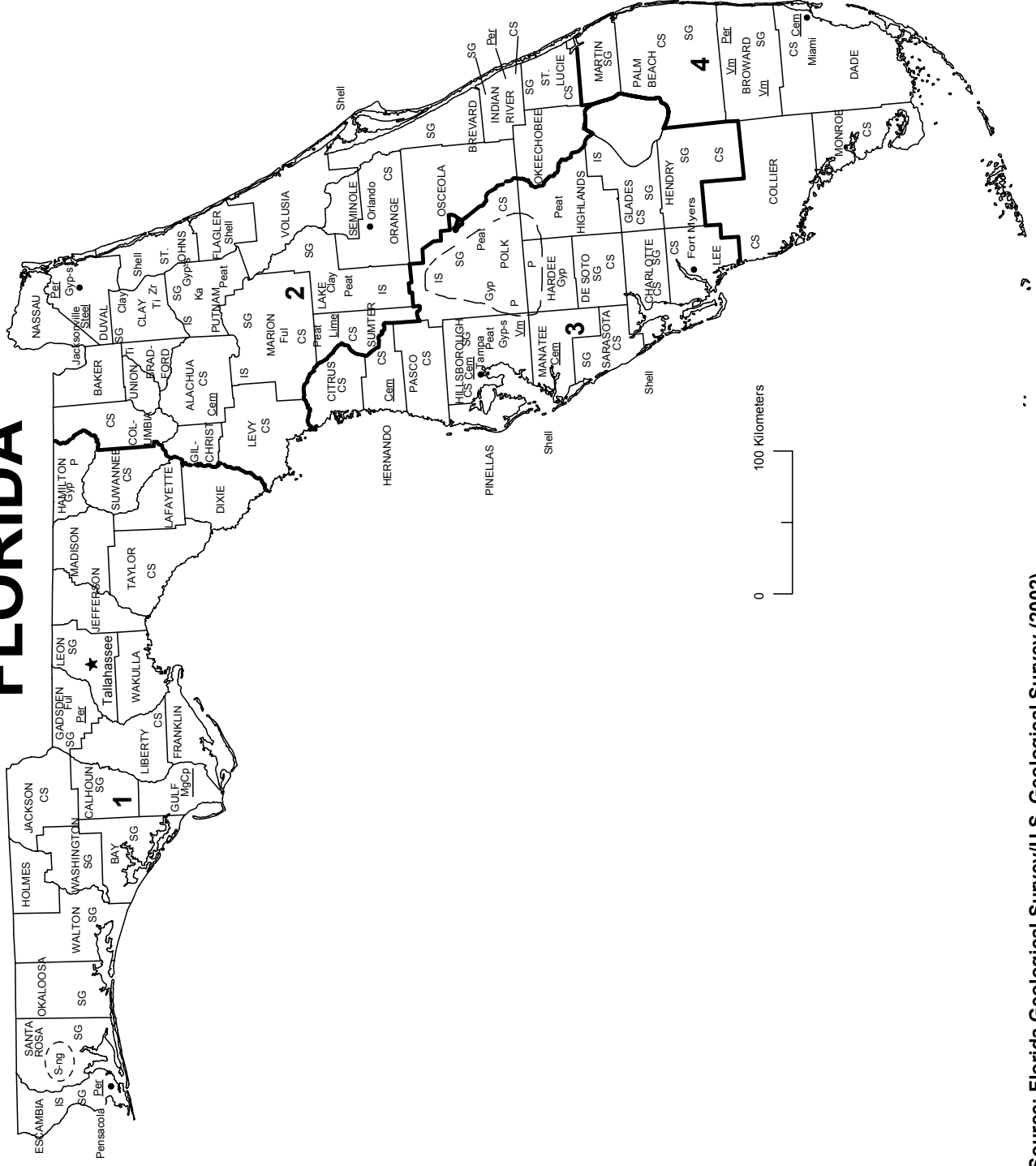


FLORIDA



LEGEND

- County boundary
- Capital
- City

1 Crushed stone/sand and gravel districts

MINERAL SYMBOLS (Major producing areas)

