrease from 2019. The gross proceeds increased 7% to $50,859,212. About two-thirds of the diatomite produced in Nevada is used in filtration and the remainder is largely used in absorbents, fillers, and cement.

U.S. Silica, LLC, a subsidiary of U.S. Silica Holdings, Inc., which bought out EP Minerals, LLC, in 2018, produced almost 90% of Nevada's diatomite. In December, the company announced its Industrial and Specialty Products business would increase prices. Depending upon grade and product, prices increased up to 15% for most of its non-contracted silica sand, aggregate diatomaceous earth and clay products used primarily in foundry, paints, coatings, elastomers, roofing, chemicals, recreation, building products, agricultural, pet litter and other applications. The price increases were intended to support upgrading capacity and to offset the rising production costs. (U.S. Silica Holdings, Inc., Form 10-K, 2/26/2021; U.S. Silica Holdings, Inc., news release 12/1/2020; U.S. Silica, LLC, website, https://www.ussilica.com)

The U.S. Silica, LLC, Colado facilities in Pershing County is the company's largest Nevada diatomite operation. It consists of a plant at Lovelock that processes diatomite mined from a series of pits about 15 miles (24 km) to the northwest in the Velvet mining district. The mine produced 258,922 tons (234,892 mt), and shipped 147,738 tons (134,027 mt) a 126% increase in mining and a 0.5% decrease in shipping from 2019. The plant processed 114,279 tons (103,673 mt) and shipped 114,903 tons (104,239 mt), 9% decreases each from 2019. The estimated recovery was 83%. The diatomite occurs as thick beds interbedded with freshwater tuffaceous sedimentary rocks of probable Miocene age. The diatomite has to be dry before processing. Most diatomite contains about 3% water, but the diatomite at the Colado Mine is 50% water. It is mined in the summer and laid out in the sun to dry. Despite the wetness of the diatomite, there is no ground- water for at least 2,000 feet (600 meters) below the pit, and what water that is needed for the operation has to be hauled in from Lovelock. The operation consists of 3,773 acres (1,527 ha) of the company-owned claims on Federal land and 7,025 acres (2,843 ha) of an evergreen land lease.

The Colado plant is the world's largest producing diatomite facility with an annual capacity of about 156,000 tons (141,500 mt). The plant contains three kilns that produce calcined and flux-calcined filter aids and functional additives and also has a perlite expander. The diatomite is processed using soda ash, natural gas, and electricity to manufacture filtration products used in industries including brewing, corn wet milling, oil and gas, wineries, potable water, swimming pools and petrochemicals. The plant also produces filler products used as an anti-block in polyethylene film and flattening agents in paint. The plant has full rail service via the Union Pacific Railroad, and its proximity to the port of Oakland allows it to be the primary export plant for filter aid and fillers. (U.S. Silica Holdings, Inc., Form 10-K, 2/26/2021; U.S. Silica, LLC, website, https://www.ussilica.com)

The U.S. Silica, LLC, Clark operation consists of the Clark plant in the Clark mining district, Storey County, about 20 miles (32 km) east of Reno and the nearby Clark Mine about 4 miles (6 km) east of the plant. The mine produced 83,243 tons (75,516 mt) and shipped 70,674 tons (64,115 mt), a 2% decrease in mining and a 26% increase in

shipping from 2019. The plant processed 58,026 (52,641 mt) and shipped 57,653 (52,302 mt) in 2020, 43% and 40% increases, respectively, from 2019. The estimated recovery was 78%. The operation consists of 2,690 acres (1,089 ha) of combined company-owned private property and unpatented placer claims and 2,813 acres (1,138 ha) of leased land. The diatomite at Clark contains about 90% of the diatom *Melosira granulate*, and is interbedded with Neogene diatomaceous shale and thin beds of lacustrine volcanic tuff.

The Clark plant operates on natural gas and electricity, contains a rotary kiln and a flash dryer, and has annual capacity of about 70,000 tons (63,500 mt). The kiln produces granular products used in the soil amendment, absorbent, and carrier markets. The flash dryer produces natural diatomite powders for the functional additive and natural insecticide/animal feed markets. The plant is immediately accessible by Interstate 80 and serviced via the Union Pacific Railroad. (U.S. Silica Holdings, Inc., Form 10-K, 2/26/2021; U.S. Silica, LLC, website, https://www.ussilica.com)

The U.S. Silica, LLC, Fernley Mine and mill about 20 miles (32 km) northeast of Fernley in the Desert mining district, mined 45,692 tons (41,452 mt) and shipped 35,406 tons (31,853 mt), decreases of 43% and 0.8% increases respectively from the previous year. The plant contains a rotary kiln uses electricity and recycled oil and has an annual capacity of 50,000 tons (45,000 mt). The estimated processing recovery was 60%. The end use of diatomite from the Fernley Mine is mainly automotive and industrial absorbent products. The deposits consists of freshwater diatomite interbedded with minor volcanic ash and tephra units. The diatomite is mainly amorphous silicate in composition. The operation consists of 5,668 acres (2,294 ha) of combined company-owned private property and unpatented placer claims. (U.S. Silica Holdings, Inc., Form 10-K, 2/26/2021; U.S. Silica, LLC, website, https://www.ussilica.com)

The U.S. Silica, LLC, Hazen Mine on the Lyon-Churchill County line did not mine or process but did ship 6,919 10,390 tons (6,277 mt), a 33% decrease from the previous year. The diatomite is mainly amorphous silicate in composition. The operation consists of 120 acres (49 ha) of combined company-owned private property and unpatented placer claims and 1,135 acres (459 ha) of leased unpatented placer claims. The end use of diatomite from the Hazen Mine is calcium silicate insulation. (U.S. Silica Holdings, Inc., Form 10-K, 2/26/2021; U.S. Silica, LLC, website, https://www.ussilica.com)

The U.S. Silica, LLC, is in the process of permitting its Sequoya Mine, greenfield diatomite deposit near Fallon. Once in operation, the diatomite will be used for filtration brewing, wine making, and the production of sweetener, swimming pool filters, additives for coatings, and low density polyethylene film. The deposit consists mainly of *Melosira granulata* with minor traces of volcanic ash and basalt detritus. The property consists of 840 acres (340 ha) of combined company-owned private unpatented placer claims. (U.S. Silica Holdings, Inc., Form 10-K, 2/26/2021; U.S. Silica, LLC, website, https://www.ussilica.com)

Imerys Filtration Minerals produced 25,693 tons (23,309 mt) from its Nightingale deposit north of Fireball Ridge in Churchill County, a 3% decrease from the previous year. The company processed and shipped 26,456 tons (24,001 mt), a 0.1% increase from the previous year, from its plant in Fernley. The company's Hazen pit, which had been mined since 1950 and still has reserves, has been on standby since 2009. The diatomite deposits at both Nightingale and Hazen are interbedded with Pliocene lacustrine tuffaceous shale, sandstone, and limestone, and siliceous tuff. (NBMG Bulletin 83; Imerys, website, https://www.imerys.com)

The Grefco Minerals, Inc., Basalt Mine and mill near the Esmeralda-Mineral County line is small relative to other Nevada diatomite companies but has been producing diatomite for many years. The company campaign mines and then processes material from the resulting stockpiles at its plant. The company mined 2,681 tons (2,432 mt), a 12% increase from the previous year. The deposit is in Miocene-Pliocene lacustrine sedimentary rocks consisting of diatomite, argillaceous and calcareous diatomite, clay, sand, and volcanic ash, and the main diatoms are *Melosira granulate*, *Stephanodiscus aslraea*, and *Eunotia robusta*. The mill shipped 4,666 tons (4,233 mt) for filter aids and 1,319 tons (1,197 mt) for fillers, 9% and 46% increases respectively from the previous year. For filter aids, the diatomite has been calcined by heating to above 1,500°F (815°C) to agglomerate the diatom exoskeletons and provide for a range of filter permeabilities. For fillers, the diatomite is dried and sized without further processing. (NBMG Bulletin 78; Dicalite Management Group, website, https://www.dicalite.com)

Brief descriptions of 11 of the main Nevada diatomite deposits are compiled in NBMG Bulletin 65, *Minerals and Water Resources of Nevada*, 1964, prepared by U.S. Geological Survey and Nevada Bureau of Mines and Geology. Not counting sites just marked as "unnamed" or "unknown" and duplicates, the U.S. Geological Survey's Mineral Resources Data System lists about 90 sites.

Dimension Stone, Landscape Rock, and Decomposed Granite

Domestic production of dimension stone was 2,870,000 tons (2,600,000 mt) valued at $400,000,000, a 3% increase in production and a 4% decrease in value from the previous year. Estimated value of apparent consumption was $1,970,000,000 a 13% decrease from the previous year. The difference in value was made up for by imports mainly from China, Brazil, Italy, India, and other places. Nevada supplied local and regional markets, and produced 4,004 tons (3,632 mt) of dimension stone, a 20% decrease from 2019. At least 177,771 tons (161,273 mt) of crushed landscape and decorative rock were mined, a 37% decrease

from 2019. Decomposed granite (DG) falls into a gray area with uses including landscape rock, paving material similar to gravel, and construction material. Reported DG production was 581,783 tons (527,790 mt), a 0.3% decrease from 2019. The value is difficult to estimate. With a median price of about $60 per cubic yard ($45.60 per cubic meter), landscape rock has an estimated value of about $8,200,000. At an average price of about $50 per cubic yard ($38 per cubic meter), the DG has an estimated value of about $22,400,000.

Mt. Moriah Stone Quarries LLC, quarried flaggy quartzite of several colors from the Cambrian Prospect Mountain Quartzite at a quarry about 15 miles (24 km) north of Baker in White Pine County. The company quarried 3,490 tons (3,159 mt) and shipped 6,768 tons (6,140 mt), 0.2% and 79% increases from the previous year. This material, which naturally splits into large slabs, is used for flagstone, ashlar (uncut facing stone), and other types of uncut building stone. The operation commonly shuts down in November or December and restarts the first quarter of the following year. (Mt. Moriah Stone Quarries LLC, website, https://www.mtmoriahstone.com)

Las Vegas Rock mined 36,091 tons (32,742 mt) and shipped 31,747 tons (28,801 mt) of crushed landscape rock from its Rainbow Quarries near Goodsprings, about 32 miles (51.5 km) southwest of Las Vegas at the base of Mount Potosi, 55% and 20% decreases, respectively, from 2019. The company had mined 1,543 tons (1,400 mt) of cut decorative slabs, flagstone, ashlar, and boulders in 2019, but did not mine such material in 2020. However, the company did ship 524 tons (475 mt) of blocks in 2020. They also mined 24,060 tons (21,830 mt) and shipped 55,013 tons (49,907 mt) of sand, a 67% decrease in mining and a 26% increase in shipping from the previous year. The operation consists of a main quarry and a number of satellite quarries located according to the color of the stone. The stone is mined from the Jurassic Aztec Sandstone, and technical data including hardness, strength, and composition are available on the company's website (Las Vegas Rock website http://vegasrock.com)

Kalamazoo Materials Inc. of Tucson, Arizona, mined and processed 138,024 tons (125,215 mt) of crushed landscape rock, a 31% decrease from 2019. The company also shipped 121,814 tons (110,508 mt), an 18% increase from 2019. Mining was from the Beatty Quarry located about 5 miles (8 km) north of Beatty. The company's Modoc Quarry about 16 miles (25.7 km) west of Searchlight was mined in 2015 but not since. In 2010, D and H Mining leased its pits making up the Beatty Quarry to Kalamazoo. These pits produce from Pliocene tuff, which in the past, D and H Mining mined and sold under the name of "Spicerite" (strong, bright white, hydrothermally altered tuff used to make bricks and blocks). The Modoc Quarry is mainly in Precambrian gneiss, schist, and granitic rocks (Kalamazoo Materials website, http://www.kalamazoomaterials.com)

The amount of landscape rock produced is likely greater than the estimate given above. Vista Landscape Center, Inc., of Henderson, Nevada, sold decorative stone mined from quarries near Searchlight and Crescent Peak, 20 miles (30 km) west of Searchlight. Desert Deco Rock sold landscape rock from the Lucky Dutchman and Copper Rose pits at the south end of the McCullough Range and the Eldorado pit about two miles (3 km) west of Nelson in the Eldorado Mountains. R.T. Donovan Co. and Reno Rock Transport of Reno, Cheyenne Rock of North Las Vegas, and others also sold decorative rock produced in Nevada. (Cheyenne Rock website, https://cheyennerock.com; Desert Deco Rock website, https://www.desertdecorock.com; R.T. Donovan Co. website, www.rtdonovan.com; Reno Rock Transport website, http://www.renorock.net; Vista Landscape Center, Inc., website, http://www.vistalandscape.com)

Along with aggregate, Cinderlite Trucking Co. in recent years has mined between 80,000 and 123,000 tons (72,600 and 112,000 mt) of decomposed granite (DG) from their Goni pit north of Carson City. However, no DG production was reported for 2020. Along with crushed stone and sand and gravel, Martin Marietta Materials, Inc., produced DG from its Spanish Springs Quarry in the McClellan District on the west side of Spanish Springs Valley in the past but reported none in 2020. R.T. Donovan Co. produced 483,467 tons (438,598 mt) of DG from its Donovan pit in the McClellan district in Spanish Springs Valley, a 23% increase from 2019. Mountain West Construction Co. produces 98,316 tons (89,192 mt) of DG from the Dressler pit in the Green Valley district, a 10% decrease from 2019. As with landscape rock, the amount of DG produced may be greater than the estimate above.

The Nevada Department of Transportation awarded a contract to Las Vegas Paving Corp. for a $12.7 million construction project to upgrade six miles (9 km) of north and southbound Interstate 11 from Wagonwheel Drive to the concrete section of the "Spaghetti Bowl" interchange in Henderson. The project calls for placing nearly 24,000 tons of blacktop, repairing concrete slab and bridge decks at East Paradise Hills and College Drives, ramp repaving, new bridge painting and drainage enhancements, and lighting and signage improvements. The project also includes installing 315,283 cubic yards (241,051 cubic meters) of decorative rock, 698 boulders, and 2,817 cubic yards (2,154 cubic yards) of riprap at the freeway interchanges. (Nevada Dept. of Transportation News Release, NDOT Awards $13 Million I-11 Paving Improvement Project in Henderson, 9/14/2020)

Brief descriptions of eight quarries are compiled in NBMG Bulletin 65, *Minerals and Water Resources of Nevada*, 1964, prepared by U.S. Geological Survey and Nevada Bureau of Mines and Geology.

Fluorspar

The USGS reports only U.S. production of fluorspar equivalent (equivalent to 92% fluorspar) derived as a by-product in the form of fluorosilicic acid from phosphate rock processed for phosphoric acid. Production was an estimated 32,000 tons (29,000 mt), the same as in 2019. Apparent consumption was 418,900 tons (380,000 mt), a 3% decrease from 2019. Imports, mostly from Mexico and some from Vietnam, China, South Africa, and other countries made up the difference between production and consumption. The average prices of acid grade and metallurgical grade fluorspar per ton was $390 and $145 ($320 and $160 per mt) respectively, which were decreases of 1% and 45%, respectively. China accounted for 57% of the world's non-U.S. fluorspar production (but just 8% of U.S. imports) making that country by far the world's largest producer. In recent years, due to an increase in world demand and concerns China may become a net importer, several of the world's main mines went to operating at or near-full capacity, existing plants ramped up production, and new plants came on line or were under construction. The supply was helped by the resulting 2.5% increase in non-U.S. production, a drop in consumption, and the development of alternatives to using fluorspar. Nevada produced an estimated 556,000 tons between 1928 and 1976, 91% of which came from four mines. Mine production continued through 1991 and then from stockpiles for several years afterwards. Despite Nevada's potential, little recent exploration has been done.

In 2012, Tertiary Minerals took out a 50-year renewable lease on the MB project in the Fish Creek mining district with the option buy from Nevada Fluorspar Inc. The company conducted several drilling and geophysical programs and other field work and compiled a resource estimate. Early metallurgical test work showed the ore in certain areas to be metallurgically complex, which presented processing challenges. The fluorspar is finely intergrown with other minerals, particularly calcite. While scoping level metallurgical test work conducted in 2019 and 2020 resulted in improved recoveries and grades, testing failed to produce acid-grade fluorspar concentrate. The poor test results and increasing costs as per the lease agreement caused the company to terminate its interest in the property. (NBMG Bulletin 93; Tertiary Minerals, PLC, news release, 7/20/2020; Tertiary Minerals, PLC, annual report, 9/30/2019, 9/30/2020; Tertiary Minerals, PLC, half-yearly report, 5/31/2020; Tertiary Minerals, PLC, website, http://www.tertiaryminerals.com)

The descriptions of 62 Nevada fluorspar deposits are compiled in Nevada Bureau of Mines and Geology Bulletin 93, *Fluorspar in Nevada*, 1979, by Keith Papke. A collection of Nevada fluorspar samples acquired by Keith Papke is also available at the Nevada Bureau of Mines and Geology Great Basin Science Sample and Records Library. Brief descriptions of 43 deposits are compiled in NBMG Bulletin 65, *Minerals and Water Resources of Nevada*, 1964, prepared by U.S. Geological Survey and Nevada Bureau of Mines and Geology.

Gemstones

The combined value of the domestic production of natural and synthetic gemstones was $98,800,000, a 4% decrease from the previous year. Domestic production of natural gemstones was $8,800,000, a 4% decrease from 2019. Consumption was severely impacted by the COVID-19 pandemic, which closed down all major gemstone trade shows. The value of consumption decreased 32% to $16,000,000,000. Nevada ranked fourth, after Arizona, Oregon, and California of the 13 states that accounted for 95% of domestic production of natural gemstones. In Nevada, the reported gross proceeds for gemstones increased 33% to $199,151 in 2020.

Precious opal is produced from several small mines in the Virgin Valley area of northern Humboldt County. Virgin Valley is a well-known source of gemstones in North America. The best known mines are the Bonanza, Rainbow Ridge, and Royal Peacock Mines, which are pay-to-dig operations. The first two operations combined produced about 200 pounds (90 kg) of precious opal, opal potch, and wood opal. The third operation did not divulge its production though its gross proceeds were $2,625. The opal occurs in lacustrine sedimentary rock, volcanic ash and tuff, and bentonite of the Miocene Virgin Valley Beds of Merriam.

Turquoise is produced from several small operations. Lone Mountain Mining, LLC, mined about 500 pounds (227 kg) of turquoise from the Lone Mountain Mine in T1N, R41E, sections 7 and 18 in the Lone Mountain district in Esmeralda County. The turquoise is present as nodules associated with silicification and argillization in thinly bedded calcareous shale. The Blueridge Mine operated by the Wintle family produced a small amount of variscite. The property is in T28N, R47E, sections 19, 20, 29, 30 in the Bullion district of Lander County. Though production was not divulged, Otteson Brothers Turquoise operated the Royston claims in the Royston district in Nye County as a pay-to-dig operation and by running tours of the property. Also, though production was not divulged, High Desert Gems and Minerals, Inc., operated the Bonanza Turquoise claims in the Pilot Mountains as a pay-to-dig operation by appointment operation.

Gemfield Gem produced chalcedony from a pay-to-dig operation on five claims in T2S, R42E, sections 29 and 39 in the Montezuma district, Esmeralda County. The descriptions of 68 mines and districts are compiled in NBMG Report 17, *Turquoise Deposits of Nevada*, 1968, by Frank R. Morrissey. A list of 34 turquoise and two opal deposits are compiled in NBMG Bulletin 65, *Minerals and Water Resources of Nevada*, 1964, prepared by U.S.

Geological Survey and Nevada Bureau of Mines and Geology.

Graphite

Natural graphite was not produced in the United States during 2020, though 38,600 tons (35,000 mt) valued at $21,900,000 were consumed. One use of graphite is as the anode in lithium ion batteries, and the Tesla Motors Gigafactory at Patrick (see Lithium) is expected to need over 35,200 tons (32,000 mt) of spherical graphite annually once it is in full production. In recent years, no graphite exploration has been reported in Nevada. However, at year's end, Timberline Resources drilled the central Graben zone of its Eureka Gold project, east of Lookout Mountain in the Eureka district. "Significant" graphite and pyrite were reported in some of the core as well as low grade gold (EV Sector Drives Massive Graphite Demand, by Shane Laslay, North of 60 Mining News, 12/23/2020; Timberline Resources, news release, 7/15/2021).

Gypsum

Domestic crude gypsum production increased 4% to 24,300,000 tons (22,000,000 mt) from the previous year valued at $190,000,000. The production of synthetic gypsum was 14,300,000 tons (13,000,000 mt), a 10% decrease from 2019. Estimated apparent consumption of all gypsum decreased 2% to 45,100,000 tons (40,900,000 mt) from 2019.

Until 2018, overall consumption had increased annually since 2009 during the collapse of the housing market in the latter 2000s. It has declined annually since then and still is down 11% since 2017. Since 2009, crude gypsum production has continued to annually increase, being up 134%, while that of synthetic gypsum has fallen off. The difference between production and consumption was mostly made up with imports mainly from Mexico, Spain, and Canada, which decreased 4% to 6,500,000 tons (5,900,000 mt) from the previous year, the first annual decrease since 2012. The estimated price of crude gypsum was $7.80 per ton ($8.60 per tonne) free on board from the mine, the same as in 2019. The bulk of consumption is for agriculture, cement, wallboard, and plaster products.

Synthetic gypsum is produced from scrubbed emissions from flue gas desulfurization (FGD) units in coal-fired power plants. In recent years, it has accounted for between 43% and 53% with an average of about 45% of production. However, due in part to economics and environmental concerns coal-fired power are closing or switching over to cheaper natural gas. This has resulted in its gypsum production share dropping to 40% in 2019 and 38% in 2020. Production of synthetic gypsum has deceased annually for three years and is down 37% from 2017. Synthetic gypsum is mainly used in wallboard production, and its decline will be made up with crude gypsum production.

Nevada ranked as one of five leading crude gypsum-producing states. The state's gypsum production was 2,416,743 tons, (2,192,455 mt), a 10% decrease from 2019. The gross proceeds were $41,371,950, a 44% decrease from the previous year.

PABCO Building Products, LLC, mined 1,494,218 tons (1,355,546 mt) of gypsum the PABCO Gypsum Mine in Clark County northeast of Las Vegas, a 65% increase from the previous year. The company also processed 1,464,393 tons (1,328,489 mt) and shipped 1,018,140 tons (923,561 mt). PABCO Gypsum processes its gypsum to make wallboard at a plant adjacent to their mining operation. The plant has an annual capacity of 1,260,000,000 square feet (117,100,000 square meters) of wallboard. The gypsum ore occurs in a nearly flat-lying late Miocene gypsite blanket atop a 5-square-mile (13-square-km) mesa. Drilling indicates the gypsum is at least 120 feet (37 meters) thick in the area of current mining. (NBMG Bulletin 103; PABCO Gypsum website, http://www.pabcogypsum.com)

Gypsum Resources Materials, LLC, did not disclose production from its Blue Diamond Hill pit for 2020. However, MSHA data shows the mine was in operation. This suggests the mine likely produced an estimated 900,000 tons (820,000 mt) of gypsum, a 16% decrease from 2019, with an estimated gross proceeds of over $15,000,000. The operation covers over 2,200 acres (890 ha), and the company processes the gypsum at its plant adjacent to the mine. The operation serves Nevada, Arizona, and southern California, and is looking to expand markets into Oregon and Washington. The gypsum is interbedded with limestone, dolomite, and red shale of the Lower Permian Kaibab Formation. The gypsum is used for wallboard and cement with about two-thirds being shipped to California's Central Valley for agricultural use, largely as a soil amendment. (United States Bankruptcy Court, District of Nevada, Gypsum Resources Materials, LLC, Debtor, Case No. BK-S-19-14796-mkn, 7/29/2019; Las Vegas Sun, 2/20/2017; Las Vegas Review-Journal, 3/29/2018, 8/2/2019; The Nevada Independent, 8/2/2019; NBMG Bulletin 103; Gypsum Resources, LLC, website, http://www.bdhgypsum.com)

Empire Mining Co., LLC, mined 352,513 tons (319,797 mt) of gypsum dihydrate and 158,036 tons (143,369 mt) of anhydrite from its Empire Mine, a 17% increase for gypsum dihydrate and a 37% decrease for anhydrite from 2019. The company also shipped 316,800 tons (287,399 mt) of gypsum dihydrate and 144,934 tons (131,483 mt) of anhydrite, an 8% increase for gypsum dihydrate and a 47% decrease for anhydrite from 2019. The gypsum and anhydrite were shipped to companies that make fertilizer and cement and use it for lithium extraction. The company was looking for a partner or another company to which to lease the existing mill and manufacturing plant. The gypsum and anhydrite occur in the Triassic or Jurassic Nightingale sequence and form ten orebodies within an area two miles (3.2 km) in diameter. The 4,400-feet by 2,200-foot (1,340 m by 670 m)

Selenite orebody is the largest. The gypsum is white, fine-grained, and nonfriable. It occurs in beds grading 85% to 95% gypsum in limestone, marble, and metasiltstone. (NBMG Bulletin 103; Empire Mining Co., LLC, website, https://www.empireminingco.com)

The Art Wilson Co. of Carson City produced 271,976 tons (246,735 mt) of gypsum from the Adams Mine in Lyon County, and the company shipped 324,709 tons (294,574 mt) from its plant, a 6% decrease in production and a 16% increase in shipping from 2019. It is mainly used as a soil amendment and livestock feed additive. The company also produced a small amount of limestone. The company has its own transportation system including the Appian siding along the Union Pacific tracks about 30 miles (48 km) east of the mine. In 2015 the Art Wilson Co. was bought out by ACG Materials (formerly Harrison Gypsum Co.) of Norman, OK, and now does business under that name. The Adams deposit is a very thinly to thinly bedded gypsum-anhydrite deposit of probable Jurassic age. The top of the deposit is a karst surface with up to 40 feet (12 m) of relief. In the pit, the northern two-thirds is overlain by pale orange limestone, and the southern third is overlain by dioritic breccia. Anhydrite is more abundant deeper in the pit. (NBMG Bulletin 103; ACG Materials, website, http://www.acgmaterials.com/art-wilson-company)

The Art Wilson Co., mined gypsum and limestone at the Ludwig Mine in 2019 but not in 2020. The company only shipped 1,039 tons (943 mt) of gypsum, a 97% decrease from the previous year. The Ludwig deposit was last mined in 1930 before being reactivated in 2018. The deposit is Jurassic in age and is in an apparent fault contact with limestone on the east side and quartz monzonite on the west side. The deposit becomes anhydrite at depth. (NBMG Bulletin 103; ACG Materials, website, http://www.acgmaterials.com/art-wilson-company)

H. Lima Nevada, LLC mined 140,000 tons (127,000 mt) of gypsum and shipped 136,000 tons (123,000 mt) from its Lima Nevada Gypsum Quarry, increases of 8% and 5%, respectively, from 2019. The company acquired the Pioneer Mine, located about 10 miles (16 km) east of Las Vegas, from the Pioneer Gypsum Mining Co. in 2015 and renamed it. The property consisted of 330 acres (133 ha) of claims. In 2017, the company filed a Plan of Operations with the BLM for new and expanded construction of an open-pit mine and supporting facilities. The Lima Nevada Gypsum Quarry is part of the same late Miocene gypsite deposit as the PABCO operation. The gypsum is used as a soil enhancer and cement retarder (NBMG Bulletin 103; Plan of Operations, H. Lima Nevada, LLC, Lima Nevada Gypsum Quarry, 11/2017).

