

THE MINERAL INDUSTRY OF UTAH

This chapter has been prepared under a Memorandum of Understanding between the U.S. Bureau of Mines, U.S. Department of the Interior, and the Utah Geological Survey for collecting information on all nonfuel minerals.

In 1996, Utah ranked seventh nationally in total nonfuel mineral production value,¹ according to the U.S. Geological Survey (USGS). The State was fourth in 1995. The estimated value for 1996 was about \$1.56 billion, a decrease of approximately 16% from that of 1995. This followed a 21.7% increase from 1994 to 1995 (based on final 1995 data). The State accounted for more than 4% of the U.S. total nonfuel mineral production value.

Metals accounted for nearly four-fifths of Utah's nonfuel mineral production value, copper being more than half of the State's entire metal value. In 1996, a decrease in the value (unit price and production) of copper accounted for the largest portion of the State's decrease in nonfuel mineral value with molybdenum and salt also showing significant decreases. Compared with 1995, nonfuel mineral values that increased in 1996 included, in descending order of value, gold, magnesium metal, construction sand and gravel, lime, silver, phosphate rock, magnesium compounds, grade-A helium, gemstones, common clays, iron ore, gypsum (crude), and masonry cement. Other values that decreased were those of portland cement, potash, and crushed stone. In 1995, an increase in copper value together with smaller yet large increases in molybdenum, magnesium metal, potash, and construction sand and gravel values accounted for much of the year's increase in value.

Based on USGS estimates of the quantities produced in the United States during 1996, Utah remained the only State to produce beryllium concentrates; second in copper and second of four potash-producing States; third in gold and magnesium metal; fourth in silver, phosphate rock and magnesium compounds; sixth in salt; and seventh in bentonite clays. Utah rose from third to second in molybdenum production.

The following narrative information was provided by the Utah Geological Survey (UGS) (Bon, Gloyn, and Tabet, 1997). Production data in the following text are those reported by the UGS, based on its own surveys and estimates. They differ from some production figures reported to the USGS. Significant price increases for copper in 1994 and 1995 pushed its value to historic highs and the value of base metal production statewide to more than \$1 billion for the first time in 1995. Copper production from Kennecott Utah Copper Corp.'s Bingham

Canyon Mine in Salt Lake County decreased about 2% in 1996 to about 295,000 metric tons² of copper in concentrate. Since 1990, annual copper production has ranged from a low of 227,000 tons to the 1994 high of more than 299,000 tons. With the completion of the modernization and expansion program that began in 1988, Kennecott's copper production has stabilized at a rate of about 300,000 tons annually.

Magnesium metal was the second-largest contributor to the value of base metals in 1996. Magnesium metal is produced from Great Salt Lake brines by Magnesium Corp. of America (Magcorp) at its electrolytic plant at Rowley in Tooele County. The plant has a capacity to produce 38,000 tons of magnesium metal (99.9% purity) annually and is the fourth largest magnesium plant in the world. Utah magnesium production remained steady in 1996, while prices declined primarily because of increased foreign competition.

Utah continued to be the Nation's leading producer of beryllium metal. Beryllium ore (bertrandite) was mined at Brush Wellman Inc.'s Topaz Mine in Juab County and processed with domestic and imported beryl at the company's plant about 5 kilometers north of Delta in Millard County. In 1996, more than 181 tons of beryllium hydroxide were produced at the Delta plant and sent to the company-owned refinery and finishing plant in Ohio. Production of beryllium hydroxide in 1996 was projected to be similar to 1995 production. The demand for beryllium alloys and beryllium oxide has increased modestly over the past several years because alloys are being introduced into components for the automobile and electronics industries. The demand for beryllium metal has decreased as national defense requirements have declined.

