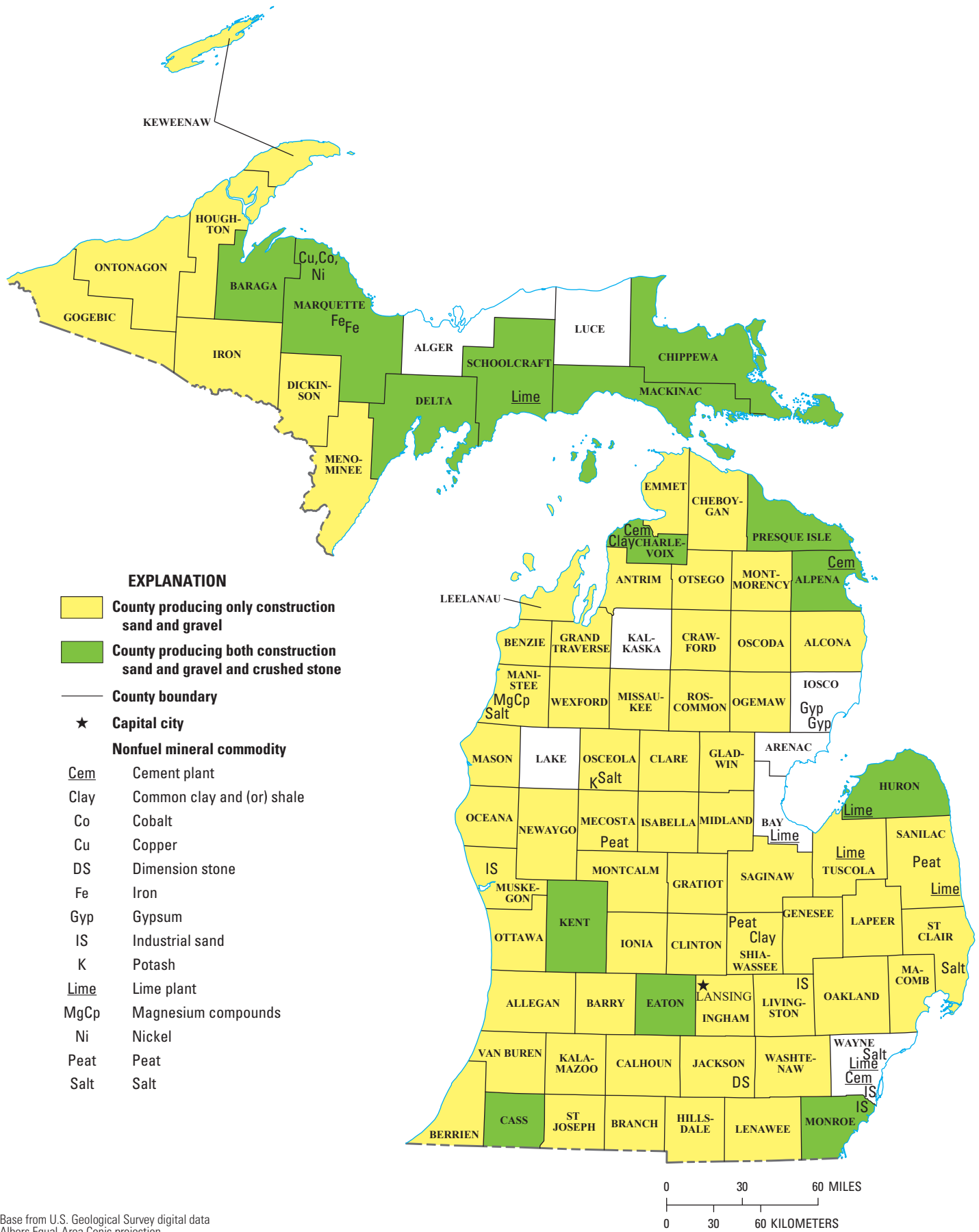




2014 Minerals Yearbook

MICHIGAN [ADVANCE RELEASE]



Base from U.S. Geological Survey digital data
Albers Equal-Area Conic projection

Figure 1. Map showing major nonfuel-mineral-producing areas in Michigan in 2014. Sources: Michigan Department of Environmental Quality, Office of the Geological Survey, and U.S. Geological Survey.

