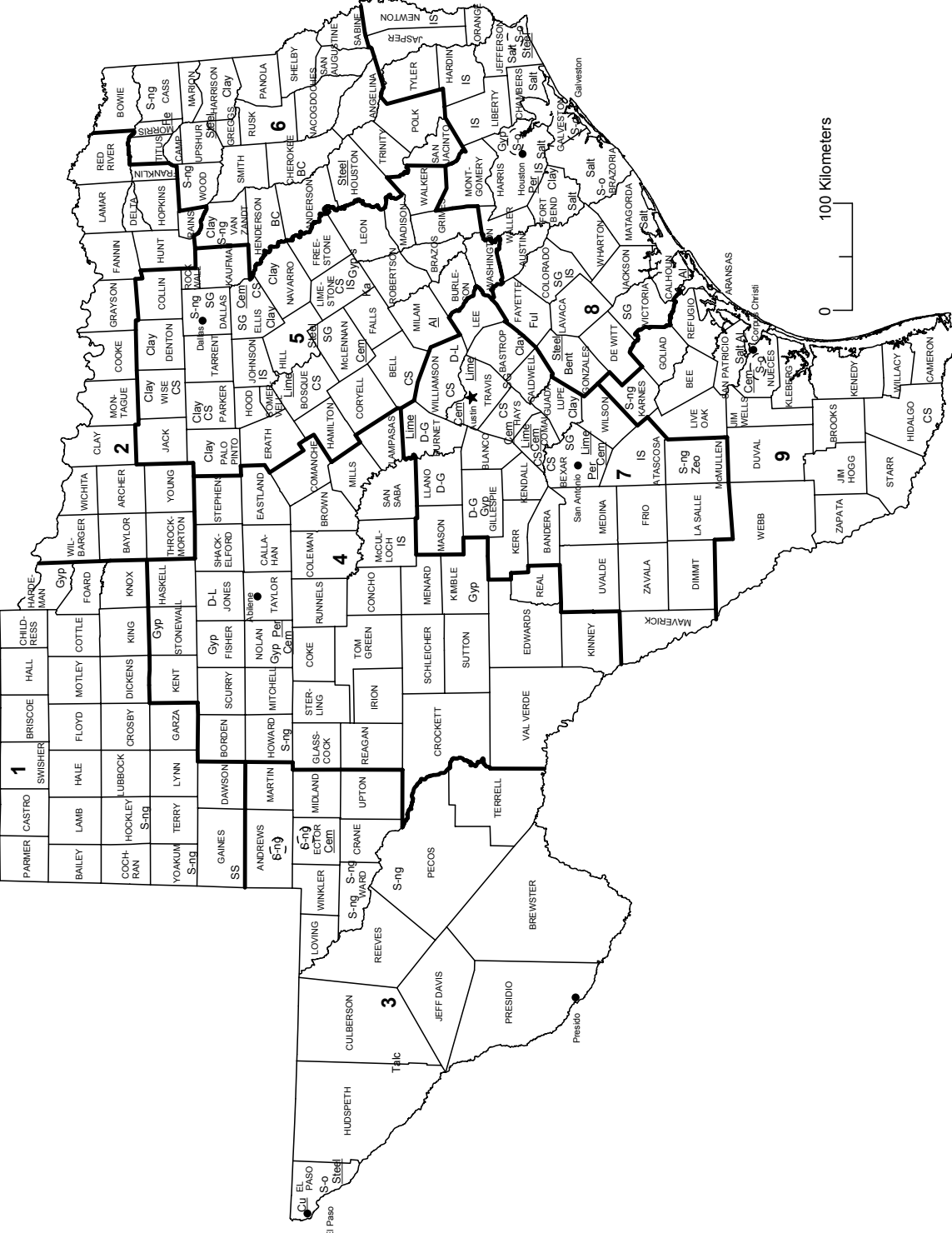


TEXAS

DALLAM	SHER-MAN	HANS-FORD	OCUIL-TREE	UPS-COMB
HARTLEY	MOORE	HUTCH-INSON	ROBERTS	HEMP-HILL
OLDHAM	POTTER	CARSON	GRAY	WHEELER
DEAF-SMITH	ARM-STRONG	ARM-STRONG	DONLEY	COLLINS-WORTH
PARMER	CASTRO	BRISCOE	HALL	CHILD-RESS
BAILEY	LAMB	FLOYD	MOTLEY	COTTLE
COCH-RAN	LUBBOCK	CROSBY	DICKENS	KING
YOAKUM	TERRY	LYNN	GARZA	KENT
GAINES	DAWSON	BORDEN	SCURRY	FISHER
ANDREWS	MARTIN	HOWARD	MITCHELL	NOLAN
LOVING	WINKLER	MIDLAND	GLASS-COOK	STER-LING
EL-PASO	WINKLER	CRANE	UPTON	REAGAN
EL-PASO	WINKLER	CRANE	UPTON	REAGAN



0 100 Kilometers

LEGEND

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

MINERAL SYMBOLS (Major producing areas)

- Al Aluminum plant
- BC Ball clay
- Bent Bentonite
- Cem Cement plant
- Clay Common clay
- CS Crushed stone
- CU Copper plant
- D-G Dimension granite
- D-L Dimension limestone
- Fe Iron ore and/or steel scrap plant
- Ful Fuller's earth
- Gyp Gypsum
- Gyp-s Synthetic gypsum
- He Helium
- IS Industrial sand
- Ka Kaolin
- Lim Lime plant
- Per Perlite plant
- S-ng Sulfur (natural gas)
- S-o Sulfur (oil)
- Salt Salt
- SG Construction sand and gravel
- SS Sodium sulfate
- Steel Steel plant
- Talc Talc
- Zeo Zeolites
- Concentration of mineral operations

THE MINERAL INDUSTRY OF TEXAS

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the University of Texas at Austin, Bureau of Economic Geology, for collecting information on all nonfuel minerals.

In 2002, the estimated value¹ of nonfuel raw mineral production for Texas was \$2.18 billion, based upon preliminary U.S. Geological Survey (USGS) data. This was a 1% increase from that of 2001² and followed a 10.8% increase from 2000 to 2001. Texas rose in rank to third from fourth in the Nation in total nonfuel mineral production value, of which the State accounted for more than 5.5% of the U.S. total.