The sole molybdenum producer in Utah is Kennecott's Bingham Canyon Mine, which produced about 18,000 tons of molybdenum concentrate in 1996. The Bingham Canyon Mine was 1 of only 11 molybdenum producers in the United States in 1995. Molybdenum is recovered as a byproduct of copper mining, and its production is dependent on the amount of copper ore processed. A strong demand for molybdenum was forecast for 1997.

The only iron ore mine in Utah is Geneva Steel's operation west of Cedar City in Iron County. The ore is used in Geneva's steelmaking facility at Vineyard, Utah

County. In 1996, the company did not produce any iron ore. The change from an open-hearth process to the new Q-BOP process for steelmaking at the Geneva plant has increased the use of higher iron, lower silica-content taconite pellets from Minnesota and decreased the use of lower iron-content ore from their Cedar City Mine over the past several years. The process change has also decreased the use of limestone from the company's Utah County limestone quarry.

Gold production in 1996 was estimated to be about 24 tons. Gold was produced from four surface mines, three of which are primary producers, and one is a byproduct operation. In descending order of production they are Kennecott's Bingham Canyon Mine, Barrick Gold Corp.'s Mercur Mine, Kennecott's Barney's Canyon Mine, and USMX Inc.'s Goldstrike Mine. North Lily Mining Co.'s North Lily mine-dump-leach operation closed in 1996. In 1996, only one mine had an increase in production from 1995 and three mines experienced a decrease in production. In 1995, the Bingham Canyon Mine was the third largest gold producer in the United States.

The Goldstrike Mine in Washington County discontinued mining operations in 1994; however, a small amount of gold was recovered from active leach dumps before the mine closed in mid-1996. The Mercur Mine in Tooele County will phase out its mining operation during the next several years because of reserve depletion and will produce at lower levels until mining and leaching are completed.

In 1996, silver production was estimated at about 149 tons. Silver was produced as a secondary metal by all but one (Barney's Canyon Mine) of the primary gold producers and as a byproduct metal by Kennecott's Bingham Canyon Mine. Kennecott is by far the largest silver producer in the State.

Industrial minerals continued to be an important contributor to Utah's mineral industry. Major commodities produced include salt, magnesium chloride, potash (potassium chloride) and sulfate of potash (SOP), sand and gravel, crushed stone, portland cement, lime, limestone, dolomite, phosphate, gilsonite, common clay and bentonite, and gypsum. Commodities produced in lesser amounts include fuller's earth, building stone, decorative stone, lightweight aggregate, masonry cement, and gemstones.

Salt and brine-derived products are the largest contributors to the value of industrial minerals in Utah. In addition to salt, other brine-derived products include magnesium chloride and potash in the form of both potassium chloride and potassium sulfate, or sulfate of potash. Most salt production came from three operators

using brine from Great Salt Lake. These operators were, in descending order of production, GSL Minerals Inc., Morton Salt Co., and Akzo Nobel Salt Inc. In addition, three other companies produce salt and/or potash from operations not related to the Great Salt Lake: Reilly Chemical Co. at Wendover in Tooele County, Moab Salt Co. near Moab in Grand County, and Redmond Clay and Salt Co. near Redmond in Sanpete and Sevier Counties (salt only). Potassium chloride, or muriate of potash, was produced by two operators, Reilly Chemical Co. and Moab Salt Co. at their above-mentioned facilities. The production of salt and brine-derived products is expected to continue to expand over the next several years. GSL Minerals, the largest potassium sulfate or SOP producer in North America, plans to double production from the current level of 270,000 tons per year within the next 5 years.

Sand and gravel and crushed stone were the second highest value industrial minerals produced in 1996. These materials are produced by commercial operators and by State and county agencies in every county in Utah. Because of the large number and diversity of producers, operators are not sent UGS production questionnaires. However, data are compiled by the USGS.

Portland cement and lime were respectively the third and fourth highest value industrial minerals produced in 1996. Two operators produce portland cement in Utah: Holnam Inc. and Ash Grove Cement Co. Holnam's Devil's Slide plant is east of Morgan in Morgan County, and Ash Grove's Leamington plant is east of Lynndyl in Juab County. The two plants have a combined capacity of more than 900,000 tons of cement annually. Both companies have plans underway to increase cement production over the next 2 years.

