2001 Summary of Mineral Activity in Utah

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SUMMARY

The value of Utah's mineral production (including coal) in 2001 is estimated to be $1.94 billion, about $27 million more than in 2000. Contributions from each of the major industry segments are: base metals, $693 million (36 percent of total); industrial minerals, $538 million (28 percent of total); coal, $473 million (24 percent of total); and precious metals, $240 million (12 percent of total).

The changes in Utah's mineral valuation by industry segment for the years 1998 through 2001 are shown in figure 1. Compared to 2000, the 2001 values of: (1) base metals decreased $56 million, (2) industrial minerals increased $38 million, (3) coal increased $17 million, and (4) precious metals increased $28 million.

The value of mineral production is expected to decrease moderately in 2002 primarily due to decreased production in several commodities, and by flat to declining base- and precious-metal prices due to the economic slowdown that began in the second half of 2000.

During 2001, the Utah Division of Oil, Gas and Mining (DOGM) received five Large Mine permit applications (5 acres [2 hectares] and larger disturbance) and 32 new Small Mine permit applications (less than 5 acres [2 hectares] disturbance). As in 2000, all of the Large Mine permit applications were made to change from Small to Large Mine classification.

Mineral exploration statewide remained low for the second year in a row. Fourteen Notices of Intent to explore on public lands were filed with DOGM in 2001, compared to 15 in 2000, 26 in 1999, and 50 to 60 per year received during the early 1990s.

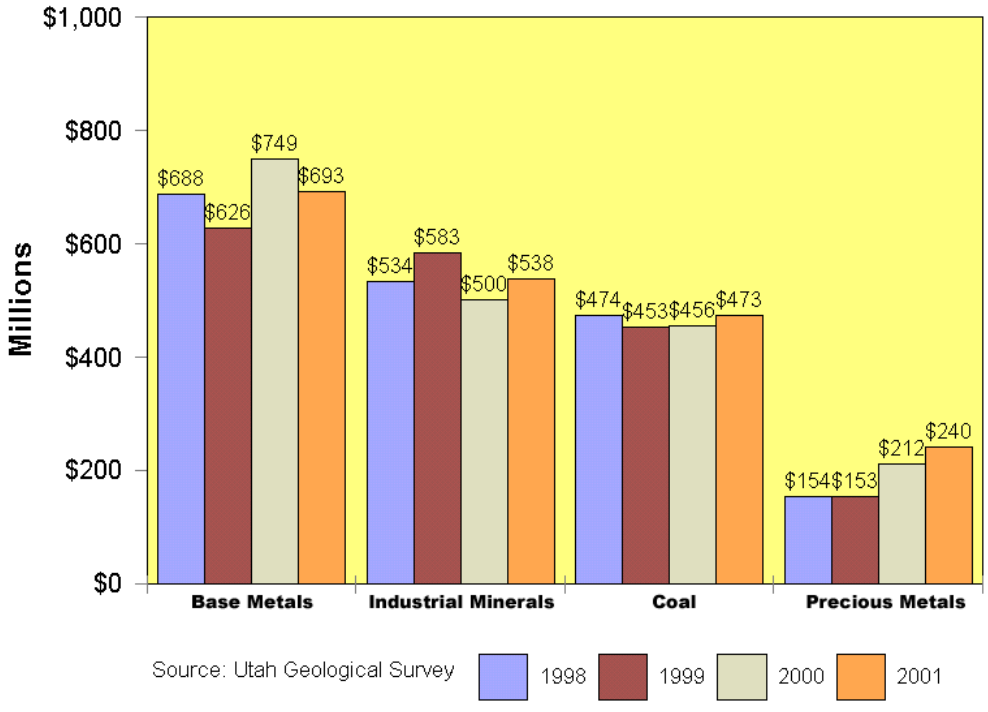

Figure 1. Value of Utah's mineral production from 1998 through 2001.

Nationally, Utah ranked 9th in the value of nonfuel minerals produced in 2000 (latest year that production figures are available) and 12th in coal production; the state should retain similar rankings in 2001. Utah accounted for about 3.6 percent of the U.S. total nonfuel mineral production value.

OUTLOOK

The value of mineral production in Utah is expected to decrease moderately in 2002. Operator surveys indicate that both precious-metal and base-metal production will be lower, coupled with continued low metal prices. The re-opening of one precious-metal mine in 2001 will partially offset the loss of precious-metal production due to the closure of the Barneys Canyon gold mine. Industrial-mineral values will also trend lower with lower sand and gravel production partially offset by an increase in production of crushed stone. The production of cement and lime products is expected to remain nearly the same as the current year. Coal production is expected to increase slightly, and an incremental increase in coal prices will leave coal values modestly higher than the present year. If base- and precious-metal prices continue to remain low, exploration for both base and precious metals is also expected to remain low for the foreseeable future.

MINE PERMIT SUMMARY

During the year 2001, DOGM received five Large Mine permit applications (5 acres [2 hectares] and larger disturbance) and 32 new Small Mine permit applications (less than 5 acres [2 hectares] disturbance). All of the Large Mine permit applications were made to change from Small to Large Mine status. These numbers represent a decrease of six Large Mine permit applications and a decrease of 24 Small Mine permit applications compared to 2000. New Large Mine permits include four dimension-stone quarries and one tar-sand pit. New Small Mine permits are grouped as follows: industrial minerals (including gemstones, geodes, fossils, and others) - 29 and precious metals - 3.

The state has 74 active Large Mines (excluding sand and gravel) that are grouped by industry segment as follows: base metals - 4, precious metals - 2, coal - 12, and industrial minerals (including gemstones, geodes, fossils, and others) - 56. Ninety-seven Small Mines reported production in 2001, 23 fewer than in 2000. These Small Mines include one base metal, 11 precious metals, and 85 industrial minerals operations.