Georgia-Pacific Gypsum LLC produced drywall and related products from its plant at Apex. The plant had been idle in 2018 and 2019. The plant has an annual capacity of 270,000,000 square feet (25,000,000 square meters) of wallboard. The plant uses synthetic gypsum and crude gypsum imported from Saint George, Utah. The company also owns the Weiser Ridge quarry about 10 miles (16 km) west of Overton, which has not been actively mined since 1995. The quarry is in gypsum interbedded with limestone of the Permian Toroweap and Kaibab Formations. (Georgia-Pacific Gypsum, LLC, telephone communication, 8/20/2021; Georgia-Pacific Gypsum LLC, website, http://www.gp.com)

CertainTeed Gypsum Manufacturing Inc. produced gypsum board, land plaster (soil amendment), and plaster products from its plant at Blue Diamond, Clark County. The plant has an annual capacity of 700,000,000 square feet (65,000,000 square meters) of wallboard. The plant has two sources of gypsum. One is the company's Black Rock Mine in Mohave County, Arizona, about 120 miles (190 km) northeast of Blue Diamond, which trucks the gypsum to the plant. The other is the nearby Blue Diamond Hill Mine operated by Gypsum Resources Materials, LLC. (NBMG Bulletin 103; CertainTeed Gypsum Manufacturing, Inc., website, http://www.certainteed.com)

The descriptions of 26 Nevada gypsum deposits are compiled in Nevada Bureau of Mines and Geology Bulletin 103, *Gypsum Deposits in Nevada*, 1987, by Keith Papke. A collection of Nevada gypsum samples acquired by Keith Papke is also available at the Nevada Bureau of Mines and Geology Great Basin Science Sample and Records Library. Brief descriptions of 26 deposits are compiled in NBMG Bulletin 65, *Minerals and Water Resources of Nevada*, 1964, prepared by U.S. Geological Survey and Nevada Bureau of Mines and Geology.

Iron Oxide

The USGS reports iron ore that is not used in general iron and steel production as iron oxide pigments (IOP). This includes use in concrete and other construction materials, foundry uses, plastics, glass, ceramics, coatings, paint, animal food, and magnetic tapes. The estimated combined amount of sold or used finished natural and synthetic IOP decreased 35% in 2020 to 28,700 tons (26,000 mt), valued at $15,000,000. Estimated apparent consumption of combined naturally and synthetically produced IOP increased 18% to 220,000 tons (200,000 mt). The estimated average price was $593 per ton ($580 per tonne), a 16% decrease from 2019.

In recent years, Saga Exploration Co. was the only company to produce IOP (reported as iron oxide) in Nevada, and that was shipped from stockpiles at the Nevada Barth Mine in Eureka County. The company produced iron oxide through 2019 but not in 2020, when the Mine Safety and Health Administration listed the mine as abandoned. The iron ore consists mostly of hematite and some magnetite, and was used in the manufacturing of cement by the Nevada Cement Company in Fernley. The American Smelting and Refining Company leased the property from the Central Pacific Railroad Company and mined 544,295 tons (439,780 mt) of iron ore between 1903 and 1918 for use

as flux in their lead smelter in Salt Lake City. Lessees continued to work the property off and on afterwards with some mining in the 1960s and 1970s. Saga Exploration began shipping iron ore from the stockpiles in 1993.

Lime, Limestone, and Dolomite

Domestic production and consumption of quicklime and hydrate decreased 5% to an estimated 17,600,000 tons (16,000,000 mt) in 2020, valued at about $2,200,000,000. Production and consumption in 2020 is the first decrease after two consecutive annual increases. The average price at the plant was $116 per ton ($128 per tonne) for quicklime and $140 ($154 per tonne) 0.2% and 0.3% decreases, respectively, from 2019. The decreases were largely attributed temporary plant closings due to the COVID-19 pandemic. The USGS rolls its production figures of limestone and dolomite not used in lime production into the figure for crushed stone, and in 2020, about 70% of the crushed stone produced nationwide was from limestone and dolomite.

Nevada limestone production was 3,220,860 tons (2,921,945 mt), a 0.8% decrease from 2019. Nevada dolomite production was 359,468 tons (326,107 mt), a 12% increase in 2020. The gross proceeds were $34,676,174 for limestone (including cement), a 6% decrease from 2019, and $4,326,025 for dolomite, a 5% decrease from 2019. The gross proceeds for dolomite are only for the Sexton Mine and Nutritional Additives. The gross proceeds for limestone includes that for dolomite for the Apex Mine.

Nevada's largest lime producer, the Pilot Peak high-calcium lime operation of Graymont Western US, Inc. (formerly Continental Lime, Inc.) is in the Toano Range about 10 miles (16 km) northwest of Wendover in Elko County. The operation mined 1,523,599 tons (1,382,200 mt) of limestone, a 5% decrease from 2019. The company shipped 523,975 tons (475,347 mt) of chemical lime and 22,231 tons (20,168 mt) of hydrated lime, 6% and 3% decreases respectively from 2019. The plant has three kilns with a combined capacity of more than 700,000 tons (635,000 mt) of quicklime per year and a hydrated lime plant capable of producing 350 tons (320 mt) per day. Production is mainly from the Devonian Devils Gate Limestone, which has between 35 years and 50 years of reserves.

Pilot Peak mainly markets lime to gold-mining operations for use in cyanide-solution pH control. Newmont Corp. and Barrick Gold Corp. are the main customers. However, the company also sells to the Rio Tinto Kennecott copper operation in Utah, and the Marigold, Rochester, and Florida Canyon Mines in Nevada. The company sells product to the coal-fired power plants to capture sulfur dioxide including the NVEnergy plant at Valmy. On the agricultural side, the company sells product to Amalgamated Sugar in Idaho to process sugar beets. The company also sells hydrated quicklime for road construction in Nevada, Utah, and Wyoming. (Elko Daily Free Press Mining Quarterly, Fall 2018; Graymont Western US, Inc. 2017 Sustainability Report, 3/20/2018; Graymont Western US, Inc. website, https://www.graymont.com)

Nevada's other lime producer, Lhoist of Arizona (formerly Chemical Lime Co.), produced lime in the Apex mining district about 20 miles (32 miles) northeast of Las Vegas. In some years, the operation is the State's largest lime producer. The operation produced 1,206,000 tons (1,094,000 mt) of limestone and 321,000 tons (291,000 mt) of dolomite, a 12% decrease for limestone and 16% increase for dolomite from 2019. The operation makes high-calcium quicklime used in metallurgical processing, paper manufacturing, and environmental markets. The company also produces dolomitic quicklime and hydrated high calcium lime at Apex, mainly for construction uses. The company's Henderson plant processes Type S hydrated dolomitic lime for building and home construction. The company shipped 413,000 tons (375,000 mt) of high-calcium quicklime and 98,000 tons (89,000 mt) of dolomitic quicklime, a 4% decrease for the former and an 18% increase for the latter from the previous year. The company also shipped 68,000 tons (62,000 mt) of hydrated lime, a 17% increase from the previous year. Production is from the Devonian Sultan Limestone. (Lhoist North America website, https://www.lhoist.com)

As noted in the Cement section, Nevada Cement Co. mines limestone from three quarries. The company's main production came from its Churchill mine in the Trinity Range about 40 miles (64 km) east of the plant. There the company mined 398,055 tons (361,113 mt) from Mesozoic marble, a 10% increase from the previous year. The company mined 73,475 tons (66,656 mt) from its Relief Canyon pit, a 36% increase from the previous year. That pit is in massive limestone beds in the Upper Triassic Natchez Pass Formation near Relief Canyon in the southern Humboldt Range about 70 miles (110 km) northeast of the plant. The company also mined 19,430 tons (17,627 mt) from its Fernley pit, an 85% decrease from 2019. Originally the company's main quarry, that pit is in Tertiary lacustrine limestone deposits a few miles south of Fernley. (Nevada Cement Co. website, http://www.nevadacement.com)

Aggregate Industries, a subsidiary of LafargeHolcim, Ltd., produced over 2,356,553 tons (2,137,851 mt) of crushed limestone, a 4% decrease from 2019, from its Sloan Quarry a few miles south of Las Vegas. The crushed limestone is used as aggregate along with Portland cement, sand, and water to produce ready mixed concrete. As part of its South West Region Concrete Division, Aggregate Industries has a series of ready mix plants in North Las Vegas, Sloan, and Summerlin. Since it is used as aggregate, the Sloan production is included with that for crushed stone in the aggregate section of this report (Aggregate Industries website: https://www.lafargeholcim.us).

Of Nevada's specialty dolomite and limestone producers, the Nutritional Additives Corp. produces

agricultural and nutritional dolomite products from its Sexton Mine along the northwest edge of the Sonoma Range about five miles (8 km) south of Winnemucca. The company processed 1,393 tons (1,264 mt) of dolomite from the Triassic Dun Glen Formation, an 18% decrease from 2019. No mining or shipping amounts were reported. Between 2012 and 2019, only amounts shipped were reported, which has ranged between 1,389 tons (1,260 mt) and 1,739 tons (1,578 mt). Min-Ad, Inc., a subsidiary of Inter-Rock Minerals Inc. of Toronto, Canada, also produced dolomite from the Dun Glen Formation about three miles (5 km) south of the Nutritional Additives Corp. operation. The company mined 37,075 tons (33,634 mt) and shipped 47,658 tons (41,635 mt), a 16% decrease in mining and a 3% increase in shipping from 2019. Their dolomite is mostly sold to midwestern states and as far as New York and Alberta for use in beef and dairy feed. Along with gypsum, the Art Wilson Co. mined 301 tons (273 mt) and shipped 851 tons (772 mt) of pure calcitic limestone from the Adams Mine, decreases of 92% and 68% respectively from 2019. The limestone is used for soil pH control and reportedly contains no detectable magnesium.

Brief descriptions of six deposits are compiled in NBMG Bulletin 65, *Minerals and Water Resources of Nevada*, 1964, prepared by U.S. Geological Survey and Nevada Bureau of Mines and Geology.

Lithium

The U.S. Geological Survey keeps domestic production and actual consumption confidential due to there being only one producer of lithium raw materials in the United States (Silver Peak operation of Nevada, see below). Estimated consumption was 2,200 tons (2,000 mt), the same as in 2019. Following decreases in the early 2010s, imports for domestic consumption (up 24%), prices (up 162%), and world mine production (up 202%) generally increased from 2015 through 2018. Most of the increase was due to lithium-based rechargeable battery sales, which accounted for 71% of the global lithium market, up from 65% in 2019. Of the remaining market, 14% is ceramics and glass, 4% is lubrication grease, and the rest includes air treatment, metallurgy, polymers, pharmaceuticals, aluminum production, and other uses. However, 2020 saw major decreases in imports, prices, and world mine production. Imports for consumption did rebound some, increasing 11% to 3,200 tones (2,900 mt) from 2019. However, world mine production (excluding that of the U.S.) fell to 90,000 tons (82,000 mt) in 2020 from 94,000 tons (85,000 mt) in 2019. Production decreases were largely due to production exceeding consumption and continuing falling prices, and global consumption remaining nearly flat at 61,700 tons (56,000 mt) lithium content. Global customer demand fell during the first half of 2020 due the pandemic, but strong growth in the lithium battery market drove a demand increase during the second half of the year.

In China, spot prices from the beginning of the year through November for lithium carbonate decreased 13% from $6,400 per ton ($7,100 per mt) to about $5,600 per ton ($6,200 per mt); lithium hydroxide prices in China decreased 10% from $7,100 per ton ($7,800 per mt) to $6,350 per ton ($7,000 per mt); and lithium metal (99.9% Li) decreased 12% from $75,000 per ton ($83,000 per mt) to $64,000 per ton ($71,000 per mt). The annual average U.S. lithium carbonate price was $7,300 per ton ($8,000 mt), a 37% decrease from the previous year.

Subsurface brines were the dominant raw material for lithium carbonate production worldwide because of low production costs as compared with the mining and processing costs for hard-rock ores, largely spodumene. However, with the growth of demand from China over the last decade, mineral-sourced lithium (operations in Australia, Brazil, Canada, and China,) is estimated to have supplied about half the market since 2014. World production was dominated by five mineral operations in Australia, two brine operations each in Chile and Argentina, and two brine and one mineral operation in China. New brine-based sources were under development in Argentina, Bolivia, Chile, China, and the United States. New mineral-based sources were under development in Australia, Austria, Brazil, Canada, China, and eleven other countries in Africa, Europe, and South America. New clay-based sources were under development in Mexico and the United States. However, due to over production and decreased prices, several operations postponed plans to expand capacity, and junior mining operations in Australia, Canada, and Namibia ceased production.

Nevada has recently experienced a lithium rush mainly due to the Tesla Motors, Inc., Gigafactory 1 in the Tahoe-Reno Industrial Center in Storey County. Tesla Motors, Inc., is in partnership with Panasonic Corp. of Japan. At the factory, Panasonic produces battery cells and Tesla assembles them into battery packs for its Model 3 electric car. Production was at a sustained rate of 3,000 battery packs at the start of the year. Panasonic was producing 35 GWh of battery cells and was preparing to spend $100,000,000 to ramp that up to 39 GWh. Tesla also produces the Model 3 drive units with the cars being assembled at the Tesla Factory in Fremont, California.

Once in full production, the Gigafactory 1 will more than double the present world production of lithium-ion batteries and at significantly less cost using the economies of scale, innovative manufacturing, reduction of waste, and vertical integration—having most manufacturing processes under one roof. This higher rate will require an annual production of 27,000 tons (24,500 mt) of lithium compounds. Tesla Motors, Inc., originally projected producing 500,000 electric cars annually by 2020. The company did produce over 365,000 in 2019, and almost 510,000 cars in 2020—almost 455,000 Models 3 and Y and the rest Models S and X. Also, production commenced at the Gigafactory 3 in Shanghai, China, in 2020.

The company prefers to have lithium sourced as close as possible to its Gigafactory, preferably Nevada, or at least North America, but has had to go abroad for much of its supply. While Nevada is well placed as a potential supplier, only the Albemarle Silver Peak operation is presently producing. Tesla has a conditional supply agreement with Pure Energy Minerals, which has a lithium brine property in Clayton Valley, but that company has yet to go into production. The company also acquired 10,000 acres (4047 ha) of mining claims containing lithium-rich clay at an undisclosed location in Nevada. Elsewhere in North America, Tesla signed a five-year deal with Piedmont Lithium to acquire about a third of the latter's planned annual 176,000-ton (160,000-tonne) spodumene concentrate production from its North Carolina deposits. Abroad, Tesla has an offtake agreement for supplies from Mount Holland, Australia, under a joint venture between Kidman Resources, Ltd., and Tesla recently signed an agreement with China's Sichuan Yahua Industrial Group Co., Ltd, to annually acquire 13,900–19,400 tons (12,600–17,600 mt) of lithium hydroxide over a five-year period.

Besides lithium, the batteries also require significant amounts of graphite and cobalt. Panasonic has not disclosed the exact composition, but it has been estimated that each kilowatt-hour will require 0.23–0.46 lbs. (104–208 g) of cobalt, 1.3–1.8 lbs. (590–820 g) of lithium, and 2.6–3.5 lbs. (1.2–1.6 kg) of graphite. Graphite is used on the anode, but can be replaced with lithium titanate, which reduces battery charging times and has the potential of increasing the lithium market even more. With permission from the Communist government, Tesla began using lithium iron phosphate batteries in the manufacture of its cars at its Gigafactory 3 in Shanghai, China. Cobalt was being used on the cathode in lithium ion batteries, but it is more expensive, more polluting to produce, and commonly sourced from conflict areas such as the Congo. In lithium iron phosphate batteries, lithium ferrophosphate ($LiFePO_4$) is used in the cathode, and graphitic carbon with a metallic backing is used in the anode. By year's end, Tesla was selling cars with lithium iron phosphate batteries in China and Germany. However, owners began complaining about shortened driving range and not being to fully charge the batteries in cold winter weather. (Tesla Powerwall, Wikipedia; Lithium Iron Phosphate Battery, Wikipedia; Australia's Piedmont Signs Lithium Ore Supply Deal With Tesla, Shares Surge, Reuters Staff, Reuters, 9/27/2020; Tesla is trying to mine its own lithium, David Stringer, Yvonne Yue Li, and Bloomberg, Fortune, 9/28/2020; China's Yahua Agrees Five-Year Deal to Supply Lithium to Tesla, Tom Daly, Reuters, 12/29/2020; Tesla's Shift To Cobalt-Free Batteries Is Its Most Important Move Yet, James Morris, Forbes, 7/11/2020; Tesla Secures Deal to Get Lithium from Australia, Fred Lambert, Electrek, 5/17/2018; Tesla Gigafactory 1 to Boost Battery Production Capacity 10% After New $100 Million Panasonic Investment, Rich Duprey, The Motley Fool, 8/19/2020; Tesla Model 3 with LFP Battery Has a Cold and Range Problem, Armen Hareyan, Torque News, 12/7/2020; Tesla Q4 2020 Vehicle Production and Deliveries, Globe Newswire, 1/2/2021; Tesla Motors, Inc., website, https://www.tesla.com)

Albemarle U.S., Inc., shipped 6,665,061 pounds (3,023 mt) of lithium carbonate, from its Silver Peak operation, a 16% decrease from 2019. The gross proceeds decreased 21% to $28,540,089 in 2020. Lithium carbonate is used in the production of aluminum and ceramics. Production comes from 4,048,710,143 gallons (15,326,035,085 liters) of lithium chloride brine pumped from beneath the Clayton Valley playa, a 20% increase in 2020. The brine varies between 100 and 300 ppm lithium and is pre-concentrated through solar evaporation in ponds covering much of north central Clayton Valley. The lithium carbonate is processed from the brine at the company's plant in the town of Silver Peak on the west side of the valley. The company also shipped 202,433 pounds (92 mt) of lithium hydroxide monohydrate and 35,472 pounds (16.1 mt) of lithium hydroxide anhydrous processed from lithium hydroxide monohydrate brought in from the company's operation at Kings Mountain, North Carolina, decreases of 59% and 9% in 2020. These compounds are used in carbon dioxide scrubbers and lithium battery electrolyte. The operation covers 13,500 acres (5,463 ha), and the company estimates that at an annual production rate of 6,600 tons (6,000 mt), about 20 years' worth of reserves remain.

Due to falling prices and a build-up of inventory in the battery grade channel of lithium products, the company temporarily closed parts of the operation. The company had ramped up production is anticipation of increased demand but the pandemic intervened. Despite the setback, production was expected to resume in early 2021. Also, the company announced plans to make full use of its brine water rights and invest $30,000,000 to $50,000,000 to double its current production at Silver Peak by 2025. The company is seeking ways to optimize lithium extraction from its brine resources and is investigating a process to streamline production of lithium hydroxide. In addition, the company will also commence clay exploration and evaluate technology that could accelerate the viability of lithium production from clay resources in the region.

Rockwood Lithium, Inc. (formerly Chemetall Foote Mineral Co.) owned and operated the Silver Peak lithium facility through to January 2015, when it was bought out by and became a subsidiary of bromine products manufacturer Albemarle U.S., Inc. Lithium was produced as a by-product from brine in California since 1938, but the Silver Peak operation, initiated in 1966 by Cyprus Mines, was the first to extract lithium as the sole commercial product from brine. This operation was the world's dominant lithium producer until the late 1980s, when a Chilean lithium brine operation started up, followed by brine operations in Argentina and China. (Silver Peak Takes a Production Break, Adella Harding, Elko Free Press, 9/24/2020; Albemarle to Close Two Lithium Facilities in the US, Cecilia

Jasmasmie, Northern Miner, 8/7/2020; Albemarle Corp., 10-K Report, 2/17/2021; Albemarle Corp., news release, 1/7/2021; Albemarle Corp., website, https://www.albemarle.com)

American Batteries Metals Corp. drilled its Railroad Valley Property (a.k.a Western Nevada Basin Claim) in T8-9N, R56-57E in the Butterfield Marsh mining district in 2019 but not in 2020. The property consisted of 1,300 placer claims covering just over 30,000 acres (12,140 ha) and was held by the company's subsidiary Lithium Ore Corp., which was in partnership with 3PL Operating, Inc. The company, which is headquartered in Incline Village, Nevada, changed its name to American Battery Technology, and most of the claims held under LithiumOre Corp. have since lapsed.

The National Aeronautics and Space Administration (NASA) was preparing an application to be filed with the BLM to withdraw and reserve lands necessary for NASA's satellite calibration activities within Railroad Valley for a period of 20 years, subject to valid existing rights. Publication of the notice of the application, which occurred April 29, 2021, segregates approximately 22,995 acres (9,306 ha) of public lands from all forms of appropriation or other disposition under the public land laws, including the mining, mineral leasing, and geothermal leasing laws, for up to two years, subject to valid existing rights. The area affected includes sections 2 through 17 and 20 through 27, T7N, R56E and sections 19 through 21 and 27 through 35, T8N, R56E. This potentially will affect lithium exploration in parts of the Butterfield Marsh district. Presently, Lithium Ore Corp. still has 80 placer claims, and 3PL Operating, Inc., has 537 placer claims still active in the sections noted. The placer claims cover 20 acres (8 ha) each. (BLM, LR2000, 4/30/2021; BLM, Notice of Application for Withdrawal; and Notification of Public Meeting; Nye County, Nevada, 4/29/2021; American Battery Technology Co., news release, 6/3/2020; American Battery Technology Co., website, https://americanbatterytechnology.com)

In February, American Lithium Corp. completed six reverse circulation holes totaling 2,065 feet (630 meters) on its Tonopah Lithium Clay project. Significant intercepts, using a 600 ppm lithium cut-off grade, included 220 feet (67 m) grading 1,239 ppm lithium, 295 feet (89.9 m) grading 1,068 ppm lithium, and 140 feet (42.7 m) grading 917 ppm lithium. The results helped define the extent of mineralization and the geological conditions within the claim block. In November, seven 6-inch sonic drill holes were completed. No details have been divulged but the holes were all planned to be less than 400 feet (122 m) deep. The sonic drilling tested the newly acquired claim block to potentially further expand the resource on the site. The results were pending at year's end.

The surface of the property is typically a Quaternary flat alluvial outwash plane interspersed with shallow westward-draining washes that partly expose the underlying Miocene Siebert Formation. The outwash alluvium averages 13 feet (4 m) thick, and a rhyolite intrusion crops out on high ground along the northeast property line. The Siebert Formation is divided into a claystone unit consisting of finely laminated claystone beds with lenses of sandstone and conglomerate and underlying basal tuff unit consisting of tuffaceous sandstones and conglomerates. Both units dip 2° to 3° to the northwest. The units are cut by four roughly parallel high angle with normal faults trending north-northeast with displacements ranging between 50 feet (15 meters) and 500 feet (152 meters). Elevated lithium concentrations occur in both units and in the alluvium. The highest and most consistent lithium grades occur in the lower claystone beds east of the westernmost fault in the western half of the property.

The property consisted of 197 contiguous claims covering about 4,111 acres (1,664 ha) in T3–4N, R42E in the Tonopah mining district. In July, the company acquired lode claims covering 2,000 acres contiguous to the north and northwest of the property. Nevada Corp. owned the claims and the acquisition was done through Esoteric Consulting Ltd. for 4,000,000 common shares of the company at a fair value of $7,320,000. In September 2020, the company entered into a real estate property purchase agreement to acquire over 300 acres of privately held lands and the accompanying 1,176 acre-feet of water rights. The company paid $265,000 on closing and issued a promissory note for $1,035,000 to the vendors to finalize the transfer. The company also signed an agreement to buy back 1.5% of the 2.5% of the existing gross overriding royalty owned by Alaska Nevada Mining Co. Corp. for $150,000 and 843,750 common shares of the company's stock. (American Lithium Corp. Management Discussion and Analysis, 1/29/2021; American Lithium Corp. news releases 2/12/2020, 5/21/2020, 7/27/2020, 9/17/2020, 11/17/2020; American Lithium Corp. NI 43-101 Technical Report, 4/15/2020; American Lithium Corp. website, https://www.americanlithiumcorp.com)

In November, American Lithium Minerals, Inc., signed an agreement with Altair International Corp., whereby the latter, through its subsidiary Lithium Now, can acquire up to a 60% interest in the former's Stonewall Lithium project. The Stonewall Lithium project consists of 63 unpatented placer mining claims covering 1,260 acres (510 ha) straddling the line between Nye and Esmeralda counties. Altair International Corp., obtained a 10% undivided interest by paying $75,000 and can obtain an additional 50% by a total payment of $1,300,648 for exploration and development over a three-year period. Much of Stonewall Flat and the adjacent Lida Valley had been claimed by Macarthur Lithium, Ltd., but the claims were dropped in 2017 due to poor exploration results. (Nevada Bureau of Mines and Geology, MI-2016 and MI-2017. Altair International Corp., news release, 11/24/2020; Altair International Corp., website, https://altairinternationalcorp.com)

Belmont Resources, Inc., and MGX Minerals, Inc., completed one hole on the Kibby Basin lithium property in

the Monte Cristo Valley in Esmeralda County in 2019 but conducted no drilling in 2020. MGX Minerals, Inc., had an option agreement with Belmont Resources, Inc., to acquire a 25% interest in the property, which included plans to conduct up to an additional 4,800 feet of drilling across four diamond drill holes. Later in the year, Belmont Resources, Inc., announced the property was available for option or a joint partner. The company began staking the adjacent public land eventually bringing the total claim area to 16,012 acres (6,480 ha). (MGX Minerals, Inc., Management Discussion and Analyses, 12/30/2019; MGX Minerals, Inc., website, https://belmontresources.com; MGX Minerals, Inc., Management Discussion and Analyses, 2/11/2021; Belmont Resources, Inc., Management Discussion and Analyses, 12/30/2020; Belmont Resources, Inc., news release, 2/28/2021; Belmont Resources, Inc., website, http://www.belmontresources.com)

Cypress Development Corp. drilled its Clayton Valley Lithium project in 2019 but not in 2020. The project consists of two properties containing placer claims and overlapping lode claims—Dean and Glory. The Dean property adjoins the east boundary of the Albemarle Corp. Silver Peak operation and covers 2,700 acres (1,093 ha). The Dean property adjoins the east boundary of the Albemarle Corp. Silver Peak operation. The Glory property adjoins the south boundary of the Dean property and covers 1,280 acres (518 ha).

Through a successful lawsuit over title, the company received core from four holes drilled in 2018, but until 2020, had not been assayed. The core was drilled in the southern part of the Glory property. Significant lithium intercepts from each hole included 346.7 feet (105.7 m) grading 1065 ppm including 301.4 feet (91.9 m) grading 1,136 ppm; 276.5 feet (84.3 m) grading 983 ppm including 168.6 feet (51.4 m) grading 1,130 ppm; 257.8 feet (78.6 m) grading 996 ppm including 90.5 feet (27.6 m) grading 1,159 ppm; and 188.3 feet (57.4 m) grading 883 ppm.

