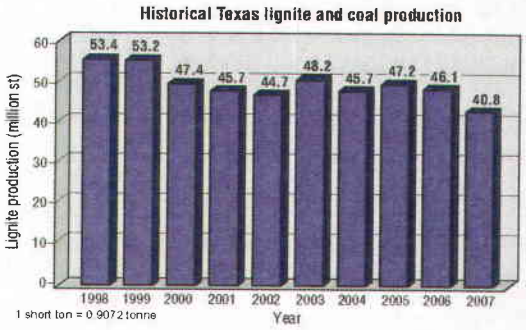
TXU on Oct. 10, 2007. TXU/Luminant Mining reached an agreement with Alcoa to acquire its Three Oaks lignite mining assets and assume responsibility for mining operations to supply the Sandow electricity-generating units.

Texas Mine Safety and Health Program (http://www.utexas.edu/cee/txmshp/) has developed a Safety Update newsletter in an effort to reach those who might benefit from or have an interest in Texas mine safety. Objectives of the newsletter are to provide mining-related groups with current information on events that have recently happened or will happen in the near future, as well as safety advice. The newsletter is currently produced on a quarterly electronic-publication basis. ■

FIG. 4

Historical Texas lignite and coal production. Data from the Railroad Commission of Texas.



UTAH

R.L. BON and K.A. KRAHULEC, Utah Geological Survey

The gross value of all energy and mineral commodities produced in Utah in 2007 is about $7.71 billion, slightly less than the record high of $7.88 billion reached in 2006 (Fig. 1). The 2007 value is largely due to the lower production of metals despite higher prices for crude oil and a record value for industrial minerals.

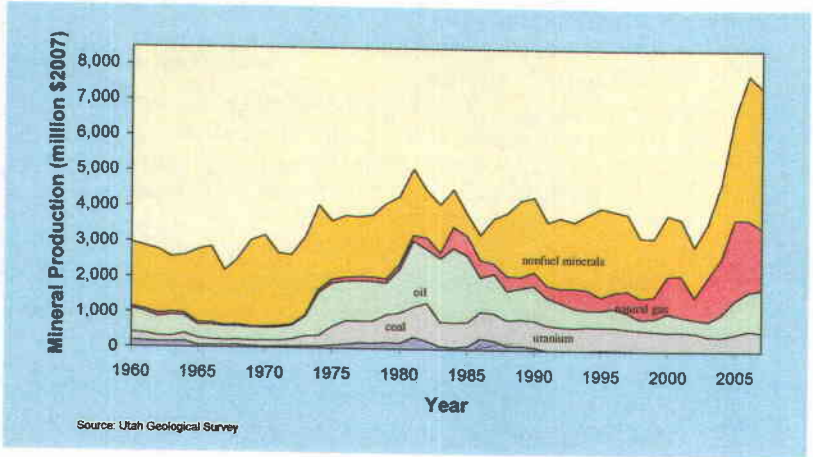
The value of Utah's mineral production (including coal) in 2007 is estimated at a near-record $4.64 billion (Fig. 2), $40 million (less than 1 percent) lower than the revised value of $4.68 billion for 2006. The only segment of Utah's mineral industry to show an increase in value was industrial minerals. Contributions from each of the mineral segments were: base metals, $2.83 billion (61 percent of total); industrial minerals, $921 million (20 percent of total); coal, $574 million (12 percent of total); and precious metals, $322 million (7 percent of total) (Fig. 2, Table 1). Compared to 2006, the 2007 values of base metals decreased $58.1 million (2 percent), industrial minerals increased $111 million (14 percent), coal decreased $13.8 million (2 percent) and precious metals decreased $79 million (20 percent).

Preliminary estimates from the U.S. Geological Survey (USGS) rank Utah fourth nationally in the value of nonfuel minerals produced in 2007, and Utah accounted for about 5.8 percent of the total U.S. nonfuel mineral production value (USGS, 2008). Utah ranked 12th (up from 15th in 2005) in coal production in 2006 (Energy Information Administration, 2007) and will likely retain the same ranking for 2007.

