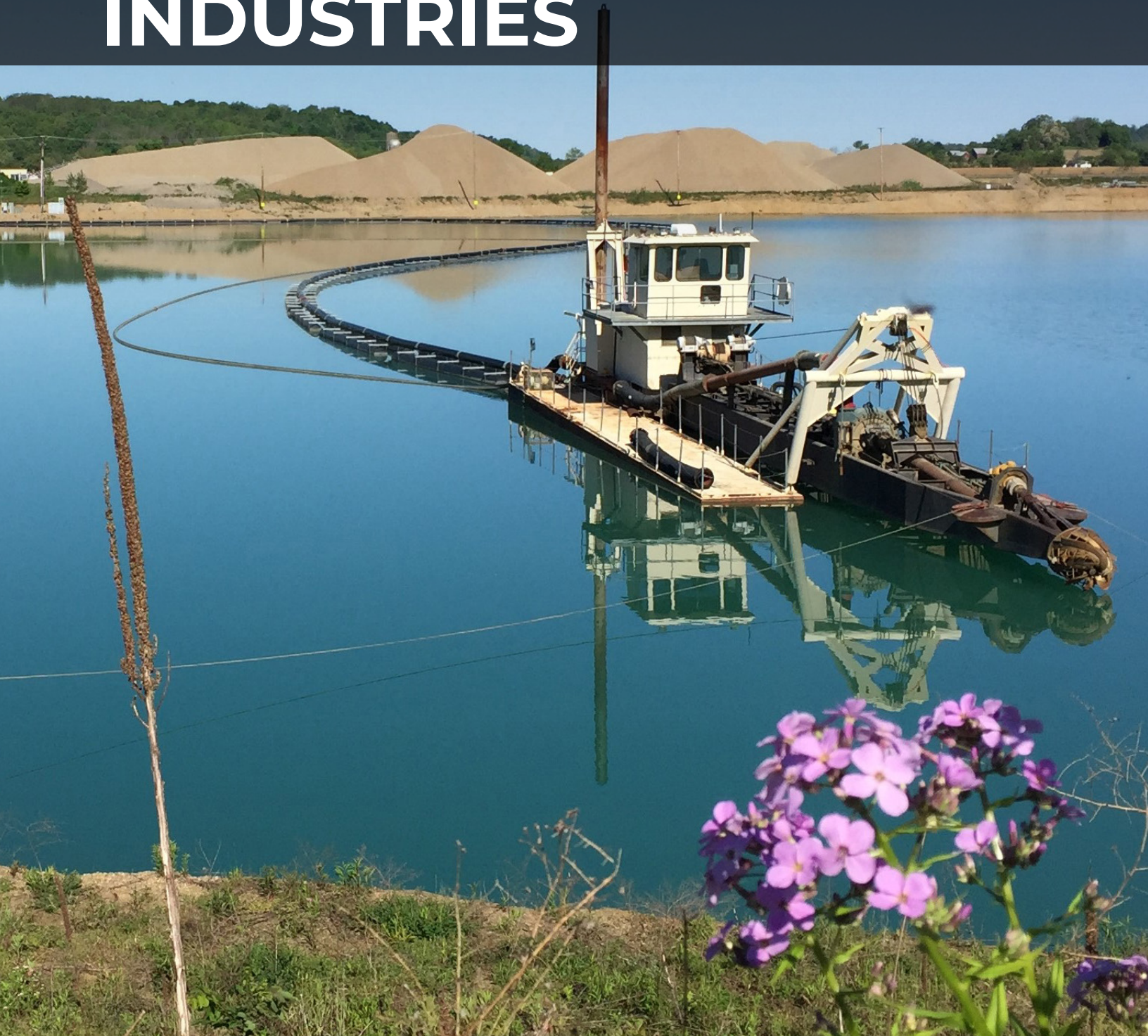


2023 REPORT ON OHIO MINERAL INDUSTRIES



compiled by Christopher E. Wright



**OHIO
GEOLOGICAL
SURVEY**
DEPARTMENT OF NATURAL RESOURCES



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2023 Report on Ohio mineral industries: An annual summary of the state's economic geology

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STATE OF OHIO
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL SURVEY
D. Mark Jones, Chief

Columbus 2024

PREFACE

The *2023 Report on Ohio Mineral Industries* continues the efforts of the ODNR Division of Geological Survey to present a clear and concise representation of mining production, sales, and employment for Ohio's mineral industry commodities. This report provides a brief discussion of each geologic commodity and a bulleted listing of commodity statistics for 2023. Percent change comparisons of 2023 production and sales values for each commodity with those of the previous year are notated, with the 2022 data coming from the 2022 edition of this report (Wright, 2023).

The *Map of Active Mineral Industry Operations in Ohio* is included at the end of the report and acts as a standalone product. The map includes a table with information about each labeled point, including the company name and total combined tonnage of material(s) mined at each operation location.

Detailed commodity information for all mineral industries, including sales, production, value, and company information for each of the operators who reported activity in 2023, is available on the ODNR Division of Geological Survey website at ohiodnr.gov/industrialminerals.

Chris Wright
Geology Program Supervisor

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2023 OHIO ECONOMIC GEOLOGY IN BRIEF

The total tonnage of coal and industrial minerals produced in Ohio during 2023 was 113,157,179 tons or approximately 9.6 tons per capita. In 2023, the total value¹ of coal was \$126,707,926; the value of oil and gas was \$5,906,856,869; and the value¹ of all nonfuel industrial minerals was \$1,615,386,379 (figs. 1, 2, 3; table 1). The combined value of fuel and nonfuel minerals produced in Ohio during 2023 was \$7,648,951,174 or approximately \$649 per capita.

Reported and estimated total direct employment in the extractive industries of Ohio in 2023 was more than 10,000 people. Industrial mineral production increased for limestone and dolomite, salt, sandstone and conglomerate, and clay, while production decreased for coal, shale, sand and gravel, and peat. The total value of nonfuel industrial minerals exceeded \$1 billion for the tenth straight year. In 2023, the production-leading commodity of limestone and dolomite was up 1.4%, with the second leading commodity of sand and gravel down 6.1% from 2022; the third leading commodity of salt was up 8.5% from 2022; the fourth leading commodity of coal was down 22.6% from 2022.

¹Includes reported and estimated values. Some operations reporting sales did not report a value for those sales. A statewide-average price per ton was calculated for each industrial-mineral commodity based on sales for which the value was reported. A statewide-average price per ton was calculated for coal based on method of production for which sales or value was reported. These calculated averages were used to estimate the value of the sales for which the actual values were not reported.

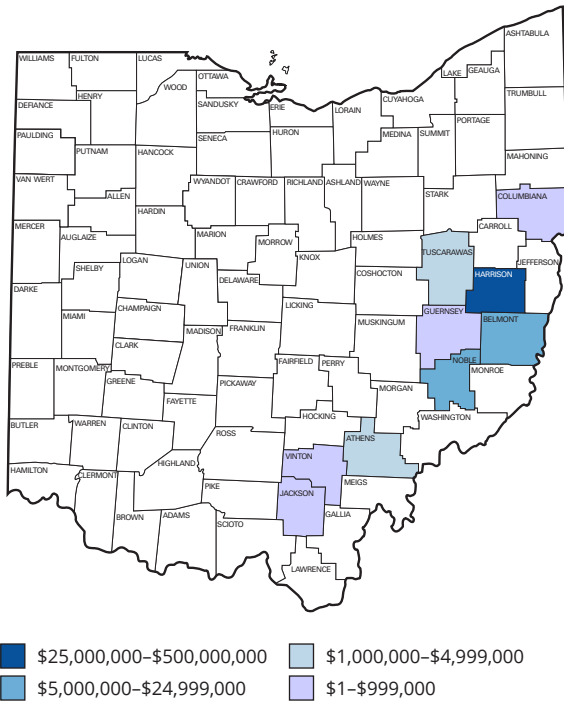


FIGURE 1. Total value of coal sold in Ohio in 2023, by county.

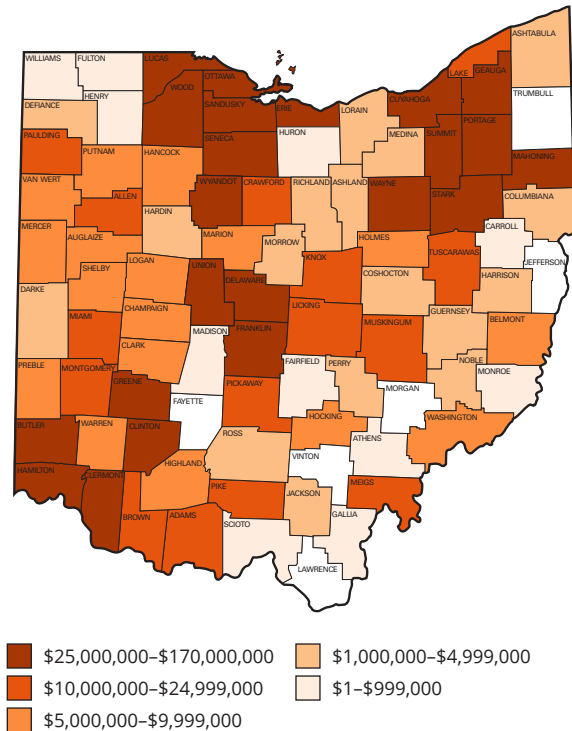


FIGURE 2. Total value of industrial minerals sold in Ohio in 2023, by county.

TABLE 1. Fuel and nonfuel mineral sales and production in Ohio in 2023

Commodity	Production ¹	Sales ²	Value ³	Change in value from 2022 (percent)
Limestone and dolomite	73,387,381 tons	72,717,921 tons	\$998,799,981	+1.5
Coal	2,089,452 tons	2,097,550 tons	\$126,707,926	-3.0
Sand and gravel	30,007,688 tons	29,700,960 tons	\$307,515,588	+0.4
Salt	4,712,595 tons	4,270,433 tons	\$235,104,944	-2.0
Sandstone and conglomerate	1,470,623 tons	1,302,177 tons	\$57,422,625	+10.7
Shale	416,693 tons	416,496 tons	\$5,726,154	+16.7
Clay	1,072,597 tons	1,084,487 tons	\$10,814,087	+17.2
Peat	150 tons	150 tons	\$3,000	-25.0
Gas	2,201,935,958 thousand cubic feet	not available	\$3,699,252,409	-71.1
Oil	29,990,551 barrels	not available	\$2,207,604,459	+22.8

¹The production figures for industrial minerals are estimates, as many operators do not know actual production. For those operators that do not report production, production is assumed equal to sales or estimated from ODNR Division of Mineral Resources Management records.

²Includes material for captive use.

³The FOB value (free on board; value of mined product excluding insurance or transportation costs) of industrial minerals sold was estimated for mines that failed to report this information and for those producing material for captive use. These estimates were calculated using a statewide-average price per ton based on reported FOB values.