Geologically, uplifted basement rocks of Angel Island dominate the western part of the project area, while uplifted lacustrine sedimentary units of the upper Miocene to lower Pliocene Esmeralda Formation dominate the southern and eastern parts. The Esmeralda Formation contains significant lithium concentrations from the surface down to depths of 400 feet (124 m). The lithium-bearing sediments occur mainly as calcareous and salty interbedded tuffaceous mudstones and claystones in a laterally and vertically extensive, roughly tabular zone with at least two prominent subsurface oxidation-reduction horizons. The clay consists of illite, smectite, and montmorillonite with the lithium commonly found absorbed within the lattice structure of the illite and smectite. Two samples designated as oxide and reduced material analyzed as being composed of 57–61% illite, 17–26% smectite, 17–22% other silicates, and less than 0.25% calcite and dolomite.

Production will involve extraction of lithium from the clay. NORAM Engineering and Constructors, Ltd., was contracted for concept testing focused on revising the extraction flowsheet. Two phases of metallurgical extraction research produced positive results, and a commercially viable process based on filtration was identified. Testing resulted in 80.2% extraction of lithium when a sodium chloride solution was used in leaching claystone under a sulfuric acid leach process. An alternate test using hydrochloric acid instead of sulfuric acid in leaching the claystone resulted 85.3% extraction.

The proposed mine would consist of a pit with eight phases and have a 40-year life. The nominal mill rate will be 16,500 tons (15,000 mt) per day. With 246,000,000 tons (223,000,000 mt) of mill feed averaging 1,146 ppm lithium and an estimated extraction rate of 83%, annual production is estimated to be 30,200 tons (27,400 mt) of lithium carbonate equivalent. The initial capital cost is estimated to be $493,284,000 and operating expenses are estimated to be $15.22 per ton ($16.78 per mt). (Cypress Development Corp. NI43-101 Technical Reports, 5/19/2020, 3/15/2021; Cypress Development Corp. Annual Information Form, 1/27/2021; Cypress Development Corp. news release, 7/2/2020, 11/24/2020, 12/3/2020; Cypress Development Corp. website, https://www.cypressdevelopmentcorp.com)

Dajin Lithium Corp. entered into an Earn-in Agreement with Lone Mountain Resources, LLC, whereby the latter can acquire up to a 75% ownership interest in the former's Alkali Spring Valley Lithium project (a.k.a. Alkali Lake Lithium project). The property consists of 62 placer claims covering 1,240 acres (502 ha) in the Alkali Lake Valley. Lone Mountain Resources, LLC, will make an initial one-time payment of $25,000 upon signing, and then make project related expenditures of at least $200,000 before August 31, 2022. Lone Mountain Resources, LLC, will also commence an initial work plan consisting of additional surface sampling and geoscience work to define a site for a 1500-foot exploration well for assessing rock and brine properties. The Agreement encompasses a 3-mile (4.8-kilometer) area of interest around the current claims. Once the agreement terms are satisfied, Dajin Lithium Corp. may either enter into a joint venture or retain a 3% royalty interest on the value of all minerals extracted and sold by Lone Mountain Resources, LLC. Lone Mountain Resources, LLC, can also purchase the 3% royalty for $1,500,000. (Dajin Resources Corp. news releases, 11/10/2021; Dajin Resources Corp., website, http://dajin.ca)

Enertopia Corp. drilled its Clayton Valley NV Lithium property in late 2018 but not in 2019 or 2020. The company resumed researching methods for extracting lithium from claystone with an eye towards reducing acid consumption. The company released an NI43-101 technical report with a maiden resource estimate. The area containing the Enertopia claim block slopes gently northwestward with washes cutting through the Tertiary Esmeralda Formation. The Esmeralda Formation consists of mostly weathered, tuffaceous soft and crumbly siltstones, mudstones and claystones with several thin beds of harder, more

consolidated sediments. The sediments are mostly calcareous, indicating lakebed deposition. Faulting occurs mostly north of the claims, and appear to trend N30°E to N45°E, approximately parallel to the edge of the playa. The property consists of nine lode (Dan claims) and eight placer claims (Steve claims) covering 160 acres (65 ha) in section 14, T2S, R40E. (Enertopia Corp., NI43-101 Technical Report, 3/30/2020; Enertopia Corp., news releases, 4/2/2020, 4/28/2020, 6/16/2020, 8/3/2020, 10/7/2020; Enertopia Corp., Form 10-K, 11/3/2020; Enertopia Corp., website, https://www.enertopia.com)

Ioneer, Ltd., headquartered in North Sydney, Australia, drilled its Rhyolite Ridge lithium-boron property about 16 miles (25 km) west of the Silverpeak Operation in early 2019 but not in 2020. In May, the company submitted a Plan of Operation for the project to the BLM, and an application for a Class II Air Quality Permit to the Nevada Division of Environmental Protection, Bureau of Air Pollution Control, and the U.S. Environmental Protection Agency.

In April, the company released a definitive feasibility study. The operation would be an open pit with 16-foot (5-meter) high benches with an estimated 26-year mine life. The ore would be processed at an on-site plant. Production would commence in 2023 and progress in two phases. The first phase would be from an initial starter pit under construction in the southwestern part of the ore body and would last about 4.5 years. Lithium grades at the starter pit are about 15% higher than the average deposit grade. Also, the ore zone is more exposed at the surface and shallows and increases in grade southward. The second phase expands the pit southward and eastward first and later northward. Annual production was expected to be 22,700 tons (20,600 mt) of lithium carbonate and 192,200 tons (174,400 mt) of boric acid with recovery rates of 85% for lithium carbonate, 95% for lithium hydroxide, and 79% for boric acid. The initial capital cost would be about $785,000,000 with another $74,000,000 to build a lithium hydroxide unit in year three. The average all-in sustaining cash cost is estimated to be $2,280 per ton (0.9 tonne) of battery grade lithium hydroxide. The project contains over 600 claims covering 19.2 square miles (51.6 square km). The deposit is 4,600 feet (1,400 m) wide and extends 8,200 feet (2,500 m) along strike with mineralization remaining open southward. The deposit is tabular and flat lying to gently dipping with the high-grade Upper zone averaging 65 feet (20 m) thick over its known extent. The lithium-boron mineralization has a low clay and high searlesite ($NaBSi_2O_5(OH)_2$) content. Lithium-boron grades are highest in the southwestern part of the deposit, where the starter pit is planned. (ioneer, Ltd., news releases, 5/12/2020, 7/21/2020, 8/31/2020; ioneer USA Corp. Rhyolite Ridge Lithium-Boron Project Definitive Feasibility Study (DFS) Report Section 1 Executive Summary, by Fluor Enterprises, Inc., 4/2020; ioneer, Ltd., annual report, 9/17/2020; ioneer, Ltd., half-year report, 3/10/2021; ioneer, Ltd., website, https://www.ioneer.com)

Noram Ventures, Inc., commenced a Phase V drilling program consisting of 12 proposed core holes drilled to 500 feet (152 m) on its Zeus lithium property in Clayton Valley. The program was designed to expand the resource size. By year's end, three holes three holes totaling 1,316 feet (401 meters) were completed with the drilling of a fourth hole underway. The results from two of the holes were reported at 10-foot (3-meter) intervals. The 39 lithium assays for hole CVZ-61 ranged between 540 and 1870 ppm with 14 over 1000 ppm. The 22 lithium assays for the upper part of hole CVZ-62 ranged between 362 and 1900 ppm with four over 1000 ppm.

The company incorporated data from the Phase IV drilling program and upgraded its resource estimates. The rocks hosting the lithium consist mostly of soft and crumbly tuffaceous siltstones, mudstones and claystones, which contain several thin beds of harder, more consolidated sediments. Most of the sediments are also calcareous with some algal mats present and likely represent lakebed deposits. The rocks are considered to be part of the upper Miocene to lower Pliocene Esmeralda Formation. The more pure claystones have higher grade lithium than claystone mixed with mudstones and siltstones. The property contains 150 placer claims and 140 lode claims covering 3,000 acres (1,214 ha). (Noram Ventures, Inc., news releases: 2/5/2020, 8/13/2020, 10/29/2020, 11/10/2020, 11/12/2020, 11/17/2020, 11/24/2020, 12/3/2020, 12/8/2020, 12/10/2020, 12/15/2020, 12/17/2020, 12/22/2020, 1/12/2021, 1/17/2021; Noram Ventures, Inc., website, http://www.noramventures.com)

Iconic Minerals, Ltd., completed two 3-inch (7.6-cm) core holes totaling 726 feet (221 meters) at its Bonnie Claire Lithium project in Sarcobatus Valley. Hole BC2001C intercepted 220 feet (67 m) averaging 1209 ppm lithium with a high of 1710 ppm lithium. Hole BC2002C contained a high of 1070 ppm lithium. Four water samples, which were highly diluted by added drill water, were taken from each core hole and analyzed for dissolved lithium. The highest analysis was 38 ppm lithium. Encouraged by the water sampling results, the company then drilled four reverse circulation holes ranging from 200 feet to 358 feet (61 to 109 m) to expand the resource and collect samples for metallurgy. The results were pending at year's end. The drilling extended the current resource approximately 8200 feet (2500 m) to the south.

Lithium in the Bonnie Claire deposit generally occurs as lithium carbonate and lithium salts within the pore space between fine grain clay, silt, and sand. The fine-grained portions of the sediment have particle sizes equivalent to that of clay, but the sediment does not contain high percentages of typical clay minerals. The sediments consist mainly of quartz, calcite, feldspar, and mica and average less than ten percent zeolitic clay. While occasional lighter colored sediments seen in the core may indicate some leaching of soluble elements is occurring, the lithium appears to generally occur as carbonate or a chloride not

associated with clay minerals. Also, the lithium-bearing sediments surround an oxidation/reduction horizon with the higher lithium concentrations occurring mainly within the oxidized zones.

The company is under a 2015 property option agreement through a related party with the original owner or vendor to acquire a 100% interest in the Bonnie Claire property. On November 30, the company and its wholly owned subsidiary, Bonaventure, entered into an option agreement with Nevada Lithium Corp. whereby the latter can earn up to a 50% interest in the Bonnie Claire property and form a joint venture with the company and Bonaventure. Nevada Lithium Corp. may exercise the option in the three stages by funding $5,600,000 in cumulative exploration expenditures on the Bonnie Claire property by: Phase I is to acquire a 20% interest by spending $1,600,000 on exploration on or before March 8, 2021. Phase II is to acquire a 15% interest in the property by spending $2,000,000 on exploration on or before June 1, 2021; and Phase III is to acquire a 15% interest in the property by spending $2,000,000 on exploration on or before October 1, 2021. The agreement also involved reducing the net smelter return to the vendor from 4.5% to 2%; removing the right of the company to buy back any portion of the net smelter return; and the requirement of the company, Bonaventure, and Nevada Lithium Corp. to pay the vendor $1,000,000 in cash upon the property attaining commercial production.

The company also has an option agreement to acquire full interest in the Smith Creek project in Lander County. However, no exploration work has been reported since a Magneto Telluric geophysical survey was completed in 2017. The company was in the process of finalizing the renegotiation of the terms of the original agreement. (Iconic Minerals, Ltd., Management Discussion and Analysis, 12/29/2020, 1/29/2021; Iconic Minerals, Ltd., news releases, 9/29/2020, 10/30/2020, 12/15/2020; Iconic Minerals, Ltd., website, http://iconicminerals.com)

Lithium Americas Corp. (formerly Western Lithium USA Corp.) owns the Nevada Lithium and Thacker Pass projects which consist of the Lith, Beta, BPE, Neutron, Neutron Plus 1, and Neutron R claims covering 37,641 acres (15,233 ha) mainly in the Disaster mining district in northern Humboldt County. The property is within the 16.3 Ma McDermitt caldera, and covers several areas containing inferred uranium resources and broader zones of uranium, molybdenum, and lithium mineralization. Significant lithium mineralization has been defined in five areas originally referred to as: PCD, South Lens, South Central Lens, North Central Lens, and North Lens by Chevron (who drilled the area in 1985) and Stages I through V respectively by Lithium Americas Corp. The Thacker Pass project is the former Stage I area and is now a stand-alone project. It covers 8,320 acres (3,367 ha) in much of the northern half of T44N, R35E at the southern end of the McDermitt caldera. In each area, high lithium clay occurs in thick, continuous accumulations with the mineralized zones varying between about 3 and 300 feet (0.9 and 91 m) thick. The lithium largely occurs in high-lithium clays, including hectorite, with significant amounts of clay formed from the hydrothermal alteration of the volcaniclastic sedimentary rocks making up the moat deposits in the western part of the caldera. These moat deposits extend northward through the western Montana Mountains and Disaster Peak into Oregon. In the Thacker Pass area, the sedimentary section of these deposits consists of alternating layers of thick claystone and thin volcanic ash with the claystone making up 40% to 90% of the section. Surficial oxidation persists to depths of 50 feet to 100 feet (15 to 30 m) in the moat sedimentary rocks. The lithium content does not change across the oxidized/unoxidized rock boundary. The highest lithium grades generally occur in the middle and lower parts of the sedimentary section. The clay consists of two different mineral types, smectite and illite, with hectorite being a subtype of smectite. The smectite occurs at depths of less than 100 feet (30 m). Hectorite has been found elsewhere in the McDermitt caldera. Drill intervals with lithium contents commonly greater than 4,000 ppm contain clay that is more like illite than smectite. The illite generally occurs below 100 feet (30 m) and sporadically occurs in intervals that contain higher lithium content.

The company drilled the property in 2018 but not in 2019 or 2020. A draft environmental impact statement was completed in July, and a final statement was completed in December. A record of decision and approval of the Plans of Operations were then issued in early 2021. The company proposes to construct and operate an open-pit lithium mine and processing facility. The associated facilities include 1) waste rock storage facilities, 2) a coarse gangue stockpile, 3) a clay tailings filter stack, 4) growth media stockpiles; 5) haul and secondary roads; and 6) additional infrastructure to support the production operations. The operation would be developed in two phases over a proposed 41-year mine life. Phase 1 would include construction of the mine, processing facilities, and related infrastructure with mining and processing proceeding for the first four years. Phase 2 would occur from years 5 to 41 of the mine life. Afterwards the operation would enter the reclamation and closure period lasting five years. In addition, the company would complete exploration activities as part of the proposed action. The project area is entirely on public land and consists of 17,933 acres (7257 ha) of land, of which 10,468 acres (4236 ha) and 7465 acres (3021 ha) are associated with the mine plan of operation and exploration plan of operation, respectively. The total disturbance footprint would be about 5695 acres (2305 ha). The open pit would be actively backfilled during the life of mine and those areas would be concurrently reclaimed prior to the final closure and reclamation period. At the end of mine life, the open pit would be completely backfilled and reclaimed.

Clay from two open pits at the Stage 1 lens of the Nevada Lithium project was processed in Fernley.

RheoMinerals, Inc., a subsidiary of Lithium Americas Corp., operated its 24,000-ton (22,000-tonne) annual capacity organoclay plant at the company-owned industrial complex in Fernley adjacent to rail and freeway access. Production occurred between 2014 and the end of 2019, and hectorite was processed into a six drilling related products under several trade names. When oil and gas drilling declined, the company developed products for the environmental, animal feed, and industrial coatings markets. Through 2019, the business operated at a loss. At the end of 2019, the company winded down the business and put its assets up for sale. The assets were sold in January 2021. (Thacker Pass Lithium Mine Project Final Environmental Impact Statement DOI-BLM-NV-W010-2020-0012-EIS, 12/4/2020; Record of Decision and Plans of Operations Approvals, Thacker Pass Mine and North/South Exploration Plans of Operations Final Environmental Impact Statement, Plans of Operations Numbers: NVN-098582 and NVN-098596, DOI-BLM-NV-W010-2020-0012-EIS, 1/2021; Lithium Americas Corp. Annual Information Form, 3/2/2021; Lithium Americas Corp. news releases, 7/30/2020, 12/4//2020, 1/15/2021; Lithium Americas Corp. website, https://www.lithiumamericas.com)

Schlumberger Technology Corp. completed brine well CV-09 to 1500 feet (457 meters) on the Clayton Valley project, which is owned by Pure Energy Minerals, Ltd., of Vancouver, British Columbia. The well was drilled in section 29, T2N, R40E, in the Resource Area (part of Clayton Valley South). The well was drilled by diamond coring followed by rotary methods. It was completed with an 8-inch (20-centimeter) diameter, which is suitable for brine production. The well was continuously pumped for nine hours with six samples taken for testing. The average pumping rate was 31 gallons per minutes (1.9 liters per second). The initial sample was taken after 38 minutes and the remainder at about every one hour and 20 minutes starting after three hours and 15 minutes. The first sample resulted in 251 mg/L lithium, 493 mg/L magnesium, and 4640 mg/L potassium. The remaining samples settled down and ranged between 180–184 mg/L lithium, 470–483 mg/L magnesium, and 2770–2940 mg/L potassium. The brine density of the last five samples also ranged between 1.072–1.076 g/cm^3.

Schlumberger Technology Corp., a subsidiary of Schlumberger, Ltd., has an earn-in agreement, whereby the former has the option to acquire all of the latter's Pure Energy's interests in the Clayton Valley project. Schlumberger Technology Corp. may earn into the option by constructing a pilot plant for processing lithium brine at its cost and expense. Schlumberger Technology Corp. then has three years to exercise the option commencing on receipt of the final permits required to construct the plant and may then only exercise the option if the pilot plant is completed and has been successfully tested. Pure Energy Minerals, Ltd., retains a 3% net smelter returns royalty and receives an annual advance minimum royalty payment of $400,000 starting January 1, 2021 for a period of five years or until the Clayton Valley project achieves commercial production. Schlumberger Technology Corp. is also responsible for exploration work including the Clayton Valley drilling program. The project consists of 948 placer claims covering 23,228 acres (9,400 ha) with lithium bearing brine present down at least to 2,790 feet (820 m). (Pure Energy Minerals, Ltd., Management Analysis and Discussion, 10/27/2020, 11/25/2020; Pure Energy Minerals, Ltd., news releases, 5/1/2019, 5/19/2020, 7/28/2020, 10/14/2020; Pure Energy Minerals, Ltd., website, http://www.pureenergyminerals.com)

Spearmint Resources, Inc., completed 10 drill holes at its McGee Lithium project. By year's end, the company received the assay results from the first three completed drill holes (holes SPMT-5, 7 and 8). These holes drilled into the clay formation and all intercepted lithium. SPMT-5 ranged between 420 ppm to 1,840 to 420 ppm Li. The hole averaged 846 ppm Li over 270 feet (82 m) including 35 feet (10.7 m) averaging 1,343 ppm. SPMT-7 ranged between 290 ppm and 1,550 ppm. The hole averaged 812 ppm over 310 feet (95 m), including 55 feet (16.8 m) averaging 1,214 ppm. SPMT-8 ranged between 340 ppm and 1,280 ppm and averaged 723 ppm Li over 205 feet (62.5 m) including 35 feet (10.7 m) averaging 1,036 ppm. The company's holdings are referred to as the Clayton Valley Lithium prospects. This consists of the McGee Lithium project (formerly McGee claim block) about five miles (8 km) southeast of Silverpeak, and the Elon claim block about seven miles (11 km) southwest of the McGee Lithium project. McGee Lithium project consists of 20 lode claims and six 80-acre association placer claims covering 880 acres (356 ha). In total, the Clayton Valley Lithium prospects cover 1160 acres (469 ha). (Spearmint Resources, Inc., Management Analysis and Discussion, 12/15/2020; Spearmint Resources, Inc., news releases, 10/15/2020, 11/3/2020. 11/18/2020, 11/23/2020, 12/11/2020, 1/15/2021; Spearmint Resources, Inc., website, https://www.spearmintresources.ca)

Magnesia

Domestic production noted as shipments of magnesium compounds (magnesium oxide content) was an estimated 385,800 tons (350,000 mt), a 7% decrease from 2010, valued at $360,000,000. This marked the third annual decrease in production. About 70% of domestic magnesia production came from seawater and natural brines, and the rest was produced from mining magnesite and minor brucite in Nevada and processing olivine stockpiles in Washington. Estimated apparent consumption decreased 14% to 838,000 tons (760,000 mt) from 2019, the first decrease after three consecutive annual increases. Most of the difference between consumption and production was made up by imports. About 67% of the magnesium compounds are used in agricultural, chemical, construction,

environmental, and industrial operations in the form of caustic-calcined magnesia, magnesium chloride, magnesium hydroxide, and magnesium sulfates. The remainder is used for refractories in the form of dead-burned magnesia, fused magnesia, and olivine. China accounts for 69% of the world production of magnesia and provides about 69% of the caustic-calcined magnesia and 66% of the dead-burned and fused magnesia imports into the U.S.

Premier Chemicals, LLC, of Cleveland, Ohio, owns the Gabbs magnesia operation in Nye County, which is the only place in the country to mine magnesite. Magnesite and some brucite (<5%) have been mined at Gabbs since 1935, and in the 1940s were processed in Henderson, Nevada, to make magnesium metal. From the 1950s to the 1980s, mining and processing was by Basic Industries, a major producer of refractory magnesia. During the 1990s, the availability of cheap foreign refractory magnesia caused production at Gabbs to be switched to light-burned (caustic calcined) magnesia that is mainly marketed for wastewater treatment and agricultural uses.

The company mined 461,947 tons (419,076 mt) of magnesite from the quarry, a 42% increase from 2019. In 2018, the company also recovered material from the old tailings, but did not do so in 2019 or 2020. The company shipped 124,088 118,698 tons (112,572 mt) of magnesium oxide, a 4.5% increase from 2019. Although production of magnesia at Gabbs is still substantially below its peak in 1981, magnesia shipments from the Gabbs operation increased steadily between 1996 and 2005. The plant capacity is rated at 150,000 tons (136,000 mt) per year. The gross proceeds increased 32% to $8,584,903 in 2020. The magnesite and brucite occur as complex replacement bodies in Triassic dolomite in an area of about 1,300 acres (530 ha) in the Paradise Range just east of the town of Gabbs. The resource is thought to be sufficient for more than 50 years of production at present mining rates.

Brief descriptions of six deposits are compiled in NBMG Bulletin 65, *Minerals and Water Resources of Nevada*, 1964, prepared by U.S. Geological Survey and Nevada Bureau of Mines and Geology.

Perlite

Domestic mine production of perlite was 573,000 tons (520,000 mt), a 1% decrease from 2019. The value of domestic processed perlite was $28,000,000. Until 2003, the U.S. was the world's largest producer of perlite, but was surpassed by Greece in 2004, Turkey in 2014, and China in 2015. Estimated apparent consumption increased 5% in 2020 to 672,000 tons (610,000 mt), the difference between production and consumption being made up by imports mostly from Greece. The estimated average price was $58.06 per ton ($64 per tonne). About 53% of perlite production is used in building construction products. About 16% is used for horticultural aggregate and most of the rest is used in fillers, filters, and specialty insulation.

Nevada has large perlite resources, and several deposits in central Pershing, northern Lincoln, and southern Clark counties were mined extensively in the past. However, the state now produces only minor amounts of perlite. Current perlite production in Nevada is restricted to relatively small-scale mining of two deposits for niche markets, and the state produced less than 0.5% of the domestic total in 2020. 2,715 tons (2,463 mt) were mined and 17,160 tons (15,567 mt) were shipped, increases of 23% and 66%, respectively, from 2019. The gross proceeds decreased 3% in 2020 to $668,199.

Wilkin Mining and Trucking Inc. mined, processed, and shipped 2,715 tons (2,463 mt), a 23% increase from the previous year, from the Tenacity Perlite Mine in the South Pahroc Range mining district about 25 miles (40 km) west of Caliente, Lincoln County. The company has mined perlite in the area for more than 25 years. The company has a small popping plant in Caliente, and sales were almost exclusively of expanded perlite used for horticultural purposes. Most years, the company ships between 1,500 and 2,000 tons. The deposit consists of a large, flat-lying, 20-foot (6-meter) thick perlite flow with obsidian pellets in Tertiary rhyolitic volcanic rocks.

U.S. Silica, LLC, shipped 7,140 tons (6,477 mt) of expanded perlite, a 12% decrease from 2019, from its Colado diatomite plant in Pershing County. The product is used as a filter aid. The crude perlite comes from the Popcorn Mine (also known as the Desert Mountains Perlite deposit and Perlite Mine) about 15 miles (24 km) south of Fallon, Churchill County. Perlite is usually mined a week or two per year. Perlite was mined in 2018, but not in 2019 or 2020. The mine did ship 7,305 tons (6,627 mt), likely from stockpiles, an 18% increase from 2019. The Colado plant includes a perlite expander installed in 1994 with an annual capacity of about 15,000 tons (13,600 mt). The perlite is crushed and screened as a raw material for the company's Blair, Nebraska facility. The plant also sells expanded perlite ore for use as a filter aid. The perlite occurs as glassy flows associated with rhyolitic flows (NBMG Bulletin 83; U.S. Silica Holdings, Inc., Form 10-K, 2/26/2021; U.S. Silica, LLC, website, https://www.ussilica.com).

Sunrise Resources, PLC, processed a 100-ton (91-tonne) bulk sample of perlite from its CS Pozzolan-Perlite project into two separate sized horticultural grade products and sent samples to five potential customers for expansion testing in their commercial facilities. The processing plant consisted of a crusher, high frequency screens and associated conveyors and was a basic version of the plant proposed for the initial production facility when commercial mining commences. The project is in the Crow Springs district, Esmeralda County, and is discussed in more detail in the section on Pozzolan. (Sunrise Resources, PLC, 2020 Annual Report, 12/11/2020; Sunrise Resources, PLC, news releases, 11/16/2020, 12/11/2020; Sunrise Resources, PLC, website,

https://www.sunriseresourcesplc.com)

During the late 1950s and early 1960s, perlite production in Nevada was almost twice of what it presently is. Twenty-one deposits with three in production at the time are listed in NBMG Bulletin 65, *Minerals and Water Resources of Nevada*, 1964, prepared by U.S. Geological Survey and Nevada Bureau of Mines and Geology.

Potassium Sulfate

Potassium sulfate is lumped under potash. Domestic production of potash was 518,000 tons (470,000 mt) valued at $430,000,000. Apparent consumption was 6,060,000 tons (5,500,000 mt), a 2% increase from the previous year, with the difference made up with imports mostly from Canada. Production from Nevada's one small producer accounted for less than 2% of domestic production.

