

THE MINERAL INDUSTRY OF NORTH DAKOTA

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

In 2004, North Dakota's nonfuel raw mineral production was valued¹ at \$44.5 million, based upon annual U.S. Geological Survey (USGS) data. This was a 4.3% decrease from the State's total nonfuel mineral value for 2003,² which was up more than 27% from 2002.

North Dakota's leading nonfuel mineral by value in 2004 continued to be construction sand and gravel. This high-volume, low-value commodity accounted for nearly three-fourths of the State's nonfuel raw mineral production value. Lime was second by value, and crushed stone was third. In 2004, construction sand and gravel production decreased by slightly more than 13%, accounting for an 8.6%, or \$3.1 million, decrease in value, the largest and most significant decrease for the year (table 1). With an increase in production, the value of crushed stone showed a significant increase, and the value of lime was up, slightly. The value of gemstones was unchanged, and industrial sand and gravel value showed a small decrease.

In 2003, a 26% increase in construction sand and gravel production accounted for an \$8 million rise in its value; smaller yet significant increases also took place in the values of lime, industrial sand and gravel, and common clays (descending order of change).

The following narrative information was provided by the North Dakota Geological Survey³ (NDGS). Production data in the text that follows are those reported by the NDGS based upon that agency's own surveys and estimates.

Commodity Review

Industrial Minerals

During 2004, 16 surface mining operators in North Dakota reported information to the North Dakota State Soil Conservation Committee (SSCC). (The SSCC collects production data by volume, unlike the USGS, which collects data by mass or metric tons produced.) Based upon these reports, 104 hectares (ha) was affected by these operations. The quantity of minerals mined included 2.02 million cubic meters (m³) of sand and gravel, 83,000 m³ of clay, 97,000 m³ of scoria, and 57,000 m³ of crushed stone for a total of 2.26 million m³ of mined mineral material. From 60 pits, ranging in size from more than 0.1 ha to 16 ha, a total of 351,000 m³ of overburden was disturbed.

Common Clays.—Most of the clay mined in North Dakota during this period (about 80%, or 66,000 m³) was mined by the Hebron Brick Co. to produce brick, and one-third to one-half of the clay mined for the manufacture of brick was kaolinite. In 2002, more than one-half of the clay produced in North Dakota was used to construct dikes and raise roads in the flooded area of Devils Lake. In 2004, about 20% (16,000 m³) of the clay was mined for this purpose.

Leonardite.—Leonardite is an oxidized lignite. Currently, Georesources, Inc. of Williston and American Colloid Co. of Scranton are the only leonardite mining operations in North Dakota. The two companies produced a combined total of approximately 60,000 metric tons (t) of leonardite in 2004, a 17% decrease from 2003. Leonardite is processed and used as a dispersant and viscosity control in oil well drilling muds, as a stabilizer for ion-exchange resins in water treatment, and as a soil conditioner.

Pumice and Pumicite.—Volcanic ash (pumicite) has been mined intermittently from a deposit in the Linton area since 1970. In 2004, less than 100 t was mined by NURTURE, Inc., a Minneapolis-based company that produces and distributes an increasing line of volcanic ash-base products. The NDGS recently estimated that this deposit contains about one billion metric tons of pumicite.

Other Industrial Minerals.—The coal gasification plant located near Beulah continued to operate an anhydrous ammonia plant. The ammonia plant, in operation since spring 1997, has the capacity to produce about 1,200 metric tons per day (t/d) of anhydrous ammonia. The plant averaged 535 t/d (340 operating days per year) during 2004; the total production of anhydrous ammonia in 2004 was 182,000 t. In 2004, the gasification plant also produced more than 2.6 million liters (ML) of krypton and xenon; approximately 10.1 ML of phenol; 10.7 ML of cresylic acid; 32.3 ML of naphtha; and about 1.7 ML of nitrogen. Ammonium sulfate production from the stack gas scrubber was 81,800 t. In 2004, the plant shipped more than 30,400 million standard cubic feet (860 million m³) of carbon dioxide for use in enhanced oil field recovery.

Legislation and Government Programs

The SSCC, as designated by the State legislature, continued to administer the Surface Mining Report Law, which required any person conducting surface mining operations for minerals other than coal to comply with the reporting requirements of North Dakota

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 2004 USGS mineral production data published in this chapter are those available as of December 2005. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—also can be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals>.

²Values, percentage calculations, and rankings for 2003 may differ from the Minerals Yearbook, Area Reports: Domestic 2003, Volume II, owing to the revision of preliminary 2003 to final 2003 data. Data and rankings for 2004 are considered to be final and are not likely to change significantly.

³Edward C. Murphy, State Geologist, authored the text of State mineral industry information provided by the North Dakota Geological Survey.