- Cem Cement plant
- Clay Common clay
- CS Crushed stone
- Ful Fuller's earth
- Gyp Gypsum
- Gyp-s Synthetic gypsum
- IS Industrial sand
- Ka Kaolin
- Lime Lime plant
- MgCp Magnesium compound plant
- P Phosphate rock
- Peat Peat
- Per Perlite plant
- S-ng Sulfur (natural gas)
- SG Construction sand and gravel
- Shell Shell
- Steel Steel plant
- Ti Titanium minerals
- Vm Vermiculite plant
- Zr Zirconium
- Concentration of mineral operations

THE MINERAL INDUSTRY OF FLORIDA

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

In 2002, the estimated value¹ of nonfuel mineral production for Florida rose to about \$2.02 billion, based upon preliminary U.S. Geological Survey (USGS) data. This was a more than 12% increase from that of 2001² and followed a slight 1% decrease in 2001 from that of 2000. The State increased in rank to fourth from fifth among the 50 States in total nonfuel mineral production value, of which the State accounted for more than 5.5% of the U.S. total.

Florida continued to lead the Nation in phosphate rock mining in 2002, producing about seven times as much as the next highest producing State. Phosphate rock is produced in only four States. In terms of value, phosphate rock, crushed stone, cement (portland and masonry), and construction sand and gravel continued to be the most important raw nonfuel mineral commodities produced in Florida. The dollar value of these four mineral commodities plus titanium concentrates (ilmenite and rutile) represented about 94% of the State's total nonfuel mineral value. In 2002, substantial increases in the value of phosphate rock and crushed stone, having a combined total increase of about \$200 million, accounted for most of the increase for the year. Increased production and values of cement and construction sand and gravel bolstered gains as did a small increase in zirconium concentrates. A relatively small drop in the value of peat accounted for the largest single decrease (table 1).

In 2001, many nonfuel minerals increased in production and value. Crushed stone was up \$20 million, and portland cement was up about \$9 million; titanium (ilmenite) concentrates, zirconium concentrates, peat, and both construction and industrial sand and gravel increased (in descending order of

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.

increase) (table 1). These increases, however, were not enough to offset the significant drop in phosphate rock production and value and smaller decreases in the value of rutile and masonry cement that led to the State's small decrease for the year. Fertilizer producers in Florida and North Carolina were affected by lower export sales and prices, which resulted from the opening of new phosphoric acid and diammonium phosphate (DAP) plants in Asia. Weak market conditions led to reduced production from phosphate rock mines and phosphoric acid plants in 2001. One mine in Florida closed permanently in August 2000 because of market conditions; the company began using phosphate rock imported from Morocco at its fertilizer plant. Since mid-1999, four mines have closed in Florida as part of corporate restructuring programs and the depletion of reserves. Overall, production in the Florida-North Carolina region during 2001 was 77% of rated annual capacity.

Based upon USGS estimates of the quantities produced in the 50 States in 2002, Florida continued to be the only State to produce rutile concentrates and staurolite. It remained first in rank in the production of phosphate rock and peat, first of two States producing ilmenite concentrates and zirconium concentrates, third in magnesium compounds, fifth in fuller's earth, and seventh in portland cement. Florida led the States in the production of masonry cement (second in 2001) and rose to second from third in the production of crushed stone. Additionally, Florida produced significant quantities of construction and industrial sand and gravel.

The Florida Geological Survey³ (FGS) provided the following narrative information. The greatest portion of Florida's nonfuel mineral production value came from the production of phosphate rock, which accounted for about 75% of the Nation's production and 25% percent of the world's production. In 2002, more than 27 million metric tons of phosphate rock was extracted from 1,968 hectares (ha) of land (Florida Phosphate Council, 2003⁴). Other important commodities included clay, crushed limestone, heavy-mineral sands, masonry and portland cement, and peat.

The Mine Safety and Health Administration reported that 6,728 persons were employed in Florida's surface mining operations in 2002; this number does not account for contractors who may be working for some operators. The limestone industry employed 2,504 workers, while the phosphate rock industry employed 2,071 workers. The remainder of the workforce was employed at cement operations, clay mining

³Steven Spencer, Coastal/Economic Geologist, authored the text of the State mineral industry information provided by the Florida Geological Survey.