Heart of Nature, LLC, a subsidiary of Advanced Bio-Minerals Technologies, LLC, of Henderson, Nevada, mined and shipped 9,131 tons (8,284 mt) of material (reported as potassium sulfate) from its Alum/Sulfur pit (formerly the Rulco Potassium Sulfate project) in the Alum mining district in Esmeralda County, a 6% decrease from 2019. The company mines material as needed and does not mine some years. The NDT includes potassium sulfate with barite, and the gross proceeds declined 6% in 2020 to $269,368.15. The mineral assemblage mined includes alunite, potassium alum (kalinite), jarosite, gypsum, native sulfur, and potassium feldspar. The alunite occurs with kalinite and sulfur as veins, stringers, and fracture fillings in either a dike or neck of rhyolite intruded into folded rhyolitic tuffs of the Tertiary Esperanza Formation. Reddish, iron-stained jarosite occurs locally in the pit. The material is mined, crushed, and stockpiled with the stockpiled material being processed as necessary. Alunite and sulfur are the main essential minerals with thiobacillis bacteria added. The final product is sold as an agricultural soil amendment, as an odor control for manure, and as an odor and algae control for ponds under the trade name SK Microsource™. (Heart of Nature, LLC, website, http://www.heartofnature.biz)

Pozzolan

The NDT includes pozzolan with clay. Nevada Cement Co. mined 30,634 tons (27,791 mt) from its Mustache Quarry near Fernley, up significantly from 959 tons (849 mt) in 2019. The gross proceeds were $227,735 up from $21,454 2019. The quarry had been idle from 2014 through 2018. The source of the pozzolan is shale within the Pliocene Chloropagus Formation.

In December, Sunrise Resources, PLC, commenced mining a 500-ton (450-tonne) sample of natural pozzolan from its CS Pozzolan-Perlite project in the Crow Springs district, Esmeralda County. The sample is being mined in collaboration with a large cement and ready mix company. The sample will be ground in the cement company's mill and will be used in a number of separate commercial concrete pours where the natural pozzolan will be substituted for a proportion of ordinary Portland cement in the concrete mixes.

Sunrise Resources, PLC, submitted its Plan of Operation for the CS Pozzolan-Perlite project and released an environmental assessment and a series of 14 supplemental reports. These were followed by a finding of no significant impact. The company also received a Mine Reclamation Permit from the Nevada Bureau of Mining Regulation and Reclamation and an Air Quality Operating Permit from the Nevada Division of Environmental Protection. The company proposed open-pit mining of the deposits. The Plan of Operation tentatively calls for a four-phase, 27-year plan. Phases 1 through 3 (years 1 to 15) would involve mining pozzolan and perlite from the Main zone. Phase 4 would mine pozzolan only from the Tuff zone. Over the life of the mine, about 1,656,000 tons (1,502,000 mt) of perlite, 14,523,000 tons (13,175,000 mt) of pozzolan, and 2,617,000 tons (2,374,000 mt) of waste rock would be mined. The material is semi-consolidated and fractured and drilling and blasted is not expected to be necessary. The pozzolan and perlite will be crushed and screened at on-site processing facilities. The project is expected to disturb 264.9 acres (107.2 ha) with another five acres (2 ha) disturbed for road widening and a well pad. The Plan of Operation does not include mining the northern part of the Main zone or Northeast zone, which have potential to sustain mining.

These deposits formed in and around a rhyolitic volcano with its crystalline core located west of the Main zone. Thick perlite deposits formed on the margins of crystalline rhyolite lava flows in the inner parts of the volcanic complex just east of the crystalline core. Further out from the core, east and northeast of the Main zone, tephra zones formed as air-fall deposits with the Northeast zone being an extensive tephra zone. Some of the tephra was contaminated by silty material in drainages and marginal lakes forming a silty tuff. Perlitic flows in the eastern part of the Main zone are interbedded with the tephra deposits. Still further away from the crystalline core, finer grained pyroclastic material fell to the ground to form volcanic tuffs such as in the Tuff zone. The more distal tephra, tuffs, and silty tuffs are glassy and silica- and aluminum-rich and contain a significant water content, which makes them good pozzolans. However, their perlitic properties are compromised by being finer grained and having a higher content of non-expandable material, especially where contaminated by non-glassy silty material. (BLM, Crow Springs Project Mine Plan of Operations and Access Road and Well Site Right-of-Way, Esmeralda County, Nevada, Environmental Assessment, DOI-BLM-NV-B020-2020-0002-EA, 7/2020; BLM, Crow Springs Project Mine Plan of Operations NVN-096868/Nevada Reclamation Permit Application and Approval of Issuance of Rights of Way Grants, Finding of No significant Impact, 7/28/2020; Sunrise Resources, PLC, 2020 Annual Report, 12/11/2020;

Sunrise Resources, PLC, news releases, 6/24/2020, 7/29/2020, 8/5/2020, 9/16/2020, 12/17/2020, 1/13/2021, 2/23/2021; Sunrise Resources, PLC, website, https://www.sunriseresourcesplc.com)

Geofortis Pozzolan, LLC, with offices in Tooele, Utah, and Reno began construction of a pozzolan processing plant in Utah. The company also announced plans to construct a plant in Reno to process pozzolan from the company's deposits in Lassen County, California. The Reno plant will serve markets in northern Nevada and northern California (Geofortis Pozzolan, LLC, website, https://www.geofortis.com)

Rare Earths

MP Materials, Mountain Pass Mine in California, which restarted production in 2018 after being on care and maintenance since 2015, is the only domestic producer of rare earths elements (REE). The company processes REE from the fluorocarbonate mineral bastnasite, and produced 41,900 tons (38,000 mt) of bastnasite concentrates (60–70% rare earth oxides), a 36% increase from 2019. Apparent apparent consumption was 8,600 tons (7,800 mt), a 33% decrease in 2020. All of the concentrates were sent to China for refining, and consumption was supplied by imports, 80% of which came from China. Prices vary according to which REE oxide and range between 91 cents per pound ($2 per kilogram) for cerium oxide and lanthanum oxide and $317 per pound ($628 per kilogram) for terbium oxide. World mine production increased 9% to 265,000 tons (240,000 mt), 58% being from China and 16% from Mountain Pass. The uses of REE are: catalysts, 75%; ceramics and glass, 6%; polishing, 5%; metallurgical applications and alloys, 4%; and other uses, 10%.

In December, Western Rare Earths, LLC, a subsidiary of American Rare Earths, Ltd., collected ten samples from a site in the Crescent district near the state line about 19 miles (30 km) east of the Mountain Pass Mine. The samples were taken from monazite-apatite bearing veins in Early Proterozoic biotite granite and hornblende biotite granite sills. Assays of Sample TH-01 included a total REE of 14,800 ppm or 1.48% including 940 ppm heavy REE and 3,320 ppm magnetic REE. The magnetic REE included neodymium, praseodymium, dysprosium, and terbium. Because of the favorable assays, in early 2021 the company staked 80 claims covering 1620 acres (656 ha) as the Searchlight Rare Earth Elements project and commenced a technical report. The project is adjacent to claims staked and maintained by Red Hill Energy (US), Inc., known as the Thor Rare Earth Elements project. The Thor Rare Earth Elements project is discussed in MI-2011 through MI-2014. (Nevada Bureau of Mines and Geology, MI-2011, MI-2012, MI-2013, MI-2014; American Rare Earths, Ltd., Quarterly Activities Report, 7/27/2021; American Rare Earths, Ltd., website, https://americanrareearths.com.au)

From 2018 through 2020 Cypress Development Corp. conducted extraction tests on core from its Cypress Dean Lithium project and Cypress Glory Lithium project. Besides lithium, leach solutions from 29 surface samples, three core holes from the Dean project, and one core hole from the Glory project also contained rare earth elements with assays ranging between 110 ppm and 200 ppm total REEs. In May, the company issued technical report noting REE as potentially being extracted as a by-product. Earlier studies were done using a sulfuric acid leach process. A more recent study using a chloride leach process indicated REEs had a higher extraction rate with that than with the sulfuric acid leach. REEs along with magnesium, and potassium will be further tested for potential commercial value. (Cypress Development Corp. NI43-101 Technical Report, 5/19/2020; Cypress Development Corp., Management Discussion and Analysis, 4/13/2021; Cypress Development Corp., news release, 12/16/2020; Cypress Development Corp. website, https://www.cypressdevelopmentcorp.com)

Salt

Domestic production of salt decreased 7% to 43,000,000 tons (39,000,000 mt) valued at $2,400,000,000. Nevada's only producer, the Huck Salt Co., produced 18,000 tons (16,300 mt) of salt, a 6% increase from 2019. Between 1995 and 2018 production ranged between 9,053 tons (8,213 mt) and 30,502 tons (27,671 mt) and averaged 18,490 tons (16,774 mt). The gross proceeds in 2020 were $511,428, a 39% decrease from 2019. The company shipped 15,042 tons (13,646 mt), which includes both processed and unprocessed salt, a 39% decrease from 2019. The salt is mainly used for de-icing roads, the production levels of which are dependent on weather, and for water softeners. The salt is mined from the playa on Fourmile Flat about 25 miles (40 km) southeast of Fallon, Churchill County. There it has been harvested almost continuously since the 1860s, when it was hauled to the mills that processed Comstock silver and gold ore.

The Nevada Department of Transportation (NDOT) began annual winter preparations in August by readying more than 80 snow plows and other pieces of snow and ice equipment for use in snow removal across northwestern Nevada. Also, nearly 33,000 cubic yards (25,200 cubic meters) of salt and sand was stockpiled across the region. NDOT also produces a salt brine in-house consisting of a water solution of 23% salt. The sand is combined with salt and wetted with the brine to create more dense sand that keeps roads ice-free at lower temperatures and will not as easily bounce off roadway surfaces. The descriptions of brine and evaporite deposits are compiled in Nevada Bureau of Mines and Geology Bulletin 87, *Evaporites and Brines in Nevada Playas*, 1976, by Keith Papke. Brief descriptions of 16 deposits are compiled in NBMG Bulletin 65, *Minerals and Water Resources of Nevada*, 1964, prepared by U.S. Geological Survey and Nevada Bureau of Mines and

Geology. (Nevada Department of Transportation, press release, 11/4/2020)

Silica

The USGS includes silica under *Industrial Sand and Gravel*. The U.S. is by far the world's largest silica sand producer, and the estimated domestic production was 78,300,000 tons (71,000,000 mt), a 38% decrease from the 2019, valued at $3,200,000,000. About 5% of the production is exported. The estimated average price decreased 5% to $40.82 per ton ($45.00 per tonne) from 2019. The uses of silica are: hydraulic fracturing sand and well-packing and cement sand, 58%; glassmaking sand and other whole grain silica, 12% each; foundry sand, 4%; and fillers and building products, golf course sand, and other uses, 26%. Nevada shipped 646,060 tons (586,102 mt) of silica, a 13% decrease from 2019 that makes up less than 1% of the national total. The gross proceeds (excluding Southern Nevada Liteweight) decreased 21% to $14,323,690. No Nevada sand was used for hydraulic fracturing in 2020.

Nevada's main silica producer, Simplot Silica Products at Overton, Clark County, shipped 570,097 tons (517,318 mt), an 8% decrease from the previous year. The company had consistently mined and processed about 1,000,000 tons (900,000 mt) per year. The sand is mined from a large open pit in the relatively friable Cretaceous Baseline Sandstone, washed in the pit, and transported via a 5-mile (8-kilometer) slurry pipeline to a plant where it is screened and bagged. The facility produces four grades of sand based on coarseness, AFS 55, 60, 70, and 100. AFS 70, which is used mainly in manufacturing glass and foundry castings.

Southern Nevada Liteweight mined, processed, and shipped 117,040 tons (106,118 mt) of plaster sand and 11,702 tons (10,615 mt) of concrete sand for stucco and masonry block, 5% and 51% decreases respectively from the previous year, from the Hidden Valley South (former Money pit) quarry about 20 miles (32 km) south of Las Vegas.

Zeolites

Domestic production and apparent consumption of zeolite estimated to be 97,000 tons (88,000 mt) and 85,000 tons (77,000 mt), a 0.3% increase for production and a 0.1 decrease in shipping in 2020. Prices varied between $45 and $272 per ton ($50 and $300 per mt), the same as in 2018 and 2019, depending upon the zeolite. Six companies operated nine zeolite mines nationally. Chabazite was mined in Arizona and clinoptilolite in five other states. Minor amounts of ferrierite, mordenite, and phillipsite were also likely produced. About 60% of the zeolites sold is used in animal feed, odor control, and water treatment.

Nevada contains large known resources of zeolite; however, zeolite production has been small, and no zeolite is currently mined in Nevada. KMI Zeolite, Inc. processed 17,124 tons (15,535 mt) and shipped 7,142 tons (6,479 mt) of clinoptilolite from its new plant near Ash Meadows in Amargosa Valley about 60 miles (100 km) west of Las Vegas, 1% and 0.2% increases, respectively, from 2019. The source is a large deposit of mainly clinoptilolite eight miles (13 km) west of Death Valley Junction in California about 18 miles (29 km) from the plant. The company built the new mill to be closer to the mine, which cuts down transportation costs. Also, the new mill is larger and more efficient than old Shenandoah mill, which was capable of producing 55,000 tons (50,000 mt) per year. The old Shenandoah mill in Sandy Valley was about 85 miles (136 km) from the mine. It was closed down in 2017 and is being reclaimed. (Conrad Wagenaar, KMI CEO, written communication, 2020; KMI Zeolite, Inc., website, http://www.kmizeolite.com)

Zeolite minerals (most of which are rare) reportedly found in Nevada include analcime, chabazite, clinoptilolite, epistilbite, erionite, ferrierite, heulandite, mordenite, natrolite, offretite, phillipsite, scolecite, and stilbite, and reported locations of these minerals are given in Nevada Bureau of Mines and Geology Special Publication 31, *Minerals of Nevada*, 2004, by Stephen B. Castor and Gregory C. Ferdock. The descriptions of a few Nevada zeolite deposits are also compiled in Nevada Bureau of Mines and Geology Bulletin 79, *Erionite and Other Associated Zeolites in Nevada*, 1972, by Keith Papke. A collection of Lovelock, Nevada, zeolite samples acquired by Keith Papke is also available at the Nevada Bureau of Mines and Geology Great Basin Science Sample and Records Library.

GEOTHERMAL ENERGY

By Bridget Ayling

OVERVIEW

The total installed geothermal energy capacity in Nevada was 786 MWe (megawatts electric) in 2020, representing an 18 MWe increase from 2019 (figure 1; tables 1 and 2). The Soda Lake 3 power plant completed its first full 12 months of production with ~18.5 MWe gross generation for the year, which was almost double the gross generation from the Soda Lake 1 and 2 plants (both now decommissioned). In 2020, the Steamboat Hills repowering was also completed with the original flash plant replaced with an OEC (Ormat Energy Converter) binary plant. This new plant has a nameplate capacity of 30 MWe (compared to 13.2 MWe for the original flash plant), and in 2020 its gross generation was more than double that of the flash plant (23.9 MWe vs 10.5 MWe respectively; table 1). The total gross geothermal power generation in Nevada for 2020 increased to approximately 583 MWe, and net generation (power to market) reached 448 MWe. The difference between the gross and net generation reflects the parasitic losses associated with running the geothermal plant (e.g., downhole pumps), and this averaged 23% in 2020.

The total geothermal power generation in Nevada in 2020 was 5,109,775 megawatt-hours (MWh) gross and 3,922,209 MWh net, representing an insignificant increase (~1%) from generation in 2019. Data obtained from the Nevada Department of Taxation indicate that the total gross 2020 proceeds from geothermal operators in Nevada (including the direct use projects) were $313,310,016 (approximately $2.3 million greater than in 2019). The reported adjusted gross proceeds for 2020 (taking into account the cost of operating and maintaining plants and transmission lines, depreciation of capital investments, amortization of each long-term Power Purchase Agreement (PPA), and other factors) were $143,118,572 (~$16 million increase compared to 2019).

In October 2020, the U.S. Bureau of Land Management (BLM) held a geothermal lease sale, with 18 parcels offered equating to 35,232 acres. This acreage is less than 10% of what was offered in the 2019 lease sale, which was the largest sale for the BLM in 10 years. Eleven of the parcels were sold for a total acreage of 23,351 (figure 2; table 3a). The high bid per acre was $42 (double the high bid from 2019), and high bid per parcel was $20,800. Total monies received by the BLM were $148,009 (including the bonus bid, administrative fees, and first year lease rental at $2/acre). In addition to the competitive lease sale, a non-competitive lease sale was held the day after the competitive sale (and is hence known as the 'day after' sale), with 7 parcels nominated for offers and 2 parcels receiving offers for a total of 3,335 acres (1,349.6 ha) (table 3b). Thus, between the competitive and non-competitive lease sales, 26,686 acres (10,799 ha) were taken up for geothermal exploration in the state in 2020, which is approximately 16% of the acreage leased in 2019.

Areas of interest for parcels leased in 2020 include:

- the geothermal system adjacent to Gerlach (Ormat Nevada Inc.);
- an area in the Singatze Range, approximately 12 miles (20 km) south of Yerrington (Ormat Nevada Inc.);
- parcels adjacent to the Salt Wells geothermal plant (Western States Environment and Resources LLC; Myint Myint Swe);
- Desert Valley, west of the Blue Mountain geothermal plant (Copland Clean Power LLC);
- northern Dixie Valley, west of the Sou Hills geothermal prospect (Baseload Power US Holdings Inc.);
- the Alum geothermal prospect, north of Silver Peak and Clayton Valley (Baseload Power US Holdings Inc.; Atlas Exploration and Production LLC); and
- Hot Pot Springs, approximately 10 km north of Valmy (Eavor Inc.).

While the acreage leased in 2020 was less than 2019, the number of geothermal wells drilled in 2020 increased to nine (table 4, figure 3) and the number of wells permitted by the Nevada Division of Minerals (NDOM) more than doubled (tables 4 and 5). Four shallow thermal gradient (TG) holes were drilled at the Wabuska geothermal field in Lyon county: two were drilled on private land and two on federal land. Ormat Nevada Inc. and its subsidiaries drilled three commercial-scale wells: an injection well at the Dixie Meadows prospect, a production well at New York Canyon, and another injection well at San Emidio. Enel drilled a shallow thermal gradient well at Salt Wells, and Star Peak Geothermal drilled a commercial-scale production well at the Star Peak (formerly known as Rye Patch) geothermal field.

Trends

In 2020, average wellhead fluid production temperatures ranged from 97–186 °C (207–368 °F) for electricity generation, and three reported direct-use applications utilized geothermal fluids ranging between 77–95 °C (171–203 °F) (figure 4). Production flow rates for an individual well averaged 137 liters/second (l/s; ~2,171 gallons/minute (gpm)) for electricity generation, with the highest production flowrates measured at the Don A. Campbell geothermal field (316 l/s; 5,009 gpm). The three most recently developed geothermal fields in Nevada (McGinness Hills, Tungsten Mountain, and Don A. Campbell) have the highest production well flowrates and collectively produce an average of 5,988 l/s (94,912 gpm). This represents almost 40% of total fluid production from geothermal plants in Nevada for 2020 and coincidentally, these three fields

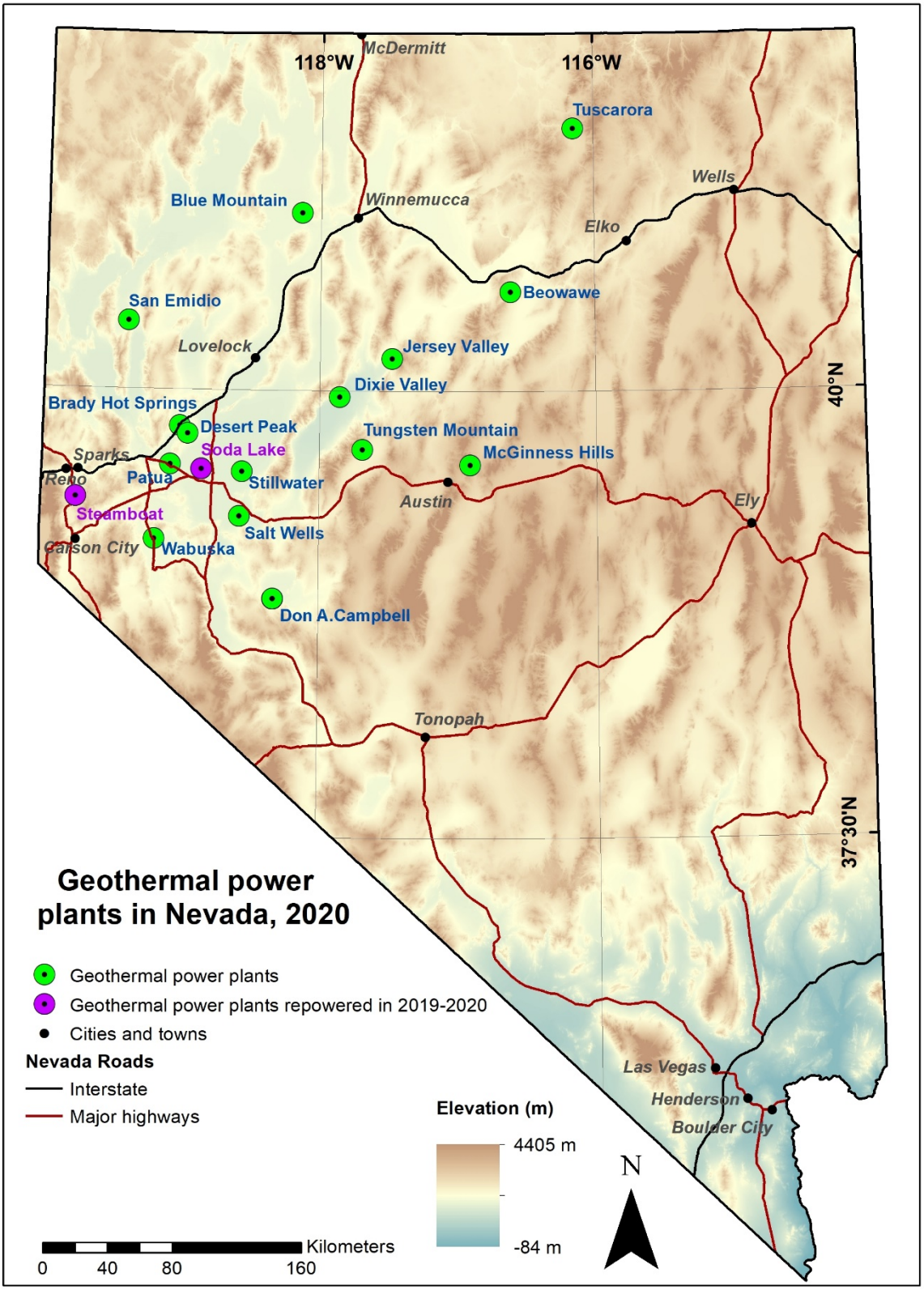


Figure 1. Location of geothermal power plants in Nevada in 2020.

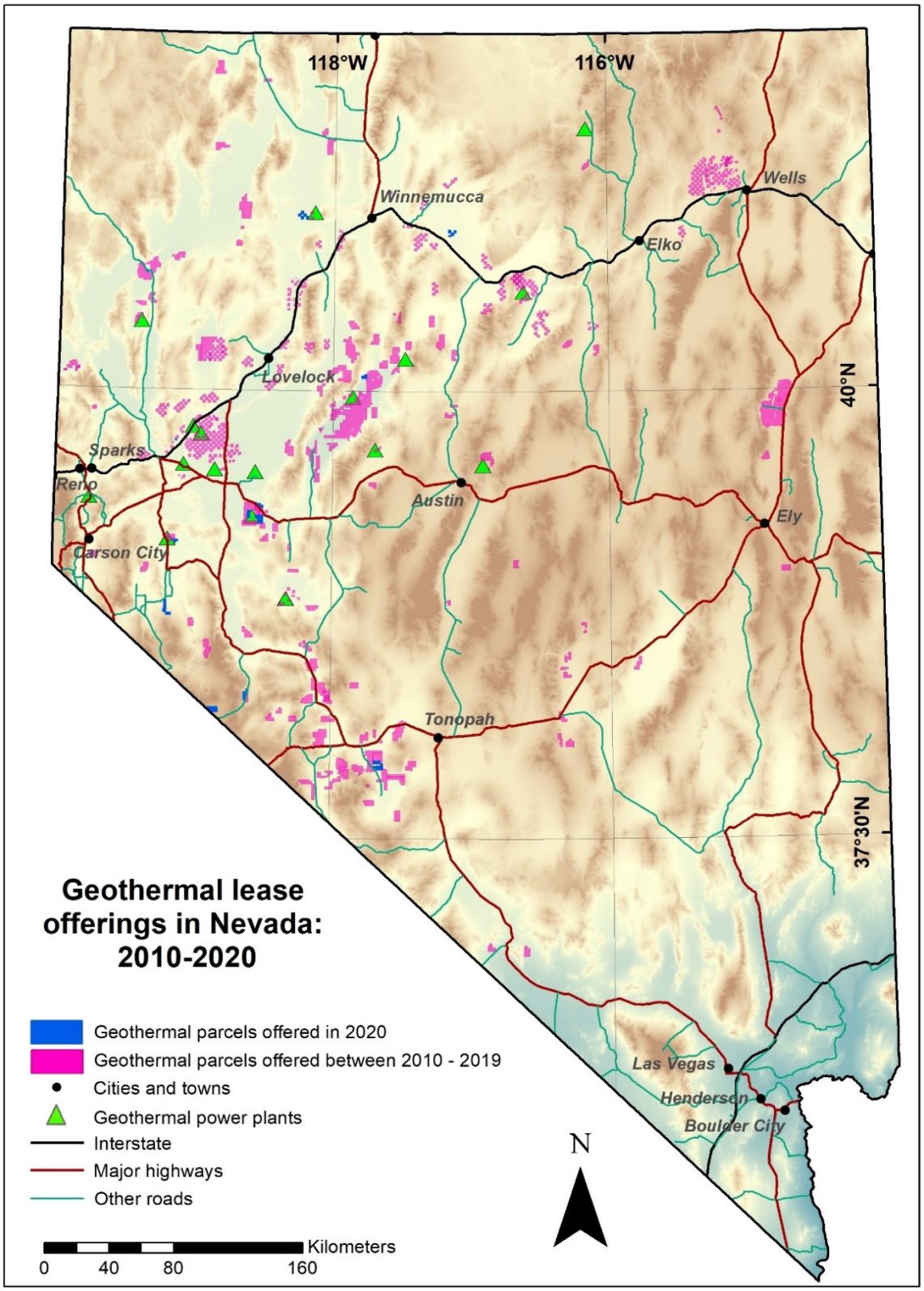


Figure 2. Geothermal leases offered by the BLM between 2010 and 2020.

Table 1. Nevada geothermal power plants and generation figures: 2020.