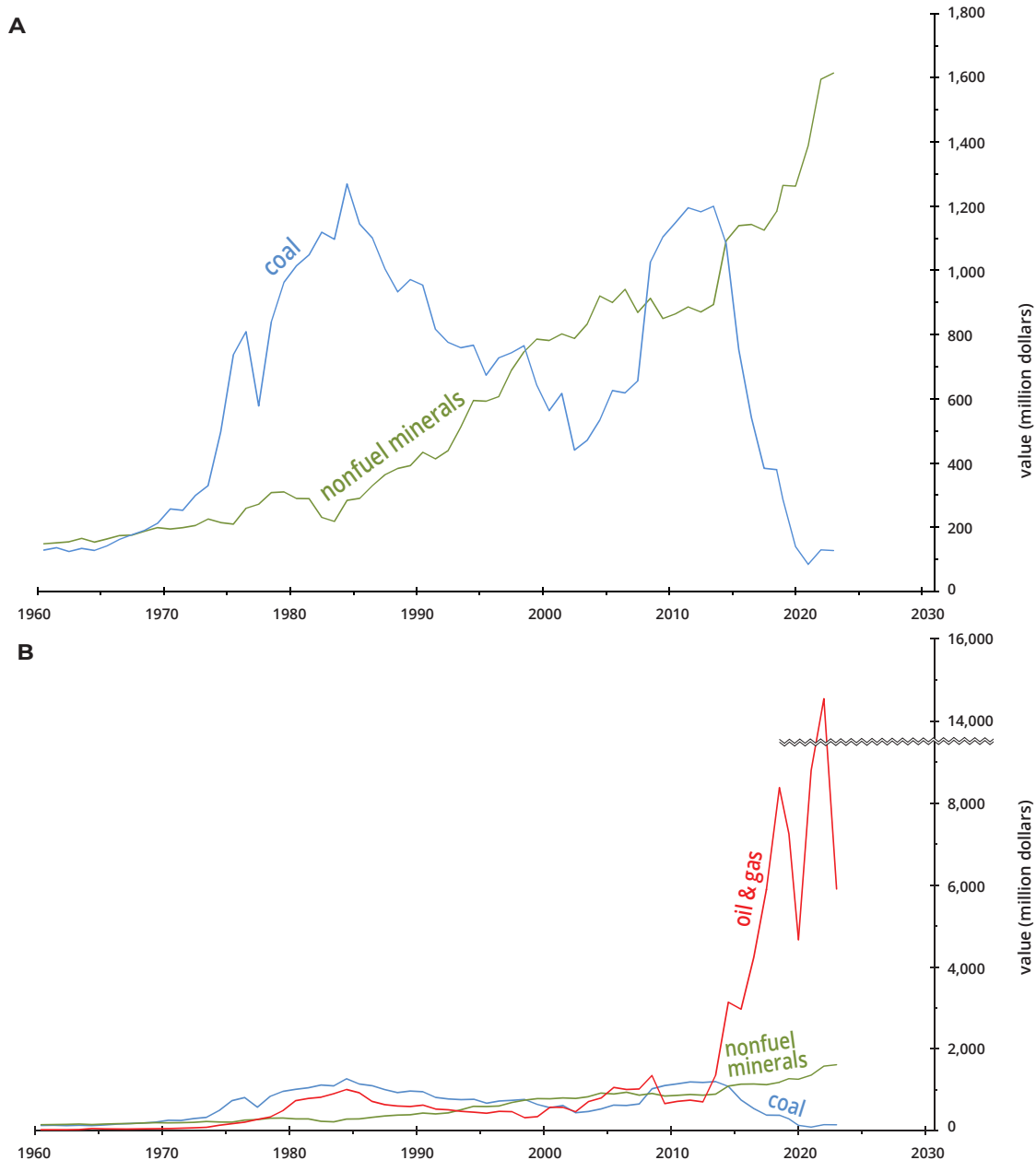


FIGURE 3. (A) Value of coal and nonfuel minerals in Ohio since 1960. (B) Value of coal, nonfuel minerals, and oil and gas in Ohio since 1960. The double wavy line indicates a gap in the value axis.

COAL

Commodity summaries and directories of operators are available at: ohiodnr.gov/industrialminerals.

Coal was first recognized in Ohio by pioneers during the 1740s, and the first map of Ohio coal deposits was made in 1752 (Crowell, 1995). Ohio coal production first occurred in Jefferson County during 1800 and amounted to 100 tons. Columbiana County was the next to report coal production starting in 1803 (Crowell, 1995). Since that time, over 4 billion tons of coal have been mined from coal seams in the state (see fig. 4; Crowell, 1995); this represents a value of more than \$200 billion in 2023 dollars.²

Throughout 2023, ODNR issued no surface-mine expansion permits and two underground-mine expansion permits. There were no new surface mine permits issued and no new underground mines permitted. Several coal operations ceased or curtailed production in 2023 because of less-expensive, competing natural gas and decreased demand.

²The following link provides more information about the formation and uses of Ohio's coal resources: ohiodnr.gov/coalgeology.

Production

- Tons produced = 2,089,452 (-22.6% from 2022)
- U.S. ranking: 16th out of 21 producing states (**USDOE, 2024**)
- Leading counties (percentage of statewide production):
 - Harrison (51.3%)
 - Belmont (21.1%)
 - Noble (18.4%)
 - Tuscarawas (5.4%)
- Top producing seams (table 5):
 - Upper Freeport (No. 7)
 - Meigs Creek (No. 9)
 - Pittsburgh (No. 8)

Sales

(See figs. 5 and 6 and tables 2, 6, and 7)

- Tons sold = 2,097,550 (-23.2% from 2022)
- Value = \$126,707,926

Employment

(See table 8)

- Production employees reported = 333
- Nonproduction employees reported = 75
- Average employee wages:
 - Surface-mine production = \$54,957
 - Underground-mine production = \$93,489
- Total wages earned = \$29,188,822

SYSTEM	GROUP	LITHOSTRATIGRAPHIC UNITS
Permian	Dunkard	Washington (No. 12) coal Waynesburg (No. 11) coal
	Monongahela	Uniontown (No. 10) coal Meigs Creek (No. 9, Sewickley) coal Pomeroy (No. 8a, Redstone) coal Pittsburgh (No. 8) coal
Pennsylvanian	Conemaugh	Ames marine zone Harlem coal Anderson coal Wilgus coal Brush Creek marine zone Mahoning (No. 7a) coal
	Allegheny	Upper Freeport (No. 7) coal Lower Freeport (No. 6a) coal Middle Kittanning (No. 6) coal Strasburg (No. 5a) coal Lower Kittanning (No. 5) coal Vanport marine zone Clarion (No. 4a) coal Winters coal Newland (No. 4, Brookville) coal
	Pottsville	Tionesta (No. 3b) coal Upper Mercer (No. 3a) coal Lower Mercer (No. 3) coal Quakertown (No. 2) coal Sharon (No. 1) coal

FIGURE 4. Stratigraphic column of coals mined in Ohio during 2023 (black), other significant coal beds (red), and associated key beds (blue) used for stratigraphic correlation. Modified from Brant and Delong (1960, table 9), Collins (1979, fig. 3), and Larsen (1991, fig. 2).

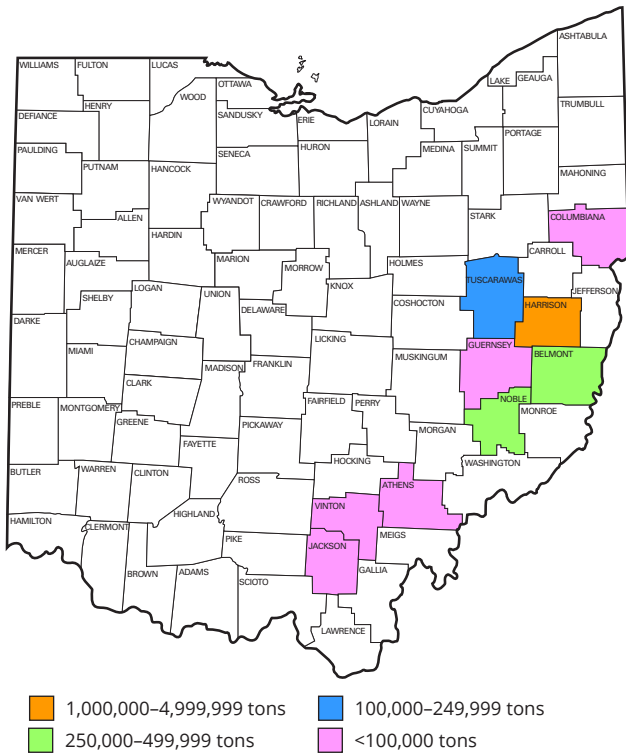


FIGURE 5. Coal sales in Ohio in 2023, by county and quantity.

TABLE 2. 2023 Ohio coal production and sales by county, in descending order of production

County	Production (short tons)	Sales (short tons)
Harrison	1,071,104	1,073,032
Belmont	439,906	443,400
Noble	383,439	383,439
Tuscarawas	112,590	113,477
Athens	52,579	54,443
Jackson	14,884	14,884
Vinton	14,751	14,751
Columbiana	196	121
Guernsey	3	3
TOTAL	2,089,452	2,097,550

TABLE 3. 2023 Ohio coal production, by production size group and change from 2022

Production size group	2023		Change from 2022 (short tons)
	Number of mines reporting	Production (short tons)	
1,000,000 tons and over	0	0	0
500,000 to 999,999 tons	1	523,538	-130,215
250,000 to 499,999 tons	0	0	-649,790
100,000 to 249,999 tons	6	1,079,729	100,503
50,000 to 99,999 tons	5	334,602	43,391
25,000 to 49,999 tons	3	89,166	18,654
Less than 25,000 tons	13	62,417	5,633
TOTAL	28	2,089,452	-611,824

TABLE 4. 2023 Ohio coal production, by county and mining method

County	All methods (short tons)	Total number of mines	Underground					Surface			
			Number of mines reporting	Production (short tons)			Number of mines reporting	Production (short tons)			
				Total	Longwall	Continuous miner		Total	Strip	Auger	Highwall
Athens	52,579	1					1	52,579	27,302	25,277	0
Belmont	439,906	3					3	439,906	347,102	31,033	61,771
Columbiana	196	1					1	196	196	0	0
Guernsey	3	1					1	3	3	0	0
Harrison	1,071,104	5	2	711,486	0	711,486	3	359,618	355,929	3,689	0
Jackson	14,884	3					3	14,884	14,884	0	0
Noble	383,439	4					4	383,439	383,439	0	0
Tuscarawas	112,590	9					9	112,590	109,978	0	2,612
Vinton	14,751	1					1	14,751	14,751	0	0
TOTAL ¹	2,089,452	28	2	711,486	0	711,486	26	1,377,966	1,253,584	59,999	64,383

¹Any tally inconsistencies are because of rounding of production tonnages.

TABLE 5. 2023 Ohio coal production, by county and seam

County ¹	Production (short tons)											
	Total	Tionesta (No. 3b)	Newland (No. 4, Brookville)	Clarion (No. 4a)	Lower Kittanning (No. 5)	Strasburg (No. 5a)	Middle Kittanning (No. 6)	Lower Freeport (No. 6a)	Upper Freeport (No. 7)	Pittsburgh (No. 8)	Pomeroy (No. 8a, Redstone)	Meigs Creek (No. 9, Sewickley)
Athens	52,579						52,579					
Belmont	439,906								243,253		196,653	
Columbiana	196				196							
Guernsey	3											3
Harrison	1,071,104						15,832	732,941	288,179	32,670	1,482	
Jackson	14,884		4,000	8,517	2,367							
Noble	383,439											383,439
Tuscarawas	112,590	905	16,285		47,338	19,208	28,854					
Vinton	14,751				10,224		4,527					
TOTAL ²	2,089,452	905	20,285	8,517	60,125	19,208	85,960	15,832	732,941	531,432	32,670	581,577

¹Production from mines operating in more than one county was evenly split between the counties involved unless a county-specific breakdown was provided by the operator.
²Any tally inconsistencies are because of rounding of production tonnages.

TABLE 6. 2023 Disposition of Ohio coal, by county

County ¹	Number of mines	Disposition ¹ (short tons)					Stored
		Total ²	Rail	Water	Truck	Conveyor	
Athens	1	54,443			54,443		
Belmont	3	443,400			443,400		
Columbiana	1	121			121	75	
Guernsey	1	3			3		
Harrison	5	1,073,031	179,669		893,362	3,280	
Jackson	3	14,884			14,884		
Noble	4	383,439			383,439		
Tuscarawas	9	113,477			113,477		
Vinton	1	14,751			14,751		
TOTAL ³	28	2,097,549	179,669	0	1,917,880	0	

¹Tonnage of coal shipped from mines operating in more than one county was evenly split between the counties involved and type(s) of disposition reported unless county-specific information was provided by the operator.
²Does not reflect tonnage stored. Reflects tonnage sold and shipped from mine.
³Any tally inconsistencies are because of rounding.

