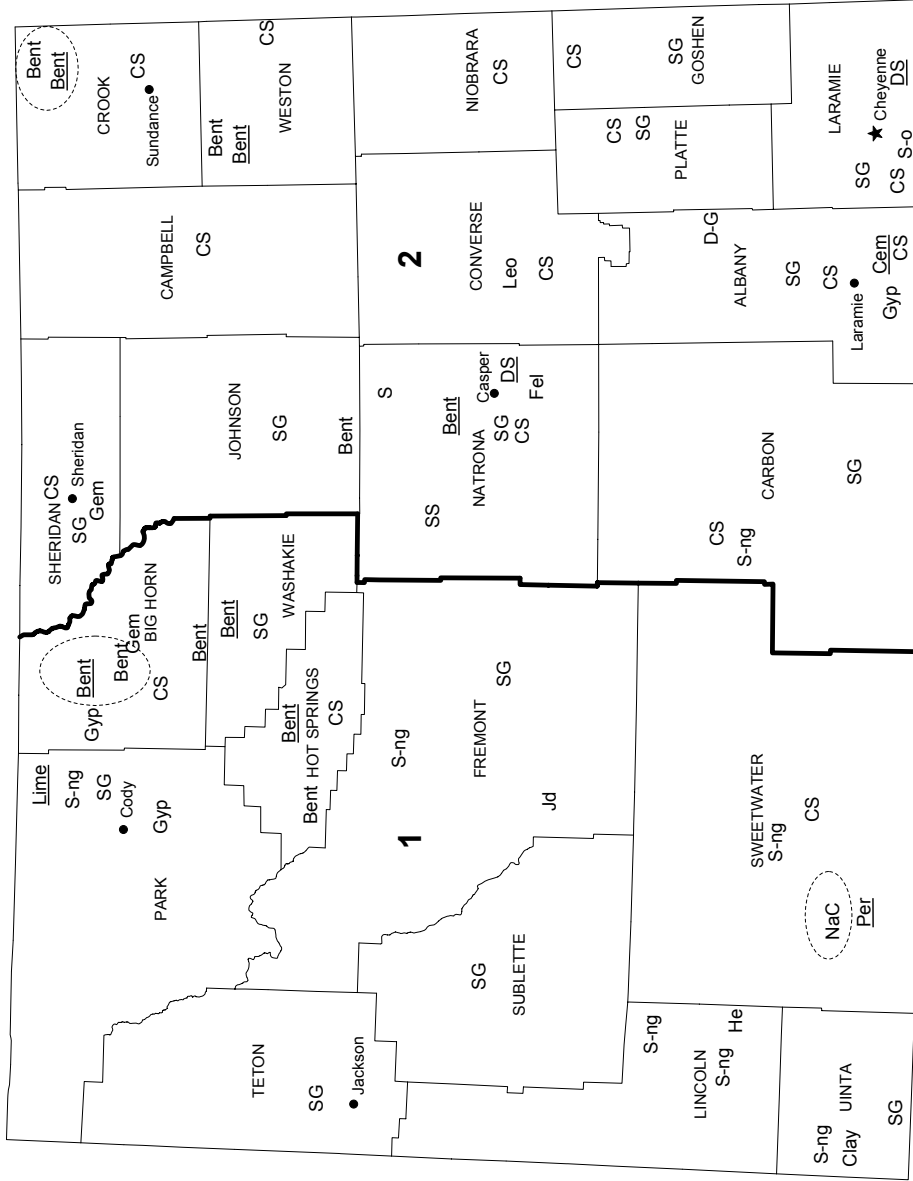








WYOMING



MINERAL SYMBOLS (Major producing areas)