In 2002, about 94% of Texas' nonfuel mineral value came from the production of the State's top five industrial minerals, in descending order of value: cement (portland and masonry), crushed stone, construction sand and gravel, salt, and lime. Cement alone accounted for about 36% of the State's total nonfuel mineral value (table 1).

In 2001, an increase in the production of crushed stone led the State's nonfuel mineral industry with a value increase of \$128 million, followed by the same in cement, up about \$66 million, and in industrial sand and gravel, up by about \$25 million. Smaller increases of more than \$1 million also occurred in the values of dimension stone, gypsum, and lime. The largest decreases were those of Grade-A helium, construction sand and gravel, helium, and kaolin (descending order of change) (table 1). All other changes in value were less than \$1 million.

Based upon USGS estimates of the quantities of minerals produced in the 50 States in 2002, Texas remained first in crushed stone; second in construction sand and gravel, salt, and common clays (listings in descending order of value); second of 3 crude helium-producing States; second of 4 States that produce ball clay; and second in talc, brucite (of 2 producing States), and zeolites. The State continued to be fifth in lime and was sixth in dimension stone, but decreased to second from first in portland cement, to fourth from third in industrial sand and gravel, and to seventh from sixth in masonry cement.

The Texas metal industry produced copper, primary aluminum, raw steel, and smaller amounts of other metals.

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 2002 USGS mineral production data published in this chapter are preliminary estimates as of July 2003 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 2001 may differ from the Minerals Yearbook, Area Reports: Domestic 2001, Volume II, owing to the revision of preliminary 2001 to final 2001 data. Data for 2002 are preliminary and are expected to change; related rankings may also change.