EXPLORATION PERMITS

Mineral exploration statewide remained at the same low level as 2000. Fourteen Notices of Intent (NOIs) to explore on public lands were filed with DOGM in 2001, compared to 15 in 2000 and 26 in 1999. The number of new NOIs listed by county include: Beaver - 2, Duchesne - 1, Emery - 1, Juab - 2, Kane - 1, Millard - 1, San Juan -1, Sanpete - 1, Utah - 2, and Washington - 2. Eight permits were issued for industrial minerals exploration and six for precious metals. This is the fewest number of permits approved in the past ten years.

NATIONAL RANKINGS

The U.S. Geological Survey (USGS) ranked Utah 9th in the nation (up from 10th) in the value of nonfuel minerals produced in 2000 (latest year that production figures are available). Utah accounted for 3.6 percent of the U.S. total nonfuel mineral production value. Based on USGS estimates of quantities produced in the 50 states during 2000, Utah remained the only state to produce beryllium concentrates and was the second of two magnesium-metal-producing states. However, by year's end, Utah had the only active primary magnesium-metal producing facility in the U.S. The state was second in copper, potash, gold, and molybdenum; fourth in phosphate rock, magnesium compounds, and perlite; fifth in silver, bentonite, and gemstones; and sixth in salt (Tanner, 2002).

USGS data show that between 1991 and 2000 the value of nonfuel mineral production in Utah ranged from a low of $1.18 billion in 1991 to a high of $1.85 billion in 1995 (figure 2). The value of nonfuel mineral production for 2000 is estimated to be $1.45 billion. The Utah Geological Survey's (UGS) estimate for the value of nonfuel mineral production for 2001 is $1.47 billion, $10 million more than the UGS's 2000 estimate.

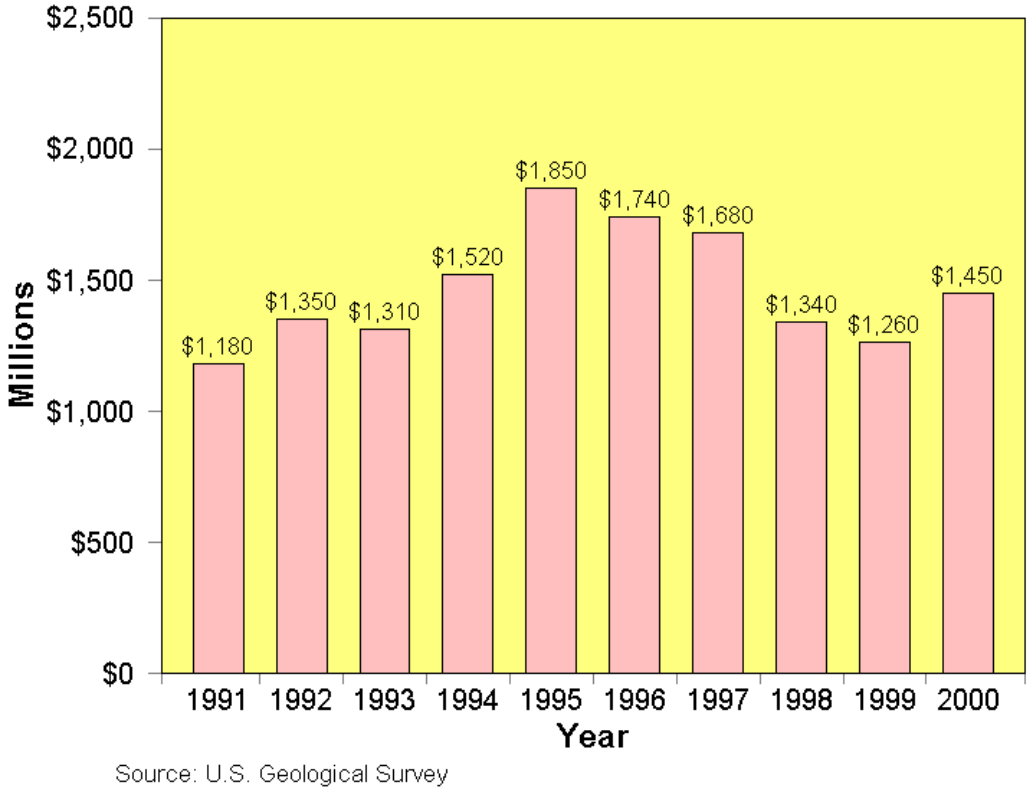

Figure 2. Value of Utah's nonfuel mineral production from 1991 through 2000.

BASE- AND PRECIOUS-METAL PRODUCTION

Base-metal production, with an estimated value of $693 million, was the largest contributor to the value of minerals produced in 2001 (figure 1). In descending order of value, those metals are: copper, magnesium metal, molybdenum, and beryllium. Precious-metal production, valued at $240 million, included gold (91 percent of total value) and silver (9 percent of total value).

Kennecott Utah Copper Corporation's Bingham Canyon mine, located in Salt Lake County, a few miles west of Salt Lake City, is the state's sole producer of copper and molybdenum, and a major producer of gold and silver. The combined value of minerals produced from the Bingham Canyon mine is more than one-third of the total value of all minerals produced statewide.

Copper

Copper is the largest contributor to the value of nonfuel minerals in the state. Significant price increases in 1994 and 1995 pushed the value of copper to historical highs and the value of base-metal production statewide to over $1 billion for the first time in 1995. Since 1995, the price of copper has fallen significantly from $1.38/lb ($3.04/kg) in 1995 to $0.76/lb ($1.67/kg) in 2001. Copper production from Kennecott's Bingham Canyon mine increased modestly in 2001 to approximately 350,000 short tons (st) (320,000 metric tons [mt]) from 2000 production of approximately 330,000 st (300,000 mt) of copper metal. Kennecott idled its North concentrator in June and closed it permanently at year's end. The company announced that economic open-pit reserves will be exhausted in the next 10 to 12 years, and that no decision has been made to extend a portion of the mine underground.

Magnesium Metal

Magnesium metal was the second-largest contributor to the value of base metals in 2001. Magnesium metal is produced from Great Salt Lake brines by Magnesium Corporation of America at its electrolytic plant at Rowley in Tooele County. The plant can produce 47,000 st (43,000 mt) of magnesium metal (99.9 percent purity) annually and was one of only two active primary processing facilities in the U.S. The other facility is located in the state of Washington. By year's end the Utah facility was the only active plant in the U.S. Magnesium production was less than capacity in 2001, due to severely depressed magnesium prices.