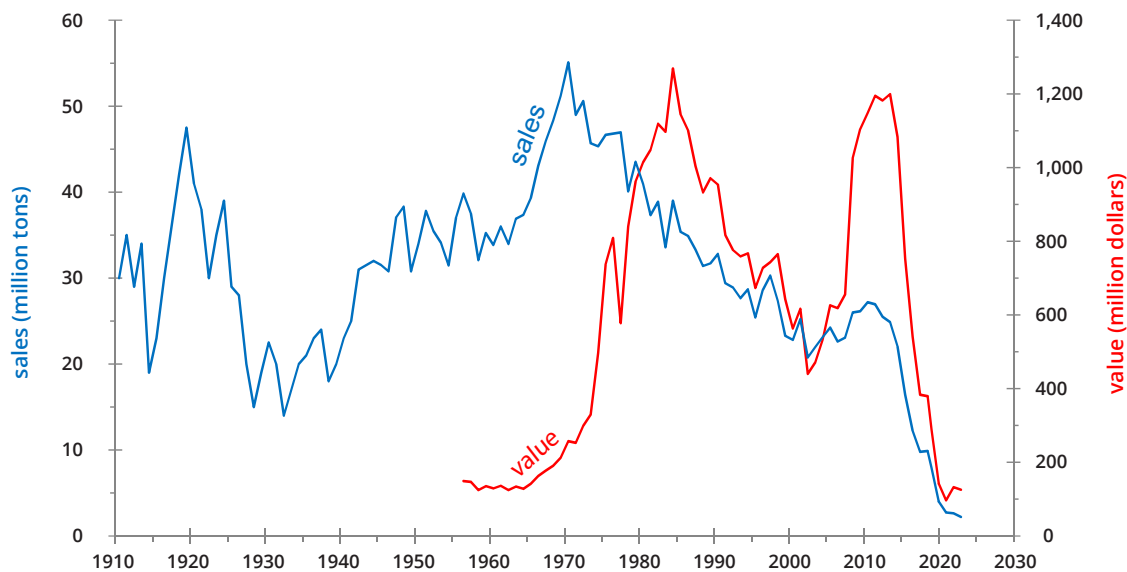


FIGURE 6. Sales and value of coal in Ohio since 1910.

TABLE 7. 2023 Dollar value of coal at mine, by county and mining method

County ¹	Total				Underground				Surface			
	No. of mines	Tonnage sold (short tons)	Value at mine ² (dollars)	Per ton average (dollars)	No. of mines	Tonnage sold (short tons)	Value at mine ² (dollars)	Per ton average (dollars)	No. of mines	Tonnage sold (short tons)	Value at mine ² (dollars)	Per ton average (dollars)
Athens	1	54,443	\$1,766,246	\$32.44					1	54,443	\$1,766,246	\$32.44
Belmont	3	443,400	\$23,848,652	\$53.79					3	443,400	\$23,848,652	\$53.79
Columbiana	1	121	\$12,770	\$105.54					1	121	\$12,770	\$105.54
Guernsey	1	3	\$108	\$36.00					1	3	\$108	\$36.00
Harrison	5	1,073,032	\$83,916,862	\$78.21	2	709,022	61,695,032	\$87.01	3	364,010	\$22,221,830	\$61.05
Jackson	3	14,884	\$555,703	\$37.34					3	14,884	\$555,703	\$37.34
Noble	4	383,439	\$13,420,365	\$35.00					4	383,439	\$13,420,365	\$35.00
Tuscarawas	9	113,477	\$2,307,264	\$20.33					9	113,477	\$2,307,264	\$20.33
Vinton	1	14,751	\$879,956	\$59.65					1	14,751	\$879,956	\$59.65
TOTAL	28	2,097,550	\$126,707,926	\$60.41	2	709,022	\$61,695,032	\$87.01	26	1,388,528	\$65,012,894	\$46.82

¹Sales reported from mines operating in more than one county were evenly split between the counties involved unless county-specific information was provided by the operator.

²The FOB value (free on board; value of mined product excluding insurance or transportation costs) of coal sold was estimated for those mines that failed to report this information. These estimates were calculated using a statewide-average price per ton by mining method, based on reported FOB values deemed to be reliable.

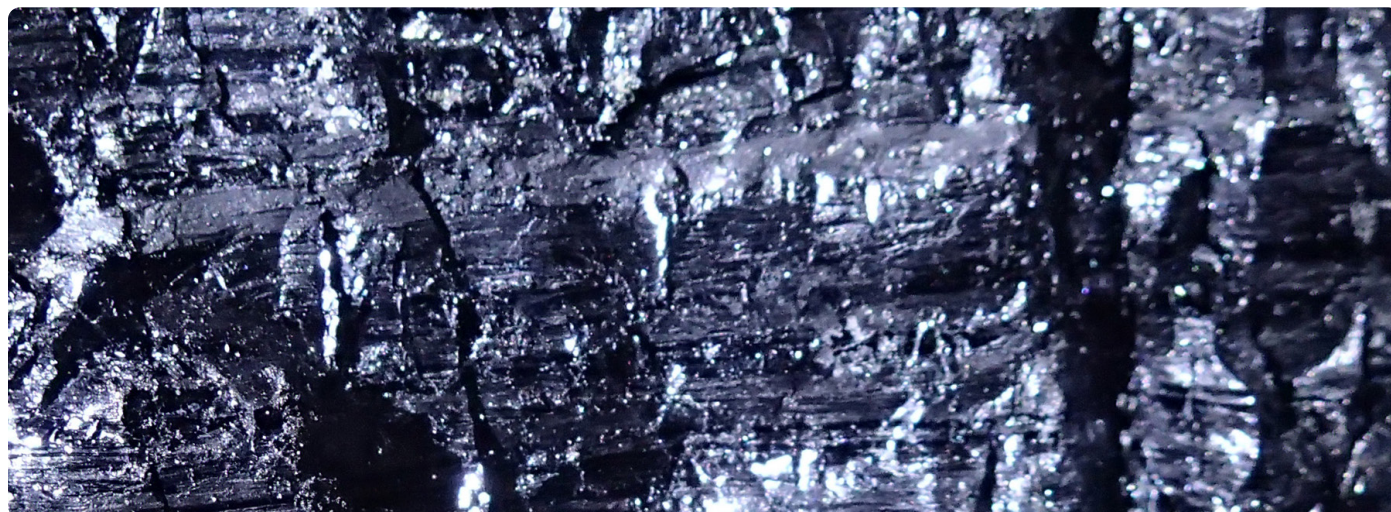
TABLE 8. 2023 Wage and salary payments to Ohio coal mine employees, by county and occupational group

County ¹	Wage and salary payments (nearest whole dollar) ²			
	All occupations	Underground production employees	Surface production employees	Other
Athens	\$739,869		\$430,677	\$309,192
Belmont	\$5,044,503		\$3,719,190	\$1,325,313
Harrison	\$15,963,109	\$11,592,665	\$2,465,468	\$1,904,976
Jackson	\$212,655		\$212,655	
Noble	\$3,150,008		\$3,150,008	
Tuscarawas	\$977,568		\$811,847	\$165,721
Vinton	\$696,166		\$696,166	
TOTAL³	\$26,783,878	\$11,592,665	\$11,486,011	\$3,705,202

¹For those operations reporting activity in more than one county, wage and salary payments were evenly split between the counties involved unless county-specific information was provided by the operator.

²For those operations reporting only a total wage and salary payment for all workers, an equal pay rate was assumed for all employees. In cases where quarterly employment was reported but wage and salary payments were not, wage and salary payments for that quarter were estimated from reported payments in the other quarters to arrive at the annual figure.

³Any tally inconsistencies are because of rounding.



INDUSTRIAL MINERALS

Commodity summaries and directories of operators are available at: ohiodnr.gov/industrialminerals.

Industrial minerals are nonmetallic, nonfuel rocks or minerals that have economic value and are essential to modern society. Industrial minerals have been mined or quarried in Ohio since the establishment of early settlements and include limestone, dolomite, sand, gravel, sandstone, conglomerate, clay, shale, salt, gypsum, and peat. Hundreds of construction projects and industrial and household products rely on the availability of industrial minerals.

The production of multiple commodities is important to the economic success of mine operations in many areas of Ohio. The production of sand and gravel along with clay is often located in glaciated portions of northern and western Ohio, where deposits of sand and gravel can occur with clay-rich glacial tills. The Pennsylvanian-age cyclic sedimentation in eastern Ohio includes coals, clays, shales, sandstones, and limestones in close proximity, allowing for economic recovery of multiple commodities.³

Industrial minerals were reported as produced or sold at 328 operations in 82 Ohio counties during 2023. The combined value of all industrial minerals sold in 2023 was \$1,615,386,379 (table 9). This is the tenth consecutive year that the combined value of all nonfuel minerals has exceeded \$1 billion. The statewide combined employment for all nonfuel industrial mineral extraction was 3,993 employees (table 10).

In 2023, peat sales were reported in Portage County by one company that also produces sand and gravel and clay. Peat production and sales have been very sporadic in Ohio since 2000. In recent years peat production and sales have been very marginal to small, generally having a negligible effect on the total value of all industrial minerals mined in Ohio (table 9).

³The following links will provide more information on the general bedrock and glacial geology of Ohio: ohiodnr.gov/bedrockgeology and ohiodnr.gov/glacialgeology.

TABLE 9. 2023 Value of Ohio industrial minerals

Commodity	Sales (tons)	Change from 2022 (tons/percent)	Value ¹	Percent of total value
Limestone and dolomite	72,717,921	+1,405,088/+2.0	\$998,799,981	61.8
Sand and gravel	29,700,960	-2,890,400/-8.9	\$307,515,588	19.0
Salt	4,270,433	-121,591/-2.8	\$235,104,944	14.6
Sandstone and conglomerate	1,302,177	+5,349/+0.4	\$57,422,625	3.6
Shale	416,496	-37,200/-8.2	\$5,726,154	0.4
Clay	1,084,487	+357,521/+49.2	\$10,814,087	0.7
Peat	150	-50/-25.0	\$3,000	0.0
TOTAL	109,492,624	-1,412,309/-1.3	\$1,615,386,379	100.0

¹The FOB value (free on board; value of mined product excluding insurance or transportation costs) of industrial minerals sold was estimated for those mines that failed to report this information and for those producing material for captive use. These estimates were calculated using a statewide-average price per ton based on reported FOB values.



