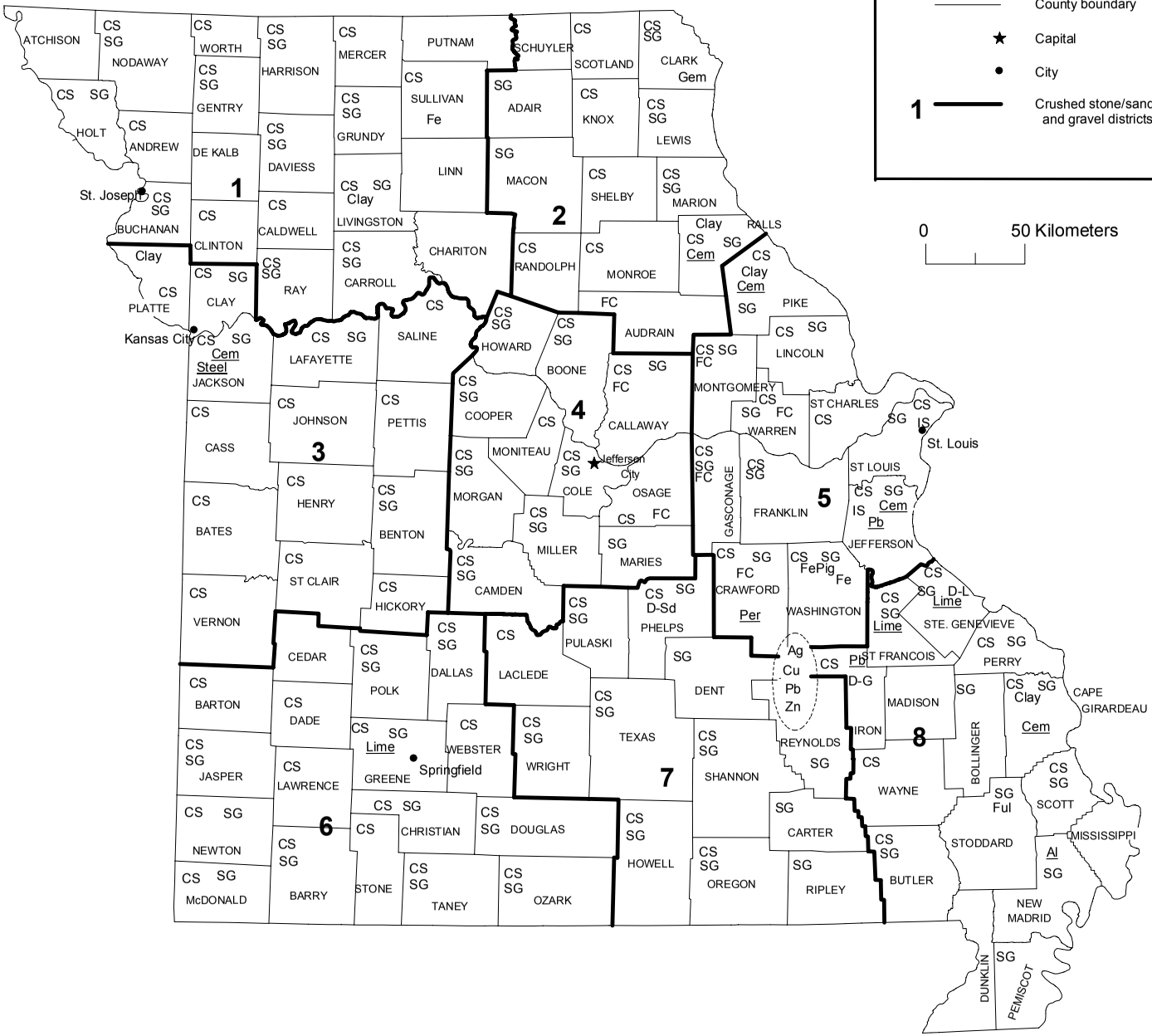
MISSOURI



LEGEND

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

MINERAL SYMBOLS (Major producing areas)

Ag	Silver
Al	Aluminum plant
Cem	Cement plant
Clay	Common clay
CS	Crushed stone
Cu	Copper
D-G	Dimension granite
D-L	Dimension limestone
D-Sd	Dimension sandstone
FC	Fire clay
Fe	Iron
FePig	Iron oxide pigments
Ful	Fuller's earth
Gem	Gemstones
IS	Industrial sand
Lime	Lime plant
Pb	Lead
Pb	Lead plant
Per	Perlite plant
SG	Construction sand and gravel
Steel	Steel plant
Zn	Zinc
◌	Concentration of mineral operations

Source: Missouri Department of Natural Resources, Division of Geology and Land Survey/U.S. Geological Survey (2001)

The Mineral Industry of Missouri

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Missouri Department of Natural Resources, Division of Geology and Land Survey, for collecting information on all nonfuel minerals.