Bent	Bentonite
<u>Bent</u>	Bentonite plant
<u>Cem</u>	Cement plant
Clay	Common clay
CS	Crushed stone
D-G	Dimension granite
<u>DS</u>	Dimension stone plant
Fel	Feldspar
Gem	Gemstones
Gyp	Gypsum
He	Helium
Jd	Jade
Leo	Leonardite
<u>Lime</u>	Lime plant
NaC	Sodium carbonate
<u>Per</u>	Perlite plant
S	Sulfur
S-ng	Sulfur (natural gas)
S-o	Sulfur (oil)
SG	Construction sand and gravel
SS	Sodium sulfate
	Concentration of mineral operations

LEGEND

-  County boundary
-  Capital
-  City
-  1 Crushed stone/sand and gravel districts
-  2



THE MINERAL INDUSTRY OF WYOMING

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Wyoming State Geological Survey for collecting information on all nonfuel minerals.

In 2001 the estimated value¹ of nonfuel mineral production for Wyoming was \$986 million, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 1% increase from that of 2000² and followed a 2.2% decrease from 1999 to 2000. The State, for the second consecutive year, ranked 15th among the 50 States in total nonfuel mineral production value, of which Wyoming accounted for more than 2.5% of the U.S. total.

Wyoming's leading nonfuel mineral, by value, was soda ash, followed by bentonite, Grade-A helium, and portland cement. The four combined accounted for about 94% of the State's total raw nonfuel mineral production value. In 2001, the State's increase in value was mostly attributable to the rising values of bentonite, Grade-A helium, and soda ash, moderated somewhat by decreases in the values of portland cement and crushed stone. In 2000, decreases of more than \$25 million in soda ash, \$20 million in bentonite, and about \$6 million in Grade-A helium were, in part, offset by increases of about \$23 million in portland cement and \$6.6 million in construction sand and gravel. All other nonfuel minerals had relatively small to no changes in production and value and had little effect on the overall net result in value (table 1).

Based upon USGS estimates of the quantities of minerals produced in the 50 States during 2001, Wyoming remained first in soda ash and bentonite and second in Grade-A helium. Soda ash (sodium carbonate) is an inorganic chemical used extensively in the manufacture of glass, paper, soap and detergents, and textiles, and as sodium bicarbonate in food products. The United States is the world's largest producer of soda ash. Wyoming, one of only three soda ash-producing States, is home to the world's largest known natural deposit of trona. Trona is the principal ore from which soda ash is produced. California and Colorado produce significantly

¹The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon 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.

All 2001 USGS mineral production data published in this chapter are preliminary estimates as of August 2002 and are expected to change. For some mineral commodities, such as 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. Specialist contact information may be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals/contacts/comdir.html>; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals>.

²Values, percentage calculations, and rankings for 2000 may differ from the Minerals Yearbook, Area Reports: Domestic 2000, Volume II, owing to the revision of preliminary 2000 to final 2000 data. Data for 2001 are preliminary and are expected to change; related rankings may also change.

smaller quantities of natural soda ash. During the past several years, Wyoming has had considerable exploration activity for metals but has not had significant metal production since iron ore mining ceased in April 1984.

The Wyoming State Geological Survey (WSGS) provided the following narrative information.³ Production data in the text that follows are those reported by the WSGS and are based on the agency's own surveys and estimates. They may differ from some production figures reported to the USGS. Bentonite production increased to near record levels in Wyoming in 2001. There are currently 15 operating bentonite mills in Wyoming. Cat box litter continued to be the primary use for bentonite, followed by its use in foundry molds and taconite pelletizing.

Mountain Cement at Laramie produced more than 450,000 metric tons (t) of cement per year, up slightly from the previous year. The plant manufactured cement from limestone, gypsum, and siliceous shale, all quarried near the plant. The plant quarried gypsum and shale intermittently and stockpiled them on site.