TABLE 10. 2023 Employment at Ohio industrial mineral operations, by county

County	Total Employees ³	Production Employees	Nonproduction Employees
Adams	19	8	11
Allen	26	12	14
Ashland	17	12	5
Ashtabula	48	9	39
Athens	9	6	3
Auglaize	13	10	3
Belmont	284	36	248
Brown	31	18	13
Butler	137	53	84
Caroll ¹	0	0	0
Champaign	14	11	3
Clark	13	10	3
Clermont	59	53	6
Clinton ¹	0	0	0
Columbiana	9	5	4
Coshocton	26	19	7
Crawford	16	16	0
Cuyahoga	255	223	32
Darke	6	4	2
Defiance	11	7	4
Delaware	25	25	0
Erie	150	80	70
Fairfield	2	1	1
Franklin	130	75	55
Fulton	3	1	2
Gallia ¹	0	0	0
Geauga	75	62	13
Greene	53	44	9
Guernsey	2	2	0
Hamilton	89	54	35
Hancock	5	5	0
Hardin	2	0	2
Harrison	2	2	0
Henry ¹	0	0	0
Highland	23	18	5
Hocking	48	20	28
Holmes	50	30	20
Huron	2	1	1
Jackson	7	5	2
Knox	83	40	43
Lake	91	65	26
Licking	33	24	9
Logan	81	46	35
Lorain	4	3	1
Lucas	90	58	32
Madison	6	2	4
Mahoning	73	50	23
Marion	13	12	1
Medina	8	6	2
Meigs	21	14	7
Mercer	40	14	26
Miami	33	28	5
Monroe	4	3	1
Montgomery	45	36	9
Morrow	5	5	0

County	Total Employees ³	Production Employees	Nonproduction Employees
Muskingum	71	55	16
Noble	18	15	3
Ottawa	113	82	31
Paulding	63	35	28
Perry	15	12	3
Pickaway	28	15	13
Pike	17	12	5
Portage	153	110	43
Preble	28	21	7
Putnam	4	4	0
Richland	14	14	0
Ross	36	16	20
Sandusky	195	171	24
Scioto	7	6	1
Seneca	67	50	17
Shelby	14	10	4
Stark	95	80	15
Summit	100	1	99
Trumbull ²	30	0	30
Tuscarawas	188	54	134
Union	65	34	31
Van Wert	38	23	15
Warren	19	10	9
Washington	48	19	29
Wayne	73	39	34
Williams ¹	0	0	0
Wood	83	54	29
Wyandot	120	96	24
TOTAL 83 counties	3,993	2,381	1,612

¹ Counties where commodities were extracted but no employment information was provided are represented with zeros in the employment fields.

² Trumbull County reported employment but no production or sales in 2023.

³ Any tally inconsistencies are because of computer rounding produced by partial-year employment.



LIMESTONE AND DOLOMITE

Limestone and dolomite are Ohio's most versatile industrial minerals. Each is used as aggregate in the construction industry, as an essential ingredient in the cement industry, to produce lime, as a flux in the steel and glass industries, as filler in a multitude of products, as an agricultural supplement, in water purification, and as a building stone. Ohio has long been a national leader in the production of lime and construction aggregates.

Devonian- and Silurian-age carbonates located in the western half of Ohio are the primary geologic units producing crushed stone. Pennsylvanian- and Mississippian-age limestones are important sources of aggregate in local markets of eastern Ohio (Stout, 1941; Lamborn, 1951).

Production

- Tons produced = 73,387,381 (+1.4% from 2022)
- U.S. ranking:
 - 5th out of 50 producing states for crushed stone ([USGS, 2024a](#))
 - In the top 4 of the 28 producing states for lime ([USGS, 2024b](#))
- Top Producing Geologic Units (fig. 7):
 - Columbus/Delaware Limestones (Devonian)
 - Lockport Dolomite (Silurian)
 - Greenfield/Peebles/Tymochtee Dolomites (Silurian)
 - Cedarville Dolomite (Silurian)

Sales

(See figs. 8 and 9)

- 72,717,921 (+2.0% from 2022; tables 11 and 12)
- Value⁴ = \$998,799,981 (table 9)
- Leading counties (percentage of statewide sales):
 - Franklin (14.2%)
 - Wyandot (11.3%)
 - Ottawa (6.5%)
 - Delaware (5.9%)

Employment

(See table 10)

- Production employees reported = 1,184
- Nonproduction employees reported = 749
- Average employee annual wage = \$54,104
- Total wages earned = \$91,490,020
- Average days worked per operation = 198

⁴Includes reported and estimated values. See footnote 1, p. 1.



TABLE 11. 2023 Ohio limestone and dolomite sales, by county and use (cont.)

County	Tons sold																
	Total all types		Crushed and broken stone											Dimension stone	Stone for portland cement manufacture	Agricultural stone (aglime)	Raw stone for burning
			Total	Riprap	Flux stone	Stone for portland cement concrete	Stone for asphaltic concrete	Road construction/resurfacing	Commercial building	Railroad ballast	Extenders/fillers	Unspecified/other					
Pike	1,441,964	58,553	1,431,964	300,000	550,000	300,000	150,000	5,000			68,411					10,000	
Preble	230,000		230,000								230,000						
Putnam	422,906	628	422,906	105,569	105,569	105,569	105,569										
Ross	224,650	650	224,650	100,000	100,000	100,000	100,000				24,000						
Sandusky	2,795,982	6,004	933,920	147,673	302,862	96,519	339,694				19,568	21,600				16,618	1,845,444
Seneca	1,472,338	3,926	702,215								698,289			693		40,218	729,212
Shelby	564,000		564,000								564,000						
Stark	2,434		2,434			2,434											
Tuscarawas	209,773	22,509	209,773			187,264											
Union	2,810,540		2,810,540														
Van Wert	541,321		541,321	1,000		1,000											
Wayne	1,899		1,899			212	1,687										
Wood	2,286,491	34,634	2,271,496	58,713	458,687	711,741	759,888				952					14,995	
Wyandot	8,184,288		8,145,288	1,236,690	1,342,772	1,108,026	1,455,587				3,002,213					39,000	
TOTAL	72,717,921	417,556	68,974,059	7,399,170	6,378,499	9,898,651	12,126,608	15,245	176,892	32,291,306	752	470,755	488,680	2,783,675			

SYSTEM	GROUP	LITHOSTRATIGRAPHIC UNITS	
		Quaternary	Permian
Pennsylvanian	Monongahela	Fishpot limestone Redstone limestone	
		Cone-maugh	Bellaire sandstone Ames limestone Buffalo sandstone Brush Creek limestone
	Allegheny	Upper Freeport sandstone Lower Kittanning clay Vanport limestone Clarion shale Putnam Hill limestone	
	Pottsville	Newland-Brookville clay Tionesta clay Middle Mercer clay Massillon sandstone Sharon conglomerate	
	Mississippian	Maxville Limestone Logan Formation	
		Black Hand Sandstone Buena Vista Sandstone	
	Devonian	Berea Sandstone Bedford Shale Ohio Shale Chagrin Member Ten Mile Creek Dolomite Dundee Limestone Delaware Limestone Columbus Limestone	
		Silurian	Salina
	Black River		Tymochtee Dolomite Greenfield Dolomite Peebles Dolomite Cedarville Dolomite Lockport Dolomite Laurel Limestone Dayton Limestone Brassfield Formation
	Ordovician	Black River	Black River Limestone

FIGURE 7. Generalized stratigraphic column of nonfuel industrial minerals typically mined in Ohio. Modified from Brant and Delong (1960, table 9), ODNR Division of Geological Survey (1990), and Slucher and others (2006).

TABLE 12. 2023 Production of lime from Ohio, by county and use

County	Total tons ¹	Building (tons)	Chemical and industrial (tons)	Refractory (tons)
Ottawa	95,009	52,015	42,994	
Sandusky	802,367		802,367	
Seneca	325,541		325,541	
TOTAL	1,222,917	52,015	1,170,902	0

¹Burning produced a 43.9% weight loss.

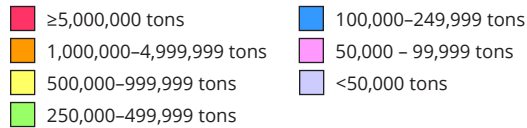
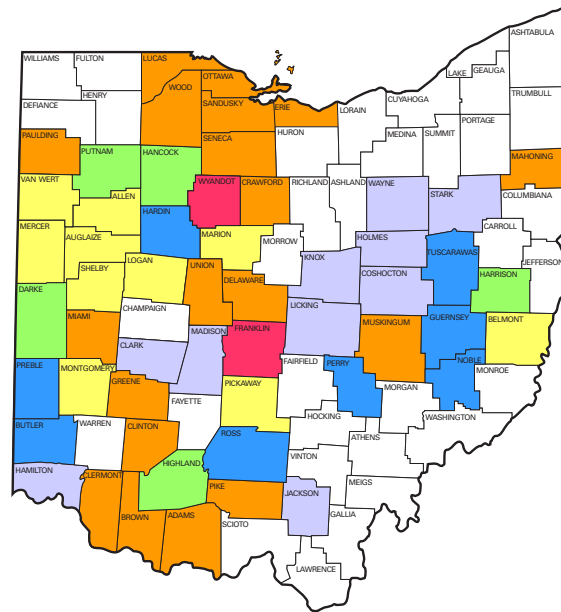


FIGURE 8. Sales of limestone and dolomite in Ohio in 2023, by county and quantity.

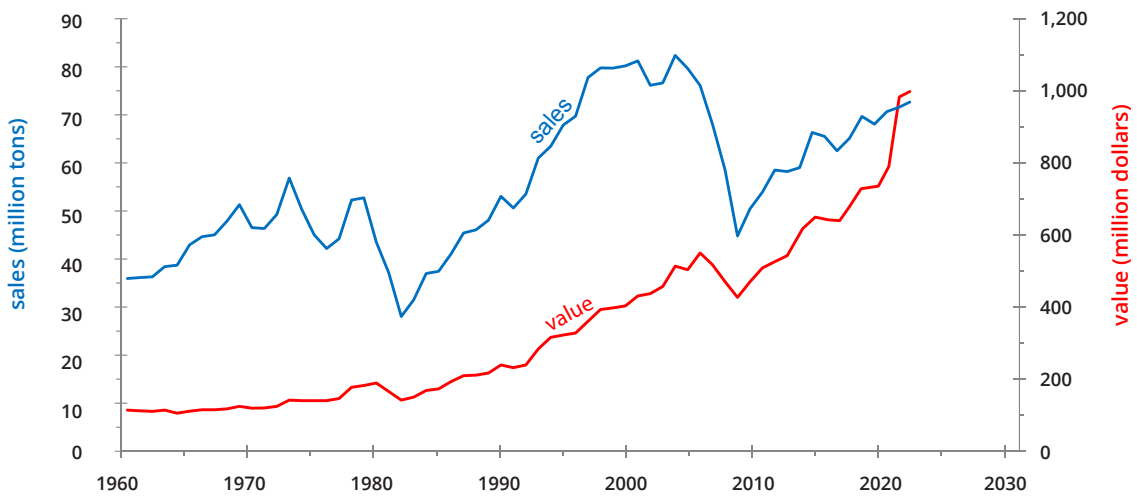


FIGURE 9. Sales and value of limestone and dolomite in Ohio since 1960.

SAND AND GRAVEL

Sand and gravel are common raw materials that are major constituents of asphalt, concrete, mortar, landscaping, roofing shingles, soil additives, and many other products. Sand-and-gravel production increased rapidly in Ohio beginning in the 1950s with the development of improved mining and processing machinery and increased demand from road building (ODNR Division of Geological Survey, 1959). Many depleted sand-and-gravel operations have been redeveloped as parks, residential spaces, or commercial facilities because of their proximity to urban areas.

Sand-and-gravel deposits in Ohio primarily are associated with Wisconsinan-age glacial outwash and kame terraces in the valleys and tributaries of the Great Miami, Scioto, and Muskingum Rivers located in the southwestern, central, and eastern portions of the state, respectively. Important sand-and-gravel deposits also are found in glacial kames in northeastern Ohio, beach ridges associated with ancestral Lake Erie, and alluvium of modern floodplains of the Ohio River and its tributaries.

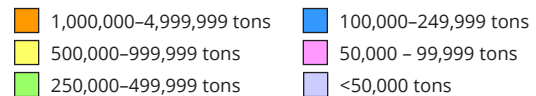
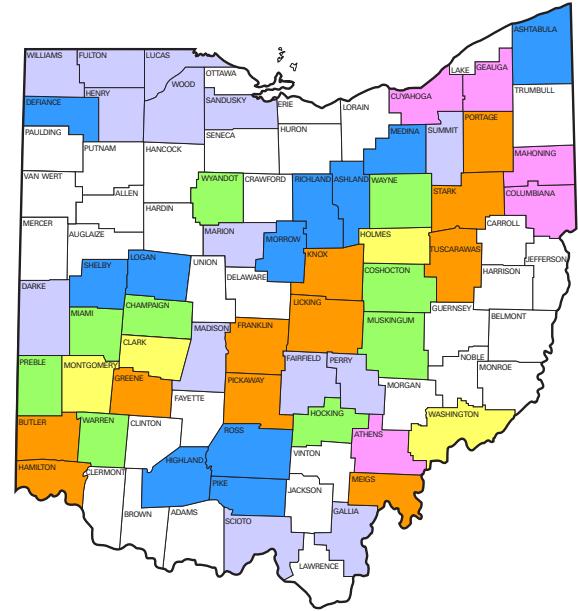


FIGURE 10. Sales of sand and gravel in Ohio in 2023, by county and quantity.