Metal prices reached near-historic highs in 2007, climbing from the record lows reached in 2001-2002. This increase has led to substantially increased mineral exploration and development in Utah. In addition to the initiation of mining at the Lisbon Valley copper mine and the Pandora uranium mine, both in San Juan County, advanced-stage exploration and development is ongoing in the Iron Springs iron and Rocky Range-Beaver Lake copper-gold mining districts.

FIG. 1

Total annual value of Utah's energy and mineral production, 1960-2007, inflation adjusted to 2007.



National rankings

Preliminary USGS data for 2007 shows that Utah remained the only state that produced beryllium concentrates and magnesium metal. Additionally, Utah continued to be second in the quantity of copper, molybdenum concentrates (first in 2006), potash, and magnesium compounds produced (in descending order of value); third in gold (second in 2006); fourth in phosphate rock and silver and fifth in salt. The state was also a significant producer of portland cement, construction sand and gravel, lime, common clays and gemstones (Tanner, USGS, written correspondence 2008).

The USGS's preliminary estimate of the value of nonfuel mineral production for 2007 was $3.94 billion (Tanner, USGS, written correspondence, 2008), about $30 million (1 percent) less than in 2006. USGS data show that between 2002 and 2007 the value of nonfuel mineral production in Utah increased from $1.24 billion (a 10-year low) in 2002 to a record high $3.97 billion in 2006 (Fig. 3). The Utah Geological Survey's (UGS) estimate for the value of nonfuel mineral production for 2007 is $4.07 billion, compared to $4.1 billion for 2006.

A summary of estimated mineral values by the UGS from 1998 through 2007 is shown in Table 1.

Base and precious metal production

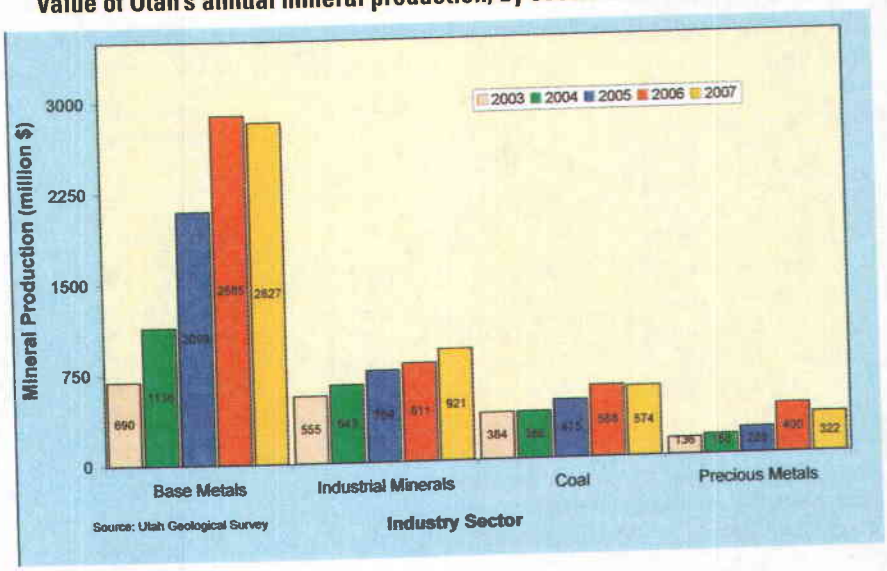
Base metal production, with an estimated value of $2.83 billion, was the largest contributor to the value of minerals produced

in 2007 (Fig. 2, Table 1). In descending order of value, those metals were copper, molybdenum, magnesium and beryllium. The 2007 base metal value was about $58 million (2 percent) less than 2006. It is the first decrease in base-metal value since 2002. Precious metal production, valued at $322 million (Fig. 2; Table 1), includes gold (85 percent of total value) and silver (15 percent of total value). Precious metal values in 2007 were $79 million (20 percent) lower than in 2006—the first decrease in precious metal value since 2003.

Kennecott Utah Copper's (KUC) Bingham Canyon Mine, located about 32 km (20 miles) southwest of Salt Lake City in Salt Lake County, is the state's major producer of copper, gold and silver, and its sole producer of molybdenum. The combined value of minerals produced from the Bingham Canyon Mine in 2007 was about 63 percent of the total value of all minerals produced statewide. KUC is in the fourth year of an aggressive mine life extension program.

FIG. 2

Value of Utah's annual mineral production, by sector from 2003 to 2007.