Molybdenum

The sole molybdenum producer in Utah is Kennecott's Bingham Canyon mine, which produced slightly more than 15,000 st (14,000 mt) of molybdenum concentrate (MoS_2) in 2001, a moderate decrease from 2000 production. The Bingham Canyon mine was one of six molybdenum-producing mines in the U.S. in 2001. Molybdenum is recovered as a by-product from the copper milling operation. The USGS reports that in the U.S., mine output of molybdenum decreased 7 percent in 2001 (Blossom, 2002).

Beryllium

Utah continued to be the nation's leading producer of beryllium. Beryllium ore (bertrandite) is mined at Brush Resource's Topaz and Hogs Back mines in Juab County and processed at the company's plant a few miles north of Delta in Millard County. The product (beryllium hydroxide) is then sent to the company-owned refinery and finishing plant in Ohio, where it is converted into beryllium metal, alloys, and oxide. In 2001, about 40,000 st (36,000 mt) of ore was mined and trucked to the processing plant. Mine production was substantially less than previous years due to reduced demand and increased processing of stockpiled ore. The use of

beryllium in electronic and electrical components, and aerospace and defense applications accounted for an estimated 80 percent of total consumption in 2000 (Cunningham, 2002). The demand for beryllium alloys and beryllium oxide had increased modestly over the past several years, but the current economic downturn and increased imports has reduced the demand for beryllium products for the past two years.

Gold and Silver

Gold production in 2001 is estimated to be about 775,000 Troy ounces (oz) (24,100 kg), a modest increase from the nearly 700,000 oz (22,000 kg) produced in 2000. Gold is produced from two surface mines owned by Kennecott Corporation: one primary producer (Barneys Canyon mine) and one by-product operation (Bingham Canyon mine), both located in Salt Lake County, and by one smaller underground producer owned by Chief Gold Mines, the newly re-opened Trixie mine near the town of Eureka in Utah County. Several other small mines in the state are known to produce minor amounts of gold and silver, but metal-specific production is not reported, and not included in the above totals. The Barneys Canyon mine exhausted its economic ore reserves in late 2001, but will continue to produce gold for several years at a reduced rate until its leach pads are depleted.

Silver production statewide was estimated to be approximately 4.5 million oz (0.14 million kg), nearly 500,000 oz (16,000 kg) more than 2000. Silver was produced as a by-product metal from the Bingham Canyon mine, and from polymetallic ore from the Trixie mine.

INDUSTRIAL MINERALS PRODUCTION

The industrial minerals segment, with an estimated value of $538 million, was the second-largest contributor to the value of minerals produced in 2001 (figure 1). Major commodities produced by group or individual commodity in descending order of value included: (1) salines, including salt, magnesium chloride, potash (potassium chloride), and sulfate of potash; (2) sand and gravel and crushed stone; (3) Portland cement, lime, limestone, and dolomite; (4) phosphate; (5) gilsonite; (6) expanded shale; (7) gypsum; and (8) common clay and bentonite.

Salt, Magnesium Chloride, Potash (Potassium Chloride), and Sulfate of Potash

Brine-derived products, including salt, are the largest contributors (up from third-largest in 2000) to the value of industrial minerals production in Utah, with a combined value of about $172 million. In addition to salt, other brine-derived products include magnesium chloride and potash (potassium chloride and sulphate of potash [SOP]). One company (North Shore Limited Partnership) produces a small amount of concentrated brine which is used as an ingredient in mineral food supplements. The location of operators around Great Salt Lake is shown in figure 3. The statewide production of salt and other brine-derived products, excluding magnesium metal, is estimated to be 3.5 million st (3.2 million mt) in 2001, about 100,000 st (90,000 mt) higher than 2000. Potash production (including SOP) is estimated to be about 335,000 st (304,000 mt) in 2001, approximately 100,000 st (90,000 mt) more than 2000.

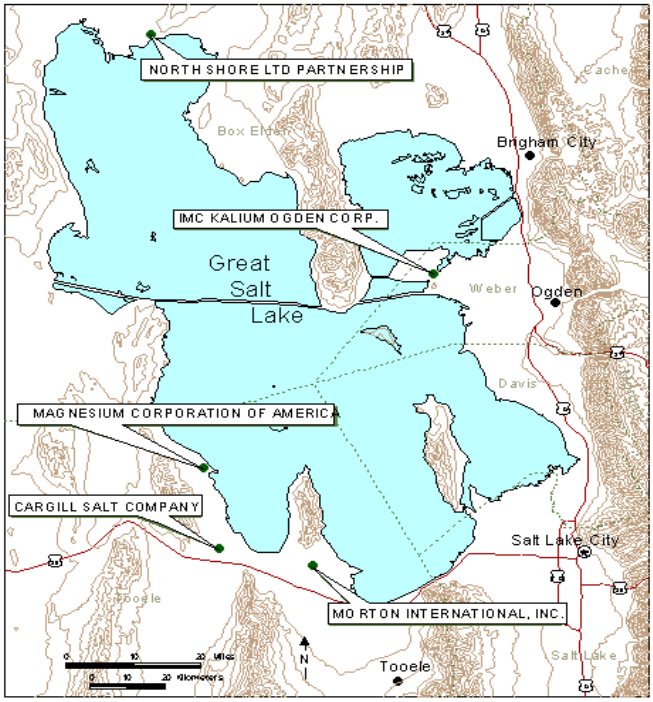

Figure 3. Location of brine processing plants around Great Salt Lake.