Production

- Tons produced = 30,007,688 (–6.1% from 2022)
- U.S. ranking:
 - 7th out of 50 producing states (USGS, 2024c)

Sales

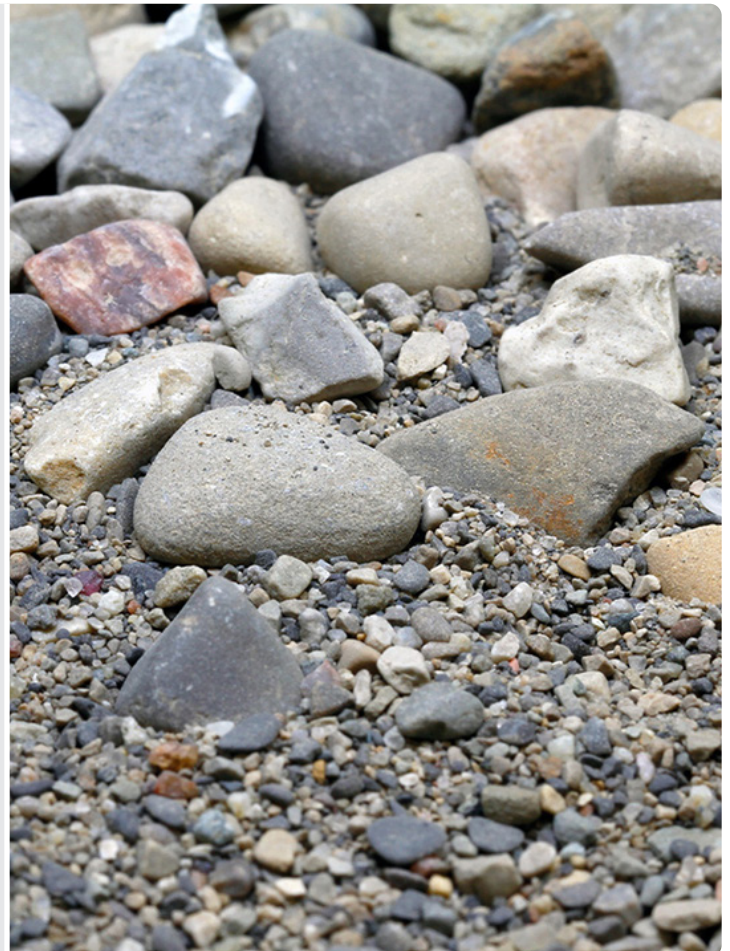
(See figs. 10 and 11)

- Tons sold = 29,700,960 (–8.9% from 2022; table 13)
- Value⁵ = \$307,515,588 (table 9)
- Leading counties (percentage of statewide sales):
 - Stark (12.2%)
 - Portage (9.7%)
 - Hamilton (8.8%)
 - Butler (7.5%)
 - Franklin (5.4%)

Employment

(See table 10)

- Production employees reported = 915
- Nonproduction employees reported = 608
- Average employee annual wage = \$56,167
- Total wages earned = \$78,745,640
- Average days worked per operation = 172



⁵Includes reported and estimated values. See footnote 1, p. 1.

TABLE 13. 2023 Ohio sand and gravel sales, by county and use

County	Tons sold																	
	Total sand and gravel	Total sand	Total gravel	Building		Portland cement concrete		Asphaltic concrete		Road construction/resurfacing		Filtration		Foundry sand	Industrial sand	Other/unspecified		
				Sand	Gravel	Sand	Gravel	Sand	Gravel	Sand	Gravel	Sand	Gravel			Sand	Gravel	
Ashland	200,831	67,077	133,754	20,123	39,597					40,246	79,194					6,708	14,963	
Ashabula	129,325	64,470	64,855	53,499	53,884											10,971	10,971	
Athens	54,099	39,509	14,590					14,590		39,509								
Butler	2,233,886	765,258	1,468,628	239,155	597,166	388,641					114,529					429,566	368,292	
Champaign	497,085	166,378	330,707	5,420	10,240	48,570	144,700	69,230	81,170	7,680	11,952					35,478	82,645	
Clark	843,894	383,814	460,080	3,316	58,800	43,847	64,612	44,358	59,614	21,793	6,554					270,500	270,500	
Columbiana	58,740	29,370	29,370													29,370	29,370	
Coshocton	403,776	223,944	179,832	5,942	3,142					14,225	13,768	325	501			203,452	162,421	
Cuyahoga	90,177	90,177														90,177		
Darke	14,814	9,244	5,570	9,244	5,570													
Defiance	206,842	178,620	28,222	7,953	20,836	170,664										3	7,386	
Fairfield	11,107	6,258	4,849													6,258	4,849	
Franklin	1,599,313	939,564	659,749	64,223	324,125	780,006	227,439	50,661	25,870		33,872					44,674	48,443	
Fulton	33,039	33,039														33,039		
Gallia	1,821	911	910													911	910	
Geauga	64,974	32,419	32,555													32,419	32,555	
Greene	1,034,025	587,267	446,758	13,000	9,000	21,800	25,000	53,000	16,000	56,000	9,600					443,467	387,158	
Hamilton	2,609,992	1,524,566	1,085,426	479,960	624,436	319,415	147,896				45,466			100		725,191	267,528	
Henry	38,121	38,121		3,000												10,000	25,121	
Highland	163,177	77,497	85,680		23,657	66,517					32,596					10,980	3,928	
Hocking	476,859	292,483	184,376			33,000	10,000	15,061	44,029	14,301	2,496					230,121	127,851	
Holmes	684,604	375,711	308,893	26,184	121,013	169,887	43,143	115,435	48,371	39,238	67,775	3,886				21,081		
Knox	1,286,481	538,232	748,249	17,085	268,117	289,604	143,508	70,286	33,986	234	121,110					161,023	117,997	
Licking	1,375,467	653,308	722,159	43,550	348,577	270,122	9,154	24,177	28,189		4,879					315,459	331,360	
Logan	188,200	79,295	108,905	620	619	2,330	2,330									76,345	105,956	
Lucas	3,946	1,973	1,973													1,973	1,973	
Madison	10,494	3,755	6,739													3,755	6,739	
Mahoning	66,147	40,734	25,413	2,300	9,000						4,545					28,607	868	
Marion	9,858	4,651	5,207	583		3,398										670	3,861	
Medina	179,600	46,600	133,000		95,000	34,600						12,000	38,000					
Meigs	1,248,169	756,032	492,137			516,695	237,685									239,337	254,452	
Miami	378,780	163,701	215,079		86,566	55,495										108,206	128,513	
Montgomery	865,483	472,336	393,147	124,662	109,349	45,000	45	74,088	88,008		333	6,000		6,000		216,586	195,412	
Morrow	223,061	97,854	125,207	520	31,302	48,667	31,302	48,667	31,302		31,301							
Muskingum	343,849	288,051	55,798		2,023			130,490	24,963	25,759	547	1,630				130,172	28,265	
Perry	724	362	362							362								
Pickaway	1,548,883	960,348	588,535	471	17,673	314,907	17,063	314,907	117,063	941	97,672					329,122	339,064	
Pike	158,255	130,723	27,532													130,723	27,532	
Portage	2,882,711	1,995,862	886,849	138,822	224,392	502,265	67,880	75,979	52,001	179,305	156,032	3,650	42,459			1,095,841	344,085	
Preble	384,801	227,166	157,635	76,515	76,515											150,651	81,120	

TABLE 13. 2023 Ohio sand and gravel sales, by county and use (cont.)

County	Tons sold																
	Total sand and gravel	Total sand	Total gravel	Building		Portland cement concrete		Asphaltic concrete		Road construction/ resurfacing		Filtration		Foundry sand	Industrial sand	Other/unspecified	
				Sand	Gravel	Sand	Gravel	Sand	Gravel	Sand	Gravel	Sand	Gravel			Sand	Gravel
Richland	137,909	113,914	23,995		4,600											113,914	18,137
Ross	244,495	182,749	61,746		3,438				27,927	25,911						85,459	25,849
Sandusky	959	959						959									
Scioto	40,778	23,584	17,194		23,584												
Shelby	156,000	78,000	78,000													78,000	78,000
Stark	3,631,884	1,934,138	1,697,746		59,342		353,190	56,141	107,466	102,141	395,108	284,611			1,019,032	1,033,579	
Summit	1,258	1,258													1,258		
Tuscarawas	1,270,145	781,397	488,748		246,866		32,530	23,037	102,429	65,479	246,867	123,764			152,705	152,706	
Warren	352,869	198,301	154,568		198,301												
Washington	631,611	432,422	199,189		25,417		268,083	8,554		26,051		21,387			138,922	138,920	
Wayne	350,162	215,235	134,927		99,702		88,182	5,349	11,722	11,711	13,187	20,537	2,442	3,176			
Williams	597	298	299												298	299	
Wood	7,990	3,995	3,995				2,559	2,558	1,210	1,210	226	227					
Wyandot	268,893	140,497	128,396		46,327		42,241		42,240			23,495	6,135	53,716	3,554		
TOTAL ¹	29,700,960	16,493,427	13,207,533	2,039,124	3,839,304	4,620,111	1,656,037	1,380,292	931,513	1,160,906	1,278,303	65,148	246,348	0	36,580	7,191,266	5,256,028

¹Any tally inconsistencies are because of rounding.

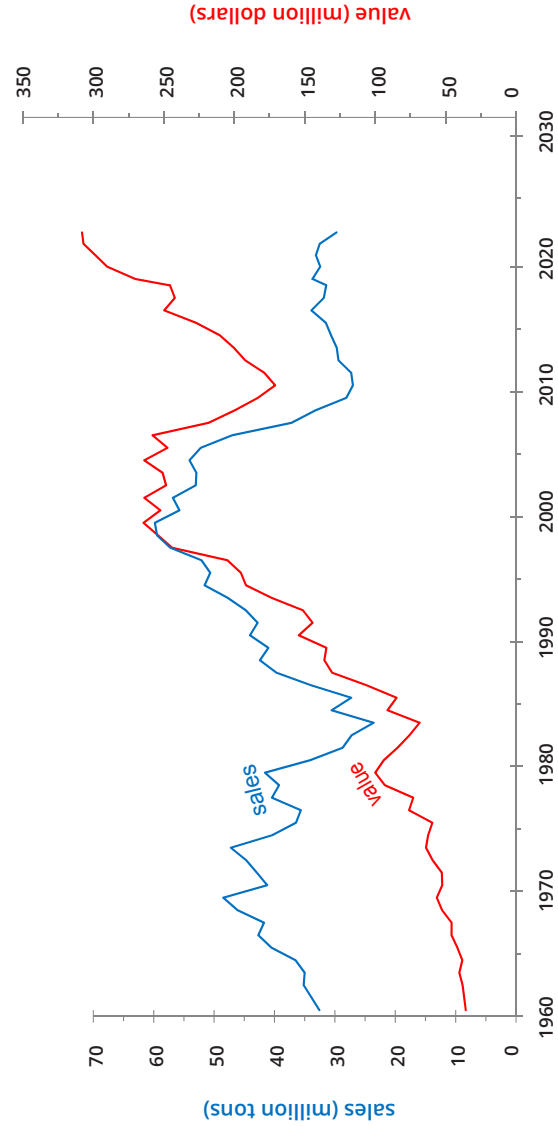


FIGURE 11. Sales and value of sand and gravel in Ohio since 1960.