Plant name	Nameplate Capacity (MWe)[1]	Flash or Binary	Commission Year[2]	2020 Production (MWhr)		2020 Production (MWe)[3]		Operator
				Gross	Net	Gross	Net	
Beowawe	18.5	F/B	1985	122,612	100,963	14.0	11.5	Terra-Gen Power
Blue Mountain	49.5	B	2009	322,867	217,212	36.9	24.8	AltaRock Energy
Brady Hot Springs	26.1	B	1992 (2018)	144,695	97,533	16.5	11.1	Ormat Nevada Inc.
Desert Peak II	23.0	B	2006	126,045	94,688	14.4	10.8	Ormat Nevada Inc.
Dixie Valley	64.7	F	1988	568,863	504,054	64.9	57.5	Terra-Gen Power
Dixie Valley Binary Unit	6.2	B	2012			0.0	0.0	Terra-Gen Power
Don A. Campbell	22.5	B	2013	170,587	131,347	19.5	15.0	Ormat Nevada Inc.
Don A. Campbell II	25.0	B	2015	166,130	124,632	19.0	14.2	Ormat Nevada Inc.
Jersey Valley	23.5	B	2011	107,551	67,154	12.3	7.7	Ormat Nevada Inc.
McGinness Hills	48.0	B	2012	441,777	361,975	50.4	41.3	Ormat Nevada Inc.
McGinness Hills II	48.0	B	2015	435,105	363,385	49.7	41.5	Ormat Nevada Inc.
McGinness Hills III	48.0	B	2018	526,306	448,370	60.1	51.2	Ormat Nevada Inc.
Patua	48.0	B	2012	210,750	118,744	24.1	13.6	Cyrq Energy
Salt Wells	23.6	B	2009	94,431	67,216	10.8	7.7	Enel North America
San Emidio	11.75	B	2012	117,684	88,636	13.4	10.1	Ormat Nevada Inc.
Soda Lake No. 3	26.5	B	2019	161,945	125,464	18.5	14.3	Cyrq Energy
Steamboat II	23.9	B	1992	84,161	49,253	9.6	5.6	Ormat Nevada Inc.
Steamboat III	23.9	B	1992	93,140	57,264	10.6	6.5	Ormat Nevada Inc.
Galena 1	30.0	B	2005	153,568	124,267	17.5	14.2	Ormat Nevada Inc.
Galena 2	13.5	B	2007	64,164	36,016	7.3	4.1	Ormat Nevada Inc.
Burdette (Galena 3)	30.0	B	2008	145,595	103,678	16.6	11.8	Ormat Nevada Inc.
Steamboat Hills	13.2	F	1988	30,703	26,357	10.5[4]	9.0[4]	Ormat Nevada Inc.
Steamboat Hills II	30.0	B	2020	139,454	122,442	23.9[4]	21.0[4]	Ormat Nevada Inc.
Total MW at Steamboat	***151.3***[5]							
Stillwater 2	47.2	B	2009	163,132	92,065	18.6	10.5	Enel Stillwater
Tungsten Mountain	37.0	B	2017	287,592	240,758	32.8	27.5	Ormat Nevada Inc.
Tuscarora	32.0	B	2012	197,852	138,664	22.6	15.8	Ormat Nevada Inc.
Wabuska	5.6	B	1984 (2018)	33,067	20,074	3.8	2.3	Open Mountain Energy
Total:	**786.0**[5]			**5,109,775**	**3,922,209**	**583.3**	**447.7**	

[1] Nameplate capacity is the manufacturer's rating of equipment output capacity, as reported to the Nevada Division of Minerals by the plant operators and does not necessarily reflect the capability of the currently developed resource. These nameplate capacities are estimates, and several different values can be found in the literature. Generator nameplate capacity refers to the size of the actual generator, but not to the turbine size or the actual capacity of the power plant. There are no public documents breaking down nameplate capacity of the turbines so these numbers may not adequately reflect actual generation.

[2] Years in brackets are those in which a plant re-powering occurred but was not associated with a change in plant name.

[3] Production values were calculated by dividing annual megawatt hours (MWh) produced by the number of hours in a year.

[4] The original Steamboat Hills plant only generated electricity for 4 months in 2020 before being replaced with the new Steamboat Hills II plant, which operated for the remaining 8 months in 2020. The MWe reported for each plant represents the average generation during the time each plant was operating (i.e., not calculated over 12 months).

[5] Total installed nameplate capacity excludes the Steamboat Hills plant that was decommissioned in mid-2020.

Table 2. Geothermal power plant operator contact information.

Company Address	Local Contact	Project	Nameplate capacity (MWe)
Cyrq Energy 15 West South Temple, Suite 1900 Salt Lake City UT 84101 (801) 875-4200 https://www.cyrqenergy.com/	NGP Blue Mountain 1 15250 Blue Mountain Road Winnemucca, NV 89445 (775) 786-4322	Blue Mountain	49.5
	Patua Geothermal Power Plant 17388 Patua Road Hazen, NV 89408 (775) 217-2650	Patua	48
	Soda Lake Power Plant 5500 Soda Lake Road Fallon, NV, 89406, USA (775) 867-5093	Soda Lake No. 3	26.5
Enel North America 1755 East Plumb Lane, Suite 155 Reno, NV 89502 (775) 329-0700 https://www.enelgreenpower.com/country-north-america	(775) 423-5374 (775) 423-0322	Salt Wells Stillwater	23.6 47.2
Open Mountain Energy 3451 N. Triumph Blvd, Suite 201 Lehi, UT 84043 (385) 352-8858 http://openmountainenergy.com/	21 Julian Lane Yerington, NV 89447 (385) 352-8858	Wabuska	5.6
Ormat Technologies, Inc. 6140 Plumas St Reno, NV 89519 (775) 356-9029 https://www.ormat.com/en/home/a/main/	(775) 322-7782 (775) 423-5800 (775) 852-1444 (775) 384-7807 (775) 557-2015 (775) 852-1444 (775) 852-1444 (775) 852-1444 (775) 384-7807	Brady Hot Springs Desert Peak Jersey Valley McGinness Hills (1,2 & 3) San Emidio (Empire) Steamboat Tungsten Mountain Tuscarora Don A. Campbell 1 & 2	26.1 23 23.5 144 11.75 151.3 37 32 47.5
Terra-Gen Power, LLC 9590 Prototype Ct., #220 Reno, NV 89521 (775) 850-1125 https://www.terra-gen.com/	(775) 635-2130 (775) 423-6535	Beowawe Dixie Valley	18.5 70.9
	Total Installed MWe (nameplate capacity)		**786.0**

Table 3a. Geothermal competitive leasing activity in Nevada, 2007–2020.

Year	Parcels Offered	Acres Offered	Parcels Sold	Acres Sold	Total receipts[1]	Highest bid per acre	Avg. bid per acre	% Acres Sold	% Parcels Sold
2007	43	122,849	43	122,849	$11,669,821	$95	$92.90	100%	100%
2008	35	105,212	35	105,212	$28,207,806	$268	$266	100%	100%
2009	108	323,222	82	243,727	$8,909,445	$3,800	$34.50	75%	76%
2010	114	328,020	75	212,370	$2,762,292	$1,000	$10.90	65%	66%
2011	51	151,119	17	42,627	$456,353	$60	$8.70	28%	33%
2012	33	94,829	8	27,834	$112,540	$2	$2	29%	24%
2013	13	16,284	9	10,373	$42,870	$2	$2	64%	69%
2014	2	3,438	1	40	$315	$2	$2	1%	50%
2015	0	0	-	-	-	-	-	-	-
2016	22	46,976	14	32,075	$30,552	$2	$2	68%	64%
2017	20	38,208	10	19,209	$78,444	$2	$2	50%	50%
2018	10	27,331	2	2,321	$26,422	$12	$9.20	8%	20%
2019	142	387,032	37	102,403	$637,892	$20	$4.20	26%	26%
2020	18	35,232	11	23,351	$148,009	$42	$4.30	65%	61%
Totals:	**611**	**1,679,557**	**344**	**944,391**	**$53,182,761**	**$3,800**	**-**	**56%**	**56%**

[1] *Includes bids, first year lease rental at a price of $2 per acre and application fee (~$165 per parcel; this changes year-to-year).*

Table 3b. Non-competitive geothermal leasing activity in Nevada, 2018–2020 ('day-after' sale).

Year	Parcels Offered	Acres Offered	Parcels Sold	Acres Sold	Total Receipts[2]	% Acres Sold	% Parcels Sold
2018	8	24,749	0	0	0	0	0
2019	105	281,967	19	64,420	$72,875	23%	18%
2020	7	11,881	2	3,335	$4225	28%	29%

[2] *First year lease rental at a price of $1 per acre and application fee ($445 per parcel in 2020.*

Table 4. Geothermal wells reported as drilled, re-drilled, or completed in 2020.

County	Area	Permit #	Operator Name	Well Number	Well Type[1]	UTM_ Easting[2]	UTM_ Northing[2]	Land Type	Permitted depth (m)[3]
Churchill	Salt Wells	1481	Enel	18-36	TG	364261	4349587	Federal BLM / USFS	304.6
Churchill	Dixie Meadows	1486	ORNI 32 LLC	14-8	Ind-Inj	407563	4405114	Federal BLM / USFS	1675.3
Pershing	Star Peak (formerly known as Rye Patch)	1488	Star Peak Geothermal	88-21	Ind-Prod	392646	4487446	Private	1218.4
Pershing	New York Canyon	1493	Ormat Nevada	68A(82-11)-2	Ind-Prod	413988	4434798	Federal BLM / USFS	1827.6
Lyon	Wabuska	1494	Open Mountain Energy, LLC	TG-C	TG	311363	4337793	Federal BLM / USFS	609.2
Lyon	Wabuska	1495	Open Mountain Energy, LLC	TG-D	TG	312082	4337779	Federal BLM / USFS	609.2
Lyon	Wabuska	1502	Whitegrass No. 1, LLC	TG-B	TG	311457	4337153	Private	609.2
Washoe	San Emidio	1480	Ormat Nevada - USG Nevada	47-33	Ind-Inj	296816	4477236	Federal BLM / USFS	152.3
Lyon	Wabuska	1503	Whitegrass No. 1, LLC	TG-F	TG	311982	4337276	Private	609.2

[1] Abbreviations as follows: Ind-Inj = Industry Injection well, Ind-Prod = Industry Production well, TG = Thermal Gradient hole.
[2] North American 1983 Datum UTM 11N (in meters).
[3] Permitted depth for each well obtained from the Nevada Division of Minerals (https://minerals.nv.gov/Programs/Geo/GeoPermits/).

Table 5. Geothermal drilling activity in Nevada, 2007–2020

Year	Number of permits issued	Number of wells drilled	Number of production wells drilled
2007	71	41	5
2008	130	53	16
2009	195	71	16
2010	119	74	19
2011	85	37	19
2012	49	24	12
2013	21	23	8
2014	27	14	6
2015	26	17	7
2016	14	16	9
2017	35	31	5
2018	23	25	3
2019	7	6	1
2020	21	9	2

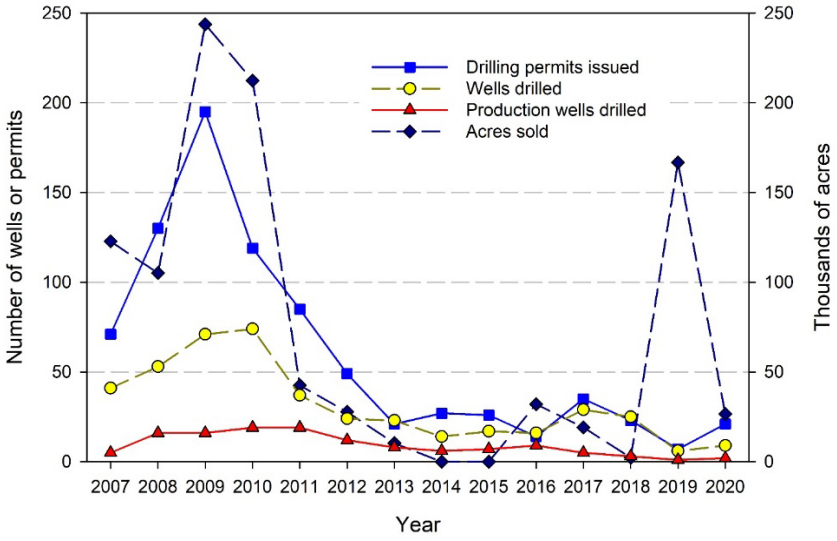


Figure 3. Trends in geothermal leasing and drilling activities in Nevada from 2007 to 2020. Note: acreage for 2019 and 2020 includes parcels sold through both competitive and non-competitive ('day-after') lease sales.

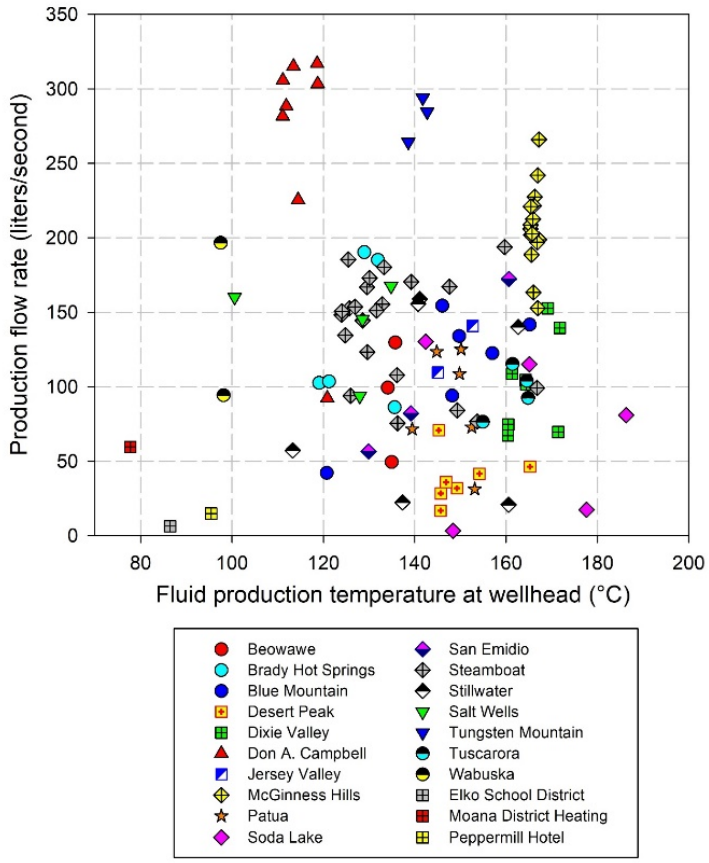


Figure 4. Average production flow rates of geothermal wells in Nevada in 2020 and their associated temperatures as measured at the wellhead. Data based on information provided to the Nevada Division of Minerals, 2020. Note that temperatures reported for wells in Dixie Valley and Beowawe represent post-flash temperatures.

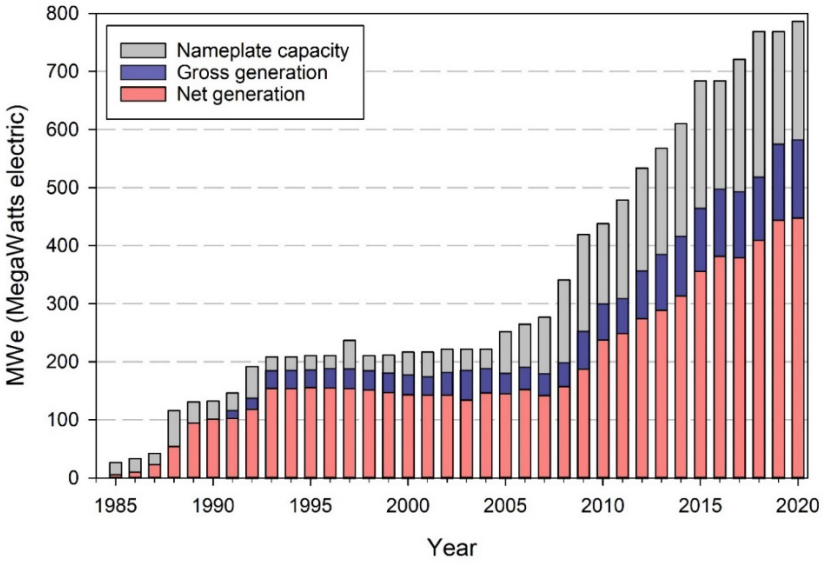


Figure 5. Growth in installed nameplate capacity, and net and gross geothermal power production in Nevada between 1985 and 2020, as reported to the Nevada Division of Minerals. Gross and net generation are calculated by dividing annual net generation in megawatt-hours by the number of hours in a year.

account for ~40% of gross power generation for the year (these numbers could be expected to vary due to different production temperatures for each field).

The total installed nameplate capacity, gross and net geothermal power generation for Nevada all increased in 2020 compared to 2019, largely associated with the repowering of the Steamboat Hills and Soda Lake plants (figure 5). These increases mask the fact that some fields continue to experience production declines in recent years, including Don A. Campbell, Steamboat Hot Springs, Stillwater, and Salt Wells (figure 6). The repowering of the Soda Lake plant in late 2019 has arrested the decline previously observed for Soda Lake. Don A. Campbell and Steamboat Hot Springs have each experienced a pronounced decline of more than 10 MWe net total production over the last five years (figure 6). Some fields have seen increases in generation in 2020 relative to 2019 including Wabuska, Soda Lake, Steamboat Hills, San Emidio, and Tungsten Mountain. Other fields have continued to maintain stable production, including Beowawe, Desert Peak, Dixie Valley, and Tuscarora.

In 2020, the estimated price for geothermal electricity is 8.05 cents(c)/kilowatt-hour (kWh) (calculated by dividing the total gross proceeds by the annual net electricity production)—almost identical to 2019 (8.06 c/kWh) (figure 7). The share of geothermal electricity generation in the state has increased since the mid-2000s to ~9.8% in 2019, coincident with an increase in solar generation (figure 8). This proportion reflects the generation of geothermal electricity in Nevada, not consumption. Some geothermal power from Nevada is sold to utilities in California and Utah (e.g., Sacramento Municipal Utility District; Southern California Public Power Authority; the University of Utah) under various PPAs.

Significant Federally Funded Geothermal Research Projects in Nevada in 2020

In 2020, there were three active geothermal research projects in Nevada that were supported by federal funds from the U.S. Department of Energy's (DOE) Geothermal Technologies Office (GTO) and the USGS's National Geological and Geophysical Data Preservation Program (NGGDPP). One additional project was supported by the Nevada Division of Minerals and associated Commission on Mineral Resources. These projects are briefly reviewed as follows:

1. Understanding a Stratigraphic Hydrothermal Resource—Geophysical Imaging at Steptoe Valley, Nevada

- **Project PI**: Sandia National Laboratories with subawards and co-PI's at several institutions, including the Nevada Bureau of Mines and Geology at UNR.
- **Project duration:** 2 years: 1 October 2020 to 30 September 2022.
- **Total project funding:** $1,500,000 (DOE-GTO)
- **Project goal:** Advance the understanding of the nature and extent of the hidden, stratigraphic hydrothermal geothermal resource in Steptoe Valley, Nevada and recommend an optimized strategy for subsequent exploration and development for this resource and

analogous resources. This will be achieved by supplementing legacy geophysical and well information with new gravity, magnetics, and CSEM-MT surveys, conducting joint inversion modeling to inform a revised 3D geological model of the basin, and using these data to develop thermal-hydrologic models of the inferred stratigraphic resource in Steptoe Valley.

2. Nevada Geothermal Machine Learning

- **Project PI:** Dr. James Faulds, Nevada Bureau of Mines and Geology, University of Nevada, Reno
- **Project duration:** 30 months: 1 August 2019–28 February 2022.
- **Total project funding:** $526,000 (DOE-GTO)
- **Project goal**: Apply machine learning (ML) techniques to develop an algorithmic approach to identify new geothermal systems in the Great Basin region and build on the successes of the Nevada geothermal play fairway project. An algorithmic approach that empirically learns to estimate weights of influence for diverse parameters may scale and perform better than the play fairway analysis. Project activities include augmenting the number of training sites (positive and negative) that are needed to train the ML algorithms, transforming the data into formats suitable for ML, and development and testing of the ML techniques and outputs (Faulds et al., 2020; Brown et al., 2020).

3. Increasing the Utility and Accessibility of Nevada's Digital Geologic Libraries: Digitization of Geothermal Well Logs, GeMS Geologic Map Conversions, and Great Basin Science Sample and Records Library Data Preservation

- **Project PI:** Emily O'Dean, Nevada Bureau of Mines and Geology, University of Nevada, Reno
- **Project duration:** 14 months: June 2020–August 2021
- **Total project funding:** $92,961 (USGS-NGGDPP)
- **Project goal:** Enhance the utility of geothermal datasets through digitizing geothermal well logs and converting geologic maps to GeMS for key geothermal areas in Nevada. The proposed sites for geothermal well log digitization included San Emidio Desert, the Hot Spring Mountains, and Hot Sulphur Springs. At these sites, >300 temperature and pressure logs are available in scanned pdf format and able to be digitized to create tabular data. Capturing tabular log data will bolster important functionality of the subsurface geothermal database managed by the Nevada Bureau of Mines and Geology at UNR, as such data are fully discoverable, machine readable, and formatted consistently. The benefits of such data include improved geothermal resource evaluation and inclusion in machine learning algorithms to reduce geothermal exploration risk.

4. Structural Inventory of Geothermal Systems and Late Miocene to Recent Epithermal Mineral Deposits in Nevada

- **Project PI:** Dr. James Faulds, Nevada Bureau of Mines and Geology, University of Nevada, Reno
- **Project duration:** 18 months: 1 July 2019–31 December 2020
- **Total project funding:** $35,000 (Nevada Division of Minerals/Commission on Mineral Resources)
- **Project goal:** Organize, review for quality assurance, and publish dataset on the structural settings of active geothermal systems and late Miocene to recent epithermal mineral deposits in Nevada. This work will foster new geothermal and mineral exploration and development in the state.

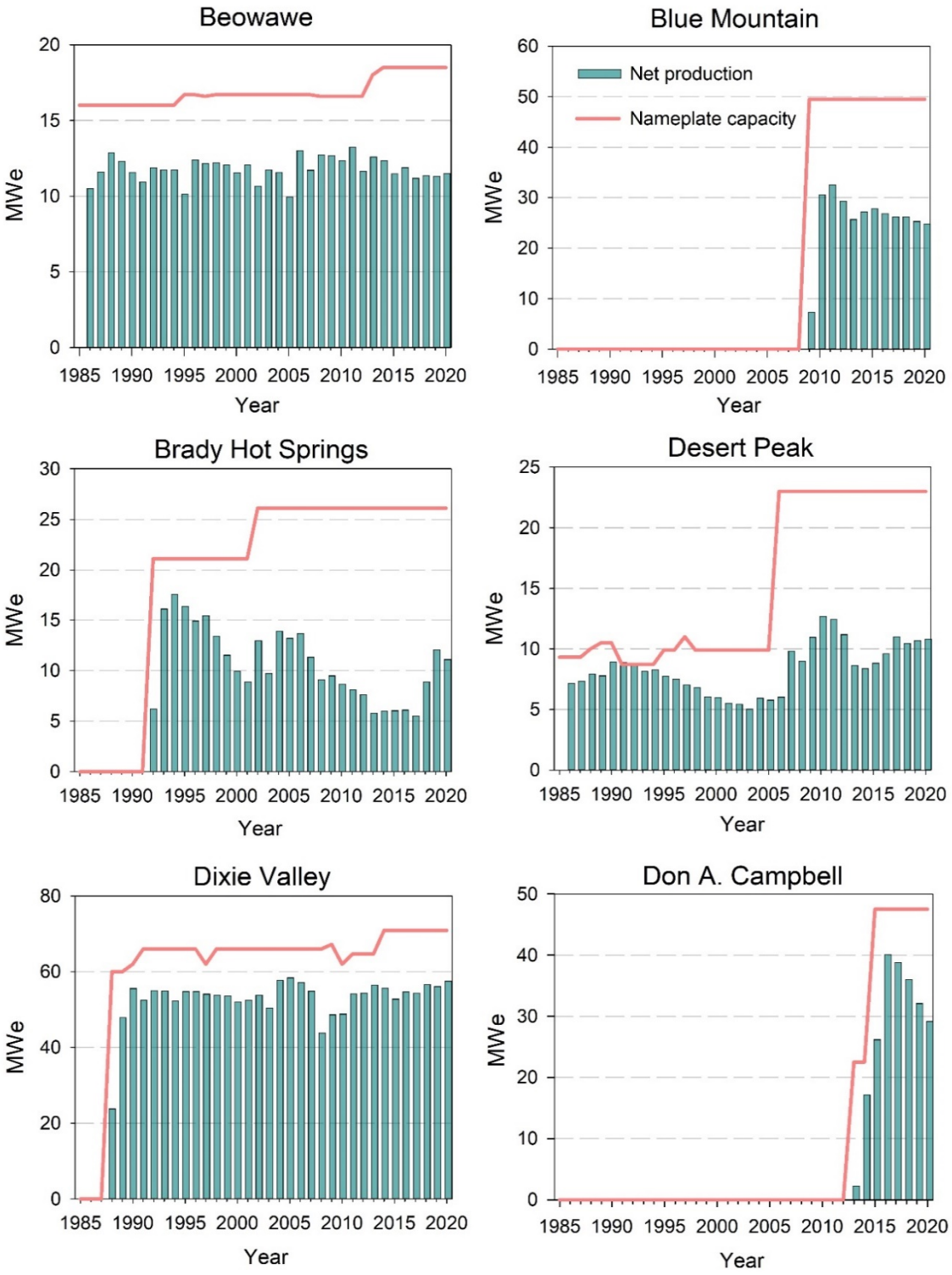


Figure 6a. Evolution of nameplate capacity (MWe) and net power generation (MWe) for geothermal power plants in Nevada (legend is the same for all plots).