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

operations, heavy-mineral sands facilities, and sand and gravel companies.

Exploration and Development

In 2002, the FGS, in cooperation with the U.S. Minerals Management Service (MMS), completed a study of the geologic processes and parameters affecting the shore and near-shore zones within the coastal area and the identified and undiscovered offshore sand resources available for beach replenishment. The area studied comprised shallow sediments in Federal waters off Brevard, Indian River, St. Lucie, and Martin Counties from 5 kilometers (km) to approximately 16 km offshore and the sediments on the beaches immediately adjacent to that area. The findings are included in a 5-year annual report. The report describes extensive new beach-quality sand deposits, including more than 18 million cubic meters of potential reserves off St. Lucie County, which were found through a program of site-specific vibrocoring. The report is available on the MMS Web site at <http://www.mms.gov> or on CD-ROM from the FGS.

Commodity Review

Industrial Minerals

Cargill Fertilizer bought Farmland Hydro L.P.'s chemical complex in Polk County and the proposed Farmland Hardee County Phosphate Mine in early November 2002. Martin Marietta Materials Inc. signed a mining services agreement with Limerock Industries Inc. that allows it to operate three limestone quarries in north Florida (Pit & Quarry, 2002§). The primary quarry is located near Perry, FL.

High-purity limestone was used to manufacture portland and masonry cement. Florida was a major producer and consumer of both types of cement in 2002. Although limestone was mined at several locations throughout the State, cement was produced only in Hernando, Dade, and Alachua Counties.

In the clay industry, Active Minerals Co. acquired the mining lease for the Fletcher-Meginniss fuller's earth mine from Oil-Dri Corp. of Georgia. Active Minerals Corp., which is owned by ITC Industries, plans to reopen and expand the mine. Fuller's earth, common clay, and kaolin were mined at a few locations in Florida. Fuller's earth, typically used as an absorbent material, was mined in Gadsden and Marion Counties; kaolin, often used in the manufacture of paper and refractories, was mined in Putnam County. Common clay was mined in small quantities from various locations throughout the State and used in the manufacture of lightweight aggregates.

Heavy-mineral sand mines continued to be operated by E.I. du Pont de Nemours and Company Inc. and Iluka Resources, Inc. in Baker, Clay, and Putnam Counties. Ilmenite, rutile, zircon, and leucoxene were the primary minerals of interest in the sand deposits of this region. Ilmenite and rutile are the primary ingredients in the manufacture of titanium dioxide pigments, which, in turn, are used in the manufacture of paint, plastics, paper, varnish, and lacquers.

Environmental Issues and Reclamation

From July 1, 1975, to Dec. 31, 2002, approximately 67,900 ha had been mined for phosphate. Mandatory reclamation regulations went into effect July 1, 1975. Since 1975, 70% of the land mined for phosphate has been reclaimed (Florida Phosphate Council, 2003§).

Phosphate companies actively mining and having reclamation responsibility at yearend included Cargill Fertilizer, Inc.; CF Industries, Inc.; IMC Phosphates MP Inc.; and PCS-Phosphates Co., Inc. The following companies are no longer operating but continue to have reclamation responsibility: Agrifos L.L.C., Brewster Phosphates, Estech, Florida Power Co., Exxon/Mobil Co., Nu Gulf Industries Inc., TECO, USS Agrichemicals, and The Williams Co.

In 2002, 37 applications for Environmental Resource Permits (ERP) (excluding phosphate) were approved for more than 6,900 ha. Mine expansions and modifications were included in this total. The Florida Department of Environmental Protection (FDEP) issued an Intent for an ERP and Conceptual Reclamation Plan for the proposed IMC Phosphates Ona Mine in Hardee County. An administrative hearing is scheduled for September 2003 because of a challenge to the Intent.

In 2002, FDEP issued an Intent for an ERP for an extension of the IMC Ft. Green Mine. A challenge to the Intent resulted in a 5-week administrative hearing and an administrative law judge ruling in favor of the Department. One of the challenging parties entered into a settlement agreement with IMC, while another is appealing the ruling.

