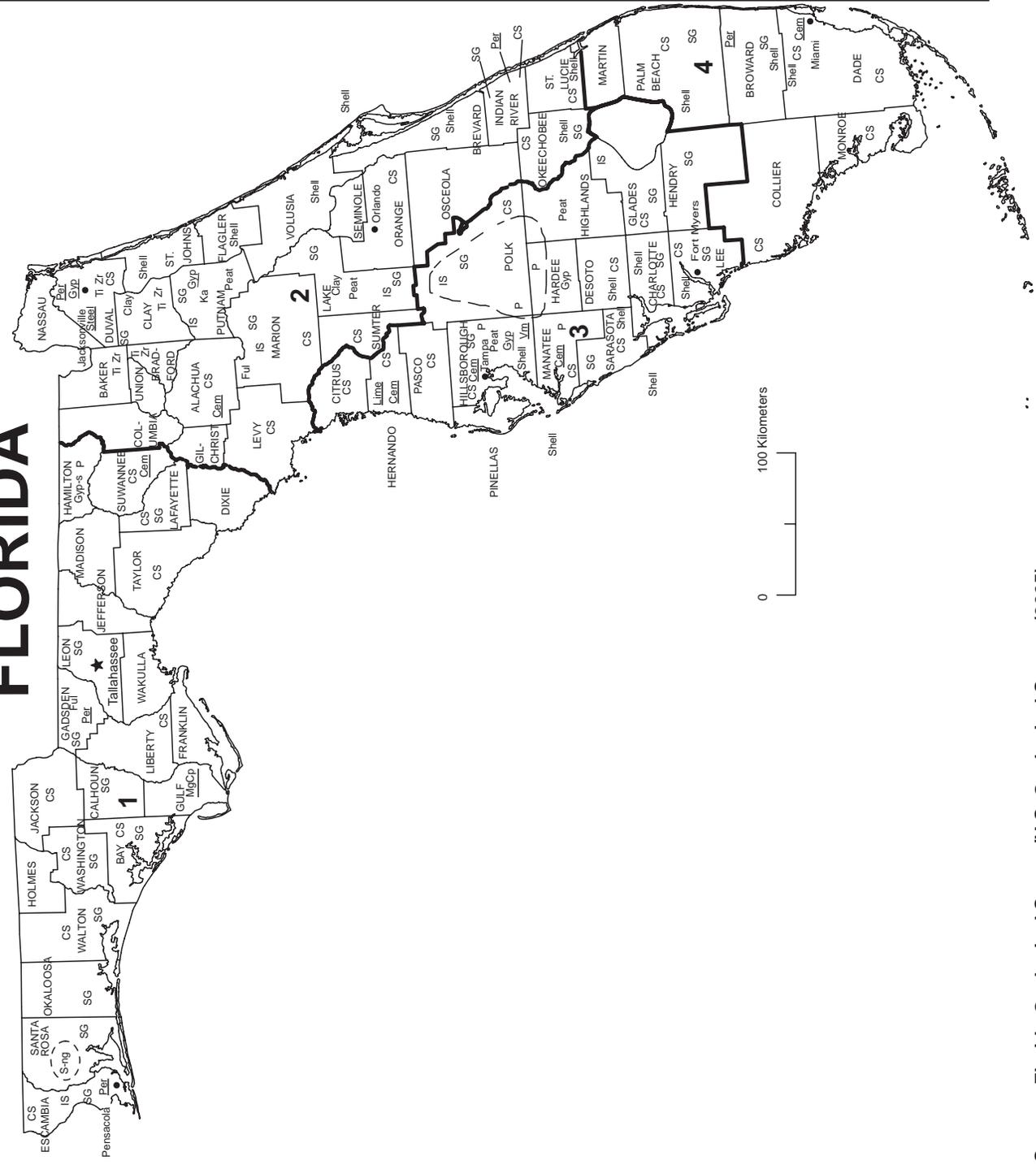




2005 Minerals Yearbook

FLORIDA

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 plant
- 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 mineral
- (dashed circle) 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 2005, Florida's nonfuel raw mineral production was valued¹ at \$2.89 billion, based upon annual U.S. Geological Survey (USGS) data. This was a \$570 million or a 24.6% increase from the State's total of \$2.32 billion in 2004, which was up 12.1% from that of 2003. The State remained fourth in rank among the 50 States in total nonfuel mineral production value, of which the State accounted for more than 5% of the U.S. total.