In 2001, the estimated value[1] of nonfuel mineral production for Missouri was $1.34 billion, based upon preliminary U.S. Geological Survey (USGS) data. This remained unchanged from 1999 and 2000.[2] The State remained 10th in rank among the 50 States in total nonfuel mineral production value, of which Missouri accounted for nearly 3.5% of the U.S. total.

Crushed stone, cement (portland and masonry), lead, and lime, in descending order of value, accounted for about 88% of Missouri's total nonfuel mineral production value in 2001. Missouri continued to be the top lead-producing State in the Nation, producing significantly more than one-half the Nation's output and about 2 times and 15 times as much lead as that of the two next highest producing States, respectively. However, both crushed stone and portland cement, by value, remained the State's leading nonfuel minerals in 2001, having surpassed lead in 1997 and 1999, respectively. Prior to this, lead had been Missouri's leading nonfuel mineral since 1969, except for several years in the mid-1980s and during 1993-95 (crushed stone was first).

In 2000, the State's increased values of crushed stone, up $53 million; portland cement, up $18 million; and zinc, up about $5 million, were offset by significant decreases in other nonfuel minerals, mostly those of lead, down more than $50 million; iron ore (proprietary data); lime, down about $10 million; and construction sand and gravel, down more than $8 million. All other changes in value in 2000 were small relative to these (table 1).

Based upon USGS preliminary estimates of the quantities produced in the 50 States in 2001, Missouri remained first in lime and fire clay, second in iron oxide pigments, third in zinc, fifth in portland cement, and ninth in gemstones (in descending order of value). The State rose to third from fourth in the production of fuller's earth and dropped from sixth to seventh in common clays. Additionally, Missouri is one of the Nation's leading producers of crushed stone as well as a significant producer of construction and industrial sand and gravel, masonry cement, and silver.

The Missouri Department of Natural Resources, Division of Geology and Land Survey[3] (DGLS), provided the following narrative information. Some data or information as reported by the DGLS may differ from USGS preliminary estimates and production figures as reported to and estimated by the USGS. Pea Ridge Iron Ore Co. closed its Pea Ridge Mine in northwest Washington County in early September 2001. The Pea Ridge Mine produced magnetite for use as heavy-media flotation, for ceramics, and for other uses. This closure represents the first time in approximately 190 years that the State will not have an active iron mining industry. The mining of iron in Missouri began in about 1815 from small deposits of magnetite on Shepherd Mountain, near Ironton in Iron County. The Pea Ridge property has been purchased for a commercial hunting preserve.

The lead industry in Missouri continued to struggle because of low priced imports of concentrates from China. The Doe Run Co. stopped underground exploration at its Higdon prospect in Perry and St. Francois Counties. The exploration program was designed to obtain material for metallurgical testing purposes and mine development planning. Viburnum No. 29 and West Fork mines and flotation mills continued on standby because of economic conditions.

The crushed stone markets in northeast Missouri have been very active for the past 8 years. During 2001, there was a slight increase from that of 2000, but the DGLS anticipated that business might decrease for many northeast operations in 2002.

The limestone aggregate market in northwest Missouri experienced moderate to slightly decreasing activity in 2001, with continued decreases expected in 2002. Most of this is related to the decreasing number of Missouri Department of Transportation (MoDOT) construction contracts. Hunt Midwest started construction of a 460-meter (m)-long decline at its Stamper Quarry. Completion is expected in midyear 2002. The decline will have a vertical depth of 76 m and will access stone resources in the Bethany Falls Limestone. Initially, haulage will be by truck, but eventually the primary crusher will be underground, and the stone will be conveyed to the surface for further processing.