Copper

Copper was the largest contributor to the value of nonfuel minerals in Utah. Substantial price increases, which began in 2003, raised the value of copper produced to a near all-time high, and the value of base metal production statewide to nearly $2.83 billion. The Bingham Canyon Mine produced about 211 kt (233,000 st) of copper in 2007, compared to the 268 kt (296,000 st) produced in 2006. However, Rio Tinto stated that smelter and refinery production was 21 percent higher in 2007 compared to 2006 when major scheduled maintenance was undertaken on the smelter (Rio Tinto, 2008).

The Lisbon Valley copper mine, located 72 km (45 miles) southeast of Moab in San Juan County, began operating in December 2005, but the solvent extraction-electrowinning (SX-EW) circuits did not start up until April 2006. The plant produced about 9.1 kt (10,000 st) of copper in 2007. Production will likely decrease in 2008 as the mine strives to reduce costs. Mining has been curtailed, but leaching will continue until the ore pad has been depleted.

Molybdenum

Molybdenum was the second largest contributor to the value of Utah's base metal production in 2007. Kennecott's Bingham Canyon Mine produced about 14.9 kt (16,400 st) of coproduct molybdenum in 2007, compared to 16 kt (18,000 st) produced in 2006. Rio Tinto reported that production of molybdenum was 11 percent lower than 2006 as a result of lower ore grade and high limestone levels in the orebody (Rio Tinto, 2008). The decreased production of molybdenum was largely offset by a 26-percent increase in molybdenum metal prices during the year. The USGS reported that the Bingham Canyon Mine was one of five domestic copper mines to recover molybdenum as a byproduct. The USGS also reported that the total U.S. mine output of molybdenum in concentrate decreased slightly in 2007 (Magyar, 2008).

Gold and silver

Gold production in 2007 was estimated to be about 12.4 t (400,000 oz), about 3.1 t (100,000 oz) less than in 2006. Gold is produced from two surface mines owned by Kennecott. One primary producer (Barneys Canyon Mine) and one byproduct operation (Bingham Canyon Mine) are located in Salt Lake County. Several other small mines in the state are known to produce minor amounts of gold and silver, but production is not reported nor included in the above totals. The Barneys Canyon Mine exhausted its economic ore reserves in late 2001 and ceased mining. But it continued to produce gold from its heap leach pads at a reduced rate into mid-2008 when those pads will be depleted. Silver is also a byproduct metal from the Bingham Canyon Mine. Silver production was about 112 t (3.6 million oz) in 2007 compared to more than 131 t (4.2 million oz) in 2006.

Magnesium

Magnesium metal was the third largest contributor to the value of base metals in 2007. Magnesium metal is produced from Great Salt Lake brines by US Magnesium at its electrolytic plant at Rowley in Tooele County. The plant's annual capacity is 43 kt (47,000 st) of magnesium metal (99.8 percent purity). It is the only active primary magnesium processing facility in the U.S.

Magnesium production in 2007 was moderately higher than in 2006. Average magnesium metal prices increased from $3.09/kg ($1.40/lb) in 2006 to $4.41/kg ($2/lb) in 2007 (Kramer, 2008).

Beryllium

Utah continued to be the nation's sole producer of beryllium concentrates. Brush Resources has a beryllium (bertrandite) mine in Juab County. Ore and imported beryl can both be processed through parallel circuits 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 Elmore, OH, where it is converted into beryllium metal, alloys and oxide. The company reported mining approximately 58 kt (64,000 st) in 2007, in addition to processing

about 1.1 kt (1,200 st) of imported beryl ore. The company's Monitor pit will close in 2008 and production will begin at the new Fluro-Roadside pit.

In 2005, Brush Engineered Materials (the parent company) was awarded a $9-million contract under the Department of Defense's Defense Production Act, Title III Program. The contract is for the engineering and design of a new facility for the production of primary beryllium, the feedstock material used to produce beryllium metal products. The new facility, to be owned and operated by Brush Engineered Materials, will be located at an existing plant site in Elmore, OH. The company anticipates that the design and engineering will be completed and construction could begin in 2008.

Table 1

Utah estimated mineral production values in nominal dollars by industry segment from 1998 through 2007, value is in millions. Note that totals may not equal the sum of individual parts due to rounding.