Salt production alone is estimated to be 2.8 million st (2.5 million mt) in 2001, about 200,000 st (180,000 mt) less than 2000, with most of the production coming from three operators using brine from Great Salt Lake. These operators are, in descending order of production: (1) IMC Kalium Ogden Corporation (formerly GSL Minerals), (2) Cargill Salt Company, and (3) Morton International, Inc. In addition, three other companies produce salt and/or potash from operations not located on Great Salt Lake: (1) Reilly Chemical Company at Wendover in Tooele County (potash), (2) Moab Salt LLC near Moab in Grand County (salt and potash), and (3) Redmond Minerals, Inc. near Redmond in Sanpete County (salt).

Sand and Gravel and Crushed Stone

Sand and gravel, and crushed stone (including limestone and dolomite) are the second-highest contributors to the value of industrial minerals produced in 2001, down from first in 2000. These materials are produced in every county in Utah by commercial operators, and by state, federal, and county agencies. Due to the large number and intermittent operation of producers, operators are not sent UGS production questionnaires. However, production data are compiled by the USGS. Their preliminary 2001 data show that 27.9 million st (25.3 million mt) of sand and gravel, and 11.6 million st (10.5 million mt) of crushed stone were produced, with a combined value of $144 million. This compares to 34 million st (31 million mt) of sand and gravel and 9.39 million st (8.52 million mt) of crushed stone produced in 2000, with a combined value of $151 million (Tepordei, 2002).

Portland Cement, Lime, Limestone, and Dolomite

Portland cement, lime, limestone, and dolomite were the third-highest value industrial minerals produced in 2001, with a combined value of $134 million. Two operators produce Portland cement in Utah: Holnam, Inc. and Ash Grove Cement Company. Holnam's Devils Slide plant is east of Morgan in Morgan County, and Ash Grove's Leamington plant is east of Lynndyl in Juab County. Both companies have expanded production capacity and the two plants have a combined capacity of more than 1.5 million st (1.4 million mt) of cement annually. Both plants operated near capacity in 2001, although total production was slightly less than 2000. In addition to limestone, both Holnam and Ash Grove Cement mine modest amounts of shale that is also used in the manufacture of cement.

Lime production was about 5 percent lower in 2001 than 2000. Graymont Western U.S., Inc. (formerly Continental Lime Company), which produces dolomitic lime and high-calcium lime, and Chemical Lime of Arizona, Inc., which produces dolomitic lime, are the two suppliers of calcined limestone (quick lime) and hydrated lime in Utah, with a combined capacity of more than 1.0 million st (0.9 million mt) per year. Both operations serve markets in Utah and surrounding states. Graymont Western's plant is in the Cricket Mountains, approximately 35 miles (56 km) southwest of Delta in Millard County, and is rated as one of the 10 largest lime plants in the United States. Chemical Lime of Arizona's plant is about 8 miles (13 km) northwest of Grantsville in Tooele County.

An additional 12 operators quarried about 1.85 million st (1.68 million mt) of limestone and dolomite in 2001, which was used mainly in construction, flue-gas desulfurization in power plants, and steel making. The three largest suppliers of crushed limestone used in construction are: Valley Asphalt Company, from two quarries in Utah County; Harper Construction Company, from one quarry in Salt Lake County; and Pelican Point Rock Products Company (formerly Larsen Limestone Company), from one quarry in Utah County. A small amount of limestone and dolomite was also crushed to a fine powder and marketed as “rock dust” to the coal mining industry.

Phosphate

Utah's only phosphate producer, SF Phosphates, Ltd.’s Vernal phosphate operation, is 11 miles (18 km) north of Vernal in Uintah County. SF Phosphates is a partnership of Farmland Industries, Inc. (with headquarters in Missouri) and J.R. Simplot, Inc. (with headquarters in Idaho). The company mines roughly 3.0 million st (2.7 million mt) of ore annually, which is processed into about 1.0 million st (0.9 million mt) of concentrate and transported in slurry form to the company's Rock Springs, Wyoming fertilizer plant via a 90-mile- (144-km-) long underground pipeline. During 2001, the mine produced more than 3.8 million st (3.4 million mt) of ore, the highest production level in the past 10 years.

Gilsonite

Gilsonite production for 2001 is estimated to be about 60,000 st (54,000 mt), essentially the same as 2000. Gilsonite is an unusual solid hydrocarbon that has been mined in Utah for more than 100 years. The three companies producing gilsonite all have mines near the town of Bonanza in eastern Uintah County. In descending order of production they are: (1) American Gilsonite Company’s Bonanza mine, (2) Zeigler Chemical and Minerals Company’s Cowboy, Neal State, and Hardaway mines, and (3) Lexco, Inc.’s Cottonwood mine. Gilsonite is marketed worldwide for use in over 150 products ranging from printing inks to explosives. Gilsonite production has been relatively stable for the past several years.

Expanded Shale

One company, Utelite, Inc., mined about 200,000 st (180,000 mt) of shale in 2001 to manufacture “expanded shale” for use as a lightweight aggregate for the construction industry. The mine is located near the town of Wanship in Summit County. Production of “expanded shale” was the same as for 2000.

Gypsum

Seven companies produced about 390,000 st (350,000 mt) of gypsum from 10 pits in 2001, nearly 110,000 st (100,000 mt) less than in 2000. In descending order of production, the companies are: (1) U.S. Gypsum Company, (2) Georgia Pacific Corporation, (3) Nephi Gypsum, Inc., (4) H.E. Davis and Sons, (5) Nephi Sandstone Company, (6) D.K. Gypsum Industries, and (7) Western Clay Company. Both U.S. Gypsum and Georgia Pacific operate wall board plants near Sigurd in Sevier County. The majority of gypsum produced in Utah is used for making wall board, but several operators supply raw gypsum to regional cement companies where it is used as an additive to retard the setting time of cement and to the agriculture industry for use as a soil conditioner.

Common Clay and Bentonite

More than 272,000 st (247,000 mt) of common clay and approximately 45,000 st (41,000 mt) of bentonite were produced by nine companies in 2001, a 16 percent decrease in common clay and a 25 percent decrease in bentonite compared to 2000. In descending order of production the four largest producers of common clay are: (1) Interstate Brick Company, (2) Peck Rock Products Co., (3) Interpace Industries, and (4) Paradise Management Company. More than 75 percent of all common clay is used in the manufacture of brick. Bentonite is used as a sealant in many civil engineering applications, as a pet-waste absorbent (litter-box filler), as an additive in oil and gas drilling fluids, and as a binder in foundry molds.