Sources of plant feed included ores, blister and anode copper, and scrap metal acquired from other domestic or foreign sources. In 2002, the State rose in rank to second from fifth in primary aluminum production (based upon USGS annual data) and was the largest producer of electrolytically refined copper. Texas also was one of the leading steel-producing States (rank withheld owing to proprietary data); its steel mills produced 3.76 million metric tons of raw steel, as reported by the American Iron and Steel Institute (American Iron and Steel Institute, 2002, p. 76).

The following narrative information was provided by the Texas Bureau of Economic Geology³ (BEG). Annual job growth in mining, reported by the Texas Labor Market Review, decreased 6.0% from December 2001 through December 2002. This number includes mining and support services for nonfuel minerals as well as oil and gas extraction and coal mining. Records from the Texas Workforce Commission show that construction job annual growth rate fell by 0.5% (Griffis, 2002).

Exploration and Development

Silver Standard Resources, Inc., continued work on its property in the Shafter District in southwest Texas, in Presidio County, 32 kilometers north of the Mexican border and 64 kilometers south of the City of Marfa. As stated by Silver Standard, the Shafter Silver Project, 100%-owned through the company's wholly owned Rio Grande Mining Co., is a measured and indicated resource of nearly 1.9 million metric tons of ore averaging 345 grams per metric ton (10.1 troy ounces per short ton) silver (along with additional inferred resources) that has been outlined. The Shafter District area has been mined for silver since the 1880s and was host to the largest known silver deposit in Texas. A total of nearly 1.1 million kilograms (35 million ounces) of silver was mined from the Shafter deposit between 1883 and 1942. Most of the permitting for the current project was completed in 2001, and the project has been awaiting higher silver prices for a final feasibility study to be completed. A major road and power lines traverse the property, and the town of Shafter nearby has 30 to 40 inhabitants. Silver Standard purchased the components of the 16:1 mill, an 800-ton-per-day facility, from American Reclamation, Inc. The previous owner, Sunshine Mining and Refining Co., last operated the mill at its former producing silver mine in Silver Peak, NV. Silver Standard made the purchase to help significantly reduce overall capital costs and thereby the price of silver at which the company could economically put the mine into production; the company planned to move the mill

³Sigrid Clift, Research Associate, Texas Bureau of Economic Geology, and J. Richard Kyle, Professor, both of the Department of Geological Sciences, John A. and Katherine G. Jackson School of Geosciences, University of Texas at Austin, coauthored the text of the State mineral industry information provided by the Texas Bureau of Economic Geology.

components to Shafter in the latter part of 2003 in anticipation of production. The project was permitted with this mill in mind. The company held eight of nine permits required for production at Shafter. The water discharge permit was the remaining permit required and was in the public notice portion of the permitting process (Silver Standard Resources, Inc., 2001§⁴). In addition to the silver mineralization at Shafter, there are zinc and copper occurrences further to the west that are potential targets for exploration (Silver Standard Resources, Inc. 2002§).

Commodity Review

Industrial Minerals

Aggregate and Cement.—In 2002, production and use of industrial rocks, minerals, and raw mineral products in Texas declined slightly largely in response to a slowing of activity in the construction industries. Hanson Building Materials America, Inc. sold its concrete operations in Texas and Oklahoma to Southern Star Concrete, Inc., now the leading concrete supplier in Texas.

Barite and Bentonite Clay.—Southern Clay Products, Inc. is actively exploring for additional clay resources in Gonzales County. U.S. Clay, LLP, in its newly renovated facility in Brownsville, TX, dedicated it specifically for the processing of barite, clay, and other drilling mud additives for the Gulf Coast market. U.S. Clay evaluated a sodium bentonite property in Brewster County in West Texas and was in the process of permitting a local processing facility.

Government Activities and Programs

The Governor created a joint committee composed of members of the State Senate, State House of Representatives,

⁴References that include a section mark (§) are found in the Internet References Cited section.

and citizen representatives from around the State to study permitting issues for aggregate facilities. The findings of this committee could affect future aggregate reserve development if new permitting regulations result.