Florida continued to lead the Nation in phosphate rock mining in 2005 with about 75% of U.S. production, producing more than six times as much as the next highest producing State. Phosphate rock is produced in only four States. In terms of value, crushed stone moved ahead of phosphate rock as Florida's leading nonfuel mineral commodity, followed by phosphate rock, cement (portland and masonry), construction sand and gravel, zirconium concentrates, and titanium concentrates (ilmenite and rutile), the combined values of which represented 97% of the State's total nonfuel mineral value.

In 2005, most of Florida's mined nonfuel mineral commodities increased in value, nearly all of which also increased in unit value. The largest increases in value took place in crushed stone, cement (portland and masonry), construction sand and gravel, and phosphate rock, the unit values of each commodity showing significant increases. A 9.5% increase in crushed stone production led to a 46%, or \$314 million, increase in the commodity's total value and close to 11% more cement production resulted in a more than 22%, or \$118 million, increase in its value. Construction sand and gravel production rose 28%, the value of which increased by \$64 million, a 44% increase. Phosphate rock, with a relatively marginal increase in production, rose by \$54 million while moderately increasing in unit value. These were followed by zirconium concentrates, up \$9 million, and fuller's earth and rutile, up about \$6 million each. The most significant decreases in value were in magnesium compounds and ilmenite, down about \$5 million and \$2 million, respectively. Data on mineral production are provided in table 1.

The Florida Geological Survey² (FGS) provided the following narrative information. Production and other data in the following text are those reported by the FGS, based upon that agency's own surveys and estimates. The FGS data may differ from some production figures reported to the USGS.

¹The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the 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 2005 USGS mineral production data published in this chapter are those available as of December 2006. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals>.

²Steven Spencer, Professional Geologist, and James Balsillie, Coastal/Economic Geologist, authored the text of the State mineral industry information provided by the Florida Geological Survey.

Exploration and Development

Expansion of phosphate mining has been proposed in west-central Florida (Hardee and Manatee Counties), to the south in DeSoto County, and in northern Florida in Lafayette County, involving some 32,900 hectares (ha). While sand supplies were adequate, the same was not true for cement, gravel, and crushed stone. Cement and stone aggregates continued to be imported into Florida, although not in quantities exceeding Florida's production levels. Industry standard distances from the source to construction sites for the Nation commonly have an average transportation trucking range of 80 kilometers (km) (50 miles) based on economics (National Stone, Sand and Gravel Association, 2005). In Florida, more than one-half of the crushed stone aggregate comes from the southernmost part of Florida, in Dade County. The remainder of Florida is experiencing progressively larger transportation distances for delivery of stone aggregates, commonly up to 240 km (150 miles). This, in turn, owing to increasing fuel prices, is elevating aggregate costs to the consumer. In northern Florida, although precise quantities are unknown, stone aggregate is arriving by barges down the Mississippi River and by rail and ships. A shortage in qualified truck drivers is aggravating delivery accommodations. Florida is experiencing a rapid population growth and a shortage of qualified construction personnel to build housing. As aggregate production levels rise, it is anticipated that the State's reserves might be exhausted or in economic jeopardy in a relatively short time. This is partly owing to public opposition to mining and environmental concerns, preemption of mining rights because of zoning or deed restrictions, and (or) other litigation-related land-use constraints.

Florida's mineral resources reach beyond those of terrestrial origin or siting, especially for Florida's excessively broad continental margins in the Gulf of Mexico. The Florida Geological Survey's research on the State's marine waters off the Gulf of Mexico has received recognition by the U.S. Department of the Interior's Minerals Management Service (MMS). A significant number of investigations have been published or otherwise reported on concerning offshore sediments along Florida's Gulf of Mexico coastline. Balsillie and Clark (2001, p. 1) compiled a comprehensive treatment of the subject on a regional, subregional, and Florida county-by-county basis. Their study was undertaken to identify what is known about potential sources of sediment for beach restoration and maintenance renourishment. They annotated publications and reports so that the user will have a grasp of the information and area of applicability of each included work.