ENERGY MINERALS PRODUCTION

Coal

Utah's operators mined 26.9 million st (24.4 million mt) of coal valued at $473 million from 11 underground mines and one surface mine in 2001 (figures 1 and 4). This production was approximately 20,000 st (18,000 mt) more than in 2000, and was the second-highest in Utah history. Utah's only coal waste reprocessing plant remained idle for the second year in a row. The mines are located in Carbon (6), Emery (5), and Sevier (1) Counties in east-central Utah. The coal reprocessing facility is located near the town of Wellington in Carbon County. The largest coal producer was the SUFCO mine, operated by Canyon Fuel Company, LLC (Sevier County) which produced slightly more than 7.0 million st (6.4 million mt) of raw coal. In addition, the following four mines each produced in excess of 2.0 million st (1.8 million mt) of coal: (1) Deer Creek, operated by Energy West Mining Company (Pacificorp, Inc.) (Emery County); (2) Skyline #3, operated by Canyon Fuel Company, LLC (Emery and Sanpete Counties); (3) Crandall Canyon mine, operated by Genwal Coal Company (Emery County); and (4) West Ridge, operated by West Ridge Resources (Carbon County).

Slightly more than 50 percent of Utah's coal was consumed by electric utilities within the state. Coal is utilized for industrial purposes within the state, shipped to electric utilities and industrial users in other states, and exported to Pacific Rim countries for both power generation and industrial use.

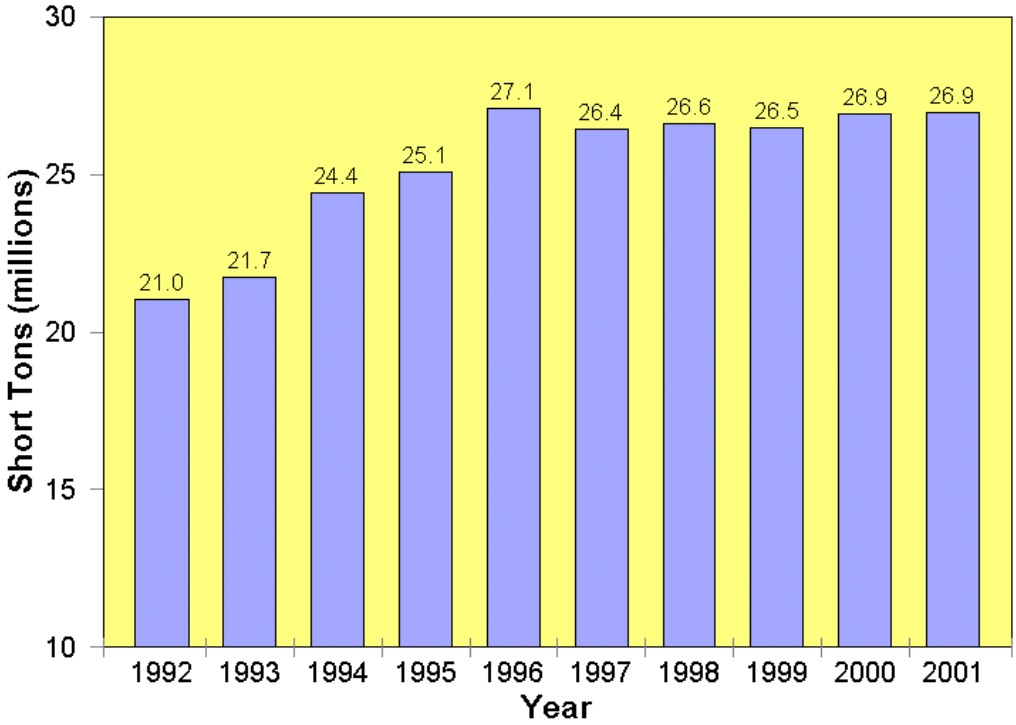

Figure 4. Utah's coal production from 1992 through 2001.

One new surface mine located in Carbon County (Whiskey Creek) began producing coal in late 2001. White Oak Mining and Construction Company's Horizon mine, which was idle in 2000, produced a small amount of coal in 2001 and will begin ramping up to full production in 2002. The Willow Creek mine (RAG International, Inc.), which was closed following a mine explosion and fire in July 2000, will remain closed indefinitely. Energy West Mining Company's Trial Mountain mine and White Oak Mining and Construction Company's White Oak #2 mine were also closed in 2001, due to reserve depletion. In spite of these mine closings, coal production is expected to again increase to a near-record level in 2002. Consolidation Coal Company's Emery mine in Emery County is in the early stage of redevelopment and may be operational by late summer 2002. One new mine (UtahAmerican Energy Company's Lila Canyon mine) in Emery County is in the permitting stage and could begin producing within the next two years, depending on successful marketing efforts.

Uranium

Because of the continued weak market for uranium, there was no uranium ore mined in Utah in 2001, and both International Uranium Corporation's White Mesa mill (San Juan County) and U.S. Energy Company's Shootaring Canyon mill (Garfield County) were idle the entire year. No milling is planned at either facility until there is a significant increase in the price of uranium or vanadium.

EXPLORATION AND DEVELOPMENT

Base- and precious-metal exploration remained at a very low level in 2001. DOGM received 14 new Notices of Intent (NOIs) to explore, one less than in 2000 and significantly lower than the 50 to 60 per year received during the early 1990s. Six NOIs were for precious or base metals, two for sandstone, two for limestone, two for slate, and the remaining two for kaolin and humate. Four of the precious or base metal NOIs were from individuals and two were from small to medium sized companies. "New" mine development was also modest with work at most developing operations confined to cleaning and rehabilitating existing workings and/or limited sampling and test mining. Figure 5 shows the location of major exploration districts, areas, and prospects discussed below. Smaller districts, mines, and prospects within a major district or area are not shown.