Century Code Chapter 38-16. Minerals included under the law are cement rock, clay, gravel, limestone, manganese, molybdenum, peat, potash, pumicite, salt, sand, scoria, sodium sulfate, stone, zeolite, or other minerals except coal. The SSCC has the regulatory authority to administer the reporting requirement, while the actual regulatory authority for most of these mining activities rests with the North Dakota Geological Survey. The law requires that any person or company that within one calendar year removes 7,650 cubic meters (10,000 cubic yards) or more of earthen materials or products (including overburden) affecting 0.2 hectare (one-half acre) or more in combined mining operations must report the particulars of its surface mining activities. Some operators of smaller operations cooperate by voluntarily submitting summary reports to the SSCC. Nevertheless, because not all operations report, the summary of surface mining statistics presented by the NGDS is a conservative estimate of the amount of nonfuel minerals mined in North Dakota in 2004.

The NDGS maintains a minerals page on its Web site at URL <http://www.state.nd.us/ndgs/minerals/minerals.htm>, in particular for the nonfuel raw mineral commodities of cement, clay, rock salt, sand and gravel, volcanic ash, and the fuel minerals coal, petroleum, and uranium.

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

(Thousand metric tons and thousand dollars)

Mineral	2002		2003		2004	
	Quantity	Value	Quantity	Value	Quantity	Value
Clays, common	57	W	W	W	W	186
Gemstones	NA	4	NA	4	NA	4
Sand and gravel, construction	10,700	27,900	13,500	35,900	11,700	32,800
Combined values of lime, sand and gravel (industrial), stone [crushed granite, limestone, volcanic cinder, and miscellaneous (2002), crushed limestone, volcanic cinder, miscellaneous (2003)], crushed granite, scoria, traprock, volcanic cinder, miscellaneous (2004)], and values indicated by symbol W	XX	8,540	XX	10,600	XX	11,500
Total	XX	36,500	XX	46,500	XX	44,500

NA Not available. W Withheld to avoid disclosing company proprietary data. Withheld values included in "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
NORTH DAKOTA: CRUSHED STONE SOLD OR USED, BY KIND

Kind	2002				2003				2004			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	-- ^r	-- ^r	-- ^r	-- ^r	1	W	W	\$13.93	--	--	--	--
Granite	1	W	W	\$8.82	--	--	--	--	1	W	W	\$4.41
Traprock	--	--	--	--	--	--	--	--	1	W	W	4.41
Volcanic cinder and scoria	2	W	W	3.55	1	W	W	3.64	1	W	W	3.64
Miscellaneous stone	5	W	W	4.34	1	W	W	3.64	4	W	W	4.23
Total or average	XX	W	W	5.31 ^r	XX	W	W	4.44	XX	W	W	3.97

^rRevised. W Withheld to avoid disclosing company proprietary data. XX Not applicable. -- Zero.

TABLE 3a

NORTH DAKOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2003, BY USE¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1½ inch), riprap and jetty stone	W	W	\$8.78
Coarse aggregate, graded:			
Bituminous aggregate (coarse)	W	W	5.51
Railroad ballast	W	W	4.03
Fine aggregate (-¾ inch), stone sand (bituminous mix or seal)	W	W	3.75
Coarse and fine aggregates, graded road base or subbase	W	W	3.79
Other miscellaneous uses and specified uses not listed	4	\$16	4.00
Unspecified, reported ²	119	519	4.37
Total or average	W	W	4.44

W Withheld to avoid disclosing company proprietary data.

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

²Reported production without a breakdown by end use.

TABLE 3b

NORTH DAKOTA: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2004, BY USE¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate, graded, concrete aggregate (coarse)	W	W	\$4.41
Coarse and fine aggregates, graded road base or subbase	W	W	4.41
Unspecified, reported ²	280	\$1,090	3.90
Total or average	W	W	3.97

W Withheld to avoid disclosing company proprietary data.

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

²Reported production without a breakdown by end use.

TABLE 4a
 NORTH DAKOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2003,
 BY MAJOR USE CATEGORY¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	318	\$2,030	\$6.39
Asphaltic concrete aggregates and other bituminous mixtures	272	899	3.31
Road base and coverings	2,170	4,770	2.19
Fill	183	330	1.80
Snow and ice control	10	32	3.20
Railroad ballast	5	24	4.80
Unspecified: ²			
Reported	1,910	4,860	2.55
Estimated	8,700	23,000	2.65
Total or average	13,500	35,900	2.66

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 4b
 NORTH DAKOTA: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2004,
 BY MAJOR USE CATEGORY¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregate (including concrete sand)	312	\$2,030	\$6.51
Asphaltic concrete aggregates and other bituminous mixtures	306	1,040	3.41
Road base and coverings	2,120	6,180	2.91
Fill	191	337	1.76
Other miscellaneous uses ²	15	90	6.18
Unspecified: ³			
Reported	2,760	7,300	2.64
Estimated	6,000	16,000	2.63
Total or average	11,700	32,800	2.80

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

²Includes railroad ballast and snow and ice control.

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