Commodities Review

Industrial Minerals

In 2005, Florida continued to be the only State to process rutile (titanium concentrate) and to mine and produce staurolite. The State also remained first in the quantity of phosphate rock, masonry cement, and peat produced (listed in descending order of value). Florida continued as first of two States that processed zirconium concentrates and ilmenite (titanium concentrate), and it rose in rank to second from third in the production of crushed stone, to fourth from fifth in fuller's earth clay, and to fourth from sixth in portland cement. While the State decreased to third from second in magnesium compounds, its mines continued to produce significant quantities of construction sand and gravel and industrial sand and gravel.

Florida is among the States gaining the most in population, with some 25,500 new residents arriving monthly. Basic materials to support infrastructure, the commercial service sector, and housing have been affected. As in recent years, the construction industry has been hampered by an inadequate supply of materials, in particular, shortages of aggregates, cement, and steel. In 2005, the mining and processing of basic construction materials in Florida (limestone or lime-rock aggregates, whether termed gravel or crushed stone, sand, and cement) comprised about 56% of the total nonfuel valuation of all mined mineral resources or mined commodities of the State.

Cement.—High-purity limestone is used to manufacture the clinker for masonry and portland cement. Florida was a major producer and consumer of both types of cement in 2005. Limestone is mined in a number of counties throughout the State; cement clinker was produced only in Alachua, Dade, Hernando, and Suwannee Counties. Cement plants that ground imported clinker operated in Hillsborough and Manatee Counties. American Cement Company has applied for an air construction permit to build a dry process portland cement plant in Sumterville. The City Commission decided in a unanimous vote that Florida Rock Industries was allowed to double the cement-making capacity of its cement plant near Newberry. Suwannee American Cement near Branford was issued a permit to double the size of their mill.

Clays.—Fuller's earth, common clays, and kaolin were mined in several locations in Florida in 2005. Fuller's earth, which was mined in Gadsden and Marion Counties, is typically used as an absorbent material; kaolin, which was mined in Putnam County, is used in the manufacture of paper and refractories. Common clays were mined in Clay and Lake Counties and in smaller quantities from various locations throughout the State.

Phosphate Rock.—CF Industries, Inc., Mosaic Fertilizer, LLC, and PCS Phosphate Co. are the only active phosphate mining companies in Florida. The phosphate industry is located in the counties of Hamilton, Hardee, Hillsborough, Manatee, and Polk. Mosaic closed its Kingsford mine owing to depleted reserves in September 2005. The closure resulted in the elimination of 275 jobs. For general information concerning phosphate mining, please visit the Florida Department of Environmental Protection's Bureau of Mine Reclamation Web site at <http://www.dep.state.fl.us/water/mines>.

Metals

Titanium and Zirconium.—E.I. du Pont de Nemours & Co., Inc. and Iluka Resources, Inc. continued to operate heavy-mineral titanium and zirconium-bearing sand mines in Baker, Bradford, Clay, and Duval Counties. Ilmenite, leucoxene, rutile, and zircon are the primary minerals of interest in the heavy-mineral sand deposits of this region. Ilmenite, leucoxene, and rutile are the primary ingredients in the manufacture of titanium dioxide pigments, which are used in the manufacture of lacquers, paint, paper, plastics, and varnish. The major uses of zircon are refractories, foundry sands, and ceramic applications. In December 2005, Iluka Resources, Inc. announced that it would undertake a staged closure of its Florida/Georgia operations during 2006 (Iluka Resources Limited, 2006³).