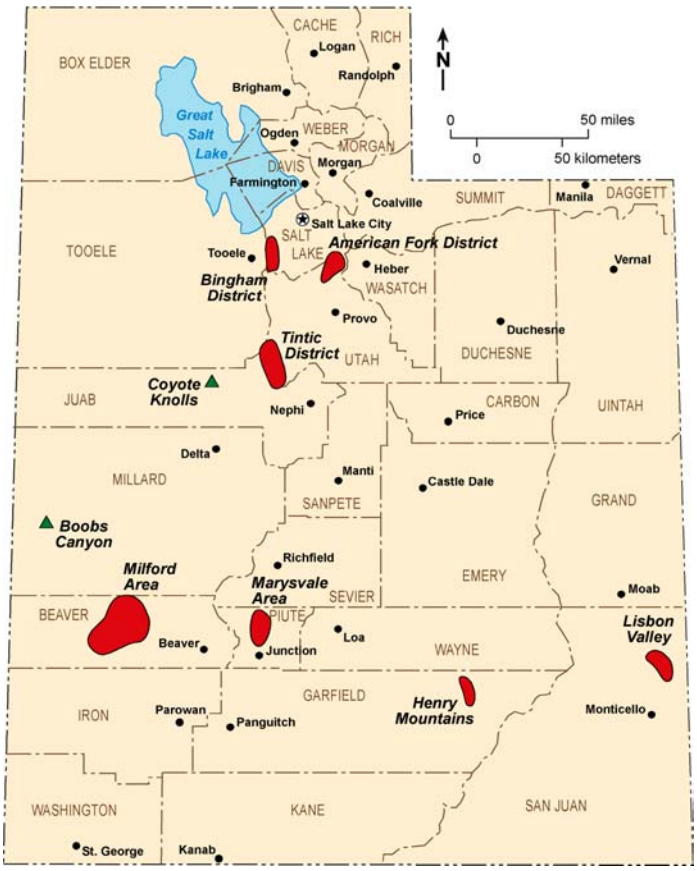

Figure 5. Major base- and precious-metals exploration areas in Utah during 2001.

Bingham District

Kennecott Utah Copper Company announced that open-pit mining at the Bingham Canyon copper mine will likely end in 2012. Previous announcements made before the drop in copper prices estimated completion of open-pit mining at 2020 or even later. No decision has been announced on underground mining of either porphyry or skarn ore, or both, which would extend the life of the operation. Published underground reserves (proven and probable) include 354 million st (321 million mt) of "block cave" (porphyry) ore and 15 million st (14 million mt) of skarn ore (Rio Tinto Annual Report, 2000).

Kennecott's Barneys Canyon gold mine ended its mining and ore crushing operations in mid-December 2001, due to depletion of reserves. Additional gold mineralization is present below the Melco pit bottom, but mining is not viable at current gold prices. Heap leaching operations will continue for four to five more years. Since the beginning of mining in 1989, the operation has produced about 1.3 million oz (40,450 kg) of gold from five open pits.

American Fork District

During 2001, Unico, Inc. reopened the Silver Bell mine in Utah County and rehabilitated, mapped, and sampled the workings. No mining was done in 2001, but 1,200 st (1,100 mt) of previously mined ore is stockpiled and could be shipped to the company's Deer Trail mill south

of Marysvale. Future activity includes plans to extend the northeast decline, crosscutting to intersect the vein, and developing the vein and associated manto deposits.

Tintic District

Chief Consolidated Mining, through its subsidiaries Chief Gold Mines (owned 100 percent by Chief Consolidated) and Tintic Utah Metals (owned 75 percent by Chief Consolidated) continued exploration and development work in the Tintic district.

At the Trixie mine, a 1,200-foot- (370- m-) long development drift was driven on the 600 level to access the up-dip extension of the 75-85 ore body previously mined on the 750 level. The extension was discovered in 2000 by surface drilling, and contains 70,500 st (64,000 mt) of blocked out reserves with an average in-place grade of 0.75 oz/st (25.7 g/mt) gold and 5 oz/st (171 g/mt) silver. The ore occurs in void fillings in a quartzite breccia. It consists of copper, lead, zinc, and silver sulfides and sulfosalts (enargite, tetrahedrite-tennantite, polybasite, pyrargyrite, and other minerals), pyrite, and native gold in gangue of quartz, barite, chalcedony, and sericite. The ore body was reached in October 2001, and mining began using overhead stopes from the 600 level. By the end of 2001, approximately 5,000 st (4,500 mt) of ore had been mined with an average mined grade of 0.75 oz/st (25.7 g/mt) gold and 2.5 oz/st (85.7 g/mt) silver. Mining is continuing at a rate of 100 to 150 st (90-140 mt) per day. The ore is processed at Tintic Utah Metal's Burgin mill, which is currently operating at a capacity of 240 st (220 mt) per day. In 2002, Chief Gold Mines plans to drill a number of long underground holes from the 600 level to test for mineralization on parallel structures west of the current workings, including the West Trixie fissure zone. The drill holes will be 500 to 1,400 feet (150-430 m) long.

Chief Gold Mines explored an area approximately 2,500 feet (760 m) southwest of the Trixie mine. Three holes were drilled in 2001 with a total footage of 3,710 feet (1,130 m) on a "Trixie-like" target developed in 2000. All holes intersected anomalous precious-metal mineralization including one 5-foot (1.5-m) interval that assayed 0.51 oz/st (17.4 g/mt) gold. In 2002, two additional 1,200 to 1,500-foot (370-460 m) deep holes are planned to further test this zone.

No drilling was done on the Burgin, Eureka Standard, or Apex properties in 2001. A new resource calculation and preliminary feasibility study, using current metal prices, was completed on the Burgin mine by Mine Development Associates and submitted by the company to the U.S. Securities and Exchange Commission. No decision has been made by the Utah Division of Water Rights on issues related to dewatering the Burgin mine, and no additional work is expected on the property until the issue is resolved and a permit is granted.