THE MINERAL INDUSTRY OF MICHIGAN

By Madan M. Singh

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Michigan Department of Environmental Quality, Office of Oil, Gas and Minerals for collecting information on all nonfuel minerals.

In 2014, the value of the nonfuel mineral production¹ in the State of Michigan was \$2.65 billion. This was a 3.3% increase from the State's revised nonfuel mineral production value in 2013 (table 1). These figures do not include steel produced in the State. Some of the blast furnace slag is ground for use in cement. Michigan accounted for approximately 3.3% of the total U.S. production value in 2014, which ranked it 11th among the 50 States. On a per capita basis, Michigan's nonfuel mineral production value was \$267 in 2014 compared with the national average of \$252. The number of mines decreased but the mine employment increased from the prior year (table 2).

In 2014, the leading five minerals produced in the State, in descending order of value, were iron ore (taconite pellets), cement, salt, construction sand and gravel, and crushed stone. In the United States, including in Michigan, iron ores with iron concentrations greater than 50% have been exhausted for some years. The ones that are currently mined contain 25% to 30% iron and need to be beneficiated to increase the iron content. These lean iron ores (taconites) are concentrated to reach, on average, at least 62.5% iron, which is a global prerequisite for steel production. The concentrates are then agglomerated using binders to create iron ore pellets, which are acceptable in blast furnaces (Tuck, 2017, p. 39.1). In 2014, taconite-processing plants in Michigan produced 12.1 million metric tons of iron concentrate (pellets), which was about 13% more than the previous year (table 1).

Events, Trends, and Issues

In 2014, Cliffs Resources, Inc. stated that its Empire iron ore mine, which was scheduled to close at yearend, would remain open until yearend 2016, because Cliffs had entered into a joint operating agreement with steel producer ArcelorMittal USA Inc. that would allow operations at the mine to be prolonged. Cliffs' operations in Michigan renegotiated their contract with a regulated electric utility service in February 2015, which would result in a \$5-per-megawatthour increase over the average 2014 rates (Tuck, 2017, p. 39.2).

In 2014, the utilization of grinding capacity for portland cement in Michigan rose to 76% from 74% in 2013, significantly higher than the national average of nearly 67% (van Oss, 2017, p. 16.11).

Nickel had not been mined in the United States for several years but, in 2014, Lundin Mining Corp. produced nickel-copper ore from the underground Eagle Mine. The ore was trucked to the company's Humboldt facilities in Marquette County for concentration and to separate nickel and copper concentrates, which were then shipped by rail to smelters in North America or to ports for shipment overseas. Lundin Mining Corp. also planned to ramp up production at the Eagle Mine in 2015 (Kuck, 2016, p. 51.2).

Nonfuel mineral production in the State surpassed \$2 billion in value in 2008; it fell below that figure in 2009 but has been above \$2 billion since then (fig. 1). In 2014, production quantity of construction sand and gravel increased by 11% and crushed stone decreased slightly from the previous year (table 1).

Aggregates by State and End Use

A companion dataset, "Aggregates by State and End Use," replaces the discrete aggregate tables that were included in the individual State chapters prior to 2014, and is available on the State Minerals Statistics and Information web page at <https://minerals.usgs.gov/minerals/pubs/state/>. This dataset is updated annually.

References Cited

- Kuck, P.H., 2016, Nickel [advance release], *in* Metals and minerals: U.S. Geological Survey Minerals Yearbook 2013, v. I, p. 51.1–51.31. (Accessed October 24, 2017, at <https://minerals.usgs.gov/minerals/pubs/commodity/nickel/myb1-2013-nicke.pdf>.)
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- van Oss, H.G., 2017, Cement [advance release], *in* Metals and minerals: U.S. Geological Survey Minerals Yearbook 2014, v. I, p. 16.1–16.33. (Accessed October 24, 2017, at <https://minerals.usgs.gov/minerals/pubs/commodity/cement/myb1-2014-cemen.pdf>.)