Year	Base metals	Industrial minerals	Coal	Precious metals	Total value
1998	$688	$534	$474	$154	$1,850
1999	$626	$583	$460	$153	$1,822
2000	$749	$500	$456	$212	$1,916
2001	$693	$538	$480	$240	$1,951
2002	$612	$565	$467	$172	$1,815
2003	$690	$555	$384	$136	$1,765
2004	$1,136	$643	$386	$158	$2,324
2005	$2,093	$759	$475	$209	$3,536
2006	$2,885	$811	$588	$400	$4,684
2007	$2,827	$921	$574	$322	$4,644

Industrial minerals production

Industrial minerals production, with an estimated value of $921 million (an all-time high) was the second largest contributor to the value of minerals produced in 2007 (Fig. 2, Table 1) and was the only segment of Utah's mineral industry to show an increase in value. The value of industrial minerals has grown substantially during the past 10 years, increasing from $534 million in 1998 to $921 million in 2007, a 72-percent increase.

Commodities or commodity groups that have realized the majority of these gains include sand and gravel and crushed stone; portland cement and lime; salines, including salt, magnesium chloride, potash (potassium chloride) and sulfate of potash (SOP), and phosphate rock. These commodities accounted for 89 percent of the total value of Utah's industrial minerals segment.

Other commodities produced in Utah, in descending order of value, include gilsonite, expanded shale, gypsum, common clay, bentonite and kaolinite. While the overall value of industrial minerals reached a record high, several commodity groups, including portland cement, phosphate, expanded shale, clay and bentonite experienced lower values due to lower production and/or lower commodity prices in 2007.

Sand and gravel and crushed stone

Sand and gravel, and crushed stone (including limestone and dolomite) were the largest contributors to the value of industrial minerals produced in Utah during 2007, with an estimated value of $318 million, about $99 million (45 percent) higher than in 2006. These materials are produced in nearly every county in Utah by commercial operators as well as county, state and federal agencies.

Due to the large number of operations (approximately 140 active pits and quarries), the UGS does not send production questionnaires to this group. However, production data are compiled by the USGS. Based on preliminary 2007 data (Tanner, 2008), the USGS estimated that 2007 production will be 41.3 Mt (45.5 million st) of sand and gravel with a value of $211 million, and 16 Mt (17.6 million st) of crushed stone with a value of $107 million. Crushed stone production includes raw materials for lime and cement plants. This is a 9-percent increase in sand and gravel production and a 63-percent increase in the production of crushed stone compared to 2006.

Salt, magnesium chloride, potash (potassium chloride) and sulfate of potash

Brine-derived products, including salt, were the second-largest contributors to the value of industrial mineral production in Utah during 2007, with a combined value of $247 million, about $14 million (6 percent) more than in 2006. In addition to salt, brine-derived products include magnesium chloride and potash (potassium chloride and potassium sulfate). One company (North Shore Limited Partnership) produces a small amount of concentrated

FIG. 3

Total annual value of Utah's nonfuel mineral production from 1998 through 2007.