Environmental Issues, Reclamation, and Awards

In 2005, the Florida Department of Environmental Protection (FDEP), Bureau of Mine Reclamation issued 48 permits, largely Environmental Resource Permits (ERP) and Wetland Resource Permits, accounting for 1,831 ha of upland and wetland disturbance and mine expansions and modifications. Records indicate that 64% of land mined for phosphate has been reclaimed since July 1, 1975; the land covered more than 68,800 ha with 44,500 ha having been reclaimed.

Since July 1, 1975, Florida has required that all mined lands be reclaimed, as administered by FDEP's Bureau of Mine Reclamation. In the past 10 years, more than \$325 million has been spent on mandatory as well as other related reclamation projects. Mined land has been reclaimed for agricultural, commercial, industrial, recreational, and residential purposes and as sanctuaries for birds and other wildlife. Since 1980, more than 30 million trees have been planted on reclaimed lands. The mining companies have also donated thousands of hectares to State and public entities for recreational uses and for wildlife habitat. The industry has continued to work with the FDEP and other State and Federal agencies to protect and to restore ecosystems and to benefit wildlife. Of the commodities mined in Florida, phosphate mining is the most land intensive. In 2005, approximately 1,800 ha (4,525 acres) of land was mined for phosphate. All phosphate lands disturbed from July 1, 1975, have a mandatory reclamation requirement. Reclamation standards for phosphate lands are detailed in Chapter 62C-16 of the Florida Administrative Code.

Florida Limerock & Aggregate Institute (FLAI), whose members represent about 85% of the construction aggregates operators in the State, was honored on March 17, 2005, as National Stone, Sand & Gravel Association's (NSSGA) State Association of the Year for 2004 at NSSGA's annual convention in Las Vegas. NSSGA's President and CEO recognized with this award how highly NSSGA valued and respected the work FLAI has done and the Institute's leadership in promoting the interest of the aggregates industry in Florida. FLAI was congratulated for their successful partnership with NSSGA on numerous workshops and seminars that have delivered excellent training

³A reference that includes a section mark (§) is found in the Internet Reference Cited section.

to aggregate industry workers, as well as the work they have completed with Florida legislators, governmental agencies, students, and educators in delivering the positive story of the production and use of aggregates as “a model for the industry.”

Government Programs

The erosional impacts of hurricanes Charlie, Frances, Ivan, and Jeanne on the coasts of Florida in 2004 brought resounding responses from Federal and State Governments. In 2004, the Florida Legislature added an emergency appropriation of \$68.4 million to its \$30 million annual expenditure level for beach restoration. These funds are, in part, used to cost-share with local governments and with the U.S. Army Corps of Engineers, funding of more than \$160 million for some 15 Florida beach restoration projects. While most of the funding is used in design phases and dredging and pumping activities, part of this total funding is used for conducting sand search studies in offshore waters. Marine sources of sand for restoration work have been the norm for decades because upland sources have become diminished and (or) not economic.

The FGS and the MMS have entered into a multiyear cooperative agreement (cooperative agreement no. 1435-0001-30757) with the specific goal of locating and characterizing the areal extent and volume of available sands suitable for beach nourishment that lie in Federal waters adjacent to State submerged lands off the northeast coast of Florida. In the second year of this study, 306 km of seismic data were collected offshore in Nassau, Duval, and Flagler Counties. These data were subsequently processed, interpreted, and integrated with the data collected in the first year. A total of 52 vibracores were collected offshore in Duval and Nassau Counties. Initial analysis of all vibracore data available for inclusion in the FGS and MMS report indicates inferred potential reserves of up to 152 million cubic meters of restoration-quality sand are offshore of southern Duval County. The analysis of planned vibracores for the third-year report will help identify the quality and quantity

of potential reserves offshore of northern Duval County and all of Nassau County.

Geologic mapping continued during 2005 with Federal matching funding from the STATEMAP program, a component of the USGS National Cooperative Mapping Program, which is congressionally mandated by the National Cooperative Geologic Mapping Program (NCGMP). The USGS distributes Federal funds through NCGMP to support geologic mapping efforts, utilizing a competitive funding process. The NCGMP has three primary components: FEDMAP, which funds Federal geologic mapping projects, STATEMAP, which is a matching-funds grant program with State geological surveys, and EDMAP, a matching-funds grant program with universities that has a goal to train the next generation of geologic mappers. In 2005, the FGS completed geologic mapping for the eastern portion of the USGS 1:100,000-scale Gainesville 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 (Evans and others, 2004).