In mid-2001, Atlas Mining Company (Osburn, Idaho) signed a lease/option agreement on the Dragon halloysite property in the southern part of the Tintic district approximately 2.5 miles (4 km) south of Eureka. According to company press releases, large volumes of halloysite-rich material have been identified in the mine that may be upgraded by relatively simple techniques. Announced reserves are 300,000 st (270,000 mt) with a potential resource of 1 million st (0.9 million mt). The halloysite has exceptionally good properties (brightness, particle size distribution, and purity) and contacts have been made with several buyers. The company intends to build a processing plant and begin mining the deposit at an initial rate of 7,500 st (6,800 mt) per year, ramping up to 30,000 st (27,000 mt) per year in year five. Halloysite is a relatively rare clay mineral that is used in petroleum refining, for high quality china and porcelain, and as a hardener in specialty cements.

Milford Area

Several operators were active in the Milford area in Beaver County including Western Utah Copper Company (WUCC), Sepa Resources, Breccia Development, and Gemstone Mining. Most drilling activity was in the Frisco area, but a few holes were drilled on the east side of the Star Range and northwest of Blue Mountain. Most exploration was for copper and precious metals, but two projects were for kaolinite and/or alunite.

Beaver Lake-Rocky Range Districts

WUCC, a Utah corporation organized in 2001, has substantially consolidated all of the major copper districts in western Beaver County. In late January 2002, WUCC entered into a purchase agreement to acquire all of the holdings of Nevada Star Resources Corporation. Nevada Star had previously spent close to $5 million in the two districts and had completed a full feasibility study for a planned open-pit, solvent extraction/electrowinning operation to treat oxide copper ore.

WUCC plans to initially develop the resources by underground mining and has hired Western Mine Development to conduct its underground operations. The first mining operation will be on the higher grade skarn deposits in the Rocky Range district. WUCC plans to recover copper, gold, silver, tungsten, molybdenum, and magnetite from the ores. The company has signed a purchase and sales agreement to acquire a 1,000 st (900 mt) per day concentrator to be located near the mine. In addition to producing sulfide concentrates, the company plans to make ammonia paratungstate on site, to be shipped direct to manufacturer's facilities.

In 2001, WUCC re-assayed pulps from the Nevada Star's 1998 exploration drilling program on the Maria copper skarn deposit. A number of pulps from drill hole M 98-6 assayed greater than 5 percent copper per 5-foot (1.5 m) interval. The average of the entire hole was 3.00 percent copper with significant gold values (up to 0.026 oz/st [0.891 g/mt] per 5-foot [1.5 m] assay interval).

WUCC owns or controls about 37,532 acres (15,189 ha) in the Marysvale-Pioche trend (Milford mineral belt), and has consolidated properties in the San Francisco district with those in the Beaver Lake and Rocky Range districts. The company plans a very aggressive exploration program for porphyry copper, skarn copper, gold, silver, and tungsten ore bodies in conjunction with mining and developing its known reserves. WUCC is a privately held company that expects to be publicly traded in the near future.

San Francisco District

In 2001, WUCC explored in and around the Cactus quartz monzonite intrusive. The company drilled seven reverse-circulation holes southeast, east, and north of the Cactus mine. Southeast of the Cactus mine, the drilling intersected widespread strong alteration and quartz veining containing significant lead- and zinc-bearing stringers and lesser disseminated copper mineralization. One hole (FRS-5) intersected over 600 feet (180 m) of anomalous gold in quartz monzonite porphyry including three 50-foot (15-m) composite samples assaying 1,000 parts per billion (ppb) gold, 520 ppb gold, and 330 ppb gold, respectively. The 330 ppb composite was the last interval of the hole. The drill hole also contained a 40-foot (12-m) interval assaying 0.14 percent copper, presumably as chalcopyrite. Other holes in the area contained similar anomalous gold and copper values. Much additional exploration is planned for the area. The target is

disseminated and fracture-controlled gold as well as porphyry and breccia pipe gold-copper deposits. Part of the area had previously been drilled by Kennecott Minerals in 1998-1999.

Surface sampling and drilling east of the Cactus mine returned significant gold, silver, and copper assay results. Several shallow holes were drilled in the Comet breccia including hole DH-CT-2, which assayed as high as 0.23 oz/st (7.9 g/mt) gold, 5 oz/st (171 g/mt) silver, and 3.36 percent copper over 5-foot (1.5-m) sample intervals. A 112-foot- (34-m-) long channel sample, collected along a nearby road cut, averaged 0.07 oz/st (2.4 g/mt) gold and had one 10-foot (3-m) interval assaying 0.218 oz/st (7.47 g/mt) gold. Silver values from surface samples collected in the same general area assayed as high as 7 oz/st (240 g/mt).

Northwest of the Cactus mine at the New Years mine, drill hole DH-NYM-1 intersected over 100 feet (30 m) of commercial-grade copper mineralization; most of the zone assayed greater than 1 percent copper with numerous intervals near and exceeding 2 percent copper.

Breccia Development, under license agreement with Sepa Resources, drilled approximately 15 reverse-circulation holes on Sepa's Frisco Summit property in 2001. The objective of the drilling program was to better define a large, possibly copper-bearing, porphyry-style sulfide system. The drilling was widespread, extending over a number of square miles. No important copper mineralization was discovered, but pyrite exceeded 5 percent in numerous holes, and in some holes was greater than 15 percent. The high sulfide content, extensive hydrothermal alteration, and brecciation are encouraging and additional work is planned. The area is now controlled by WUCC.

Star District

Breccia Development drilled four holes on their Star project with an aggregate footage of 2,075 feet (632 m); the deepest hole was 875 feet (267 m). The property is located at the north end of the Star Range. The target was lead-silver, manto-style mineralization similar to that at the nearby Harrington-Hickory mine. Drill hole assays returned anomalous lead and silver values, but no ore-grade zones were intersected. No additional drilling is planned for 2002.