SANDSTONE AND CONGLOMERATE

Extensive high-quality sandstone and conglomerate deposits are located in central and eastern Ohio, from near Lake Erie to the Ohio River. During the mid-1800s, these geologic resources were developed into large building stone and glass production industries, and to support the steel and associated industries. Many prominent buildings in the state were built using local building stones, including the Ohio Statehouse, Cleveland’s Old Stone Church, The Ohio State University’s Orton Hall, Cincinnati’s City Hall, and numerous other churches, monuments, and historic structures.

Ohio led the nation in sandstone production for many decades; this natural resource continues to support the state’s industries today. Historically, the Pennsylvanian-age Massillon sandstone and the Devonian-age Berea Sandstone of northern Ohio, as well as the Mississippian-age Buena Vista Sandstone in southern Ohio, have been the primary geologic units quarried for building stone (Bownocker, 1915; see also fig. 7).

Production

- Tons produced = 1,470,623 (+7.0% from 2022)
- U.S. ranking:
 - 5th out of 50 producing states for crushed stone (USGS, 2024a)
 - The 2023 U.S. state rankings for the 33 dimension-stone producing states were unavailable (USGS, 2024d).
- Top Producing Geologic Units (fig. 7):
 - Sharon conglomerate (Pennsylvanian)
 - Berea Sandstone (Devonian)
 - Logan Formation (Mississippian)
 - Unidentified Pottsville Group sandstone (Pennsylvanian)

Sales

(See figs. 12 and 13)

- Tons sold = 1,302,177 (+0.4% from 2022; tables 14 and 15)
- Value⁶ = \$57,422,625 (table 9)
- Leading counties (percentage of statewide sales):
 - Geauga (52.7%)
 - Wayne (13.6%)
 - Pike (7.3%)
 - Lake (5.4%)
 - Tuscarawas (3.2%)

Employment

(See table 10)

- Production employees reported = 166
- Nonproduction employees reported = 86
- Average employee annual wage = \$62,997
- Total wages earned = \$15,875,132
- Average days worked per operation = 152

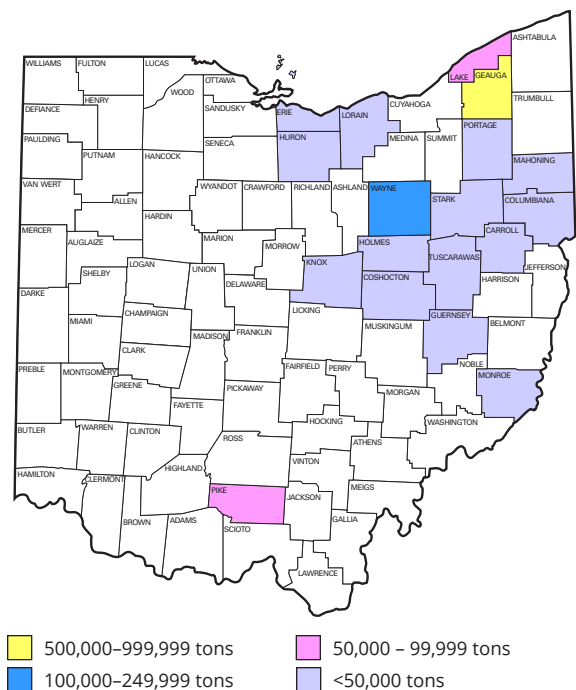
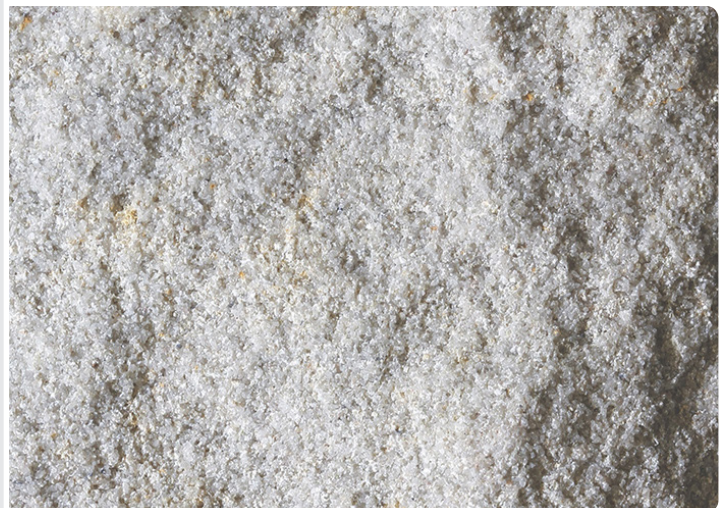


FIGURE 12. Sales of sandstone and conglomerate in Ohio in 2023, by county and quantity.



⁶Includes reported and estimated values. See footnote 1, p. 1.

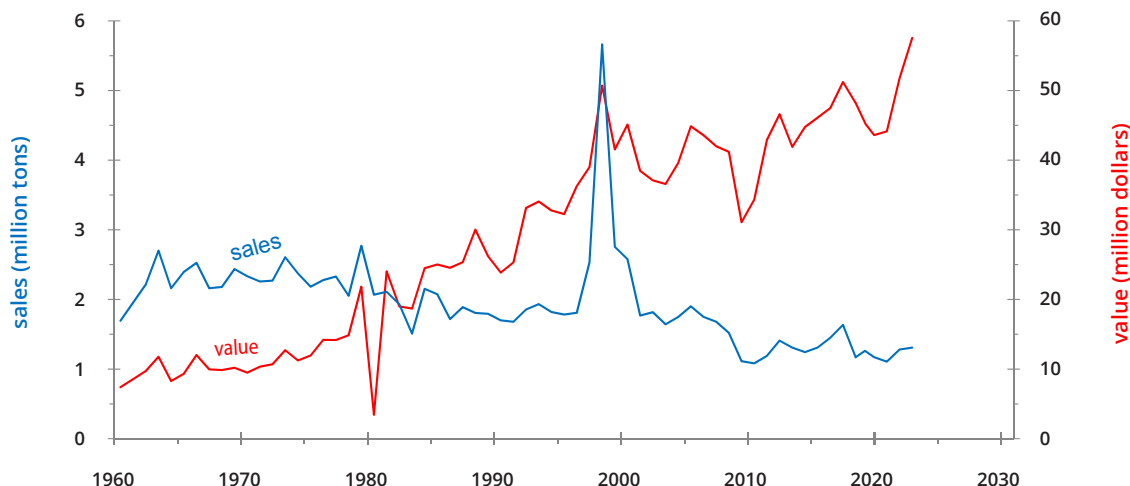


FIGURE 13. Sales and value of sandstone and conglomerate in Ohio since 1960.

TABLE 14. 2023 Ohio sales of crushed sandstone and conglomerate, by county and use

County	Tons sold														
	Total	Foundry sand	Glass sand	Metallurgical pebble	Refractory	Riprap	Aggregate	Silica flour	Polishing/grinding sand	Fire and furnace sand	Engine sand	Frac sand	Construction	Industrial sand	Other/unspecified
Carroll	2,800														2,800
Columbiana	8,354												8,354		
Coshocton	17,577						17,577								
Geauga	686,824	52,716	77,584	6,868	10,000		27,000		3,000				210,942	40,449	258,265
Guernsey	20,000						20,000								
Holmes	7,432						7,432								
Huron	881						881								
Knox	39,923													39,923	
Lake	70,309						54,461						15,848		
Lorain	32,777						32,777								
Mahoning	39,329												39,329		
Monroe	19,063						19,063								
Pike	94,901	97											26,861	1,214	66,729
Portage	28,200														28,200
Stark	4,581												4,581		
Tuscarawas	41,460	1,534											38,126		1,800
Wayne	176,943					18,407	87,190						71,346		
TOTAL	1,291,354	54,347	77,584	6,868	10,000	18,407	266,381	0	3,000	0	0	0	415,387	81,586	357,794

TABLE 15. 2023 Ohio sales of dimension sandstone, by county and use

County	Tons sold									
	Total	Refractory	Rough construction	Rubble	Grindstones	Rough architectural	Finished	Curbing	Flagging	Other/unspecified
Columbiana	159					159				
Coshocton	710			150			560			
Erie	6,509		1,941	1,702		1,647	1,219			
Lorain	3,445						3,445			
TOTAL	10,823	0	1,941	1,852	0	1,806	5,224	0	0	0

CLAY AND SHALE

The ceramics industry in Ohio has a long and dynamic history. Potteries were established by the early 1800s to supply dinnerware, and by the early 1900s, Ohio was producing tremendous amounts of building bricks, sewer pipes, roof and floor tiles, paving bricks, art pottery, and refractory products. Edward Orton, Jr., established the first ceramics engineering program in the nation at The Ohio State University in 1894. Ohio clay and shale still are being used to produce important ceramic products, though production tonnages are much less than 100 years ago. Ohio ceramic products are shipped throughout the eastern United States and Canada. Nearly all clay and shale produced in Ohio is used to produce value-added products (e.g., building bricks, industrial ceramics, pottery, expanded aggregate, quarry tile), thus the economic impact is much greater than the combined mined value.

Pennsylvanian-age shales and clays of eastern Ohio are the primary sources of raw materials for the ceramics industry; Mississippian- and Devonian-age shales of northern and central Ohio and Quaternary-age glacial clays of western Ohio are important secondary sources. General discussions of clay and shale geology in Ohio can be found in Lamborn and others (1938) and Stout and others (1923).

Production

- Tons produced (clay) = 1,072,597 (+48.5% from 2022)
- Tons produced (shale) = 416,693 (-8.2% from 2022)
- The 2023 U.S. state rankings for the 38 states producing clay and shale were unavailable ([USGS, 2024e](#)).

Sales

(See figs. 14, 15, 16, and 17)

- Clay:
 - Tons sold = 1,084,487 (+49.2% from 2022; table 16)
 - Value⁷ = \$10,814,087 (table 9)
- Leading counties for clay (percentage of statewide sales):
 - Ashtabula (38.3%)
 - Tuscarawas (25.7%)
 - Greene (16.6%)
 - Paulding (6.8%)
 - Jackson (2.9%)
- Shale:
 - Tons sold = 416,496 (-8.2% from 2022; table 17)
 - Value⁸ = \$5,726,154 (table 9)
- Leading counties for shale (percentage of statewide sales):
 - Tuscarawas (42.2%)
 - Marion (20.9%)
 - Holmes (7.1%)
 - Licking (7.0%)
 - Wayne (5.4%)

Employment

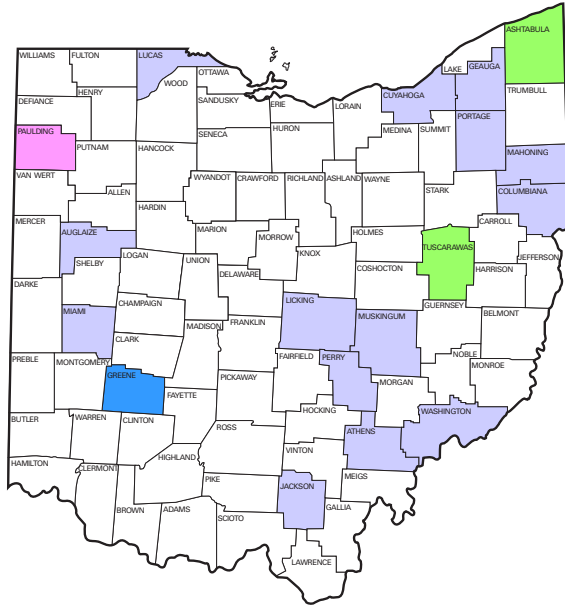
(See table 10)

- Production employees reported = 142
- Nonproduction employees reported = 125
- Average employee annual wage = \$51,251
- Total wages earned = \$12,710,348
- Average days worked per operation = 113

⁷Includes reported and estimated values. See footnote 1, p. 1.