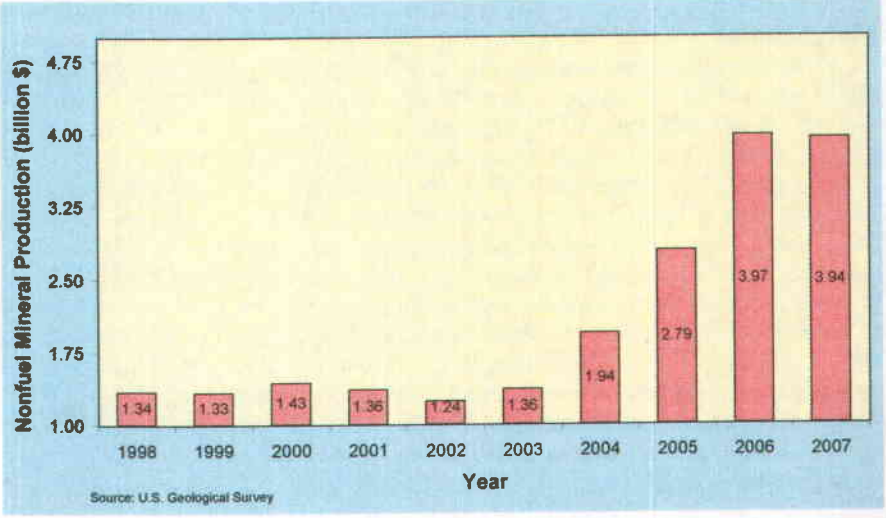
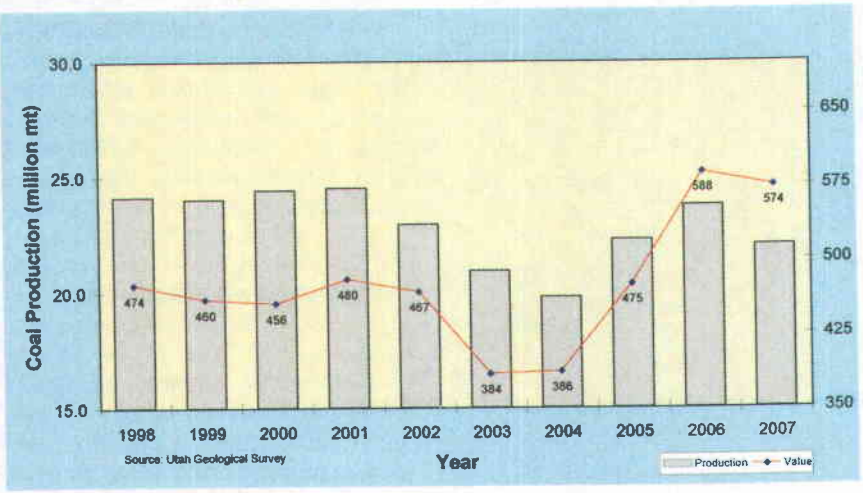


FIG. 4

Utah's annual coal production and value from 1998 through 2007.



magnesium brine that is used as an ingredient in mineral food supplements. The statewide production of salt and other brine-derived products, excluding magnesium metal, was estimated to be 3.26 Mt (3.59 million st) in 2007, slightly less than in 2006. Potash production (including SOP) was estimated to be about 360 kt (400,000 st) in 2007, approximately 200 kt (220,000 st) less than in 2006.

Salt production alone was estimated to be 2.49 Mt (2.75 million st) in 2007, about the same as 2006. Most of the production came from three operators processing brine from Great Salt Lake. The three largest operators are, in descending order of production; Great Salt Lake Minerals, Cargill Salt and Morton International. In addition, three other companies produce salt and/or potash from operations not located on Great Salt Lake. They are Reilly Chemical at Wendover in Tooele County (salt and potash); Moab Salt near Moab in Grand County (salt and potash), and Redmond Minerals near Redmond in Sanpete County (rock salt). In the past five years, Redmond Minerals has increased production significantly as the result of an aggressive marketing campaign.

Portland cement and lime

Portland cement and lime were the third largest contributors to the value of industrial minerals produced in 2007, with a combined value of $236 million, about $2 million (1 percent) less than in 2006. Two operators produce portland cement in Utah: Holcim and Ash Grove Cement Co. Holcim's Devils Slide plant and mine are located east of Morgan in Morgan County and Ash Grove's Leamington plant and mine are east of Lynndyl in Juab County. The companies have a combined capacity of more than 1.4 Mt (1.5 million st) of cement annually. Both plants operated at or above capacity in 2007, with total production of about 1.5 Mt (1.7 million st). In addition to limestone, Ash Grove Cement mines a modest amount of shale and sandstone that are used in the manufacture of cement.

Lime production was about 5 percent higher in 2007 than in 2006, with an estimated production of about 853 kt (940,000 st). There are two suppliers of lime in Utah, with a combined capacity of more than 900 kt/a (1 million stpy). Graymont Western U.S., produces dolomitic quick lime. And high-calcium quick lime, and Chemical Lime of Arizona, produces dolomitic quick lime and hydrated dolomitic lime. Both operations serve markets in Utah and surrounding states. Graymont Western's plant is in the Cricket Mountains, approximately 56 km (35 miles) southwest of Delta in Millard County. It is one of the 10 largest lime plants in the United States. The addition of a fifth kiln to Graymont's Cricket Mountain plant will add about 500 kt/a (551,000 stpy) of capacity. Chemical Lime of Arizona's plant is about 13 km (8 miles) northwest of Grantsville in Tooele County.