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- Evans, W.L., III, Green, R.C., Bryan, J.R., and Paul, D.T., 2004, Geologic map of the western portion of the U.S.G.S. 1:100,000-scale Gainesville Quadrangle, northern Florida: Florida Geological Survey Open-File Map Series No. 93, 2 plates.
- National Stone, Sand and Gravel Association, 2005, 50 fascinating facts about stone, sand and gravel: National Stone, Sand and Gravel Association, brochure, 6 p. (Also available at <http://www.nssga.org>.)

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

(Thousand metric tons and thousand dollars unless otherwise specified)

Mineral	2003		2004		2005	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	674	82,900 ^e	763	97,600 ^e	902	129,000 ^e
Portland	4,190	323,000 ^e	5,230	432,000 ^e	5,730	519,000 ^e
Clays:						
Common	94 ^e	1,280 ^e	W	W	W	W
Fuller's earth	W	W	234	W	279	W
Kaolin	31	3,250	31	3,280	29	3,510
Gemstones	NA	1	NA	1	NA	1
Lime	--	--	24	2,090	23	2,940
Peat	373	7,440	478	9,710	464	9,450
Sand and gravel:						
Construction	30,900	141,000	29,300	146,000	37,500	210,000
Industrial	624	7,270	679	8,520	715	9,410
Stone, crushed	97,100	587,000	105,000 ³	680,000 ^{r,3}	115,000 ³	994,000 ³
Combined values of magnesium compounds, phosphate rock, staurolite, stone (crushed sandstone [2004-05]), titanium concentrates, zirconium concentrates, and values indicated by symbol W	XX	918,000	XX	945,000	XX	1,010,000
Total	XX	2,070,000	XX	2,320,000 ^r	XX	2,890,000

^eEstimated. ^rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in "Combined value" data. XX Not applicable. -- Zero.

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.

³Excludes certain stones; kind and value included with "Combined values" data.

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

Kind	2004			2005		
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Number of quarries	Quantity (thousand metric tons)	Value (thousands)
Limestone ²	77 ^r	102,000 ^r	\$666,000 ^r	84	110,000	\$963,000
Dolomite	4	1,030	7,260 ^r	4	982	7,370
Shell	3	1,150	6,110	4	4,040	24,000
Total	XX	105,000	680,000 ^r	XX	115,000	994,000

^rRevised. XX Not applicable.

¹Data are rounded to no more than three significant digits; 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 2005, BY USE¹

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Construction:		
Coarse aggregate (+1½ inch):		
Macadam	W	W
Riprap and jetty stone	51	927
Filter stone	119	1,910
Other coarse aggregate	706	6,770
Total	876	9,600
Coarse aggregate, graded:		
Concrete aggregate, coarse	2,620	41,400
Bituminous aggregate, coarse	(2)	(2)
Other graded coarse aggregate	13,600	185,000
Total	16,200	226,000
Fine aggregate (-¾ inch):		
Stone sand, concrete	(3)	(3)
Stone sand, bituminous mix or seal	(3)	(3)
Screening, undesignated	1,410	17,600
Other fine aggregate	9,800	104,000
Total	12,400	128,000
Coarse and fine aggregates:		
Graded road base or subbase	14,000	66,200
Crusher run or fill or waste	2,040	7,920
Other coarse and fine aggregates	10,700	101,000
Total	26,700	175,000
Other construction materials	2,650	12,700
Agricultural:		
Agricultural limestone	620	5,080
Other agricultural uses	54	240
Total	674	5,320
Chemical and metallurgical:		
Cement manufacture	6,150	18,200
Chemical stone	(3)	(3)
Sulfur oxide removal	(3)	(3)
Total	6,950	29,300
Special, other fillers or extenders	(4)	(4)
Other miscellaneous uses and specified uses not listed	84	798
Unspecified:⁵		
Reported	41,300	348,000
Estimated	6,900	60,000
Total	48,200	408,000
Grand total	115,000	994,000

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

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

²Withheld to avoid disclosing company proprietary data; included with "Other graded coarse aggregate."