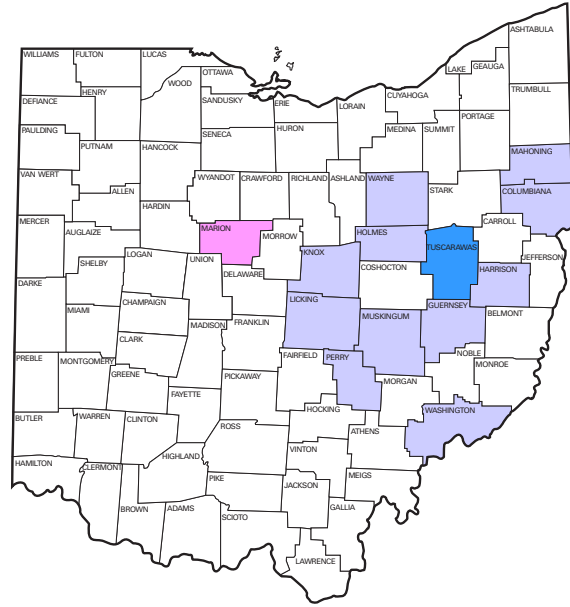
⁸Includes reported and estimated values. See footnote 1, p. 1.





■ 250,000-499,999 tons ■ 50,000 - 99,999 tons
■ 100,000-249,999 tons ■ <50,000 tons

FIGURE 14. Clay sales in Ohio in 2023, by county and quantity.



■ 100,000-249,999 tons ■ 50,000 - 99,999 tons
■ <50,000 tons

FIGURE 15. Shale sales in Ohio in 2023, by county and quantity.

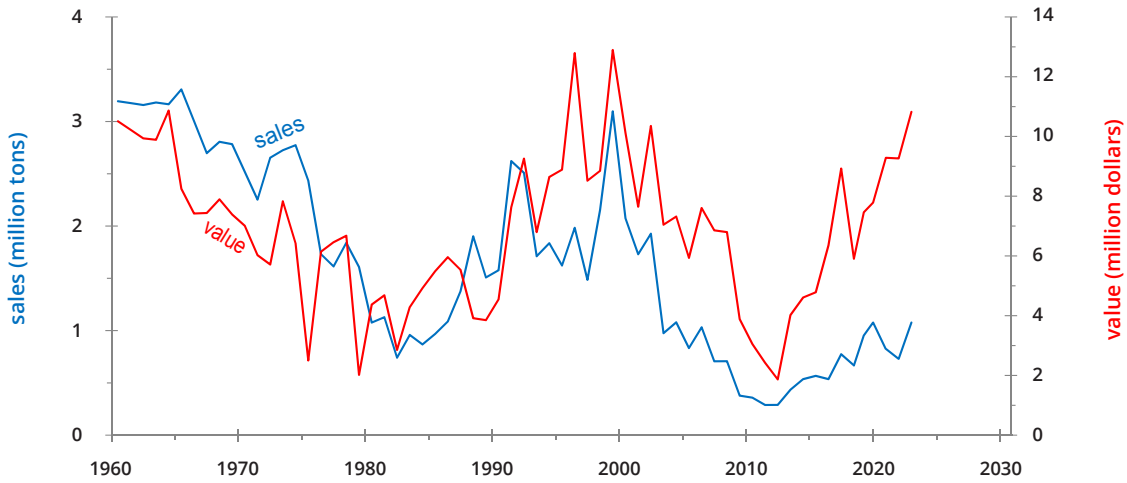


FIGURE 16. Sales and value of clay in Ohio since 1960.

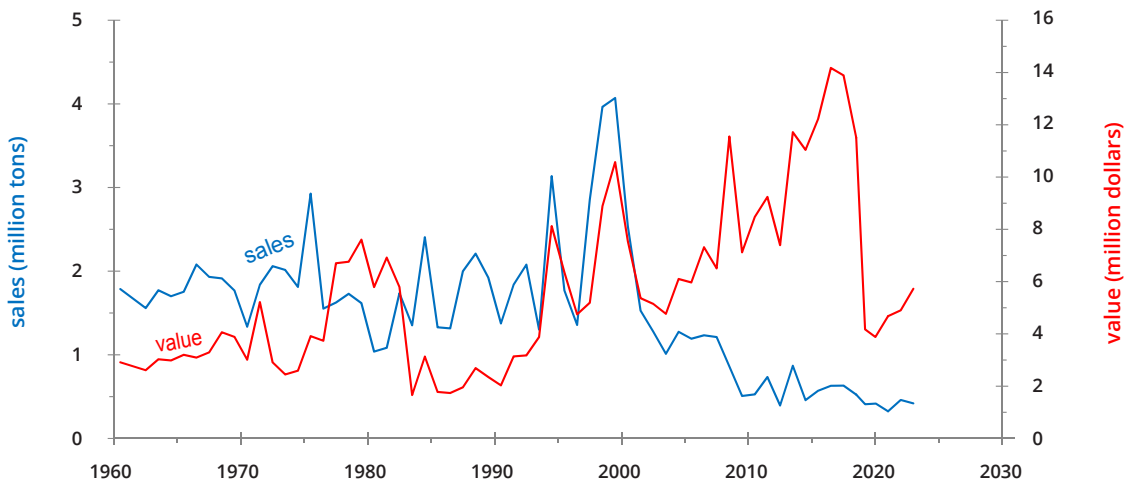


FIGURE 17. Sales and value of shale in Ohio since 1960.

TABLE 16. 2023 Ohio clay sales, by county and use

County	Tons sold								
	Total	Common clay products	Stoneware	Vitrified products	Cement manufacture	Refractories	Construction	Landfill use	Other/ unspecified
Ashtabula	415,887						415,887		
Athens	14,000							14,000	
Auglaize	1,189	1,189							
Columbiana	5,643	5,643							
Cuyahoga	2,545	999							1,546
Geauga	3,948								3,948
Greene	180,000				180,000				
Jackson	31,579	26,679				4,900			
Licking	29,575						29,575		
Lucas	754						754		
Mahoning	24,756						10,000		14,756
Miami	152	152							
Muskingum	5,320	5,320							
Paulding	74,023				74,023				
Perry	7,339	7,339							
Portage	4,925	1,442					3,283		200
Tuscarawas	278,537	258,962					19,575		
Washington	4,315						4,315		
TOTAL	1,084,487	307,725	0	0	254,023	4,900	483,389	14,000	20,450

TABLE 17. 2023 Ohio shale sales, by county and use

County	Tons sold							
	Total	Common clay products	Vitrified products	Cement manufacture	Lightweight aggregate	Construction	Landfill use	Other/ unspecified
Columbiana	17,027	17,027						
Guernsey	691					691		
Harrison	21,420	21,420						
Holmes	29,384				22,297	360		6,727
Knox	1,542							1,542
Licking	29,152	29,152						
Mahoning	2,020	3						2,017
Marion	87,001	87,001						
Muskingum	14,182	12,320						1,862
Perry	15,375	15,375						
Tuscarawas	175,681	175,681						
Washington	324	324						
Wayne	22,697	13,955				8,742		
TOTAL	416,496	372,258	0	0	22,297	9,793	0	12,148

SALT

Salt was one of the first industrial minerals produced in Ohio and was a valuable commodity to early pioneers who obtained it from natural springs. The first State Legislature enacted laws concerning salt springs in 1803–1804, and wells were drilled in Jackson and Muskingum Counties, leading to the first commercial salt production in the state. The highest-producing area for early salt production was in Meigs County, beginning in 1850. By 1903, Ohio was producing 14.7 percent of all salt in the United States (Bownocker, 1906). The modern salt industry in Ohio began in 1956 with the construction of the underground salt mine at Fairport Harbor in Lake County. A second large underground operation was constructed in Cleveland, beginning in 1957.

The primary use for Ohio salt in 2023 was ice control. Salt also was used as an additive in animal feed, for cattle blocks, and as a commercial and residential water-softening agent.

In 2023, salt production increased while sales decreased, when compared to 2022 data. The recent stretch of warmer winters with lower-than-average precipitation have resulted in municipalities not needing to replenish salt supplies every year, resulting in fluctuating cycles of production, sales, and value.

Production

- Tons produced = 4,712,595 (+8.5% from 2022)
- U.S. ranking:
 - In the top 7 of 16 producing states (USGS, 2024f)
- Top producing geologic units (fig. 7):
 - Salina Group (Silurian)

Sales

(See figs. 18 and 19)

- Tons sold = 4,270,433 (-2.8% from 2022)
- Value⁹ = \$235,104,944 (table 9)

Employment

(See table 10)

- Production employees reported = 274
- Nonproduction employees reported = 153
- Average employee annual wage = \$84,650
- Total wages earned = \$36,061,070
- Average days worked per operation = 281

⁹Includes reported and estimated values. See footnote 1, p. 1.

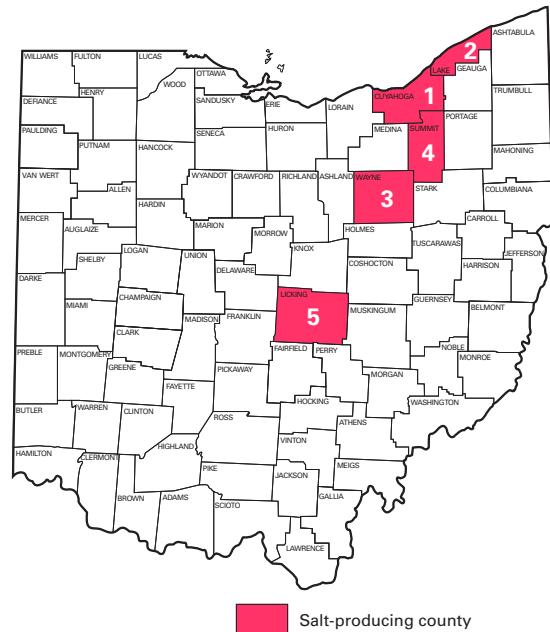


FIGURE 18. Counties producing salt in Ohio in 2023 and their rankings in sales.

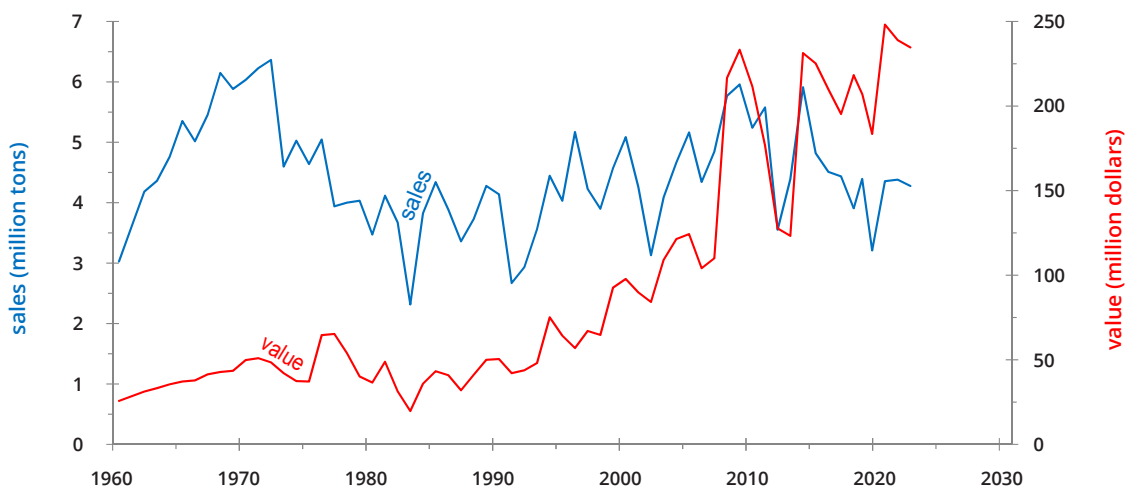


Figure 19. Sales and value of salt in Ohio since 1960.