The U.S. Department of the Interior's National Park Service and the USGS, in cooperation with university researchers, recently began a study of the Big Bend National Park in southwest Texas and related borderlands along the Rio Grande. Particular emphasis of the current study was on human influences on geologic processes in park ecosystems. The comprehensive geologic study of Big Bend National Park was published in 1967 (Maxwell, Hazzard, Lonsdale, and Wilson, 1967); one aim of the project is to make significant advances in updating the geologic framework of the region. Drainages in the park are downstream from the Terlingua mercury mining district that ceased production in the early 1970s; lesser quantities of mercury and fluorspar mining took place in an area that is now in the National Park. Major fluorspar deposits occur south of the Park across the Rio Grande in the contiguous State of Coahuila, Mexico.

References Cited

- American Iron and Steel Institute, 2002, Washington, DC, Annual statistical report 2002: American Iron and Steel Institute, 130 p.
Griffis, Clayton, ed., 2002, Texas Labor Market Review: Texas Workforce Commission, Austin, TX, December, 15 p.
Maxwell, R.A., Hazzard, R.T., Lonsdale, J.T., and Wilson, J.A., 1967, Geology of Big Bend National Park, Brewster County, Texas: Austin, TX, The University of Texas at Austin, Bureau of Economic Geology, Publication 6711, 320 p.

Internet References Cited

- Silver Standard Resources, Inc., 2002, Projects, Shafter Project, accessed December 3, 2003, via URL <http://www.silver-standard.com/s/Shafter.asp>.
Silver Standard Resources, Inc., 2001, Third Quarter 2001, accessed February 17, 2004, via <http://www.silverstandard.com/i/pdf/2001-3rdQ.pdf>.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN TEXAS ^{1,2}

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	2000		2001		2002 ^p	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	268	28,800 ^e	291	32,700 ^e	290 ^e	33,000 ^e
Portland	9,270	683,000 ^e	10,400	745,000 ^e	10,700 ^e	766,000 ^e
Clays:						
Common	2,210	9,460	2,120	8,750	2,240	9,490
Fuller's earth	W	W	29	2,270	29	2,270
Kaolin	W	W	W	W	40	7,990
Gemstones	NA	11	NA	12	NA	12
Gypsum, crude	1,760	8,980	W	W	W	W
Helium, crude	million cubic meters	W	9	9,320	8	8,350
Lime	1,600	105,000	1,610	108,000	1,560	100,000
Salt	10,800	104,000	9,370	104,000	9,390	104,000
Sand and gravel:						
Construction	80,800	408,000	82,900	405,000	78,700	393,000
Industrial	1,750	45,200	1,850	70,000	1,770	62,200
Stone:						
Crushed	121,000	496,000	130,000	624,000	128,000	649,000
Dimension	metric tons	84,700	11,500	85,900	12,600	13,000
Talc, crude	do.	212,000	3,580	234,000	4,070	233,000
Zeolites	do.	(3)	NA	(3)	NA	(3)
Combined values of brucite, clays (ball, bentonite), helium (Grade-A)						
	XX	44,900	XX	35,100	XX	29,100
Total	XX	1,950,000	XX	2,160,000	XX	2,180,000

^eEstimated. ^pPreliminary. NA Not available. W Withheld to avoid disclosing company proprietary data; values included with "Combined values" data. XX Not applicable.

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

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

³Withheld to avoid disclosing company proprietary data.