³Withheld to avoid disclosing company proprietary data; included in "Total."

⁴Withheld to avoid disclosing company proprietary data; included with "Unspecified: Reported."

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

TABLE 4
FLORIDA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2005, 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 (+1½ inch) ²	W	W	18	363	W	W
Coarse aggregate, graded ³	W	W	W	W	5,730	87,300
Fine aggregate (-¾ inch) ⁴	W	W	W	W	3,250	38,600
Coarse and fine aggregates ⁵	476	4,610	9,690	44,200	3,590	21,600
Other construction materials	272	2,000	--	--	2,380	10,700
Agricultural ⁶	378	2,730	--	--	296	2,590
Chemical and metallurgical ⁷	--	--	W	W	W	W
Special ⁸	--	--	--	--	W	W
Other miscellaneous uses and specified uses not listed	--	--	--	--	84	798
Unspecified:⁹						
Reported	2,580	18,500	3,800	30,000	13,500	115,000
Estimated	1,200	11,000	1,500	13,000	1,100	9,700
Total	5,770	53,800	17,900	110,000	33,500	302,000
			District 4		Unspecified districts	
			Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1½ inch) ²	W	W	--	--	--	--
Coarse aggregate, graded ³	9,500	123,000	--	--	--	--
Fine aggregate (-¾ inch) ⁴	W	W	--	--	--	--
Coarse and fine aggregates ⁵	13,000	105,000	--	--	--	--
Other construction materials	--	--	--	--	--	--
Agricultural ⁶	--	--	--	--	--	--
Chemical and metallurgical ⁷	W	W	554	6,180	--	--
Special ⁸	--	--	--	--	--	--
Other miscellaneous uses and specified uses not listed	--	--	--	--	--	--
Unspecified:⁹						
Reported	21,100	183,000	--	--	--	--
Estimated	3,000	26,000	--	--	--	--
Total	57,000	522,000	554	6,180	--	--

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 aggregate.

³Includes bituminous aggregate (coarse), concrete aggregate (coarse), and other graded aggregate.

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

⁵Includes crusher run or fill or waste, graded road base or subbase, and other coarse and fine aggregates.

⁶Includes agricultural limestone and other agricultural uses.

⁷Includes cement manufacture, chemical stone, and sulfur oxide removal.

⁸Includes other fillers or extenders.

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

TABLE 5
 FLORIDA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2005,
 BY MAJOR USE CATEGORY¹

Use	Quantity		Unit value
	(thousand metric tons)	Value (thousands)	
Concrete aggregate (including concrete sand)	11,500	\$79,400	\$6.92
Plaster and gunitite sands	1,370	8,350	6.08
Asphaltic concrete aggregates and road base materials	2,290	20,000	8.73
Fill	6,370	20,100	3.15
Other miscellaneous uses	2,420	9,500	3.93
Unspecified: ²			
Reported	7,140	38,200	5.35
Estimated	6,410	34,300	5.35
Total or average	37,500	210,000	5.60

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

²Reported and estimated production without a breakdown by end use.

TABLE 6
 FLORIDA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2005, BY USE AND DISTRICT^{1,2}

(Thousand metric tons and thousand dollars)

Use	District 1		Districts 2 and 3		District 4	
	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates (including concrete sand) ³	660	2,550	12,200	85,200	--	--
Asphaltic concrete aggregates and road base materials	--	--	2,290	20,000	--	--
Fill	659	855	5,180	16,100	531	3,070
Other miscellaneous uses	--	--	2,420	9,500	--	--
Unspecified: ⁴						
Reported	--	--	7,140	38,200	--	--
Estimated	2,270	12,200	4,050	21,600	92	494
Total	3,590	15,600	33,300	191,000	623	3,570

-- Zero.

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

²Districts 2 and 3 are combined to avoid disclosing company proprietary data.

³Includes plaster and gunitite sands.

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