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 USGS mineral production data published in this chapter are those available as of June 2017. All USGS Mineral Industry Surveys and USGS Minerals Yearbook chapters—mineral commodity, State, and country—can be retrieved over the internet at <http://minerals.usgs.gov/minerals>.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MICHIGAN^{1,2,3}

(Thousand metric tons and thousand dollars)

Mineral	2012		2013		2014	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	73	9,540 ^e	61	8,500 ^e	43	6,100 ^e
Portland	3,890	346,000 ^e	3,860	370,000 ^e	3,950	399,000 ^e
Cobalt ^{e,4} metric tons	--	--	--	--	120	W
Gemstones, natural ^c	NA	2	NA	2	NA	2
Gypsum, crude	192 ^r	1,340 ^r	233 ^r	1,930 ^r	233	2,050
Iron ore ⁵	11,000 ^r	1,240,000	10,700 ^r	1,390,000	12,100	1,240,000
Lime	526	62,300	524	64,700	526	65,400
Nickel ⁴ metric tons	--	--	--	--	4,300	W
Sand and gravel:						
Construction	32,500 ^r	178,000 ^r	31,800 ^r	167,000 ^r	35,400	200,000
Industrial	1,450	59,100	1,230	49,000	1,590	112,000
Stone, crushed	25,300 ^r	171,000 ^r	27,100 ^r	193,000	26,900	199,000
Combined values of clays (common clay), copper (2014), magnesium compounds, peat, potash, salt, stone (dimension), and values indicated by symbol W	XX	237,000 ^r	XX	324,000 ^r	XX	427,000
Total	XX	2,300,000 ^r	XX	2,560,000 ^r	XX	2,650,000

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

¹Includes data available through June 2017.

²Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

³Data are rounded to no more than three significant digits; may not add to totals shown.

⁴Content of concentrate.

⁵Production based on publically available data; refer to the 2014 Minerals Yearbook iron ore chapter.

TABLE 2
MINING ACTIVITY IN MICHIGAN

Mining activity	2012	2013	2014
State rank ¹	10	9	11
Employment, number: ²			
Nonfuel mineral mines	2,163	2,105	2,136
Mills and plants	1,257	1,239	1,293
Number of nonfuel mineral mines ²	393	393	389
Number of mills and plants ²	20	20	21
Average annual wage, all mining ³	dollars per year	78,831	78,880
Average annual wage, all industries ³	do.	46,223	46,673
Per capita value ¹	dollars per person	233	259
National per capita value ¹	do.	241	236
do. Ditto.			252

¹Based on total, unadjusted, State value.

²Source: U.S. Mine Safety and Health Administration.

³Source: National Mining Association.

TABLE 3
STRUCTURE OF THE NONFUEL MINERAL INDUSTRY IN MICHIGAN

(Nonfuel-mineral-producing companies, not including aggregate producers)

Commodity	Company	County
Cement	Lafarge North America, Inc. (Alpena plant)	Alpena
Do.	St Marys Cement Co. (Charlevoix plant)	Charlevoix
Do.	St Marys Cement Co. (Detroit plant)	Wayne
Clays, common clay	Heidelberg Cement (Hanson Brick Co.)	Shiawassee
Do.	St Marys Cement Co.	Charlevoix
Cobalt, copper, nickel	Lundin Mining Co.	Marquette
Gypsum	National Gypsum Co.	Iosco
Do.	United States Gypsum Co.	Do.
Iron ore	Cliffs Resources, Inc. (Empire Mine)	Marquette
Do.	Cliffs Resources, Inc. (Tilden Mine)	Do.
Lime	Carmeuse Lime & Stone	Wayne
Do.	Graymont, Inc.	Schoolcraft
Do.	Michigan Sugar Co.	Bay, Huron, Sanilac, Tuscola
Magnesium compounds	Martin Marietta Materials Inc.	Manistee
Peat	Al-Par Peat Co.	Shiawassee
Do.	Gummers Peat Co. (Markman Peat Corp.)	Mecosta
Do.	Michigan Peat Co.	Sanilac
Potash	Mosaic Co.	Osceola
Salt	Cargill Inc.	Osceola and St. Clair
Do.	Detroit Salt Co. (Kissner Holding Corp.)	Wayne
Do.	Morton International Inc.	Manistee
Sand and gravel, industrial	Bentley Sand and Gravel Co.	Livingston
Do.	Great Lakes Aggregates LLC	Monroe
Do.	Nugent Sand Co., Inc.	Muskegon
Do.	U.S. Silica Co.	Wayne
Stone, dimension	Jude Stone Quarry Co.	Jackson
Do. Ditto.		