Statewide, DOGM lists 34 active limestone operations including 18 large mine and 16 small mine permits. Total limestone production reported in 2007 was 5.1 Mt (5.6 million st). Other uses of limestone include construction as well as fluegas desulfurization in coal-fired power plants. A small amount of limestone is also crushed to a fine powder and marketed as "rock dust" to the coal mining industry.

Phosphate

Simplot Phosphates is Utah's only phosphate producer. The company's phosphate operation is 18 km (11 miles) north of Vernal in Uintah County. The mine produces roughly 2.7 to 3.6 Mt (3 to 4 million st) of ore annually, which is processed into 970 kt to 1.8 Mt (1 to 2 million st) of phosphate concentrate. The concentrate is transported in slurry form to the company's Rock Springs, WY fertilizer plant by a 144-km (90-mile) underground pipeline. During 2007, the mine produced about 3.4 Mt (3.7 million st) of ore, slightly less than in 2006.

Gilsonite

Gilsonite production for 2007 was estimated to be about 77 kt (85,000 st), a slight increase from 2006. Gilsonite is an unusual solid hydrocarbon that has been mined in Utah for more than 100 years. Gilsonite is marketed worldwide for use in more than 150 products ranging from printing inks to explosives. All of the gilsonite mines are located in southeastern Uintah County. The three companies that produce gilsonite, in descending order of production, are American Gilsonite, Lexco and Zeigler Chemical and Minerals. Gilsonite production has been increasing modestly during the past several years.

Expanded shale and perlite

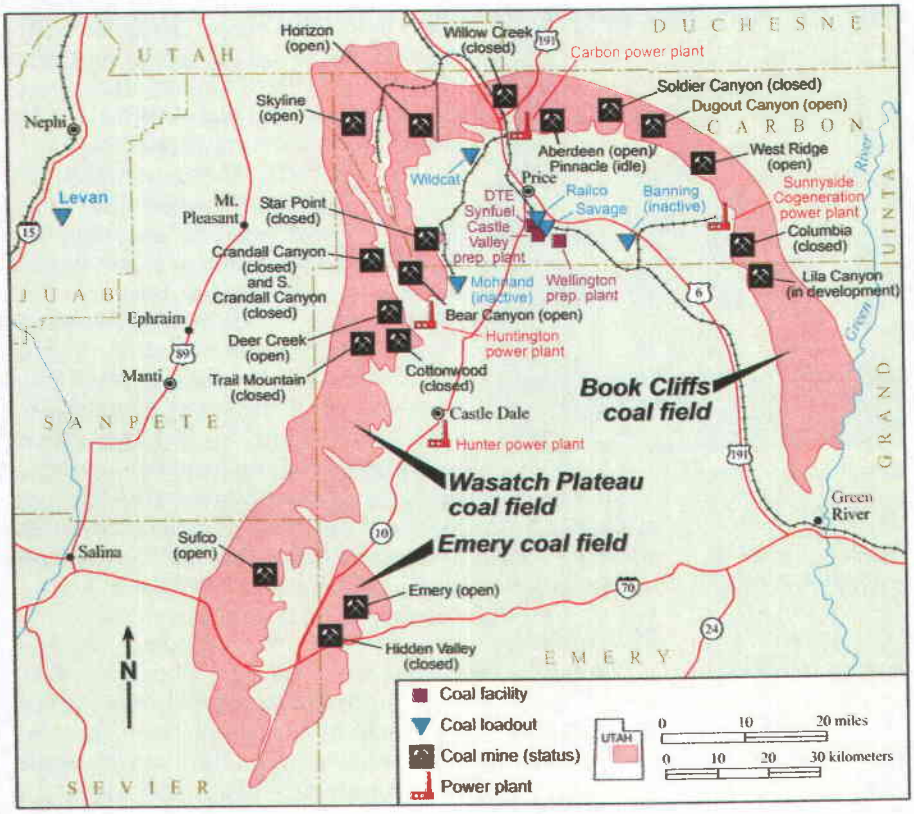
Only one company, Utelite, produced lightweight expanded products from shale for use primarily in the construction and building industries. Mine production was about 181 kt (200,000 st) in 2007, a slight increase from 2006. Utelite's shale plant and mine is east of the town of Wanship in Summit County.