Overall, in 2001, there was considerable activity in the construction-related crushed stone markets in Missouri. Commercial markets were especially busy in some areas, while the housing market was similarly active. Infrastructure work was decreasing (in particular MoDOT work) and was expected

[1]The 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.

[2]Values, 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.

[3]Ardel Rueff, Geologist, authored the text of State mineral industry formation submitted by the Division of Geology and Land Survey.

to continue as such in 2002.

Springfield Underground Inc. in Greene County started the construction of a new facility to replace a late 1960s plant. A new primary crusher is being installed underground to shorten haul distances and open additional underground space for development. The surface plant will have a capacity of 540 metric tons per hour and is completely enclosed except for loading and transfer points. The plant will produce a variety of aggregate sizes but is optimized to produce concrete stone, manufactured limestone, concrete, sand, and high-grade agricultural lime.

The crushed stone market in the St. Louis area remained very active in 2001, although sales were down slightly from the record high of 2000. The DGLS outlook was for increased sales in 2002 owing to ongoing infrastucture work related to the airport and highways; a continued demand for stone at or near current rates is expected for the next 5 years. Central Stone Co. purchased Bellefontaine Quarries from Berra Construction Co. in November 2001. The purchase included Bellefontaine North in Bellefontaine, St. Louis County; Bellefontaine South in Antonio, Jefferson County; Lincoln County Stone in Moscow Mills, Lincoln County; and St. Francois Stone in Farmington, St. Francois County.

Aggregate markets in southeast Missouri were similar to the active markets in northeast Missouri, 2001 also being slightly busier than 2000. The outlook for 2002 was optimistic because a considerable amount of work was already under contract (although projects had been somewhat slowed down by a rainy spring).

Delta Companies acquired Brown Sand & Gravel at Caruthersville, Pemiscot County. Included in the acquisition were a dredge operation and barge loading and unloading facilities. Several operators expressed concern about the future of funding for highways and bridges.

Housing and commercial projects kept ready-mix concrete markets busy, but market share has been reduced because of the limited use of sand in "superpave." Superpave is a new more stringent asphalt aggregate specification. Environmental and wetland issues continue to be an issue in many areas and streams. A decision by the U.S. Army Corps of Engineers on future management practices for the Missouri River, expected in early 2002, may affect dredge operations. This impact could be significant if a spring flood is mandated to mimic the natural seasonal flow of the river.

During 2001, the Missouri refractory clay industry experienced reduced production and some shifts in the uses of the raw materials produced. RHI continued to consolidate production at its brick plants following the acquisition of Harbison-Walker and A.P. Green. These consolidations included plant closings and large staff reductions in management and hourly workers. Major reasons given for the market condition is low domestic steel production and improved products. More Missouri refractory clay is being used for cement production than is being used in traditional refractory markets.

At yearend 2001, Nestle purchased Ralston Purina Co., which included the operations of a bentonitic clay mine and processing plant near Bloomfield, Scott County. The new name for the facility is the Nestle Purina PetCare Co., Golden Products Division. The Bloomfield plant makes absorbents for pet care and industrial uses.

In the cement industry, Lafarge Corp.'s North American Division commissioned the underground Sugar Creek Mine to provide raw materials for the company's cement plant near Kansas City, Jackson County, in March 2001. Lafarge acquired the Missouri Portland Cement Co. in 1991 and, in October of 1996, decided to build a new plant at the site and to develop an underground mine to supply stone. The mine was developed in the St. Louis Limestone at a depth of 200 m below the plant level. The mine is serviced by two shafts—a production shaft 4 m in diameter and a service shaft 5 m in diameter. Mining is by room-and-pillar methods, and all crushing is underground. The planned capacity of the mine is 1.2 million metric tons per year (Mt/yr). The new cement manufacturing plant is scheduled for completion in the near future.

Holcim (US) Inc. continued the permitting process for its planned Lee Island cement plant in Ste. Genevieve County. Opposition to construction has been expressed by numerous environmental groups. The company completed a road into the property to permit easier access and for use in plant construction. The planned facility would have a 4-Mt/yr capacity. It would be a single kiln, dry process operation with coal planned as the primary fuel. The company controls in excess of 1,620 hectares at the site.