Governmental Programs

A State senator proclaimed February 6, 2002, as Mining Day at the State Capitol. Twenty-one mining companies displayed products and discussed mining issues with legislators, colleagues, and visitors. The Florida Limerock and Aggregate Institute organized the event and planned to make it an annual affair.

The FGS finished field mapping the western portion of the USGS 1:100,000 Marianna Quadrangle and completed the final maps and cross sections for the same area. The completed maps and cross sections are available as part of the FGS Open-File Map Series (OFMS 91), which is part of an ongoing cooperative effort through the STATEMAP component of the USGS National Cooperative Geologic Mapping Program.

The FGS Web site is on the Internet at URL <http://www.dep.state.fl.us/geology/>. Some of the new publications there include a geologic map of the State, a report on marine sand resources of Florida's Gulf of Mexico, a poster on protecting Florida's springs, a poster on Florida's industrial minerals, and an open-file report on granulometry.

Internet References Cited

- Florida Phosphate Council, 2003, 2002 Florida phosphate facts, accessed August 7, 2003, at URL <http://www.flaphos.org/facts2002.pdf>.
Pit & Quarry, 2002 (August 26), Martin Marietta Materials announces transactions in Texas, Florida, Iowa, accessed August 7, 2003, at URL <http://www.pitandquarry.com/pitandquarry/article/articleDetail.jsp?id=29844>.

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

(Thousand metric tons and thousand dollars)

Mineral	2000		2001		2002 ^p	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	546	64,900 ^e	556	62,600 ^e	610 ^e	69,000 ^e
Portland	3,750	285,000 ^e	4,060	294,000 ^e	4,130 ^e	299,000 ^e
Clays:						
Common	W	W	94 ^e	1,280 ^e	94 ^e	1,280 ^e
Fuller's earth	W	W	334 ^e	22,200 ^e	334	22,200
Kaolin	33	3,420	32	3,380	31	3,500
Gemstones	NA	1	NA	1	NA	1
Peat	416	8,640	544	11,300	546	9,800
Sand and gravel:						
Construction	24,500	107,000	24,800	109,000	26,000	116,000
Industrial	510	6,320	598	7,510	524	8,020
Stone, crushed	93,000	495,000	95,100	515,000	104,000	595,000
Combined values of magnesium compounds, phosphate rock, staurolite, titanium concentrates, zirconium concentrates, and values indicated by symbol W	XX	848,000	XX	770,000	XX	896,000
Total	XX	1,820,000	XX	1,800,000	XX	2,020,000

^eEstimated. ^pPreliminary. NA Not available. W Withheld to avoid disclosing company proprietary data; value 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.

TABLE 2
FLORIDA: 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 ²	85	89,200	\$472,000	\$5.29	78	92,100	\$497,000	\$5.39
Dolomite	5	2,280	15,900	7.00	5	1,820	12,500	6.87
Shell	5	1,460	6,980	4.77	4	1,160	6,060	5.24
Total or average	XX	93,000	495,000	5.33	XX	95,100	515,000	5.42

XX Not applicable.

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

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

TABLE 3
FLORIDA: 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):			
Macadam	W	W	\$5.79
Riprap and jetty stone	105	\$762	7.26
Filter stone	88	594	6.75
Other coarse aggregates	58	506	8.72
Total or average	251	1,860	7.42
Coarse aggregate, graded:			
Concrete aggregate, coarse	9,050	57,100	6.31
Bituminous aggregate, coarse	W	W	6.31
Bituminous surface-treatment aggregate	W	W	4.85
Other graded coarse aggregates	8,160	56,800	6.96
Total or average	17,200	114,000	6.62
Fine aggregate (-3/8 inch):			
Stone sand, concrete	2,230	15,400	6.92
Stone sand, bituminous mix or seal	W	W	7.62
Screening, undesignated	3,100	23,900	7.72
Other fine aggregates	3,740	30,200	8.09
Total or average	9,070	69,600	7.67
Coarse and fine aggregates:			
Graded road base or subbase	14,200	57,700	4.06
Crusher run or fill or waste	3,280	13,000	3.97
Other coarse and fine aggregates	4,730	21,600	4.56
Total or average	9,070	92,300	4.16
Other construction materials	825	3,530	4.28
Agricultural limestone	214	1,470	6.85
Chemical and metallurgical:			
Cement manufacture	(2)	(2)	3.95
Lime manufacture	(2)	(2)	4.96
Special, other fillers or extenders	(2)	(2)	5.87
Other miscellaneous uses and specified uses not listed	(2)	(2)	7.91
Unspecified: ³			
Reported	31,100	167,000	5.37
Estimated	11,000	52,000	4.76
Total or average	42,100	219,000	5.21
Grand total or average	95,100	515,000	5.42