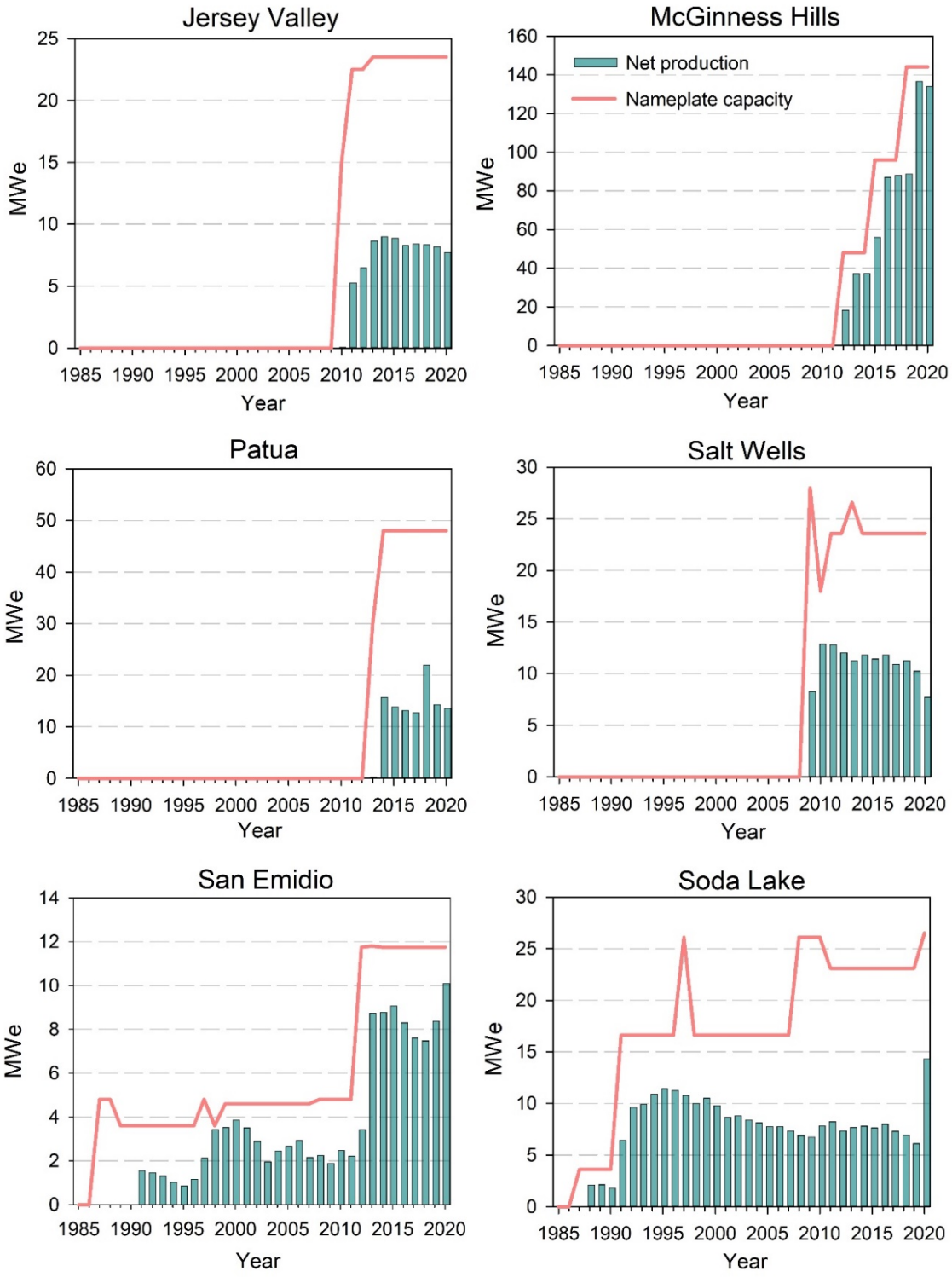


Figure 6b. Evolution of nameplate capacity (MWe) and net power generation (MWe) for geothermal power plants in Nevada (legend is the same for all plots).

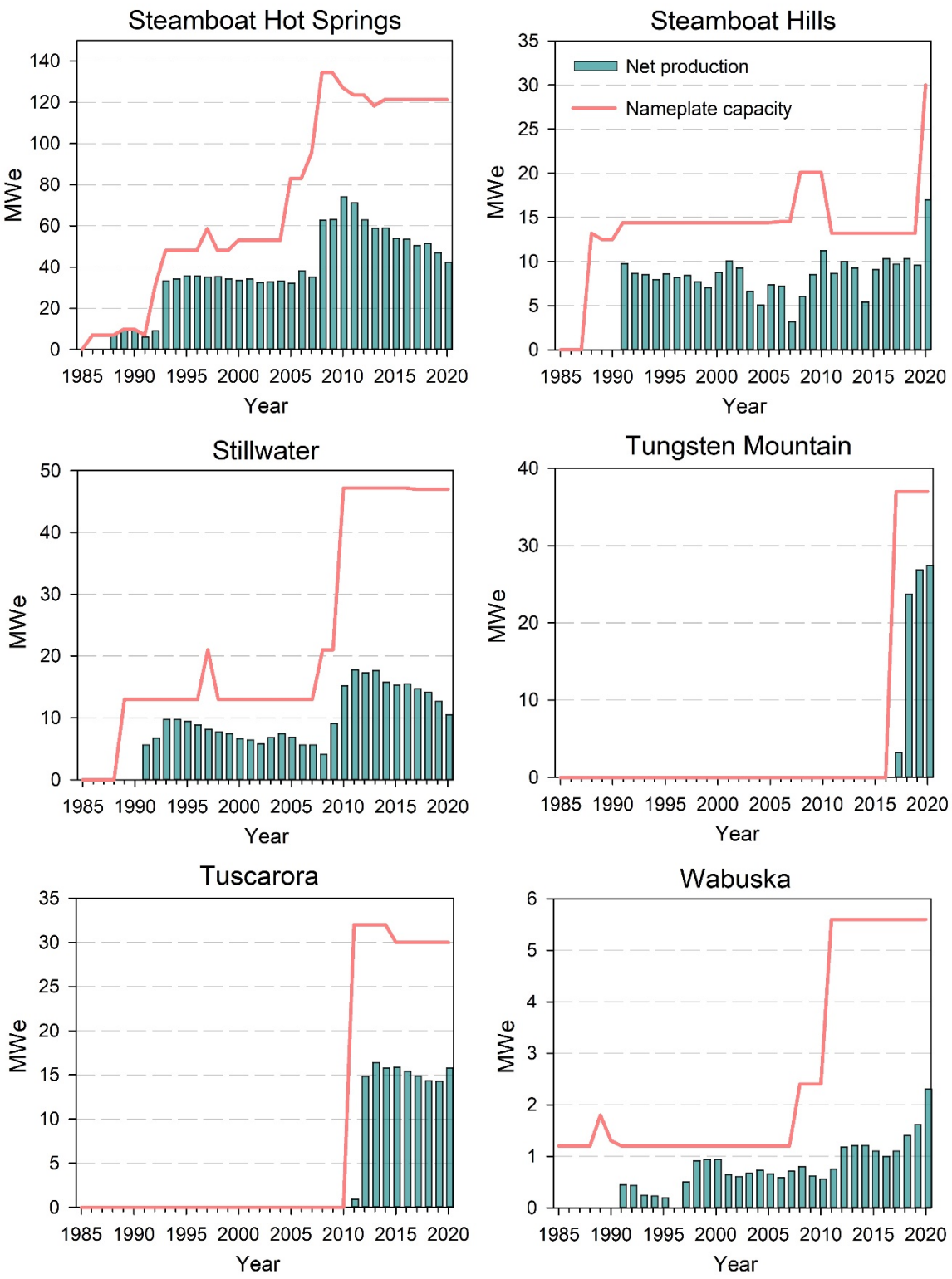


Figure 6c. Evolution of nameplate capacity (MWe) and net power generation (MWe) for geothermal power plants in Nevada (legend is the same for all plots).

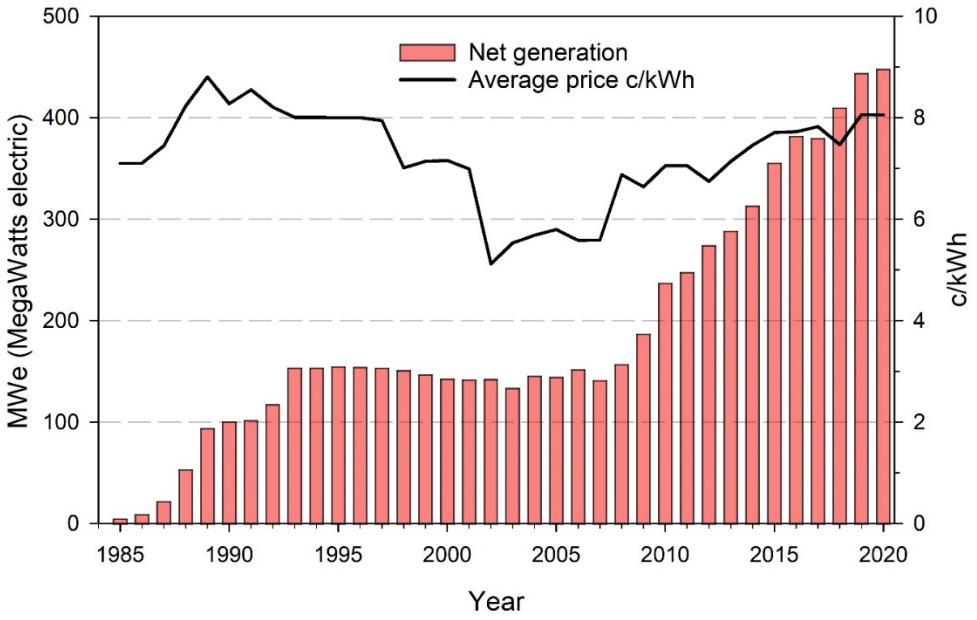


Figure 7. Trends in annual, net geothermal electricity generation and the estimated average price of geothermal electricity (calculated from gross proceeds and reported net production through 2020) in cents per kilowatt hour (c/kWh). The actual price for any individual power plant may be different and is held confidential by the State Energy Office.

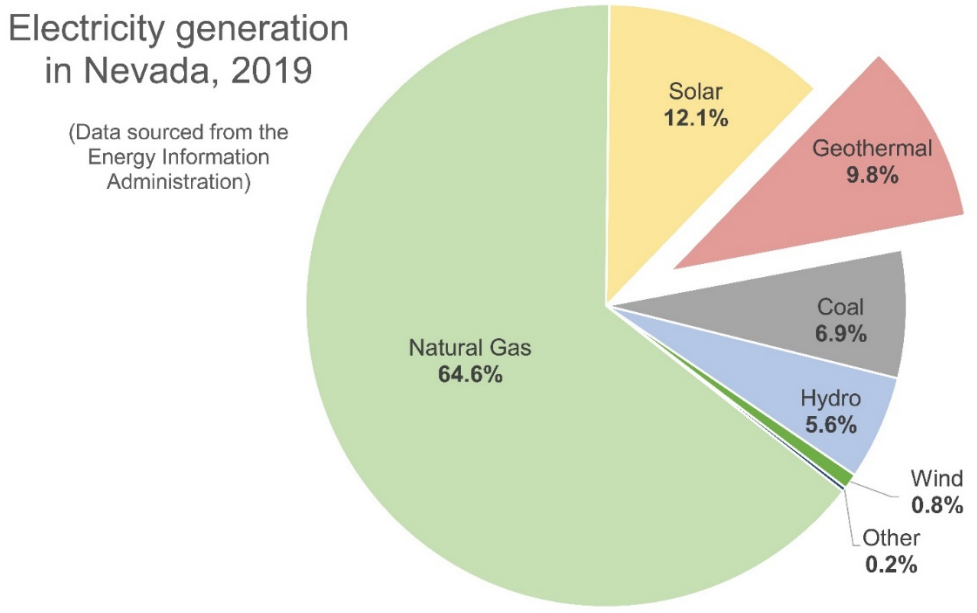


Figure 8. Sources of Nevada's electricity generation in 2019. Data sourced from the U.S. Energy Information Administration (EIA)[1].

[1] https://www.eia.gov/electricity/state/nevada/

ACTIVITY DURING 2020

The following section outlines new activity at geothermal power plants and major exploration sites in 2020. For historical information about geothermal sites in Nevada, refer to previous Mineral Industry reports published annually by NBMG (e.g., Muntean et al., 2020).

Crescent Valley (Ormat Nevada Inc.)

In 2020, Ormat Nevada submitted a geothermal project area permit application to the Nevada Division of Minerals (NDOM) for their Crescent Valley geothermal lease area. The permit included 24 proposed production wells, 24 injection wells and 10 observation wells: all with a proposed maximum depth of ~6,000 ft (~1,829 m). The Crescent Valley prospect was evaluated during Phase 1 and 2 of the Nevada Geothermal Play Fairway Project led by NBMG at UNR (refer to McConville et al., 2017; McConville, 2018). The area with greatest potential suggested by this analysis included Dann Hot Springs on the eastern side of Crescent Valley along the range front: Ormat's exploration leases include this area and also extend westward into the basin. Three permits for commercial size production wells were submitted to NDOM in 2020 (after the project permit application was submitted); however, no drilling was reported for the year.

Dixie Meadows (Ormat Nevada Inc.)

Field development continued at Ormat's Dixie Meadows geothermal prospect with an additional injection well drilled in 2020 in the center of the well field (well 14-8: refer to table 4). This brings the total number of wells that Ormat has drilled at the prospect to nine, comprising three observation wells, two thermal gradient holes, two production wells, and two injection wells. Ormat reports a planned commission date at the end of 2021 of a 12 MWe air-cooled binary power plant at the site (Ormat, 2020 annual report[2]).

Don A. Campbell (Ormat Nevada Inc.)

In 2020, Ormat submitted drilling permits for four new observation wells (permitted depths up to 914 m) and a new production well (permitted depth of 1,280 m) for the Don A. Campbell geothermal plant. The field has demonstrated a pronounced production decline over the last five years, and Ormat has reported that they are working to address this issue (Ormat, 2020 annual report).

New York Canyon (Ormat Nevada Inc.)

Ormat Nevada Inc. submitted a geothermal project area application with NDOM for their New York Canyon geothermal prospect. The application included 20 proposed production wells, 14 injection wells and 10 observation wells: all with a maximum proposed depth of 10,000 ft (3,048 m). Ormat previously drilled a commercial-scale production well at New York Canyon in 2017 (well 68(72-11)2) and completed the drilling of another commercial-scale production well at the site in 2020 (well 68A(82-11)-2) on the same well pad. No other activity is reported for 2020.

McGinness Hills (Ormat Nevada Inc.)

Currently the largest developed geothermal system in Nevada, Ormat plans for additional expansion, with an 8 MWe air cooled binary plant to be added in 2021 to the existing three plants (Ormat, 2020 annual report[3]). No other updates are reported for McGinness Hills in 2020.

Salt Wells (Enel)

Salt Wells experienced a pronounced decline in generation in 2020, producing 7.7 MWe net (compared to 10.3 MWe in 2019). Although the reason for this decline is not reported, it appears Enel is pursuing additional drilling in the field. A new thermal gradient hole (#18-36) was drilled in 2020 south of the power plant, with a permitted depth of ~1000 ft (~305 m). No other activity is reported for 2020.

San Emidio (Ormat Nevada Inc.)

In 2020, Ormat Nevada Inc. drilled another new injection well (47-33) in the northern part of the San Emidio geothermal field, less than 1 km from injection well 57-33 that was drilled in 2019. Both wells were permitted with total drilled depths of ~152 m and are intended to 1) test the connectivity of the northern part of the geothermal system with the main production area to the south and 2) evaluate its suitability to serve as an injection area for the field. No other updates are reported for San Emidio for 2020.

Soda Lake (Cyrq Energy)

In late 2019, Cyrq Energy commissioned the Soda Lake 3 plant, consisting of a new air-cooled Ormat Energy Converter (OEC). This plant replaced the two original power plants (Soda Lake 1 and 2) that were commissioned by Ormat in the late 1980s and early 1990s. The new unit is a higher-efficiency plant with a nameplate capacity of 26.5 MWe (table 1). After a full year of generation in 2020, gross

[2] https://investor.ormat.com/annual-reports/

[3] https://investor.ormat.com/annual-reports/

generation for Soda Lake doubled to reach 18.5 MWe (gross) compared to 9.4 MWe gross generation in 2019.

Rye Patch (Star Peak; Open Mountain Energy)

A commercial size production well was drilled at the Star Peak geothermal field in 2020, with a permitted depth of ~3,996 ft (~1,218 m). This new well complements the existing 9 production and injection wells already present at the site as well as a partially constructed power plant. Open Mountain Energy (OME) reported that Kaishan power generation equipment will be utilized for the Star Peak facility (the same equipment that is used at the new Wabuska plant). OME have worked to secure a PPA with the city of Glendale in California, eventually providing it with a combined 15.5 MWe of geothermal electricity from the Star Peak and Wabuska geothermal fields combined. The initiation of power supply to Glendale from the Star Peak facility is estimated to occur in April 2021[4].

Steamboat Hills (Ormat Nevada Inc.)

Ormat completed the repowering of the Steamboat Hills plant in 2020, replacing the 10 MWe (net) flash-steam system with a new 30 MWe, air-cooled binary facility. The new binary plant came online in May 2020 and averaged gross generation of ~24 MWe for the remainder of the year, more than doubling the previous generation from the flash plant.

Tungsten Mountain (Ormat Nevada Inc.)

The Tungsten Mountain geothermal plant achieved its largest annual gross and net generation in 2020, due to a full 12 months of production of the solar PV array that Ormat commissioned at the site in July 2019. Additionally, Ormat reported a planned phase two expansion of the geothermal plant, with a proposed 11 MWe air cooled binary plant planned to be commissioned in 2022 (Ormat, 2020 annual report[5]). No other activity is reported for Tungsten Mountain in 2020.

Wabuska (Open Mountain Energy)

After no new drilling at the Wabuska geothermal field since 2017 (when production well PW-5 was drilled), eight geothermal drilling permits for thermal gradient holes were submitted to NDOM by Open Mountain Energy and partners in 2020. Four of these wells were reported drilled in 2020: two of these are close to the existing wells and surface plant (on private land), and the other two were drilled to the north, closer to the range front and on BLM land (wells TG-C and TG-D; refer to table 4). 2020 also represented a historic record for the field with the largest gross and net generation ever reported (3.8 MWe and 2.3 MWe, respectively) due to the repowering of the plant with new Kaishan generators in 2018 (see table 1; figures 6c and 9). As of April 2020, Wabuska (also known as Whitegrass-1) sells its power to the city of Glendale in California under a 25-year PPA that was negotiated by the Southern California Public Power Authority (SCPPA)[6].

[4] https://www.prnewswire.com/news-releases/glendale-water--power-enters-into-agreement-to-purchase-geothermal-energy-increasing-its-renewable-portfolio-301013023.html

[5] https://investor.ormat.com/annual-reports/

[6] https://www.latimes.com/socal/glendale-news-press/news/story/2020-02-27/geothermal-energy-contract-glendale-open-mountain-energy

Figure 9. Cooling towers of the recently installed Kaishan power system at the Wabuska geothermal plant, Lyon county (photograph-Bridget Ayling).

ACKNOWLEDGMENTS

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WEB LINKS TO OTHER GEOTHERMAL INFORMATION

For further information on geothermal resources in Nevada, check the following Websites or contact Rachel Micander at (775) 682-8766 or via e-mail at rmicander@unr.edu:

- The Nevada Bureau of Mines and Geology Open Data website: https://data-nbmg.opendata.arcgis.com/
- The Great Basin Center for Geothermal Energy https://gbcge.org/
- Map of Geothermal Resources in Nevada, NBMG Map 161, available online in PDF format: http://www.nbmg.unr.edu/Geothermal/PublishedMaps.html (includes zipped file of GIS layers)
- Nevada Bureau of Mines and Geology Geothermal Resources of Nevada Website at http://www.nbmg.unr.edu/Geothermal/index.html. This site contains geothermal exploration data, interactive maps, lease and information, and numerous geothermal digital data sets. These data are increasingly made available through the National Geothermal Data System (www.geothermaldata.org) and the Department of Energy's Geothermal Data Repository (https://gdr.openei.org/).
- Nevada Commission on Minerals, Nevada Division of Minerals at http://minerals.state.nv.us/ and http://minerals.nv.gov/Programs/Geo/Geo/.
- Southern Methodist University Geothermal Lab, specializing in geothermal gradient data and maps of the entire country, posts information at https://www.smu.edu/Dedman/Academics/Departments/Earth-Sciences/Research/GeothermalLab.
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OIL AND GAS

by David A. Davis

PRODUCTION

According to the Nevada Division of Minerals, Nevada's net oil production was 220,292 barrels, which accounted for 0.005% of total domestic production. Production decreased 17% from 266,872 barrels in 2019. Production in 2018 was the lowest since 143,101 barrels were produced in 1976 (NBMG Bulletin 104). Production came from 58 actively producing wells in seven fields in Railroad Valley, Nye County, which accounted for 83% of the state's production, and eight wells in three fields in Pine Valley, Eureka County, which accounted for about 17% of the state's production. Five other minor fields were shut-in throughout the year and four other minor fields plus an outlier well that briefly produced were plugged and abandoned. Nevada ranked 27 out of the 32 oil-producing states (http://www.eia.gov). The sales volume (or gross proceeds) decreased 37% to $8,792,325.87 from $14,035,529.62 in 2019 (2020–2021 Net Proceeds of Minerals Bulletin).

Production from Nevada's 66 actively producing wells (a one well decrease from 2019) ranged up to 77 barrels of oil per day and up to 2,978 barrels of water per day. The daily averages were 9.1 barrels of oil, a 14% decrease from 10.6 barrels per day in 2019, and 178 barrels of water per day for the 62 water producers, a 33% decrease from 267 barrels per day in 2019 for 57 water producers. Two wells shut-in since 2016 and one since 1992 were brought back on line in January, and two wells active in 2019 were shut-in throughout 2020. Nine wells were shut-in for up to three months, and 22 were shut-in for between 4 and 11 months. Thirty-eight wells produced ten or less barrels of oil per day, and seven produced more than 30 barrels of oil per day. Thirty-three wells produced less than 300 days, and 16 produced less than 100 days during the year. Thirty-nine other wells listed as producers were shut-in for the entire year. Of these, 17 had been shut-in since 2010, and 21 had been shut-in since before 2000. One well shut-in since 2016 produced one barrel in November. Four other wells shut-in for extended periods also occasionally produced a barrel or so after being shut-in.

At 77 barrels of oil and 581 barrels of water per day over a full year of production, Grant Canyon 10 was Nevada's most productive well. Trap Spring 9 was Nevada's second most productive well at 58 barrels of oil and 1,197 barrels of water per day over 333 days of production. Trap Spring 9 was Nevada's third most productive well at 30 barrels of oil and 11 barrels of water per day over 365 days of production. Kate No. 1A had been third for the previous three years.

Bacon Flat Field

The Bacon Flat Field produces from dolomite in the Devonian Guilmette Formation between about 4,960–5,350 feet (1,512 and 1,634 m). The field's one producer, which has been active since 1994, averaged 13 barrels of oil and 134 barrels of water per day and accounted for 2.1% of Nevada's total oil production. Oil production increased 1.5% and water production decreased 12% from 2019. The field had two inactive producers. One of those, inactive since 1993, produced briefly in 2019.

Blackburn Field

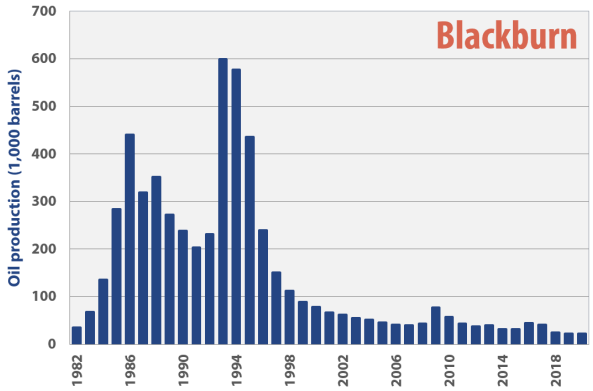

Figure 1. Chart showing oil production from the Blackburn Field in Pine Valley, Eureka County, from 1983 to 2020.

The Blackburn Field produces from the Oligocene Indian Well Formation (tuff and tuffaceous sandstone), Mississippian Chainman Shale (sandstone), and Devonian Nevada Group (dolomite) between about 6,700 and 6,750 feet (2,043 and 2,058 m). The field had six active wells, one less than in 2019. A producer active since 2017 was shut-in since August 2019. Production ranged between 67 and 366 days and averaged 309 days of production each. Spread over the year, production for the field averaged 62 barrels of oil and 3,613 barrels of water per day, and accounted for 10.4% of Nevada's total oil production. Oil production increased 1.2%, and water production decreased almost 7% from 2019. Daily per well oil production ranged between less than 1 barrel and over 23 barrels and averaged almost 11 barrels. Daily per well water production ranged between 46 and 2689 barrels and averaged 1,048 barrels. Not counting the producer shut-in since August 2019, oil production increased in three wells and decreased in three wells. The field also had one other inactive producer.

Eagle Springs Field

The Eagle Springs Field produces from Oligocene ignimbrites, the Eocene Sheep Pass Formation (lacustrine carbonates) and the Pennsylvanian Ely Limestone between about 5,780 and 7,360 feet (1,762 and 2,244 m). The field had 13 active producers, the same as in 2019. Several wells

were only active during very short periods during the year. One well only produced one barrel of oil during one day in January, on well produced two barrels during one day in February, one well produced four barrels during four days across three months, one well produced 35 barrels during one day in July, and one well produced and one well produced 29 barrels over seven across five months. Not counting these outliers production ranged between 72 and 257 days and averaged 178 days. Spread over the year, production for the field averaged 73 barrels of oil and 663 barrels of water per day and accounted for about 12% of Nevada's total oil production. Oil and water production decreased 24%, and 48% respectively from 2019.

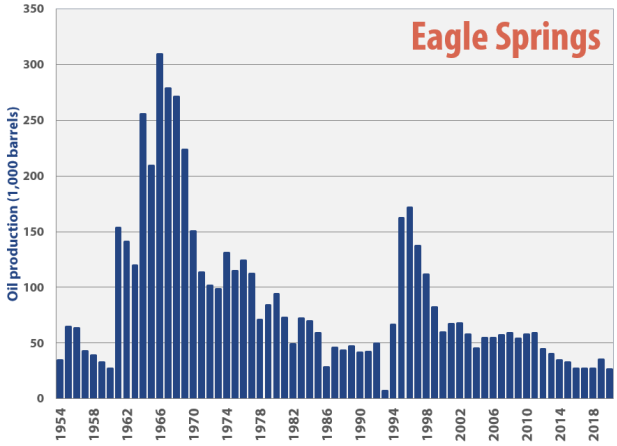

Figure 2. Chart showing oil production from the Eagle Springs Field in Railroad Valley, Nye County, from 1954 to 2020.

Daily per well oil production ranged between one and 35 barrels and averaged 13 barrels. Daily per well water production ranged between two and 617 barrels and averaged 164 barrels. Of the 13 wells with production consistent from 2019, production increased in four wells, and decreased in nine wells. The field had eight inactive producers, and a producer now used as a water disposal well.

Ghost Ranch Field

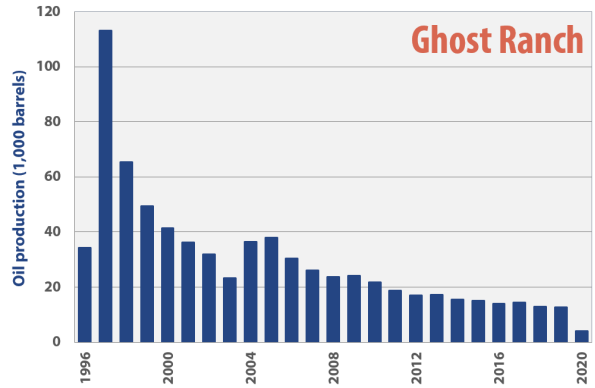

Figure 3. Chart showing oil production from the Ghost Ranch Field in Railroad Valley, Nye County, from 1996 to 2020.

The Ghost Ranch Field produces from dolomites of the Devonian Guilmette Formation between about 4,350 and 4,620 feet (1,326 and 1,409 m). The field had four active producers, three of which produced 134 days each between January and April and parts of July and August. The fourth producer was active from January through March and part of September. Spread out over the average of 125 days, production for the field averaged 33 barrels of oil and 1,274 barrels of water per day and accounted for almost 2% of Nevada's total oil production. Oil and water production decreased 68% each from 2019. Daily per well oil production ranged between seven and 13 barrels and averaged eight barrels. Daily per well water production ranged between 317 and 367 barrels and averaged 319 barrels. Production decreased in all four wells.