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

(Thousand metric tons and thousand dollars)

Mineral	1999		2000		2001 p/	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement, portland	4,910	354,000 /	4,880	372,000 e/	5,000 e/	381,000 e/
Clays:						
Common	1,080	4,180	1,050	3,240	1,050	3,240
Fire	293	3,980	351	4,630	270	3,500
Sand and gravel, construction	12,400	50,300	10,700	41,700	11,500	45,400
Stone, crushed	72,600 r/	346,000 r/	75,500	399,000	75,300	410,000
Combined values of cement (masonry), clay (fuller's earth), copper, gemstones, iron ore [usable(1999)], iron oxide pigments (crude), lead, lime, sand and gravel (industrial), silver, stone (dimension granite), zinc, and values indicated by symbol W	XX	585,000 r/	XX	516,000 r/	XX	500,000
Total	XX	1,340,000 r/	XX	1,340,000 r/	XX	1,340,000

e/ Estimated. p/ Preliminary. r/ Revised. 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
MISSOURI: CRUSHED STONE SOLD OR USED, 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/	176 r/	66,000 r/	$313,000 r/	$4.74 r/	179	70,200	$337,000	$4.79
Dolomite	23 r/	4,630 r/	21,800 r/	4.71	24	3,880	18,700	4.82
Granite	2	W	W	W	2	W	W	W
Traprock	2	W	W	W	2	W	W	W
Total or average	XX	72,600 r/	346,000 r/	4.77 r/	XX	75,500	399,000	5.28

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

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
MISSOURI: 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	339	$1,840	$5.42
Riprap and jetty stone	2,880	13,700	4.76
Filter stone	172	836	4.86
Other coarse aggregate	1,470	7,120	4.85
Total or average	4,860	23,500	4.84
Coarse aggregate, graded:			
Concrete aggregate, coarse	2,080	13,000	6.25
Bituminous aggregate, coarse	1,110	6,270	5.66
Bituminous surface-treatment aggregate	914	5,640	6.17
Railroad ballast	886	4,140	4.67
Other graded coarse aggregate	3,650	22,700	6.23
Total or average	8,640	51,800	5.99
Fine aggregate (-3/8 inch):			
Stone sand, concrete	227	1,380	6.06
Stone sand, bituminous mix or seal	278	1,850	6.67
Screening, undesignated	482	2,720	5.65
Other fine aggregate	1,370	6,350	4.65
Total or average	2,350	12,300	5.23
Coarse and fine aggregates:			
Graded road base or subbase	5,800	27,400	4.73
Unpaved road surfacing	1,220	5,720	4.34
Crusher run or fill or waste	187	774	4.14
Roofing granules	W	W	W
Other coarse and fine aggregates	4,590	56,900	12.40
Total or average	11,800	90,400	7.67
Other construction materials	346	2,040	5.89
Agricultural:			
Agricultural limestone	854	3,760	4.40
Poultry grit and mineral food	W	W	3.54
Other agricultural uses	138	491	3.56
Total or average	992	4,250	4.28
Chemical and metallurgical:			
Cement manufacture	4,360	14,300	3.28
Lime manufacture	1,600	7,290	4.57
Flux stone	(3/)	(3/)	5.70
Chemical stone	(3/)	(3/)	5.19
Special, asphalt fillers or extenders	(3/)	(3/)	4.80
Unspecified: 4/			
Reported	15,900	75,900	4.76
Estimated	24,000	120,000	4.74
Total or average	40,200	191,000	4.75
Grand total or average	75,500	399,000	5.28

W Withheld to avoid disclosing company proprietary data; included with "Other."
1/ Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.
2/ Includes dolomite, granite, limestone, limestone-dolomite, and traprock.
3/ Withheld to avoid disclosing company proprietary data; included in "Grand total."
4/ Reported and estimated production without a breakdown by end use.