More than 11 million metric tons (Mt) of construction aggregate was quarried in Wyoming in 2001, about a 10% increase from the previous year. The largest increase was in construction aggregate used to surface coal mine haul roads in the Powder River Basin. An increase in highway construction also contributed to the increase in aggregate quarrying. The Martin Marietta Materials Inc. quarry in granite gneiss west of Cheyenne continued to be the largest single aggregate quarry in Wyoming. Other aggregate production included sand and gravel (river rock), crushed limestone, crushed clinker (baked and fused shale), and crushed sandstone.

The production of cut and polished pieces of Wyoming Raven (black granite) and Mirage (gneiss) continued at Raven Quarries LLC quarry in northern Albany County. Raven leased the operation of its quarries to Gallegos Stone at the yearend. At yearend, five companies were in various stages of planning, acquiring leases, or permitting dimensional stone quarries and fabricating plants in Wyoming.

Several small fieldstone quarries continued in operation or opened in Wyoming in 2001. These supplied rock for landscaping, interior and exterior finishing, and similar uses. Most of this material was shipped to the Colorado Front Range and ski towns.

Decorative aggregate was produced in several localities in Wyoming in 2001. Like fieldstone, most of Wyoming's production was shipped to Colorado. Imerys Marble Co. is increasing production of the white marble aggregate from its Wheatland, WY, quarry and processing plant. About 90,000 t of

³Ray E. Harris, Staff Geologist-Industrial Minerals and Uranium, and W. Daniel Hausel, Senior Economic Geologist-Metals and Precious Stones, both of the Wyoming State Geological Survey, coauthored the text of mineral industry information submitted by that agency.

white marble was quarried in 2001.

Gypsum is mined at two localities in the Bighorn Basin, where it is used as the primary ingredient in wallboard, and south of Laramie for use as a retardant in cement. Gypsum production in Wyoming declined significantly in 2000 from 1999 because of a partial shutdown of the Celotex plant at Cody during its sale to BPB, Ltd., a British company. In 2001, the Cody operation was called BPB-Celotex. Production recovered in 2001 to reach a record 537,000 t.

Wyoming produces slightly less than 45,000 t of leonardite per year. Leonardite is a soft, earthy, medium-brown coallike substance associated with lignite. Black Hills Lignite, LLC produced this mineral product from one mine near Glenrock in Converse County. Leonardite is used in oil drilling muds, agricultural conditioners, wood stain, and other products. Leonardite production from Wyoming has been decreasing slightly during the past 2 years.

Basin Electric obtained limestone for emissions control at its Laramie River Station powerplant near Wheatland from Colorado Lien's Hartville Quarry. Lien also sold limestone to Holly Sugar for use in refining sugar beets in 2001. Limestone is mined near Laramie for cement. Lime is produced in Wyoming by Wyoming Lime Producers at Frannie from limestone quarried in Montana.

The production of soda ash and other sodium based products in Wyoming declined slightly in 2001 from the preceding year. More than 16.1 Mt of trona was mined in Wyoming in 2001, down from a high of 17.3 Mt in 1997. Wyoming's trona-based industry continues to face competition from China and the nahcolite facility in Colorado.

The Addwest Minerals, Inc. zeolite mine located west of Bitter Creek remained inactive in 2001. Addwest is determining product uses and markets for its clinoptilolite.

Diamond exploration in the Wyoming Craton was at a low level in 2001, even though the available data supports that the craton has been intruded by major swarms of mantle-derived intrusives and that the potential for the discovery of additional diamond deposits is considered high.

Results of mapping and sampling in the Iron Mountain district in the central Laramie Range of southeastern Wyoming by the WSGS showed an extensive field of kimberlite dikes, blows, and sills over a strike length of more than 8 kilometers. The geology is favorable for other undiscovered kimberlites within, north, and west of the mapped area.

The Leucite Hills near Rock Springs, WY, is the largest lamproite field in North America. Lamproites are considered potential diamond targets, although no diamonds have been found here; there has been very little sampling. The search for diamond-stability chromites in the lamproites led to the recovery of a few chrome spinels with geochemical signatures similar to diamond inclusion chromites. Thus future exploration was recommended to concentrate on the search for hidden olivine

lamproites within the volcanic field. Another gem was identified by the WSGS when 13,000 carats of peridot and industrial olivine were recovered from two anthills.