TABLE 2
TEXAS: CRUSHED STONE SOLD OR USED, BY KIND¹

Kind	2000				2001			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	124	115,000	\$468,000	\$4.07	122	124,000	\$600,000	\$4.83
Dolomite	2	W	W	4.23	1	W	W	4.38
Marble	7	W	W	3.94	7	W	W	4.35
Calcareous marl	2	W	W	3.45	2	W	W	3.96
Shell	1	W	W	23.08	1	W	W	24.25
Granite	9	W	W	4.21	2	W	W	4.14
Traprock	1	W	W	8.24	1	W	W	9.26
Sandstone and quartzite	5	1,080	6,110	5.65	5	871	4,560	5.23
Volcanic cinder and scoria	1	W	W	4.48	1	W	W	4.41
Miscellaneous stone	15	2,400	10,400	4.35	10	2,080	8,260	3.97
Total or average	XX	121,000	496,000	4.10	XX	130,000	624,000	4.82

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

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

TABLE 3
TEXAS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2001, BY USE¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	433	\$2,790	\$6.45
Filter stone	64	392	6.13
Other coarse aggregate	245	877	3.58
Total or average	742	4,060	5.47
Coarse aggregate, graded:			
Concrete aggregate, coarse	8,590	42,700	4.97
Bituminous aggregate, coarse	3,790	19,100	5.04
Bituminous surface-treatment aggregate	777	6,580	8.46
Railroad ballast	628	4,180	6.65
Other graded coarse aggregate	6,630	54,600	8.23
Total or average	20,400	127,000	6.23
Fine aggregate (-3/8 inch):			
Stone sand, concrete	2,620	12,900	4.91
Stone sand, bituminous mix or seal	1,600	7,300	4.56
Screening, undesignated	960	3,470	3.61
Other fine aggregate	12	66	5.50
Total or average	5,200	23,700	4.56
Coarse and fine aggregate:			
Graded road base or subbase	12,800	47,800	3.72
Unpaved road surfacing	W	W	3.53
Terrazzo and exposed aggregate	W	W	4.96
Crusher run or fill or waste	1,750	6,360	3.64
Other coarse and fine aggregates	4,600	22,100	4.81
Total or average	19,200	76,300	3.97
Other construction materials	36	132	3.67
Agricultural:			
Limestone	291	1,380	4.74
Poultry grit and mineral food	189	1,700	8.98
Other agricultural uses	121	1,310	10.82
Chemical and metallurgical:			
Cement manufacture	8,600	34,100	3.96
Lime manufacture	2,740	9,930	3.63
Sulfur oxide removal	(2)	(2)	4.59
Special:			
Asphalt fillers or extenders	(2)	(2)	10.68
Other fillers or extenders	797	46,600	58.42
Other miscellaneous uses and other specified uses not listed	20	124	6.20
Unspecified:³			
Reported	53,600	227,000	4.23
Estimated	17,000	66,000	3.88
Total or average	70,700	293,000	4.14
Grand total or average	130,000	624,000	4.82

W Withheld to avoid disclosing company proprietary data; included with "Other."

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

²Withheld to avoid disclosing company proprietary data, included in "Grand total."

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

TABLE 4
TEXAS: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2001, BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) ²	W	W	W	W	--	--
Coarse aggregate, graded ³	196	1,060	191	843	--	--
Fine aggregate (-3/8 inch) ⁴	W	W	W	W	--	--
Coarse and fine aggregates ⁵	W	W	172	617	2	8
Other construction materials	--	--	1	3	--	--
Agricultural ⁶	--	--	--	--	--	--
Chemical and metallurgical ⁷	--	--	--	--	--	--
Special ⁸	--	--	--	--	--	--
Other miscellaneous uses	--	--	--	--	--	--
Unspecified:⁹						
Reported	--	--	278	1,230	4,630	18,700
Estimated	1,400	5,000	370	1,400	530	2,100
Total	1,650	6,300	1,070	4,330	5,160	20,800
Use	District 4		District 5		District 6	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) ²	--	--	W	W	W	W
Coarse aggregate, graded ³	1,200	8,610	6,700	34,600	--	--
Fine aggregate (-3/8 inch) ⁴	11	60	1,280	4,780	--	--
Coarse and fine aggregates ⁵	1,210	5,450	2,740	12,100	W	W
Other construction materials	--	--	35	129	--	--
Agricultural ⁶	--	--	420	3,620	--	--
Chemical and metallurgical ⁷	633	3,060	W	W	--	--
Special ⁸	--	--	W	W	--	--
Other miscellaneous uses	--	--	16	75	--	--
Unspecified:⁹						
Reported	--	--	24,700	106,000	--	--
Estimated	480	1,900	8,100	31,000	60	250
Total	3,530	19,100	52,500	265,000	281	1,210
Use	District 7		District 8		District 9	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) ²	365	2,530	--	--	--	--
Coarse aggregate, graded ³	10,900	65,800	1,170	15,900	45	300
Fine aggregate (-3/8 inch) ⁴	W	W	W	W	91	320
Coarse and fine aggregate ⁵	13,500	48,400	W	W	844	2,980
Other construction materials	--	--	--	--	--	--
Agricultural ⁶	173	572	8	193	--	--
Chemical and metallurgical ⁷	W	W	W	W	--	--
Special ⁸	W	W	--	--	--	--
Other miscellaneous uses	--	--	3	49	--	--
Unspecified:⁹						
Reported	16,400	69,000	5,510	23,100	2,080	8,700
Estimated	6,000	24,000	--	--	140	560
Total	54,700	246,000	7,500	48,800	3,200	12,900