Lime usage continues to expand. Continental Lime Inc., which produces high-calcium lime, and Chemical Lime Co., which produces dolomitic lime, are the two suppliers of calcined limestone (quicklime) and hydrated lime in Utah, with a combined capacity of more than 900,000 tons per year. Both operations serve markets in Utah and surrounding States. Continental Lime's plant is in the Cricket Mountains, approximately 56 kilometers southwest of Delta in Millard County, and is rated 1 of the 10 largest lime plants in the United States. Chemical Lime of Arizona's plant is near Grantsville in Tooele County.

Two companies produced less than 90,000 tons of limestone in 1996. In descending order of production, they are Cotter Corp.'s Papoose Mine in San Juan County and Emery Industrial Resources' Cherry Hill Park Mine in Utah County. Their production compares with more than

163,000 tons of limestone produced in 1995 by five operators. Three of the five operators who produced limestone in 1995 were idle in 1996. Limestone is used primarily for reducing fluestack emissions in electric power generation plants and also for aggregate in the construction industry.

Geneva Steel produces about 181,000 tons per year of dolomite from a quarry located near the southeast end of Utah Lake in Utah County. The majority of the dolomite is used in the blast furnace operation at the Geneva plant, while the remainder is crushed to a fine powder and marketed as a product named "rock dust" for use as a coal-dust suppressant in underground coal mines.

Utah's only phosphate operation, SF Phosphates Ltd. Co.'s Vernal Phosphate Operation, is 18 kilometers north of Vernal in Uintah County. SF Phosphates Ltd. is a partnership comprising Farmland Industries Inc. of Kansas City, MO, and J.R. Simplot Inc. of Boise, ID. The company mines roughly 2.3 million tons of ore annually, which is processed into about 900,000 tons of concentrate and transported in slurry form to the company's Rock Springs, WY, fertilizer plant via a 145-kilometer-long, underground pipeline. The mine operates at a nearly constant annual rate because its product is used exclusively in its company-owned manufacturing facility. Production for 1996 is the highest in the past several years.

Gilsonite production for 1996 is estimated at about 54,000 tons, the same as in 1995. Gilsonite is an unusual solid hydrocarbon that has been mined in Utah for more than 100 years. The three operations which produce gilsonite are all near the town of Bonanza in Uintah County. In descending order of production they are American Gilsonite Co.'s Bonanza Mine, Zeigler Chemical and Minerals Co.'s Zeigler Mine, and Lexco Inc.'s Lexco Mine. Gilsonite is used in more than 150 products ranging from printing inks to explosives and is marketed worldwide.

More than 254,000 tons of structural clay and more than 36,000 tons of bentonite were produced by five companies in 1996. This is a slight decrease from the nearly 272,000 tons of clay produced in 1995. Bentonite production was essentially the same as last year. In descending order of production, the companies are Interstate Brick Co., ECDC Environmental LC, Redmond Clay and Salt Co., Interpace Industries, and Western Clay Co. Clay is used primarily in the manufacture of bricks and as a sealant for open pit storage of drilling fluids and oil, heap-leach pads in the mining industry, irrigation ditches, and industrial and municipal waste landfills. Bentonite is used primarily as a drilling mud in the oil and

gas industry, as a pet-waste absorbent, and as a sealant in civil engineering applications.

Nearly 272,000 tons of gypsum were produced by six companies in 1996, 54,000 tons more than 1995 production. In descending order of production the companies are U.S. Gypsum Co., Georgia Pacific Corp., Thomas J. Peck & Sons, D.K. Gypsum Industries, H.E. Davis & Sons Inc., and Western Clay Co. In 1995, Georgia Pacific Corp. reopened its wallboard plant, which had been idle since 1992, near Sigurd in Sevier County. The majority of gypsum produced in Utah is used for making wall board, but several small 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 in animal feed.