Harborlite Mineral's perlite mine is about 40 km (25 miles) north and east of the town of Milford in Beaver County. The plant is located in Milford. The plant and mine were shut down in mid-2006 and remain inactive.

Harborlite's parent company, World Minerals was sold to Imerys Group, a major worldwide industrial minerals company based in France, in 2005.

FIG. 5

Location and status of central Utah's coal mines and processing plants. Data from DOGM files.



Common clay, bentonite and high-alumina clay

More than 434 kt (478,000 st) of common clay and approximately 57 kt (63,000 st) of bentonite were produced by 10 companies in 2007. Statewide, there were 23 active mine permits held by common clay, bentonite and high-alumina clay operators in 2007. Many of these mines operate intermittently. The two largest producers of common clay in 2007 were Interstate Brick and Interpace Industries (also a brick producer). Two companies (Western Clay Co. and Redmond Minerals) produce bentonite from pits located in central Utah. Sandy Nell produces a high-alumina clay from a pit in Beaver County.

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 a component of oil and gas drilling fluids, and as a binder in foundry molds. High-alumina clays are currently only being used in the manufacture of portland cement.

Gypsum

Five companies produced about 370 kt (408,000 st) of gypsum in 2007, about 96 kt (106,000 st) less than in 2006. In descending order of production, the three largest producers were U.S. Gypsum, Sunroc (Clyde Companies) and Georgia Pacific Gypsum. Georgia Pacific Gypsum and U.S. Gypsum operate the only two wallboard plants in Utah. Both plants are near the town of Sigurd in Sevier County. The Georgia Pacific plant, which closed in 2002, reopened in 2006 and is operating on a full-time basis.

Statewide, there are 10 active gypsum mines. Six reported production in 2007. Most gypsum produced in Utah is used for making wallboard. 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 agricultural industry for use as a soil conditioner. The decreased production of gypsum is likely related to the downturn of the housing industry.

Energy minerals production

Coal

Utah's coal operators produced 22 Mt (24.3 million st) of coal valued at $574 million from 13 underground mines in 2007 (Figs. 2 and 4, Table 1). This production was 1.7 Mt (1.9 million st), or 7 percent less than in 2006. All of the mines and coal-related facilities are located in east-central Utah (Fig. 5). Utah's synfuel plant, DTE Utah Synfuels the only synfuel facility west of the Mississippi River, is located at the Castle Valley (CV) railroad spur southeast of Price. The plant operated full time in 2007 and processed slightly more than 1.8 Mt (2 million st) of high-ash coal purchased from several local coal operators. The DTE plant produces a solid synthetic product that is used in cogeneration, industrial and traditional coal-fired power plants. It closed in late December because of the loss of synfuel tax credits.

Covol Technologies' Wellington air-sparge processing plant that began operating in December 2005 continued to process coal during 2007. Covol Technologies is a subsidiary of Headwaters and the plant is rated at about 226 t/h (250 stph). The plant is located just south of the CV spur. Arch Coal's new (2006) Castle Valley coal preparation plant operated on an as-needed basis in 2007, and processed coal from the company's Skyline and Dugout mines. The plant is located along the CV spur and has the capacity to process up to 1.8 Mt/a (2 million stpy) of coal.

The largest coal producer was the Sufco Mine, operated by Canyon Fuel Co. which produced 6.1 Mt (6.7 million st) of coal in 2007. In addition, the following four mines each produced in excess of 1.8 Mt (2 million st) of coal: Aberdeen, operated by Utah American Energy (formerly Andalex Resources); Deer Creek, operated by Energy West Mining (Rocky Mountain Energy); Dugout Canyon, operated by Canyon Fuel and West Ridge, operated by West Ridge Resources.

Following the Crandall Canyon Mine disaster in August 2007, the Crandall Canyon Mine, operated by Utah American Energy Inc. was permanently closed. Utah American Energy's Lila Canyon Mine received all of its required permits late in 2007 and some site work was initiated (Fig. 5). The surge in oil and gas prices that began in the fall of 2003 has positively affected coal prices and production, which are both