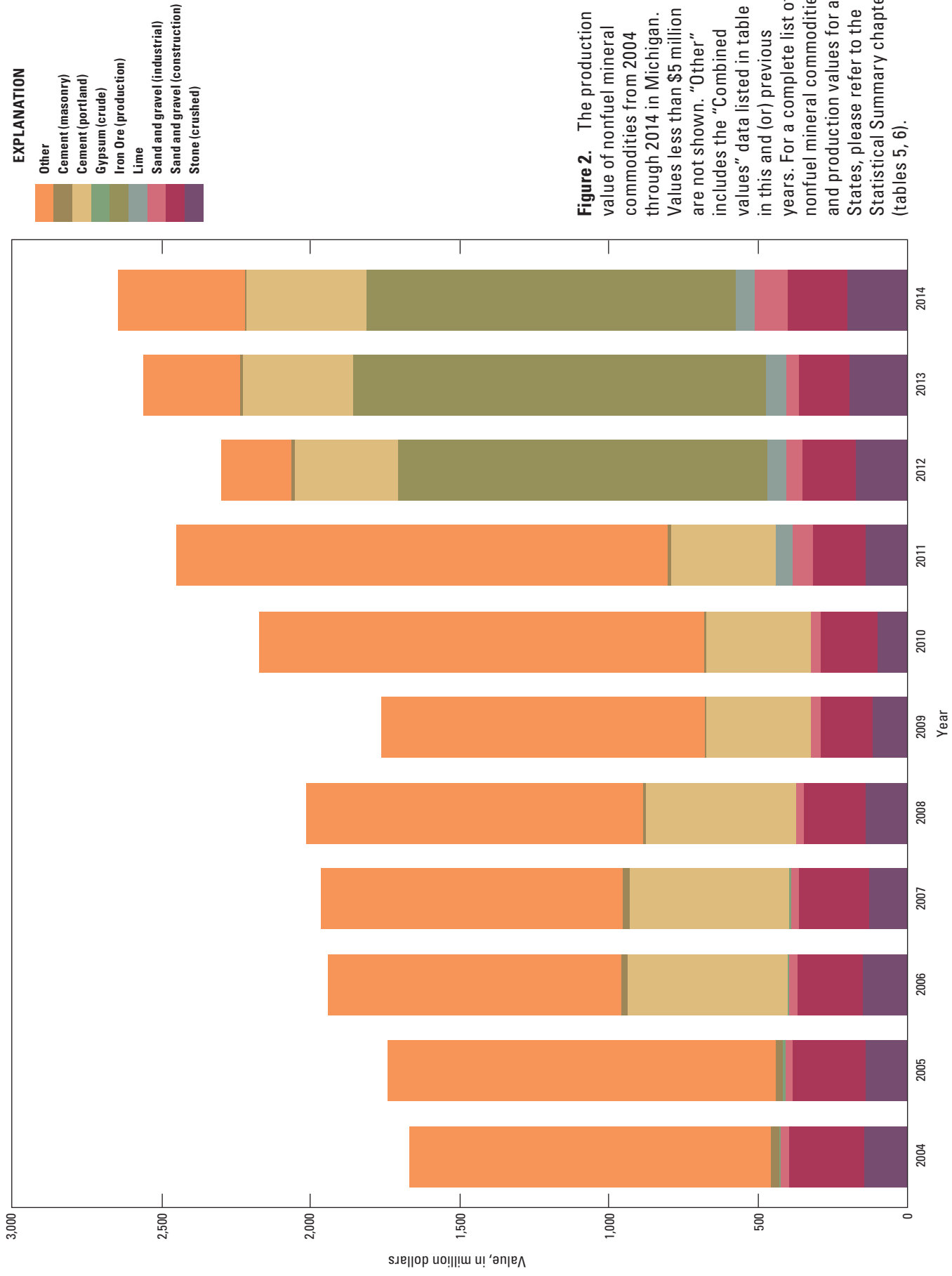


Figure 2. The production value of nonfuel mineral commodities from 2004 through 2014 in Michigan. Values less than \$5 million are not shown. "Other" includes the "Combined values" data listed in table 1 in this and (or) previous years. For a complete list of nonfuel mineral commodities and production values for all States, please refer to the Statistical Summary chapter (tables 5, 6).