Grant Canyon Field

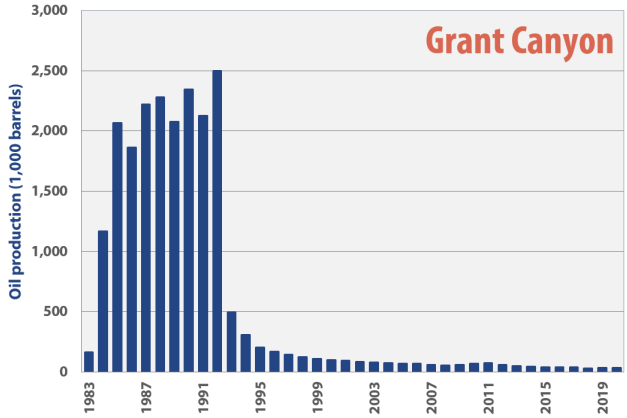

Figure 4. Chart showing oil production from the Grant Canyon Field in Railroad Valley, Nye County, from 1983 to 2020.

The Grant Canyon Field also produces from dolomites of the Devonian Guilmette Formation between about 2,160 and 4,300 feet (659 and 1,333 m). The field had three active producers, two of which produced 366 days and one for 364 days. Spread over the year, production for the field averaged 94 barrels of oil and 1,772 barrels of water per day and accounted for almost 16% of Nevada's total oil production. Oil production increased 3% and water production decreased 6% from 2019. Daily per well oil production ranged between two and 77 barrels and averaged 31 barrels. Daily per well water production ranged between 216 and 851 barrels and averaged 591 barrels. Oil production increased in two wells and decreased in one well. The field also had two inactive producers.

Kate Spring Field

The Kate Spring Field produces from the Tertiary Horse Camp Formation (breccia) and the Devonian Guilmette Formation between about 4,450 and 4,820 feet (1,357 and 1,470 m). The field had five active producers.

Production ranged between 91 and 318 days and averaged 207 days of production each. Spread over the year, production for the field averaged 47 barrels of oil and 684 barrels of water per day, and accounted for almost 8% of Nevada's total oil production. Oil and water production decreased 32% and 37%, respectively, from 2019. Oil production decreased in all five wells producers of which Kate Spring 12-2 was shut-in from April onwards. Daily per well oil production ranged between less than 4 and almost 32 barrels and averaged 14 barrels. Daily per well water production ranged between 26 and 415 barrels and averaged 214 barrels. All five active wells also produced natural gas. A total of 849,000 cubic feet of gas was produced, a 67% decrease from 2019. The gas is used to operate production and related equipment at the lease sites of Makoil, Inc., and Western General, Inc.

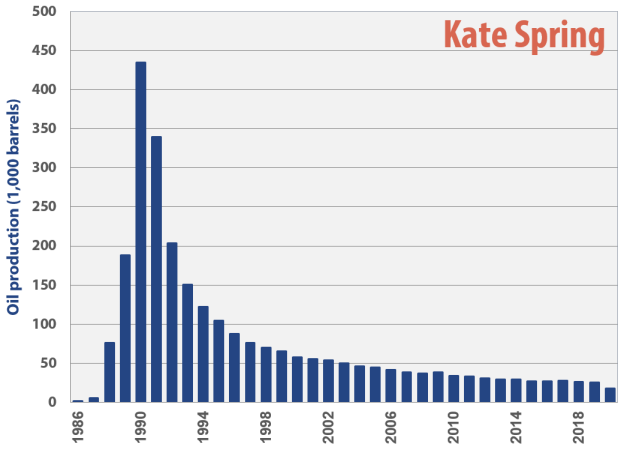

Figure 5. Chart showing oil production from the Kate Spring Field in Railroad Valley, Nye County, from 1986 to 2020.

Sans Spring Field

The Sans Spring Field produces from the Oligocene Garrett Ranch Group (volcaniclastic rocks and ignimbrites) between about 5,640 and 5,770 feet (1,720 and 1,759 m). It is the only active well that produced for a few days each month between March and November. It averaged 34 barrels of oil per day with no water over 34 days of production. Production increased 2% from 2019 and accounted for about 0.5% of Nevada's total oil production. The field also contains two inactive producers.

Three Bar Field

The Three Bar Field produces was from the Miocene Humboldt Formation. Three Bar Federal 25-2 came on line in September 2019 and produced most of 2020. It averaged almost 17 barrels of oil and 35 barrels of water per day. Three Bar also contained three other wells, which produced from the Miocene Humboldt Formation, the Oligocene Indian Well Formation, and the Cretaceous Newark Formation between 5,720 and 7,070 feet (1,744 and 2,155 m). These wells were plugged and abandoned in 2000 and 2001.

Tomera Ranch Field

In the Tomera Ranch Field, the latest production is from an unnamed conglomerate unit. The field produced 208 barrels of oil and no water from one well during 28 days in February only. The second recent producer, Tomera Ranch 33-1B produced was shut-in after September 2019. Oil production declined 44% from 2019, and accounted for less than 0.1% of Nevada's total oil production. Past production from three now plugged and abandoned wells was from the Oligocene Indian Well Formation (tuffaceous sandstone) between about 1,150 and 1,950 feet (351 and 595 m).

Trap Spring Field

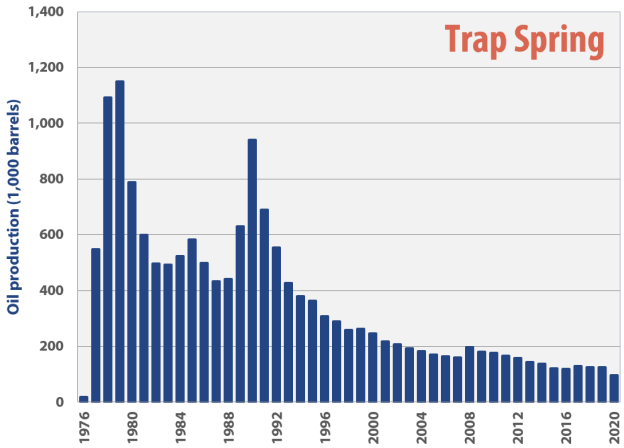

Figure 6. Chart showing oil production from the Trap Spring Field in Railroad Valley, Nye County, from 1976 to 2020.

The Trap Spring Field produces from the Oligocene Tuff of Pritchards Station between about 3,210 and 4,950 feet (979 and 1,509 m). The field had 31 active producers, two more than in 2019. Three shut-in wells Ranch No. 13-45 (since 1992) and Trap Spring No. 8 and Munson Ranch No. 13-45, (since 2016) were brought back on line in January. Munson Ranch No. 14-41, shut-in since 2016, produced one barrel in November. Munson Ranch No. 13-14 produced through December 2019 and was shut-in throughout 2020. Excluding the reactivated wells and the newly shut-in well, oil production increased in eight wells and decreased in 19. Production ranged between 24 days and the entire year. Fourteen wells produced for more than 360 days and each averaged 279 days of production. Spread over the year, production for the field averaged 261 barrels of oil and 3,680 barrels of water per day and accounted for 43% of Nevada's total oil production. Daily per well oil production ranged between 1.2 and almost 58 barrels and averaged 9 barrels. Daily per well water production ranged between less than one and 2,978 barrels and averaged 221

barrels. Oil and water production decreased almost 24% and 42%, respectively, from 2019. The field had 13 inactive producers.

Minor Fields

Five minor fields were shut-in throughout 2018. The North Willow Creek Field, which produced from the Mississippian Chainman Shale between about 6,290–6,470 feet, contains two wells and has been shut in since 2008. The remaining four fields contain one well each. The Sand Dune Field produced from Permian and Pennsylvanian limestones between about 5,970 and 6,200 feet (1,820 and 1,890 m) and was shut in in 2018. The Currant Field produced from the Eocene Sheep Pass Formation between about 6,850 and 7,080 feet (2,088 and 2,159 m). The Duckwater Creek Field produced from the tuffs of the Oligocene Garrett Ranch Group between about 5,680 and 5,830 feet (1,732 and 1,777 m). The East Inselberg Field, produced from the Devonian Guilmette Formation between about 1,046–1,171 feet (319 and 357 m). The Currant, Duckwater Creek, and East Inselberg fields have been shut-in since 2015.

Production from Nevada's oil fields (barrels of oil)

Compiled from producers' reports filed with the Nevada Division of Minerals

Field (year discovered)	1954-2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Eagle Springs (1954) (Railroad Valley)	5,445,179	58,900	44,422	39,818	34,217	32,675	26,872	26,716	27,045	35,205	26,606	5,797,655
Trap Spring (1976) (Railroad Valley)	14,465,502	166,383	156,962	143,876	136,627	120,748	118,847	129,104	125,262	125,540	95,586	15,784,436
Currant (1979) (Railroad Valley)	1,932	119	159	194	143	25	0	0	0	0	0	2,572
Bacon Flat (1981) (Railroad Valley)	1,028,969	6,358	5,690	6,447	6,223	5,000	5,261	5,325	5,000	4,623	4,692	1,083,588
Blackburn (1982) (Pine Valley)	5,402,033	43,198	38,004	40,392	32,217	31,605	44,180	40,767	24,625	22,559	22,838	5,742,418
Grant Canyon (1983) (Railroad Valley)	21,186,236	77,683	58,897	50,517	46,263	42,810	41,631	38,861	32,126	33,495	34,345	21,642,864
Kate Spring (1986) (Railroad Valley)	2,404,019	32,719	30,833	29,402	28,934	26,672	26,486	27,861	26,102	25,428	17,241	2,675,696
Spencer Lease (1986) (Railroad Valley)	86	0	0	0	0	0	0	0	0	0	0	86
Tomera Ranch (1987) (Pine Valley)	36,472	0	11,705	3,757	2,016	1,224	961	854	385	372	208	57,746
North Willow Creek (1988) (Pine Valley)	51,841	0	0	0	0	0	0	0	0	0	0	51,841
Three Bar (1990) (Pine Valley)	23,837	0	0	0	0	0	0	0	0	5,910	13,737	43,484
Duckwater Creek (1990) (Railroad Valley)	18,818	115	117	119	124	45	0	0	0	0	0	19,338
Sans Spring (1993) (Railroad Valley)	273,747	1,404	1,498	1,318	1,604	1,268	246	1,567	1,437	1,148	1,170	286,407
Ghost Ranch (1996) (Railroad Valley)	597,348	18,605	17,022	17,232	15,564	15,106	13,914	14,345	12,959	12,592	4,077	738,764
Deadman Creek (1996) (Elko County)	367	0	0	0	0	0	0	0	0	0	0	367
Sand Dune (1998) (Railroad Valley)	151,225	2,483	2,656	2,567	7,467	2,606	201	121	37	0	0	169,363
East Inselberg (2005) (Railroad Valley)	434	32	29	33	24	14	0	0	0	0	0	567
Toano Draw (2007) (Elko County)	1,964	0	0	0	0	0	0	0	0	0	0	1,964
Humboldt (2014) (Elko County)					2,756	0	0	0	0	0	0	2,756
Huntington (2014) (Elko County)					2,248	1,584	0	9	0	0	0	3,840
Total	51,090,009	407,999	367,994	335,672	316,426	281,382	278,599	285,530	254,978	266,872	220,292	54,105,752
Change from previous year		-4%	-10%	-9%	-6%	-11%	-1%	2%	-11%	5%	-17%	

Production of water from Nevada's oil fields (barrels of water)

Compiled from producers' reports filed with the Nevada Division of Minerals

Field (year discovered)	1994-2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Eagle Springs (1954) (Railroad Valley)	8,097,846	644,703	361,101	375,711	429,749	557,326	377,316	474,199	611,335	465,346	242,519	12,637,151
Trap Spring (1976) (Railroad Valley)	39,125,155	2,450,044	2,460,099	2,429,108	2,382,353	2,325,601	2,394,821	2,386,266	2,299,045	2,320,594	1,346,868	61,919,954
Currant (1979) (Railroad Valley)	2	0	0	0	0	0	0	0	0	0	0	2
Bacon Flat (1981) (Railroad Valley)	427,823	1,810	1,765	1,685	1,825	1,625	4,152	56,319	83,590	54,717	48,070	683,381
Blackburn (1982) (Pine Valley)	30,543,822	1,334,105	1,418,780	1,284,774	1,117,893	1,373,509	1,601,484	2,022,722	1,602,479	1,416,358	1,322,443	45,038,369
Grant Canyon (1983) (Railroad Valley)	7,166,873	644,303	640,311	637,840	621,172	547,166	572,710	534,650	803,463	687,952	648,672	13,505,112
Kate Spring (1986) (Railroad Valley)	8,042,980	450,155	426,896	337,981	368,722	398,138	343,883	449,919	496,998	400,474	250,438	11,966,584
Spencer Lease (1986) (Railroad Valley)	0	0	0	0	0	0	0	0	0	0	0	0
Tomera Ranch (1987) (Pine Valley)	505,881	0	0	0	0	0	0	7	0	0	0	505,888
North Willow Creek (1988) (Pine Valley)	3,983	0	773	360	0	0	0	0	0	0	0	5,116
Three Bar (1990) (Pine Valley)	5,958	0	0	0	0	0	0	0	0	1,530	12,429	19,917
Duckwater Creek (1990) (Railroad Valley)	72,081	1,080	1,080	1,080	990	0	0	0	0	0	0	76,311
Sans Spring (1993) (Railroad Valley)	4,205,523	0	0	0	0	0	0	0	0	0	0	4,205,523
Ghost Ranch (1996) (Railroad Valley)	1,025,976	514,379	479,013	600,429	537,388	561,107	452,521	518,688	442,673	505,623	159,221	5,797,018
Deadman Creek (1996) (Elko County)	0	0	0	0	0	0	0	0	0	0	0	0
Sand Dune (1998) (Railroad Valley)	420,827	50,857	55,225	49,525	14,308	5,211	365	135	102	0	0	596,555
East Inselberg (2005) (Railroad Valley)	4,200	698	0	0	0	0	0	0	0	0	0	4,898
Toano Draw (2007) (Elko County)	29,121	0	0	0	0	0	0	0	0	0	0	29,121
Humboldt (2014) (Elko County)					0	0	0	0	0	0	0	0
Huntington (2014) (Elko County)					0	4,589	0	0	4,589	0	0	9,178
Total	99,678,051	6,092,134	5,845,043	5,718,493	5,474,400	5,774,272	5,747,252	6,442,905	6,344,274	5,852,594	4,030,660	157,000,078
Change from previous year		-4%	-4%	-2%	-4%	5%	-1%	12%	-2%	-8%	-31%	

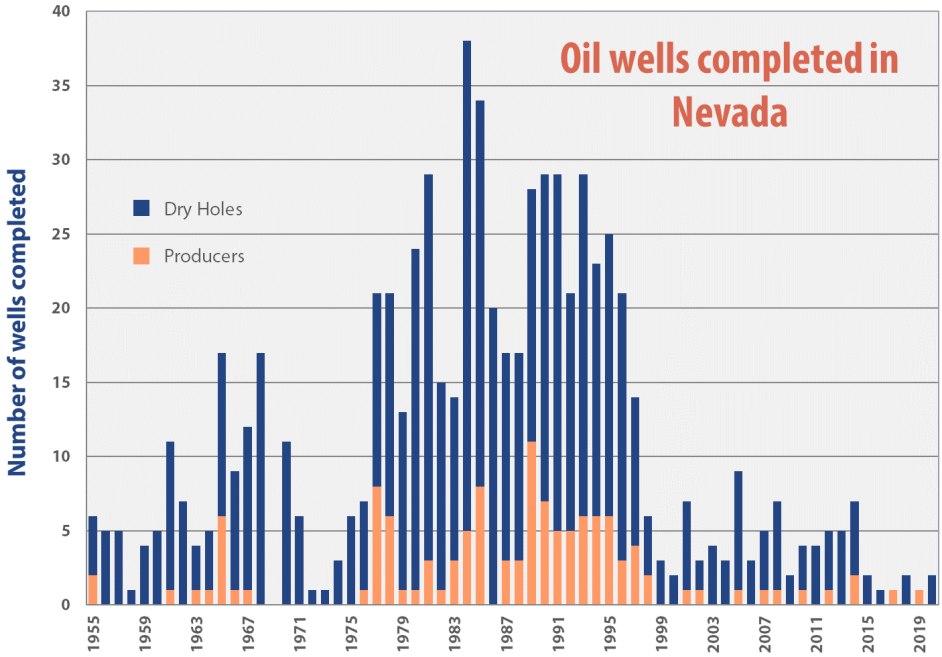

Figure 7. Chart showing number of wells completed and how many were producers in Nevada from 1955 to 2020.

Oil well activity in 2020

Company	Well	Permit No.	Location	Permit Date	Spud Date	Completion Date	Depth (Ft.)	Status
NYE COUNTY								
Grant Canyon Oil and Gas, LLC	Federal No. 12-14	673	NW/4, SW/4, S14, T7N, R56E	APR 93	MAY 93	JUN 93	6,106	TA
Wester Oil Co.	Gigante No. 1-4	837	NW/4, NE/4, S4, T12N, R35E	MAY 01	AUG 01	DEC 03	7,707	TA
Tri Valley Oil and Gas	Midland Trail No. 1-32	861	SW/4, SW/4, S32, T6N, R56E	SEP 04	JUN 05	JAN 06	7,063	Shut in
Makoil, Inc.	Radio No. 6-31	865	NE/4, NW/4, S6, T9N, R57E	SEP 04	MAY 05	MAY 05	3,433	Shut in
Makoil Inc.	Trap Spring No. 27-41	899	NE/4, NE/4, S27, T9N, R56E	APR 08	DEC 08	JAN 09	7,294	Shut in
Desert Discoveries, LLC	Paradise Unit No. 2-12	916	SE/4, NE/4, S12, T12N, R34E	APR 10	JUL 10	NOV 10	4,250	Shut in
HBF Exploration, Inc.	Well No. 2	920	SW/4, NW/4, S33, T7N, R61E	APR 11	JUL 11	AUG 11	1,020	Shut in
Major Oil International	Eblana No. 1	925	NE/4, NE/4, S25, T7N, R50E	MAY 12	MAY 12	JUN 12	8,550	Shut in
Bestoso Oil and Gas, Inc.	Well No. 1	940	NW/4, SE/4, S20, T5N, R61E	APR 13			*14,000	Expired
Major Oil International	Eblana No. 6	974	SE/4, NW/4, S25, T7N, R50E	JAN 18			*8,000	Not Drilled
Sam Oil. LLC	White River No. 1-9	976	NE/4, NE/4, S7, T7N, R61E	FEB 19			*2,300	Not Drilled
West Grant Canyon Development Co.	Butterfield Federal No. 1	978	SE/4, NE/4, S21, T7N, R56E	MAY 19			*8,000	Not Drilled
Kebo Oil and Gas Co.	Well No. 1	981	NW/4, SW/4, S3, T9N, R57E	NOV 20			*7,000	Not Drilled
Major Oil International, LLC	Eblana No. 9	982	NW/4, NW/4, S29, T7N, R50E	NOV 20	NOV 20	DEC 20	*5,300	Drilled
WHITE PINE COUNTY								
Geyser Petroleum	Pipeline Canyon No. 1	870	NE/4, SW/4, S28, T15N, R62E	JAN 05	MAR 05	AUG 05	5,280	Shut in
Grant Alliance, LLC	FLT-1	918	NE/4, NW/4, S11, T16N, R55E	OCT 10	JAN 11	MAY 11	4,875	Shut in
Western Oil Exploration	Nicole Scott Federal No. 25-1	979	SW/4, NE/4, S25, T17N, R59E	MAY 20			*10,000	Not Drilled
Western Oil Exploration	Well No. 25-1	980	NW/4, NE/4, S35, T17N, R59E	MAY 20	NOV 20	NOV 20	*10,000	Drilled

P&A: Plugged and abandoned; TA: Temporarily abandoned; *: Permitted depth given when the actual depth is not available

The following four minor fields produced in the past, but are all now plugged and abandoned. Deadman Creek had only one well that produced briefly from the Humboldt Formation between 8,165 and 8,850 feet (2,489 and 2,698 m). Toano Draw had only one well that produced from the Humboldt Formation between 8,250 and 8,950 feet (2,515 and 2,729 m). The Humboldt Field, produced from the Elko Formation between 7,906 feet and 8,210 feet (2,410 and 2,503 m). The Huntington Field also produced from the Eocene Sheep Pass Formation between 8,924 and 9,290 feet (2,721 and 2,832 m). The Humboldt and Huntington Fields were plugged and abandoned in 2017.

Most of Nevada's oil is used to make such products as No. 1 and No. 2 diesel fuel, kerosene, stove oil, and asphalt. Nevada crude oil was transported in batches by trucks to the 8,000-barrel-per-day capacity refinery near Currant in Railroad Valley, which is owned by Foreland Refining Corporation.

NEW PRODUCERS

No new producers were completed during the year.

EXPLORATION

Four wells were permitted for oil and gas in 2020, an increase of one from 2019. Three of these wells were completed and drilled of which two were still in the one-year confidentiality period at the time of this writing. Permit 940, which was for Well No. 1 of Bestoso Oil and Gas, Inc., had been extended several times since 2013, finally expired. Of 12 wells completed between 1993 and 2012, ten were shut-in and one was temporarily abandoned. Radio No. 6-31 of Makoil, Inc., shut-in since 2005 and, has been waiting for a plugging and abandoning plan. Federal No. 12-14 of Grant Canyon Oil and Gas, LLC, which had been reported as temporarily abandoned since completion in 1993, was now reported as shut-in. In this section, the shut-in wells were never listed as producers.

Sam Oil, LLC, completed White River No. 1-9 to 1,892 feet (577 m) and then shut the well in. An oil zone was reported at 1,555 feet (474 m) in Oligocene Garret Ranch volcanic rocks. White River No. 1-9 is located in the southern part of White River Valley and is within six miles (10 km) of two other wells reporting oil shows. White River Valley No. 6 of Northwest Exploration Co., completed to 6,300 feet (1,921 m) in 1981 and plugged and abandoned is about 2.5 miles (4 km) to the east. Oil was recovered during a drill stem test between 2,190 feet and 2,225 feet (668 m and 678 m) in Tertiary tuff conglomerate. White River Valley No. 1 of Northwest Exploration Co., completed to 10,473 feet (3,193 m) in 1976 and is now plugged and abandoned is about 3.5 miles (5.5 km) to the east. Numerous oil and gas shows in the Mississippian Joana Limestone and Chainman Shale, Mississippian to Pennsylvanian Ely Limestone, and the Eocene Sheep Pass Formation.

One drill rig operated in May and another in November, but none were reported for the rest of the year. No wells were hydraulically fractured in Nevada in 2020, but a table of wells hydraulically fractured in the past is provided. At year's end, Nevada had 487 authorized oil and gas leases covering 882,948 acres (357,324 ha), an area a little larger than the state of Rhode Island. This was a 2% decrease in both number of leases and acreage from 2019.

On March 26, 2020, the NSO-BLM held an internet-based competitive oil and gas lease sale for 45 parcels covering 70,111 acres (28,374 ha) with one parcel in Lander County, and the rest in Nye County. Six registered bidders were present. Two parcels covering 1,223 acres (495 ha) received the minimum $2 per acre bid totaling $2,446. The total receipts were $4,620.50. Major Oil International, LLC, of Houston, Texas, acquired both parcels, which are in T7N, R50E in Nye County–parcel NV-2020-03-5637 covering 1,912 acres (774 ha) in all of sections 8, 17, and 18, and parcel NV-2020-03-5639 covers 876 acres (354 ha) in parts of sections 19 and 20. Three parcels covering 68.888 acres (27,879 ha) were then put up for non-competitive offers, but none were filed on. Due to the COVID-19 pandemic, lease sales scheduled for June 8, September 7, and December 7 were postponed (https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/leasing/regional-lease-sales/nevada).

TRANSFERS

No transfers occurred during this year.

Partial list of Nevada oil wells that were stimulated in the past

Modified and compiled from well records and data from consultant Jerry Walker

Permit	Company	Well Name	Year Completed	Perfs (gross)	Fluid	Proppant	Date Fracked	Present Status	Formation
3	Gulf Refining Co.	Wilkins Ranch No. 1	1954	6510'-6740'	4,000 gal. oil; 500 gal. mud acid	sand	5/25-30/1954	P&A	Oligocene volcanic tuff
203	Northwest Exploration Co.	Trap Spring No. 13	1977	4976'-5078'	10,122 gal lease oil	55,000 lbs. 8/12 sand	6/21/1977	WD	Garrett Ranch Volcanics
189	Northwest Exploration Co.	Trap Spring No. 4	1977	4018'-4389'	53,000 gal. oil	37,000 lbs. 8/12 sand	8/19/1977	P&A	Garrett Ranch Volcanics
196	Northwest Exploration Co.	Trap Spring No. 8	1977	4408'-4575'	72,300 gal. lease oil	100,000 lbs. 10/20 sand	9/11/1977	Producer	Tertiary volcanic rock
233	Northwest Exploration Co.	Trap Spring No. 20	1978	3932'-3987'	62,000 gal. lease oil	75,000 lbs. 10/20 sand	8/4/1978	WD	Pritchards Station Volcanics
196	Northwest Exploration Co.	Trap Spring No. 8	1979	4408'-4575'	1,795 gal. lease oil	100,000 lbs. 10/20, 8/12, 4/8 sand	6/23/1979	Producer	Tertiary volcanic rock
263	Wexpro Co.	Jiggs 10-1	1980	10,060'-10,080'	Hy-gel	1.5 ppg 100 mesh sand	3/6/1980	P&A	Paleozoic rock
324	Amoco Production Co.	Blackburn No. 3	1982	6274'-6345'	Jellied lease crude	30,000 lbs. 20/40 sand	1982	Shut in	Indian Well Formation
342	Sun Exploration and Production Co.	Southern Pacific No. 3-13	1983	8386'-8432'	53,090 gal. diesel; 1500 SCF CO_2	53,620 lbs. 20/40 sand	1/28/1983	P&A	Humboldt Formation
350	Amoco Production Co.	Blackburn No. 10	1983	5660'-5870'	87,500 gallons foamed oil	120,000 lbs. 20/40 sand	9/22/1983	Producer	Indian Well Formation
210	MAPCO Oil and Gas Co.	Trap Spring No. 17	1985	3570'-3610'	10,000 gal. foam	12/20 sand	1985	P&A	Horse Camp Volcanics
856	DY Exploration	Toano Draw 15-19	2005	8800'-8950'	75,000 gal. gel; 6,400 gal. slickwater	115,000 lbs. 20/40 PR6000 sand	8/30/2005	P&A	Humboldt Formation
856	DY Exploration	Toano Draw 15-19	2006	8800'-8950'	61,967 gal. water, solvents, gels, and other additives	30,900 lbs. 20/40 PR6000 sand	6/1/2006	P&A	Humboldt Formation
942	Noble Energy, Inc.	M2C-M2-21B	2014	7906'-8210'	250,057 gal. water; 2% by mass solvents, gels, and other additives	9% by mass PRC Sand; 0.7% by mass Premium white sand	3/17-24/2014	Shut in	Elko Formation
946	Noble Energy, Inc.	M10C-M10-11B	2014	8620'-8889'	343,919 gal. water; 2.5% by mass solvents, gels, and other additives	10% by mass PRC Sand; 0.6% by mass Premium white sand	6/3-4/2014	Shut in	Elko Formation
458	Grant Canyon Oil and Gas	Blackburn No. 16	1985	6959'-7012'	209,600 gal. water; 2.4% by mass solvents, gels, and other additives	12% by mass Premium white sand; 2.4% by mass PRC Sand	6/5/2014	Producer	Nevada Formation
928	Makoil, Inc.	Portuguese Mtn. 14A-2	2014	N/A	29,949 gal. water; 14% by mass solvents, gels, and other additives	32% by mass Premium white sand	11/23/2014	P&A	N/A
960	Noble Energy, Inc.	K1L-1V	2014	N/A	300,537 gal. water; 0.3% by mass solvents, gels, and other additives	7% by mass Premium white sand; 1.5% by mass SSA-2	12/5/2014	Producer	N/A

Abbreviations: Perf (gross) - larger interval containing one or more smaller perforated intervals; P&A - plugged and abandoned; gal. - gallons; WD - water disposal

OTHER DEVELOPMENTS

The NSO-BLM had received an expression of interest for oil leasing involving U.S. Forest Service lands in the Ruby Mountain Range, Elko County. Oil exploration in Ruby Mountains would likely be speculative, because the range is mainly underlain by a metamorphic core complex which has low-to-no hydrocarbon potential. Even so, the BLM sent a request asking the Forest Service for leasing concurrence, along with any stipulations to protect surface resources. In 2018 and 2019, the Forest Service released draft and final environmental assessments covering potential oil lease sales on 52,533 acres (21,260 ha) in the Ruby Mountains. The area is between Lamoille and Sherman Creeks and includes parts of T26–27N, R56E; T28–29N, R57E; and T32N, R57E. Hunting, conservation, and environmental groups, the general public, and the local Indian tribes sent a large number of negative responses. In 2019, the U.S. Forest Service issued a notice decision adopting the No Leasing Alternative of the final environmental assessment and the affected U.S. Forest Service lands were withdrawn from oil and gas leasing. The decision only involved U.S. Forest Service lands, and the BLM included some parcels adjacent to withdrawn lands during the July 2019 lease sale. In 2019, U.S. Senator Catherine Cortez-Masto of Nevada introduced the Ruby Mountains Protection Act (Senate Bill 258) and recently reintroduced the Act. The Act would withdraw 309,272 acres (125,161 ha) from oil leasing though it would continue to protect existing multiple uses including recreation, grazing, and mining. (U.S. Forest Service, Ruby Mountains Oil and Gas Leasing Availability Analysis, Environmental Assessment, 7/2018; U.S. Forest Service, Ruby Mountains Oil and Gas Leasing Availability Analysis, Environmental Assessment, 3/2019; U.S. Forest Service, Draft Decision Notice and Finding of No Significant Impact for the Ruby Mountains Oil and Gas Leasing Availability Analysis, March 2019; TrackBill, U.S. Congress S258, Ruby Mountains Protection Act, 1/29—12/17/2019; Senator Catherine Cortez-Masto press release, 8/26/2019; Senator Renews Effort to Protect Ruby Mountains, Elko Daily Free Press, 3/4/2021).