The 8th International Kimberlite Conference will be held in Vancouver, British Columbia, Canada, in 2003. Part of that conference will include a 6-day field trip through a portion of the Wyoming Craton. The WSGS will assist in the logistics of the field trip. Information and updates on the conference are available on the Internet at URL <http://www.venuewest.com/8IKC/>.

Treasure hunters and prospectors continued to search for gold in Wyoming, but company activity remained at a minimum. Treasure hunters made several discoveries, but no statistics are kept on such finds. One reported finding more than 100 nuggets in the South Pass region of western Wyoming, and another reported that 399 nuggets were found in the Encampment district in southeastern Wyoming.

Company interest for gold was at one of its lowest points in two decades. Geologists with one Nevada gold company arranged for a field trip to the South Pass district with the WSGS. Following the trip, an offer was made to purchase the Carissa Mine at South Pass, but the company was unable to come to an agreement with the owner. Employees of a second Nevada-based gold company attended a public field trip and requested a followup field trip by the WSGS.

The only permitted gold mine in Wyoming, the Mary Ellen, operated by the Gyorvary Mining Co., continued to upgrade the mill at the mine site in 2001.

Platinum-group metals (PGM) exploration continued throughout 2001 in the Lake Owen, Mullen Creek, Centennial Ridge, Puzzler Hill, Wood Mountain, and other areas within the Medicine Bow National Forest and Sierra Madre Mountains. Exploration activity in southeastern Wyoming for PGM included stream sediment sampling, soil and rock sampling, and airborne geophysical surveys. At least six companies held mining claims and reported interest in the region. Some discoveries reported during 2001 include significant anomalous palladium and platinum zones over relatively thick zones with good strike lengths. It has been estimated that about 2000 claims have been filed in the Medicine Bow National Forest for PGM.

The WSGS continued compiling data for the Rattlesnake Hills 1:100,000 quadrangle in central Wyoming in 2001. This quadrangle covers a large portion of the Granite Mountains west of Casper.

In cooperation with the USGS under the STATEMAP component of the USGS National Cooperative Geologic Mapping Program, the WSGS received funding to map the geology of the Keystone 7.5-minute quadrangle in the Medicine Bow Mountains in southeastern Wyoming. This quadrangle encloses the Proterozoic age Keystone Quartz Diorite and the eastern portion of the Mullen Creek layered mafic complex.

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

(Thousand metric tons and thousand dollars)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, bentonite	3,370	146,000	3,080	126,000	3,160	131,000
Gemstones	NA	12	NA	12	NA	12
Sand and gravel, construction	4,410	17,200	6,340	23,800	6,510	24,800
Stone, crushed	6,970	27,600	6,250	26,100	5,000	21,500
Combined values of cement (portland), clays (common), gypsum (crude), helium (Grade-A), lime, soda ash	XX	814,000	XX	802,000	XX	809,000
Total	XX	1,000,000	XX	978,000	XX	986,000

P/ Preliminary. NA Not available. XX Not applicable.

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

2/ Data are rounded to no more than three significant digits; may not add to totals shown.

TABLE 2
WYOMING: CRUSHED STONE SOLD OR USED BY PRODUCERS, BY KIND 1/

Kind	1999				2000			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	8 r/	2,280 r/	\$9,250 r/	\$4.06 r/	8	2,130	\$9,840	\$4.63
Granite	2	W	W	W	2	W	W	W
Marble	1	W	W	W	1	W	W	W
Quartzite	1	W	W	W	--	--	--	--
Volcanic cinder and scoria	1	W	W	W	1	W	W	W
Miscellaneous stone	2	280	1,550	5.52	5	788	3,040	3.86
Total or average	XX	6,970	27,600	3.96	XX	6,250	26,100	4.18