Breccia Development drilled an additional two holes on their Goldstar property approximately 2 miles (3.2 km) south of the Star project; nine holes were drilled on the property in 2000. The holes drilled in 2001 were about 3/4 mile (1.2 km) west of workings of the Gold Crown and Estell mines, and southwest of earlier drilling. The main exploration target was distal disseminated gold in altered and silicified Mesozoic sandstone and shale. Results were discouraging, and no additional drilling is planned for 2002. Breccia Development is keeping the property and plans additional exploration at a later date.

Blue Mountain-White Mountain Area

In August 2001, Gemstone Mining Inc. (GMI) ceased mining and closed the processing plant on the Red Emerald (formerly Ruby Violet) red beryl mine in southern Beaver County. The mine is the only known source of gem-quality red beryl in the world. Several months earlier GMI had failed to make their final payment for purchase of the property. The underlying owners began foreclosure procedures and the matter is currently in litigation. GMI could obtain clear title by making the final payment plus interest; otherwise the property would be returned to the underlying owners. The future of the property is uncertain until the litigation is completed. One of the owners, Red Emerald, Inc., is planning to begin mining on their solely-owned claims and

hopes to start up by June 2002. The other owner, Rex Harris, is planning to make his claims available for lease/purchase and is currently evaluating several offers.

Breccia Development evaluated two areas for kaolinite and/or alunite. Breccia drilled 20 shallow reverse-circulation holes on their Omar property east of Blawn Wash to confirm results from previous core drilling. The company also mined and shipped 700 st (640 mt) of material for quality testing. Six holes were drilled on Brimstone prospect located 6 miles (10 km) to the northeast with discouraging results.

Henry Mountains

In September 2001, Unico signed a lease/option agreement with Kaibab Industries covering six patented and 21 unpatented claims in the Bromide Basin area east of Mount Ellen in northern Garfield County. During the summer, Unico mapped and took bulk samples of the Bromide and Crescent veins and the Kimble-Turner shear zone. The ore occurs along fissure veins or shear zones with higher grade ore developed in breccia zones ("pipes") at the intersection of north- and northeast-trending fractures. Approximately 2,500 st (2,300 mt) of material was mined and is currently being processed at Unico's Deer Trail mill near Marysvale in central Piute County. The material is expected to contain from 0.5 to more than 1 oz/st (17-34 g/mt) gold.

Unico plans to continue developing the properties in 2002 by extending the El Dorado adit approximately 700 feet (210 m) to intersect the Bromide and Crescent veins 300 and 500 feet (90 and 150 m), respectively, below the adit levels and stoping up on the veins. Unico plans to mine 75 to 100 st (68-90 mt) per day during the six summer months when the property is accessible. The ore will be processed at the Deer Trail mill.

Marysvale Area

During 2001, Unico continued rehabilitation of the Deer Trail mine and began mining in the 3400 area. Three stopes were developed on two high-grade manto horizons on the PTH tunnel level, and approximately 3,000 st (2,700 mt) of ore was mined and stockpiled. The mantos currently being mined in the 3400 area are 4 to 5 feet (1.2-1.5 m) thick and contain high-grade ore. Based on sampling of the workings, the ore averages 0.14 oz/st (4.8 g/mt) gold, 30 oz/st (1,030 g/mt) silver, 8.4 percent lead, 17 percent zinc, and 1.3 percent copper. However, an unexpected higher grade zone averaging 1.66 oz/st (56.9 g/mt) gold, 181 oz/st (6,200 g/mt) silver, 14.4 percent lead, 8.4 percent zinc, and 8.7 percent copper was discovered during mining and development and is currently being mined. In 2002, Unico plans to continue to mine and develop the 3400 area at an estimated production rate of 60 to 70 st (50-60 mt) per day, and to develop the 8600 ore bodies by driving a decline. Unico will also begin processing the stockpiled Deer Trail ore at the Deer Trail mill.

Lisbon Valley

Summo Minerals Corporation did no exploration or development work on their Lisbon Valley copper deposit in San Juan County in 2001. At the end of 2001, Summo put the property on a care-and-maintenance basis and closed their Moab field office. The deposit has announced reserves of 36.7 million st (33.3 million mt) of 0.51 percent copper and is open to the southwest.

No exploration is planned for 2002, and although several funding avenues are available, the property will not be developed until there is a significant increase in the price of copper.

The company made a proposal to the U.S. Department of Energy to accept and store the Atlas mill tailings in their fully permitted leach pad area, but no decision has been made on the proposal. Lisbon Valley would be a fitting site for the tailings because much of the ore milled at the Atlas site was from the Lisbon Valley uranium district.

Coyote Knolls and Boobs Canyon Prospects

Lawrence Fawn continued exploration and development on the Coyote Knolls gold property in western Juab County. Development work consisted of limited test mining and preparation of the site for full production in 2002. Nearly 20,000 st (18,000 mt) of overburden were removed from the ore zone and the access road was graded and improved. In addition, a minor amount of ore was mined and sold to McFarland and Hullinger to be added to silica flux going to the Kennecott smelter. Mining is scheduled to begin in April or May 2002, at a rate of approximately 100 st (90 mt) per day. The ore zone is a 5- to15-foot- (1.5-5-m-) wide silicified vein and breccia zone. Previous drilling and sampling indicated that the ore averaged 0.12 oz/st (4.11 g/mt) gold and 22 oz/st (754 g/mt) silver.

An outside geologic report and feasibility study was completed for the Boobs Canyon gold-silver deposit located within and adjacent to the western boundary of the King Top Wilderness Study Area in central Millard County. The claim owners (Robert and Terry Steele) contend that, based on the feasibility study, the claims are valid and that mining and further exploration should be allowed. The claim holders are considering litigation should the BLM deny the request. Mineralization occurs in several jasperoid and/or silicified limestone bodies adjacent to northwest-trending fractures. In addition to low-grade gold, the jasperoids contain high-grade silver with some samples assaying 30 to more than 170 oz/st (1,000-5,800 g/mt) silver. No activity was reported for the other prospects in the area including the Kings Canyon gold deposit of Crown Resources.

Owners and vendors of gold prospects in the West Desert have reported increased interest from companies but there have been few firm offers to lease or acquire the properties.

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