Utah's coal industry achieved yet another production record in 1996 with a total of more than 24 million tons, 8% above last year's record. Coal production came from 12 underground mines operated by 6 companies in 3 central Utah counties. Emery County was the leading coal producing county (62%), followed by Carbon (22%), and Sevier (16%) Counties. The value of Utah coal sold in 1996 exceeded \$500 million.

Although no uranium mines were active in Utah in 1996, U.S. Energy Inc. has applied to the Nuclear Regulatory Commission to change the status of its 900,000-ton-per-day Shootaring Canyon uranium mill in Garfield County from standby to operational. Approval is expected by mid-1997 with production to start soon afterwards.

During 1996, the Utah Division of Oil, Gas and Mining (DOG M) received nine Regular Mine permit applications (2 hectares, or 5 acres, and larger disturbance) and 35 new Small Mine permit applications (less than 2 hectares, or 5 acres' disturbance). Five applications were made to change from Small Mine to Regular Mine status.

In December 1996, 410 annual report questionnaires were sent to active large and small mine operators. By mid-February, 249 reports had been received by the division. Of the mines reporting, 43 large mines, 12 coal mines, and 53 small mines reported production. Several reporting mines produced more than one commodity.

Mineral exploration for base and precious metals in Utah showed some improvement over 1995, but still remained at relatively modest levels. DOGM received 31 new Notices of Intent to Explore (NOI) in 1996. Nearly 70% of these was for precious metals, mostly in Tooele, Beaver, and Millard Counties; about 10% was for base metals. In addition to the new NOI's, exploration was also done in areas previously permitted, such as the Oquirrh Mountains in Salt Lake and Tooele Counties, the

Tintic district in Juab and Utah Counties, and near Milford in Beaver County. Although most exploration took place in a few well-known mining districts, many of the new exploration areas are more scattered throughout the State. In addition to precious metals, targets for base metals included skarn, porphyry, breccia pipe, sedimentary copper deposits, and lead-zinc-silver limestone replacement deposits.

All 1996 USGS mineral production data published in this chapter are estimates as of February 1997. For some commodities (for example, construction sand and gravel, crushed stone, and portland cement), estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Call MINES FaxBack at (703) 648-4999 from a fax machine with a touch-tone handset, and request Document # 1000 for a telephone listing of all mineral commodity specialists, or call USGS information at (703) 648-4000 for the specialist's name and number. This telephone listing may also be retrieved over the Internet at: <http://minerals.er.usgs.gov/minerals/contacts/comdir.html>

²All tons are metric tons unless otherwise specified.

¹The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending on the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

Reference Cited

Bon, R.L., Gloyd, R.W., and Tabet, D.E., 1996 *Summary of Mineral Activity in Utah, March, 1997, 14pp.*

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN UTAH 1/ 2/

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	1994		1995		1996 p/		
	Quantity	Value	Quantity	Value	Quantity	Value	
Beryllium concentrates	metric tons	4,330	5	5,040	6	5,430	6
Clays		243 ^{3/}	3,410 ^{3/}	424	4,280 ^{3/}	477	4,440 ^{3/}
Gemstones		NA	620	NA	939	NA	W
Iron ore (usable)		W	W	144	1,700	W	W
Salt		1,680	56,700	2,160	54,800	2,030	30,100
Sand and gravel (construction)		21,100	69,600	23,800	80,200	27,000	97,200
Stone (crushed)		4,540	19,800	4,140	14,800	3,800	13,900
Combined value of cement, clays (bentonite), copper, gold, gypsum (crude), helium (Grade-A), lime, magnesium compounds, magnesium metal, mercury, molybdenum, phosphate rock, potash, silver, stone [dimension (1995), dimension quartzite and sandstone (1994, 1996)], and values indicated by symbol W		XX	1,370,000	XX	1,700,000	XX	1,410,000
Total		XX	1,520,000	XX	1,850,000	XX	1,560,000

p/ Preliminary. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" data. XX Not applicable.