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

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

²Includes filter stone, riprap and jetty stone, and other coarse aggregate.

³Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.

⁴Includes screening (undesignated), stone sand (bituminous mix or seal), stone sand (concrete), and other fine aggregate.

⁵Includes crusher run (select material or fill), graded road base or subbase, terrazzo and exposed aggregate, unpaved road surfacing, and other coarse and fine aggregates.

⁶Includes agricultural limestone, poultry grit and mineral food, and other agricultural uses.

⁷Includes cement manufacture, lime manufacture, and sulfur oxide removal.

⁸Includes asphalt fillers or extenders and other fillers or extenders.

⁹Reported and estimated production without a breakdown by end use.

TABLE 5
TEXAS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2001, BY MAJOR USE CATEGORY¹

Use	Quantity		Unit value
	(thousand metric tons)	Value (thousands)	
Concrete aggregate (including concrete sand)	23,400	\$128,000	\$5.47
Plaster and gunitite sands	270	1,700	6.28
Concrete products (blocks, bricks, pipe, decorative, etc.)	245	698	2.85
Asphaltic concrete aggregates and other bituminous mixtures	990	5,540	5.59
Road base and coverings	5,350	20,400	3.82
Road stabilization (cement and lime)	342	4,000	11.70
Fill	7,850	16,700	2.13
Filtration	114	1,200	10.53
Other miscellaneous uses ²	251	1,420	5.64
Unspecified: ³			
Reported	19,700	112,000	5.66
Estimated	25,000	110,000	4.68
Total or average	82,900	405,000	4.89

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

²Includes roofing granules.

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

TABLE 6
TEXAS: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2001, BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

Use	District 1 and 3		District 2 and 5		District 4 and 7	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products ²	769	6,770	9,720	60,500	3,360	16,800
Asphaltic concrete aggregates and road base materials ³	405	3,260	1,760	8,470	1,750	6,740
Fill	85	301	1,590	6,160	1,680	2,340
Other miscellaneous uses ⁴	--	--	243	1,910	2	12
Unspecified: ⁵						
Reported	2,560	17,600	6,860	38,700	3,210	19,300
Estimated	2,200	11,000	7,200	29,000	4,400	21,000
Total	6,650	39,000	27,300	145,000	14,400	65,700
	District 6 and 8		District 9			
	Quantity	Value	Quantity	Value		
Concrete aggregates and concrete products ²	8320	35,900	1,770	10,600		
Asphaltic concrete aggregates and road base materials ³	2,260	8,490	504	3,010		
Fill	4,490	7,870	--	--		
Other miscellaneous uses ⁴	120	697	--	--		
Unspecified: ⁵						
Reported	5,530	28,300	1,550	7,790		
Estimated	7,200	36,000	3,400	18,000		
Total	27,900	117,000	7,180	39,100		

-- Zero.

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

²Includes plaster and gunitite sands.

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

⁴Includes filtration and roofing granules.

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