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

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

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

TABLE 3
 WYOMING: CRUSHED STONE SOLD OR USED BY PRODUCERS
 IN 2000, BY USE 1/ 2/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Macadam	W	W	\$10.25
Riprap and jetty stone	71	\$575	8.10
Coarse aggregate, graded:			
Concrete aggregate, coarse	170	994	5.85
Bituminous aggregate, coarse	W	W	4.88
Bituminous surface-treatment aggregate	W	W	3.96
Railroad ballast	W	W	4.19
Fine aggregate (-3/8 inch):			
Stone sand, concrete	21	75	3.57
Stone sand, bituminous mix or seal	W	W	6.56
Screening, undesignated	W	W	3.39
Coarse and fine aggregates:			
Graded road base or subbase	1,230	4,890	3.97
Terrazzo and exposed aggregate	W	W	12.10
Other construction materials	55	198	3.60
Unspecified: 3/			
Reported	1,070	4,060	3.80
Estimated	240	880	3.65
Total or average	6,250	26,100	4.18

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

1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

2/ Includes granite, limestone, limestone-dolomite, marble, miscellaneous stone, and volcanic cinder and scoria.

3/ Reported and estimated production without a breakdown by end use.

TABLE 4
 WYOMING: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2000,
 BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	Districts 1 and 2 2/		Unspecified districts	
	Quantity	Value	Quantity	Value
Construction:				
Coarse aggregate (+1 1/2 inch) 3/	W	W	--	--
Coarse aggregate, graded 4/	2,520	11,100	--	--
Fine aggregate (-3/8 inch) 5/	W	W	--	--
Coarse and fine aggregate 6/	W	W	--	--
Other construction materials	55	198	--	--
Unspecified: 7/				
Reported	60	231	1,010	3,830
Estimated	240	880	--	--
Total	5,240	22,300	1,010	3,830

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

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Districts 1 and 2 are combined to avoid disclosing company proprietary data.

3/ Includes macadam and riprap and jetty stone.

4/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), and railroad ballast.

5/ Includes screening (undesignated), stone sand (bituminous mix or seal), and stone sand (concrete).

6/ Includes graded road base or subbase, and terrazzo and exposed aggregate.

7/ Reported and estimated production without a breakdown by end use.

TABLE 5
WYOMING: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000,
BY MAJOR USE CATEGORY 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	629	\$3,010	\$4.79
Plaster and gunit sands	11	37	3.36
Concrete products (blocks, bricks, pipe, decorative, etc.)	10	44	4.40
Asphaltic concrete aggregates and other bituminous mixtures	694	4,690	6.76
Road base and coverings 2/	1,590	7,790	4.91
Fill	210	505	2.40
Railroad ballast	6	34	5.67
Other miscellaneous uses 3/	11	51	4.64
Unspecified: 4/			
Reported	2,450	4,850	1.98
Estimated	730	2,800	3.79
Total or average	6,340	23,800	3.75

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

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

3/ Includes snow and ice control.

4/ Reported and estimated production without a breakdown by end use.

TABLE 6
WYOMING: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2000,
BY USE AND DISTRICT 1/

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	311	1,450	338	1,650	--	--
Asphaltic concrete aggregates and road base materials 3/	1,360	7,740	923	4,750	--	--
Fill	50	195	160	310	--	--
Railroad ballast	--	--	6	34	--	--
Other miscellaneous uses 4/	8	35	3	16	--	--
Unspecified: 5/						
Reported	599	1,780	1,020	1,710	827	1,370
Estimated	190	700	540	2,100	--	--
Total	2,520	11,900	2,990	10,500	827	1,370

-- Zero.

1/ Data are rounded to no more than three significant digits; may not add to totals shown.

2/ Includes plaster and gunit sands.

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

4/ Includes snow and ice control.

5/ Reported and estimated production without a breakdown by end use.