1/ Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

2/ Data are rounded to three significant digits; may not add to totals shown.

3/ Excludes certain clays; kind and value included with "Combined value" data.

TABLE 2
 UTAH: 1/ CRUSHED STONE 2/ SOLD OR USED
 BY PRODUCERS IN 1995, BY USE 3/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Fine aggregate (-3/8 inch):			
Screening, undesignated	2	\$8	\$4.00
Coarse and fine aggregates:			
Graded road base or subbase	55	284	5.16
Unpaved road surfacing	41	214	5.22
Other construction materials	3	17	5.67
Agricultural:			
Agricultural limestone	3	83	27.67
Poultry grit and mineral food	W	W	28.29
Chemical and metallurgical:			
Cement manufacture	W	W	4.65
Lime manufacture	200	1,320	6.60
Flux stone	W	W	5.97
Special: Mine dusting or acid water treatment	W	W	4.38
Unspecified: 4/			
Actual	1,950	4,820	2.47
Estimated	446	1,100	2.47
Total	4,140	14,800	3.58

W Withheld to avoid disclosing company proprietary data; included in "Total."

1/ To avoid disclosing company proprietary data; "District tables were not produced in 1995."

2/ Includes dolomite, limestone, limestone-dolomite, sandstone, and quartzite.

3/ Data are rounded to three significant digits; may not add to totals shown.

4/ Includes production reported without a breakdown by use and estimates for nonrespondents.

TABLE 3
 UTAH: CRUSHED STONE SOLD OR USED, BY KIND 1/

Kind	1994				1995			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	13	1,980	\$12,300	\$6.23	16	2,080	\$8,860	\$4.25
Dolomite	2	W	W	2.66	2	W	W	2.65
Sandstone	5	W	W	5.07 r/	3	W	W	5.46
Volcanic cinder and scoria	3	4	4	1.00	--	--	--	--
Total	XX	4,540	19,800	4.37 r/	XX	4,140	14,800	3.58

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes limestone-dolomite, reported with no distinction between the two.

TABLE 4
UTAH: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1995,
BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Value per ton
Concrete aggregate and concrete products 2/	4,440	\$17,000	\$3.84
Asphaltic concrete aggregates and other bituminous mixtures	2,590	12,900	4.98
Road base and coverings 3/	6,960	19,400	2.79
Fill	3,050	4,280	1.40
Snow and ice control	34	82	2.41
Other	191	1,020	5.36
Unspecified: 4/			
Actual	2,600	8,810	3.38
Estimated	3,910	16,700	4.27
Total or average	23,800	80,200	3.38

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes road and other stabilization (cement and lime).

4/ Includes production reported without a breakdown by end use and estimates for nonrespondents.

TABLE 5
UTAH: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 1995,
BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		Unspecified within all districts	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	1,420	6,350	2,830	9,770	188	930	--	--
Asphaltic concrete aggregates and road base materials	663	4,060	1,350	6,260	187	1,190	385	1,390
Road base and coverings 3/	1,920	5,610	3,760	9,840	890	2,820	399	1,150
Fill	219	319	2,630	3,700	201	270	--	--
Snow and ice control	24	51	10	31	--	--	--	--
Other miscellaneous uses 4/	31	298	49	178	112	547	--	--
Unspecified: 5/								
Actual	2	4	2,570	8,720	29	80	--	--
Estimated	581	2,130	2,440	8,240	888	6,310	--	--
Total	4,860	18,800	15,600	46,700	2,490	12,100	784	2,540

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes plaster and gunite sands.

3/ Includes fill and road and other stabilization (lime).

4/ Includes railroad ballast and snow and ice control.

5/ Includes production reported without a breakdown by end use and estimates for nonrespondents.