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
FLORIDA: 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	W	W
Coarse aggregate, graded ³	W	W	W	W	1,880	18,700
Fine aggregate (-3/8 inch) ⁴	W	W	W	W	1,710	13,400
Coarse and fine aggregate ⁵	514	3,530	5,910	23,700	1,340	6,840
Other construction materials	--	--	--	--	--	--
Agricultural ⁶	W	W	W	W	W	W
Chemical and metallurgical ⁷	--	--	--	--	W	W
Special ⁸	W	W	--	--	W	W
Other miscellaneous uses and specified uses not listed	--	--	W	W	--	--
Unspecified: ⁹						
Reported	1,030	4,870	2,260	10,800	8,450	44,600
Estimated	1,900	9,200	1,900	8,900	4,800	24,000
Total	4,000	26,000	10,600	48,200	20,300	117,000
District 4						
	Quantity	Value				
Construction:						
Coarse aggregate (+1 1/2 inch) ²	229	1,500				
Coarse aggregate, graded ³	14,600	85,300				
Fine aggregate (-3/8 inch) ⁴	W	W				
Coarse and fine aggregates ⁵	14,400	58,200				
Other construction materials	825	3,530				
Agricultural ⁶	--	--				
Chemical and metallurgical ⁷	W	W				
Special ⁸	--	--				
Other miscellaneous uses and specified uses not listed	(10)	(10)				
Unspecified: ⁹						
Reported	19,300	107,000				
Estimated	2,500	11,000				
Total	60,200	324,000				

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, macadam, riprap and jetty stone, and other coarse aggregates.

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

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

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

⁶Includes agricultural limestone.

⁷Includes cement manufacture and lime manufacture.

⁸Includes other fillers or extenders.

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

¹⁰Less than 1/2 unit.

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

Use	Quantity		
	(thousand metric tons)	Value (thousands)	Unit value
Concrete aggregates and concrete products	3,180	\$14,400	\$4.53
Plaster and gunite sands	286	1,700	5.94
Asphaltic concrete aggregates and other bituminous mixtures	W	W	3.31
Road base and coverings ²	W	W	4.07
Fill	1,310	2,590	1.98
Other miscellaneous uses ³	736	2,630	3.57
Unspecified: ⁴			
Reported	13,500	65,000	4.81
Estimated	5,800	22,000	3.83
Total or average	24,800	109,000	4.40

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

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

²Includes road and other stabilization (lime).

³Includes filtration.

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

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

(Thousand metric tons and thousand dollars)

Use	District 1		District 2	
	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products ²	W	W	W	W
Asphaltic concrete aggregates and road base materials	--	--	W	W
Fill	225	502	565	646
Other miscellaneous uses ³	1,190	6,860	8,790	43,800
Unspecified: ⁴				
Reported	W	W	W	W
Estimated	1,600	6,200	2,500	9,600
Total	3,060	13,600	11,800	54,000
	District 3		District 4	
	Quantity	Value	Quantity	Value
Concrete aggregates and concrete products ²	W	W	W	W
Asphaltic concrete aggregates and road base materials	--	--	--	--
Fill	303	801	219	640
Other miscellaneous uses ³	2,610	10,600	785	3,770
Unspecified: ⁴				
Reported	5,950	25,200	--	--
Estimated	W	W	W	W
Total	8,870	36,500	1,000	4,410

W Withheld to avoid disclosing company proprietary data; included in "Other miscellaneous uses." -- Zero.

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

²Includes plaster and gunite sands.

³Includes filtration.

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