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

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1 1/2 inch) 2/	53	231	W	W	W	W	231	1,060
Coarse aggregate, graded 3/	W	W	W	W	1,020	5,180	1,110	7,200
Fine aggregate (-3/8 inch) 4/	W	W	W	W	W	W	W	W
Coarse and fine aggregate 5/	338	1,390	W	W	W	W	912	3,960
Other construction materials	137	678	--	--	--	--	--	--
Agricultural 6/	55	186	W	W	122	493	W	W
Chemical and metallurgical 7/	--	--	W	W	W	W	--	--
Special 8/	--	--	--	--	--	--	--	--
Unspecified: 9/								
Reported	3,210	15,100	164	770	4,480	21,100	506	2,400
Estimated	1,800	8,400	2,900	14,000	3,300	16,000	1,200	5,900
Total	5,670	26,400	4,670	20,700	10,200	48,100	4,060	20,900

	District 5		District 6		District 7		District 8	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Construction:								
Coarse aggregate (+1 1/2 inch) 2/	1,400	7,630	120	804	W	W	2,580	12,000
Coarse aggregate, graded 3/	2,720	18,400	1,620	10,100	533	2,950	1,530	7,480
Fine aggregate (-3/8 inch) 4/	1,320	5,960	W	W	W	W	162	806
Coarse and fine aggregate 5/	3,740	17,000	1,500	7,520	415	2,010	4,080	55,000
Other construction materials	--	--	115	737	17	87	76	535
Agricultural 6/	W	W	270	1,210	63	314	331	1,550
Chemical and metallurgical 7/	W	W	W	W	--	--	W	W
Special 8/	--	--	--	--	--	--	W	W
Unspecified: 9/								
Reported	5,180	24,400	1,500	7,860	--	--	908	4,280
Estimated	5,100	24,100	4,700	22,300	620	2,900	4,700	22,000
Total	20,900	101,000	10,600	55,400	1,690	8,480	17,800	18,000

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/ Includes filter stone, macadam, riprap and jetty stone, and other coarse aggregate.
3/ Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, concrete aggregate (coarse), railroad ballast, and other graded coarse aggregate.
4/ Includes screening (undesignated), stone sand (concrete), stone sand (bituminous mix or seal), and other fine aggregate.
5/ Includes crusher run (select material or fill), graded road base or subbase, roofing granules, unpaved road surfacing, and other coarse and fine aggregates.
6/ Includes agricultural limestone, poultry grit and mineral food, and other agricultural uses.
7/ Includes cement manufacture, chemical stone for alkali works, flux stone, and lime manufacture.
8/ Includes asphalt fillers or extenders.
9/ Reported and estimated production without a breakdown by end use.

TABLE 5
MISSOURI: 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) 2/	5,670	$22,000	$3.88
Concrete products (blocks, bricks, pipe, decorative, etc.)	596	2,270	3.82
Asphaltic concrete aggregates and other bituminous mixtures	407	1,200	2.94
Road base and coverings	202	885	4.38
Fill	345	770	2.23
Snow and ice control	42	194	4.62
Other miscellaneous uses 3/	106	917	8.65
Unspecified: 4/			
Reported	667	3,020	4.53
Estimated	2,700	10,000	3.86
Total or average	10,700	41,700	3.89

1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Includes plaster and gunite sands.
3/ Includes filtration and roofing granules.
4/ Reported and estimated production without a breakdown by end use.

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

(Thousand metric tons and thousand dollars)

	District 1		District 2		District 3		District 4	
Use	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	66	386	--	--	--	--	W	W
Asphaltic concrete aggregates and road base materials	W	W	--	--	--	--	151	629
Fill	18	46	--	--	--	--	67	236
Other miscellaneous uses 3/	7	39	--	--	--	--	1,160	4,950
Unspecified: 4/								
Reported	--	--	28	171	361	1,480	172	828
Estimated	430	1,600	180	820	10	44	99	380
Total	516	2,020	205	995	371	1,520	1,650	7,020

	District 5		District 6 and 7		District 8	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregate and concrete products 2/	4,100	14,600	242	1,160	W	W
Asphaltic concrete aggregates and road base materials	385	1,190	59	184	W	W
Fill	220	331	39	156	--	--
Other miscellaneous uses 3/	90	762	28	232	733	3,330
Unspecified: 4/						
Reported	--	--	106	545	--	--
Estimated	1,200	5,000	480	1,800	340	840
Total	5,980	22,000	954	4,060	1,070	4,170

W Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous uses." -- Zero.
1/ Data are rounded to no more than three significant digits; may not add to totals shown.
2/ Includes plaster and gunite sands.
3/ Includes filtration, roofing granules, and snow and ice control.
4/ Reported and estimated production without a breakdown by end use.