In 2019, Southwest Gas Corp. filed a notice with the Public Utilities Commission of Nevada for an application to a Federal agency for approval to construct a 69.5-mile (111-km) 24-inch (61-cm) steel natural gas transmission pipeline. The pipeline will address increased demand and replace two existing pre-code pipelines, which will be abandoned in place, with one using modern materials placed with current construction standards and practices. The pipeline will start at the company's existing pressure limiting station south of Laughlin and extend westward and northwestward roughly along US 95 west of Searchlight and end at the company's existing pressure limiting station south of Henderson. The pipeline will cross Federal land and be within Clark County, Boulder City, and Nevada

Department of Transportation rights-of-way. The project will be done in three phases over 12 years. The BLM commenced compiling a draft environmental assessment for release in early 2021. (BLM, Draft Environmental Assessment DOI-BLM-NV-S010-2020-0114-EA, Southern Transmission System Replacement Project Environmental Assessment, 2/2021; Original Filing, Public Utilities Commission of Nevada, Electronic Filing, Docket No. 19-05017, 5/9/2019; Southwest Gas to Replace Pipeline, The Laughlin Nevada Times, 7/16/2019)

In 2016, the BLM published its final Methane and Waste Reduction Rule, which was summarized in MI-2017 and MI-2018 and involves the perceived waste of natural gas from BLM-administered mineral leases. In Nevada, most production is from public lands, but gas production is small and only from the Kate Spring field, where it is used to run equipment. The rule and delays in implementation spawned a series of lawsuits, and Congress was reviewing the rule. The BLM suspended 2018 compliance dates until 2019 and proposed to return to the rules in place prior to 2016. A lawsuit was initiated against the BLM by the State of California, the Sierra Club, the Wilderness Society, and others. In July 2020, Judge Yvonne Rogers of the United States District Court, District of Northern California ruled against the BLM and ordered the rule must go into effect within 90 days. (United States District Court, District of Northern California, Case No. 4:18-cv-05712-YGR; https://www.blm.gov/sites/blm.gov/files/Final%20Rule%20-1004-AE53%20-%20%20Ready%20for%20OFR%209.18.18_508%20%281%29.pdf; https://energyindepth.org/mtn-states/myth-vs-fact-on-the-blm-methane-venting-and-flaring-rule; https://www.blm.gov/press-release/blm-offers-revision-methane-waste-prevention-rule)

U.S. OIL PRODUCTION AND CONSUMPTION

According to the Energy Information Agency of the U.S. Department of Energy (http://www.eia.gov), the total petroleum products supplied to the U.S. averaged 18,120,000 barrels per day, a 12% decrease from 20,543,000 barrels per day in 2019, and down 13% from the all-time high of 20,788,000 barrels per day in 2005. Domestic crude oil production averaged 11,313,000 barrels per day, an 8% decrease from 12,248,000 barrels per day in 2019. Except for 2016 and 2020, production has increased annually since 2009. Production had reached an all-time high in 2019 and was 27% higher than the previous record of 9,636,849 barrels per day set in 1970. Imported crude oil averaged 5,877,000 barrels per day, a 13.5% decrease from 6,801,000 barrels per day in 2019, and down 42% from the all-time high of 10,126,000 barrels per day in 2005. Imported crude oil accounted for 34% of the total, down from 36% in 2019. The average price of domestic oil decreased 31% to $39.16 per barrel from an average of $57 per barrel in 2019. On a monthly basis, however, the average price per barrel started the year at $57.52, declined rapidly to $16.55 in April, and the rose erratically afterwards to end the year at $47.02. Prices continued rising into 2021 (Cushing, Oklahoma, West Texas Intermediate Spot Price, FOB).

NEVADA OIL PRODUCERS AND REFINERY

(Nevada Oil Patch; unpublished well files)

Company	Field/Refinery	Contact	Addresses, Phone and FAX Numbers, and Websites
Grant Canyon Oil and Gas, LLC	Bacon Flat Blackburn Grant Canyon Sans Spring Three Bar	Michael O'Neal Rod Prosceno Steve Barnes	717 17th Street, No. 1400 Denver, CO 80202 Phone: 303-297-2777 FAX: 303-298-0049 E-mail: michael@onealrc.com E-mail: rod@4arocket.com E-mail: steve@breckenergy.com
Kirkwood Oil and Gas, LLC/ Wesco Operating, Inc.	Eagle Springs Ghost Ranch North Willow Creek Sand Dune	Robert Kirkwood	120 South Durbin Street P. O. Box 1706 Casper, WY 82602 Phone: 307-265-5178 FAX: 307-265-1791 E-mail: bradl@kirkwoodcompanies.com Website: http://www.kirkwoodcompanies.com
Makoil, Inc.	Currant Duckwater Creek Ghost Ranch Kate Spring Trap Spring	Gregg Kozlowski	25391 Commercentre Drive, No. 120 Lake Forest, CA 92630 Phone: 949-462-9010 FAX: 949-462-9012 E-mail: makoil@msm.com Website: http://www.makoil.com
Tomera Oil Fields, LLC	Tomera Ranch	Patsy Tomera Thomas Tomera	HC 65 Box 11 Carlin, NV 89822 Phone: 775-754-2333
Western General, Inc.	Kate Spring	Richard Taylor	HC 34 Box 34830 Ely, NV 89301 Phone: 702-233-1490 E-mail: richardtaylor@cox.net
Foreland Refining Corporation	Currant Refinery		1582 West 2600 South Woods Cross, UT 84087 Location: 65 miles south of Ely Phone: 775-863-0229

Status of Nevada oil and gas production wells in 2020

This table gives the amount of oil and water produced and the number of production days in 2017. The sources of information include well records and statistics from the Nevada Division of Minerals.
Status abbreviations with dates of the action where applicable: BBL-barrels; ex-except; MCF-thousand cubic feet; PA-plugged and abandoned; Prod-production; SI-shut-in; WD-water disposal

FIELD/OPERATOR/WELL	NEVADA PERMIT	DATE COMPLETED	STATUS	LOCATION	PRODUCTION OIL (BBL)	PRODUCTION WATER (BBL)	PRODUCTION GAS (MCF)	PRODUCTION DAYS
EAGLE SPRINGS (Nye Co., 1954)								
Kirkwood Oil and Gas, LLC								
Eagle Springs Federal No. 44-35	813	05/98	SI 08/04-06/11; SI 02/12	SE, NW, S35, T9N, R57E	0	0		0
Eagle Springs Federal No. 54-35	726	10/94	Prod	SW, NE, S35, T9N, R57E	1,622	28,592		141
Eagle Springs Unit No. 1-34	107	07/67	SI 07/86	SE, NE, S34, T9N, R57E	0	0		0
Eagle Springs Unit No. 1-35	4	05/54	WD 1978	NE, NW, S35, T9N, R57E	0	0		0
Eagle Springs Unit No. 1-36	76	02/65	SI 05/08	SW, NE, S36, T9N, R57E	0	0		0
Eagle Springs Unit No. 2-36	80	07/65	SI 11/96-12/06; SI 12/15-02/19 ex 5/17	NW, SE, S36, T9N, R57E	5,862	56,664		272
Eagle Springs Unit No. 4-36	86	10/65	SI 06/97	NW, SE, S36, T9N, R57E	0	0		0
Eagle Springs Unit No. 5-36	94	04/66	Prod	NW, NE, S36, T9N, R57E	6,991	3,336		208
Eagle Springs Unit No. 15-35	21	07/55	SI 09/95-08/02	NW, SW, S35, T9N, R57E	29	375		7
Eagle Springs Unit No. 35-35	17	03/55	Prod	NE, SW, S35, T9N, R57E	720	9,482		141
Eagle Springs Unit No. 43-36	83	08/65	Prod	NE, SE, S36, T9N, R57E	1	2		1
Eagle Springs Unit No. 62-35	46	01/60	SI 01/12	NW, NE, S35, T9N, R57E	0	0		0
Eagle Springs Unit No. 73-35	69	10/63	Prod	SE, NE, S35, T9N, R57E	2,670	68,572		257
Eagle Springs Unit No. 74-35	71	04/64	SI 01/98-01/01; SI 10/16-11/19 ex 8/18	SE, NE, S35, T9N, R57E	648	21,707		107
Eagle Springs Unit No. 84-35	77	01/65	SI 10/97	SE, NE, S35, T9N, R57E	0	0		0
Eagle Springs/Plains Petroleum No. 13-36	744	02/96	Prod; SI 01/12-07/17	SW, NW, S36, T9N, R57E	35	377		1
Eagle Springs/Plains Petroleum No. 23-36	733	10/95	Prod	SW, NW, S36, T9N, R57E	7,589	8,882		229
Eagle Springs/Plains Petroleum No. 24-36	737	11/94	SI 07/16-12/17	SW, NW, S36, T9N, R57E	4	25		4
Eagle Springs/Plains Petroleum No. 55-35	761	11/95	SI 02/97	SW, NE, S35, T9N, R57E	0	0		0
Eagle Springs/Plains Petroleum No. 64-35	755	09/95	SI 01/12	SW, NE, S35, T9N, R57E	0	0		0
Eagle Springs/Plains Petroleum No. 82-35	734	10/94	Prod	NE, NE, S35, T9N, R57E	475	44,433		72
Eagle Springs/Plains Petroleum No. 83-35	754	07/95	Prod	SE, NE, S35, T9N, R57E	2	72		1
TRAP SPRING (Nye Co., 1976)								
J. N. Oil and Gas Federal No. 1	449	09/85	PA 01/99	NE, NW, S34, T9N, R56E				
Munson Ranch No. 12-42	572	06/90	PA 08/08	SE, NE, S12, T9N, R56E				
Munson Ranch No. 12-44X	445	07/85	PA 08/08	SE, SE, S12, T9N, R56E				
Trap Spring No. 4	189	03/77	PA 07/95	SE, NE, S27, T9N, R56E				
Makoil, Inc.								
Britton No. 13-21	224	04/78	SI 12/91	NE, NW, S13, T9N, R56E	0	0		0
Munson Ranch No. 11-23X	346	10/82	SI 11/82	NE, SW, S11, T9N, R56E	0	0		0
Munson Ranch No. 12-14	688	05/95	Prod	SW, SW, S12, T9N, R56E	623	534		71
Munson Ranch No. 12-23	596	11/90	Prod; SI 04/98	NE, SW, S12, T9N, R56E				
Munson Ranch No. 12-24	432	04/85	Prod	SE, SW, S12, T9N, R56E	1,792	10,727		366
Munson Ranch No. 12-32	559	12/89	Prod	SW, NE, S12, T9N, R56E	2,509	18,597		359
Munson Ranch No. 12-33	423	03/85	SI 04/96	NW, SE, S12, T9N, R56E				
Munson Ranch No. 12-34	406	10/84	Prod	SW, SE, S12, T9N, R56E	1,626	2,926		297
Munson Ranch No. 12-43	880	03/08	Prod	NE, SE, S12, T9N, R56E	7,055	13,219		366
Munson Ranch No. 13-1	435	08/85	Prod; SI 03/16-11/19	SE, NW, S13, T9N, R56E	3,357	1,124		366
Munson Ranch No. 13-11	622	11/91	Prod; SI 02/03-03/16; SI 01/18	NW, NW, S13, T9N, R56E	0	0		0
Munson Ranch No. 13-11R	840	11/01	Prod	NW, NW, S13, T9N, R56E	1,564	23,966		363
Munson Ranch No. 13-12	537	07/89	Prod; SI 07/89	SW, NW, S13, T9N, R56E	0	0		0
Munson Ranch No. 13-14	623	09/91	SI 01/01-12/06; SI 12/19	SW, SW, S13, T9N, R56E	0	0		0
Munson Ranch No. 13-21X	640	05/92	Prod	NE, NW, S13, T9N, R56E	3,125	15,333		366
Munson Ranch No. 13-24	218	08/79	SI 12/18	SE, SW, S13, T9N, R56E	0	0		0
Munson Ranch No. 13-31	382	07/84	Prod	NW, NE, S13, T9N, R56E	2,851	18,314		358
Munson Ranch No. 13-32	373	08/84	Prod	SW, NE, S13, T9N, R56E	4,222	41,258		366
Munson Ranch No. 13-33	211	11/78	Prod	NW, SE, S13, T9N, R56E	1,463	5,689		366
Munson Ranch No. 13-41X	448	09/85	Prod	NE, NE, S13, T9N, R56E	8,416	73,655		366
Munson Ranch No. 13-42	222	11/78	Prod	SE, NE, S13, T9N, R56E	240	67,771		122
Munson Ranch No. 13-45	547	08/89	SI 03/16-12/19	NW, SW, S13, T9N, R56E	1,480	614		330
Munson Ranch No. 13-46	548	07/89	SI 06/92-12/19	NE, SW, S13, T9N, R56E	1,322	157		181
Munson Ranch No. 14-23	313	08/81	Prod	NE, SW, S14, T9N, R56E	2,822	20,311		363
Munson Ranch No. 14-24	354	10/83	SI 06/96	SE, SW, S14, T9N, R56E	0	0		0
Munson Ranch No. 14-32	455	09/87	Prod	SW, NE, S14, T9N, R56E	2,852	71,979		366
Munson Ranch No. 14-33	513	07/89	SI 03/16-08/19	NW, SE, S14, T9N, R56E	172	861		137
Munson Ranch No. 14-34	287	11/80	SI 07/15	SW, SE, S14, T9N, R56E	1,263	8,099		366
Munson Ranch No. 14-34X	522	08/88	Prod	SW, SE, S14, T9N, R56E	1	0		0
Munson Ranch No. 14-41	538	07/89	SI 02/16; ex 11/20	NE, NE, S14, T9N, R56E	2,670	136,508		355
Munson Ranch No. 14-44	528	08/89	Prod	SE, SE, S14, T9N, R56E	2,521	127,632		364
Munson Ranch No. 14-49	550	08/89	SI 01/11-10/13; SI 03/16-08/19	NE, SE, S14, T9N, R56E	575	1,403		160
Munson Ranch No. 14-49X	562	02/90	SI 07/15-11/19	NE, SE, S14, T9N, R56E	58	48		24
Trap Spring No. 2	185	02/77	Prod	SE, SW, S27, T9N, R56E	4,951	722		332
Trap Spring No. 3	188	04/77	Prod	NW, NE, S34, T9N, R56E	2,455	274,006		92
Trap Spring No. 8	196	09/77	SI 03/16-12/19	SE, SW, S23, T9N, R56E	79	50		68
Trap Spring No. 9	197	09/78	Prod	NW, NW, S26, T9N, R56E	19,298	398,651		333
Trap Spring No. 14-42	523	10/88	SI 02/16-08/19	SE, NE, S14, T9N, R56E	1,725	18,714		363
Trap Spring No. 16	232	09/78	Prod	NW, SE, S23, T9N, R56E	3,338	116,550		366
Trap Spring No. 19	219	12/77	Prod	SE, NW, S23, T9N, R56E	11,090	4,212		365
Trap Spring No. 23-41	574	06/90	Prod	NE, NE, S23, T9N, R56E	593	870		53
Trap Spring No. 27-41	899	01/09	SI 01/09	NE, NE, S27, T9N, R56E	0	0		0
Zuspann No. 24-1	198	06/77	SI 07/86	NW, SW, S24, T9N, R56E	0	0		0
Zuspann No. 24-3	208	09/77	SI 08/15 ex 11/19	NE, NW, S24, T9N, R56E	0	0		1
EAST INSELBERG (Nye Co., 2005)								
Makoil, Inc.								
East Inselberg No. 36-33	860	04/05	SI 12/06-06/10; SI 08/15	NW, SE, S36, T10N, R56E	0	0		0
CURRANT (Nye Co., 1979)								
Makoil, Inc.								
Currant No. 1	241	10/78	SI 07/05-05/07; SI 08/15	SE, SW, S26, T10N, R57E	0	0		0

Status of Nevada oil and gas production wells in 2020 (continued)

FIELD/OPERATOR/WELL	NEVADA PERMIT	DATE COMPLETED	STATUS	LOCATION	PRODUCTION OIL (BBL)	PRODUCTION WATER (BBL)	PRODUCTION GAS (MCF)	PRODUCTION DAYS
BACON FLAT (Nye Co., 1981)								
Grant Canyon Oil and Gas, LLC								
Bacon Flat No. 1	316	07/81	SI 10/88	C, SW, S17, T7N, R57E	0	0		0
Bacon Flat Federal No. 23-17	657	09/92	SI 12/93 ex 10/19	NE, SW, S17, T7N, R57E	0	0		0
Bacon Flat Federal No. 23-17A	710	01/94	Prod	NE, SW, S17, T7N, R57E	4,692	48,070		359
BLACKBURN (Eureka Co., 1982)								
Grant Canyon Oil and Gas, LLC								
Blackburn No. 3	324	03/82	SI 12/98 ex 11/05	SW, SW, S8, T27N, R52E	0	0		0
Blackburn No. 10	350	09/83	Prod	SW, NW, S8, T27N, R52E	5,958	39,784		354
Blackburn No. 14	442	07/85	Prod; SI 01/01-10/08	NE, SE, S7, T27N, R52E	8,476	16,636		366
Blackburn No. 16	458	12/85	Prod; SI 08/09-09/13	SE, NE, S7, T27N, R52E	2,309	57,670		339
Blackburn No. 18	660	11/92	Prod	NE, SE, S7, T27N, R52E	4,292	674,432		364
Blackburn No. 19	724	06/94	Prod	NW, SW, S8, T27N, R52E	64	17,960		67
Blackburn No. 21	802	09/97	SI 08/14-12/18	NE, SE, S7, T27N, R52E	1,739	515,961		364
Grant Canyon Oil and Gas, LLC								
Blackburn No. 22	971	05/16	SI 08/19	NW, SW, S8, T27N, R52E	0	0		0
GRANT CANYON (Nye Co., 1983)								
Grant Canyon No. 4	376	07/84	PA 04/92	NE, NW, S21, T7N, R57E				
Grant Canyon No. 5	400	08/84	PA 07/95	E/2, NE, S20, T7N, R57E				
Grant Canyon Oil and Gas, LLC								
Grant Canyon No. 3	375	08/84	SI 06/92	SW, SW, S16, T7N, R57E	0	0		0
Grant Canyon No. 7	625	08/91	SI 12/93-10/07; SI 12/12-11/19	NW, NW, S21, T7N, R57E	754	79,050		366
Grant Canyon No. 9	642	04/92	SI 03/18	NW, NW, S21, T7N, R57E	0	0		0
Grant Canyon No. 10	706	07/11	Prod; PA 11/93-01/10	NW, NW, S21, T7N, R57E	28,324	311,390		366
Grant Canyon No. 22-21	705	01/94	Prod	SE, NW, S21, T7N, R57E	5,267	258,232		364
KATE SPRING (Nye Co., 1986)								
Makoil, Inc.								
Kate Spring No. 12-2	544	08/89	Prod	NW, NW, S2, T8N, R57E	1,351	26,519	157	91
Western General, Inc.								
Kate Spring No. 1	436	01/86	Prod	W/2, SW, S2, T8N, R57E	3,361	44,999	158	129
Kate Spring No. 1A	560	12/89	Prod	NW, SW, S2, T8N, R57E	10,105	131,855	377	318
Kate Spring No. 1B	567	08/90	Inj 10/90	NE, SW, S2, T8N, R57E				
Kate Spring No. 1C	592	09/91	Prod; SI 06/97-07/2016	SW, SW, S2, T8N, R57E	1,100	8,000	35	308
Taylor Federal No. 1	497	10/87	Prod	NE, SE, S3, T8N, R57E	1,324	39,065	122	191
Taylor Federal No. 2	536	06/89	SI 09/93 ex 06/17	SE, NE, S3, T8N, R57E	0	0	0	0
SPENCER LEASE (Nye Co., 1986)								
Spencer Federal No. 32-29	446	12/85	PA 06/86	SW, NE, S29, T9N, R57E				
TOMERA RANCH (Eureka Co., 1987)								
Tomera Ranch No. 33-1	591	10/90	PA 09/07	SW, SW, S33, T31N, R52E				
Southern Pacific Land Co. No. 1-5R	647	05/92	PA 06/97	NE, NE, S5, T30N, R52E				
Tomera Ranch No. 33-2RR	841	01/02	PA 09/07	SW, SW, S33, T31N, R52E				
Tomera Oil Fields, LLC								
Tomera Ranch No. 3	923	02/12	Prod	SE, SW, S33, T31N, R52E	208	0		28
Tomera Ranch No. 33-1B	962	11/14	SI 09/19	SW, SW, S33, T31N, R52E	0	0		0
Foreland Corp.								
Southern Pacific Land Co. No. 1-5	492	08/87	WD 1992	NE, NE, S5, T30N, R52E				
NORTH WILLOW CREEK (Eureka Co., 1988)								
North Willow Creek No. 5-27	646	06/93	PA 10/98	SE, NW, S27, T29N, R52E				
Kirkwood Oil and Gas, LLC								
North Willow Creek No. 6-27	648	09/93	SI 04/02	NE, SW, S27, T29N, R52E	0	0		0
Southern Pacific Land Co. No. 1-27	633	01/92	SI 02/97-04/02; SI 06/08	NW, SE, S27, T29N, R52E	0	0		0
THREE BAR (Eureka Co., 1990)								
Three Bar Federal No. 24-13A	566	09/90	PA 01/01	SW, SW, S24, T28N, R51E				
Three Bar Federal No. 5	679	07/93	PA 12/00	SE, NE, S25, T28N, R51E				
Three Bar Federal No. 25-A	556	10/90	PA 01/01	C, NE, S25, T28N, R51E				
Grant Canyon Oil and Gas, LLC								
Three Bar Federal No. 25-2	977	06/19	Prod	C, NE, S25, T28N, R51E	13,737	12,429		354
DUCKWATER CREEK (Nye Co., 1990)								
Makoil, Inc.								
Duckwater Creek No. 19-11	542	03/90	SI 06/15	NW, NW, S19, T9N, R57E	0	0		0
SANS SPRING (Nye Co., 1993)								
Grant Canyon Oil and Gas, LLC								
Federal No. 5-14	635	02/93	SI 03/98	SW, NW, S14, T7N, R56E				
Sans Springs No. 5-14A	792	05/97	Prod	SW, NW, S14, T7N, R56E	1,170	0		34
Federal No. 12-14	673	06/93	SI 10/93 TA	SW, SW, S14, T7N, R56E				
GHOST RANCH (Nye Co., 1996)								
Makoil, Inc.								
Ghost Ranch Springs No. 2-21X	800	08/97	Prod; SI 08/97-8/04	NE, NW, S2, T8N, R57E	1,286	31,051		98
Kirkwood Oil and Gas, LLC								
Ghost Ranch Springs No. 38-35	793	01/97	Prod	SE, SW, S35, T9N, R57E	852	46,170		134
Ghost Ranch Springs No. 47-35	799	03/97	Prod	SE, SW, S35, T9N, R57E	1,152	37,955		134
Ghost Ranch Springs No. 48-35	779	07/96	Prod	SE, SW, S35, T9N, R57E	787	44,045		134
DEADMAN CREEK (Elko Co., 1996)								
Deadman Creek No. 44-13	342	01/96	PA 09/98	SE, SE, S13, T39N, R65E				
SAND DUNE (Nye Co., 1998)								
Kirkwood Oil and Gas, LLC								
Sand Dune Federal No. 88-35	816	07/98	SI 10/18	SE, SE, S35, T9N, R57E	0	0		0
TOANO DRAW (Elko Co., 2007)								
Toano Draw No. 15-19	856	12/06	PA 10/08	NW, SW, S19, T39N, R66E				
HUMBOLDT (Elko Co., 2013)								
M2C-M2-21B	942	10/13	PA 08/17	NE, NW, S2, T34N, R58E	0	0		0
HUNTINGTON (Elko Co., 2014)								
K1L-1V	960	11/14	PA 09/17	SW, SW, S1, T29N, R55E	0	0		0

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