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MAP OF ACTIVE MINERAL INDUSTRY OPERATIONS IN OHIO 2023

By Christopher E. Wright

GIS Database Administration by Joseph G. Wells
GIS Cartography by Jason Piwarski

ABOUT THE MAP

This map is based on operators included in the supplementary appendices of the 2023 Report on Ohio Mineral Industries (Wright, 2023) and is intended for general reference. Locations of mineral extraction operations are approximate and are based on permitting information on file at the Ohio Department of Natural Resources (ODNR), Division of Mineral Resources Management. The letters and numbers adjacent to the symbols are the state mine numbers assigned to operations listed in the downloadable directory of the 2023 Report on Ohio Mineral Industries. More information about specific operations may be found using the state mine number to refer to the table included on this map or in the directory of operators reporting production, sales, and value in the report appendices. An interactive map of mineral industries and operator information can be viewed online. More information is available on the ODNR Division of Geological Survey website (geology.ohio.gov).

2023 OHIO ECONOMIC GEOLOGY IN BRIEF

The total tonnage of coal and industrial minerals produced in Ohio during 2023 was 113,107,179 tons or approximately 5.6 tons per capita. In 2023, the total value of coal was \$129,707,826; the value of oil and gas was \$5,908,856,866; and the value of all nonfuel industrial minerals was \$1,615,388,379 (Fig. 1, table 1). The combined value of fuel and nonfuel minerals produced in Ohio during 2023 was \$7,648,935,174 or approximately \$469 per capita.

Reported and estimated total direct employment in the extractive industries of Ohio in 2023 was more than 10,000 people. Industrial mineral production increased for limestone and dolomite, sand, sandstone and conglomerate, and clay, while production decreased for coal, shale, sand and gravel, and peat. The total value of nonfuel industrial minerals exceeded \$1 billion for the first time in Ohio history. In 2023, the production-leading commodity of limestone and dolomite was up 1.4%, with the second leading commodity of sand and gravel down 6.1% from 2022, the third leading commodity of salt was up 4.5% from 2022, the fourth leading commodity of coal was down 22.6% from 2022.

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*Includes reported and estimated values. Some operators reporting sales did not report a value for those sales. A statewide average cost per ton was calculated for coal based on method of production for which sales value was reported. Those calculated average values are reported in the table for the coal value.

Commodity	Production	Value	Change in value from 2022 (percent)
Limestone and dolomite	71,381,381 tons	\$2,971,731,045	+1.4%
Coal	2,064,443 tons	\$2,097,353,200	-22.6%
Sand and gravel	20,748,049 tons	\$2,700,950,000	+4.5%
Clay	4,172,299 tons	\$2,783,131,000	+1.7%
Sandstone and conglomerate	1,062,117 tons	\$221,104,144	+2.0%
Oil	446,123 tons	\$5,908,856,866	+1.3%
Gas	150 tons	\$150,000,000	+2.7%
Other	2,007,993 tons	\$1,615,388,379	+1.3%
Total	113,107,179 tons	\$7,648,935,174	+1.3%

Production figures for industrial minerals are based on the 2023 Report on Ohio Mineral Industries. Production figures for coal are based on the 2023 Report on Ohio Mineral Industries. Production figures for oil and gas are based on the 2023 Report on Ohio Mineral Industries. Production figures for limestone and dolomite are based on the 2023 Report on Ohio Mineral Industries. Production figures for sand and gravel are based on the 2023 Report on Ohio Mineral Industries. Production figures for clay are based on the 2023 Report on Ohio Mineral Industries. Production figures for sandstone and conglomerate are based on the 2023 Report on Ohio Mineral Industries. Production figures for other industrial minerals are based on the 2023 Report on Ohio Mineral Industries.

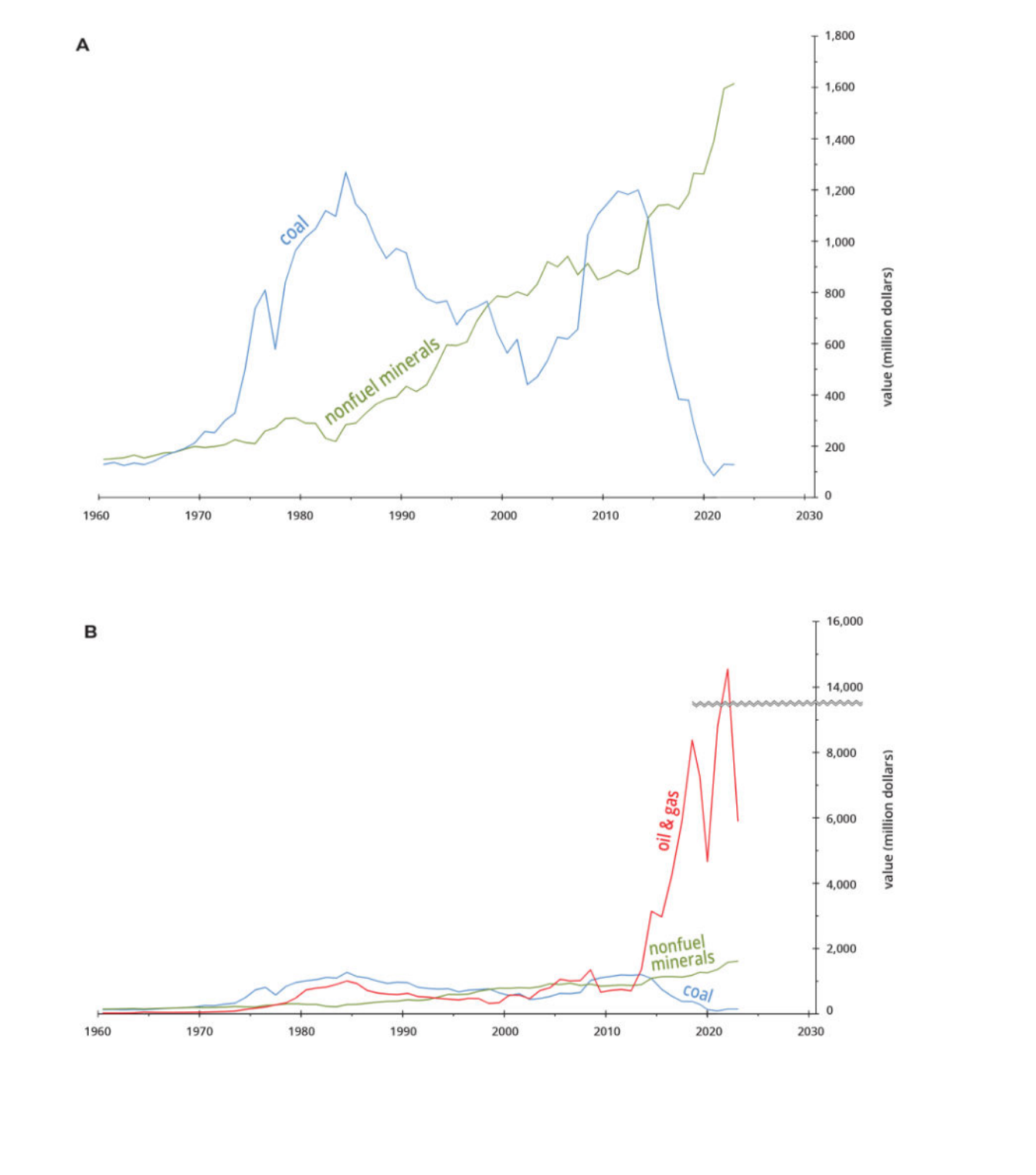


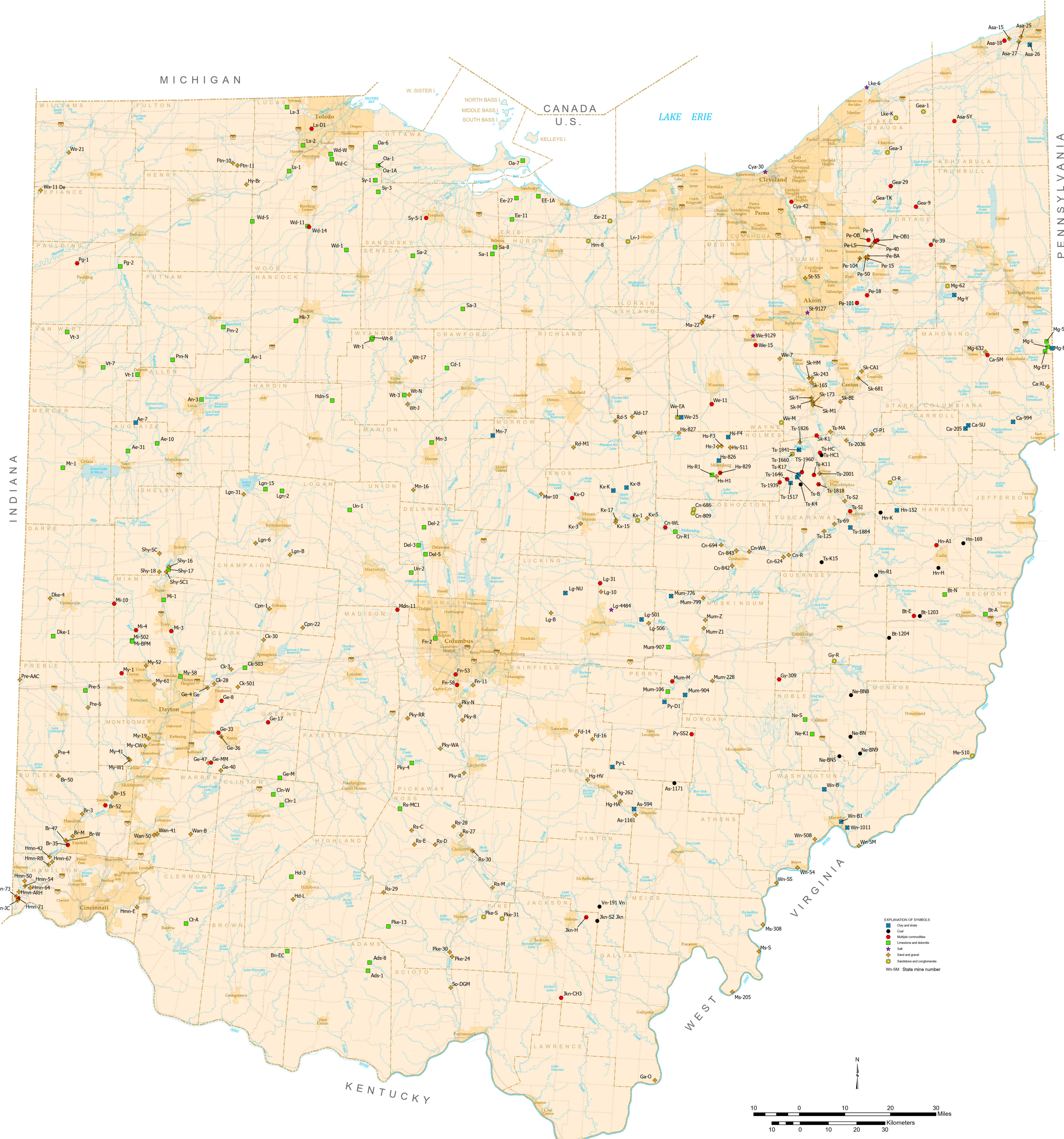
FIGURE 1. (A) Value of coal and nonfuel minerals in Ohio since 1960. (B) Value of coal, nonfuel minerals, and oil and gas in Ohio since 1960. The double yellow line indicates a gap in the value axis.

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Recommended bibliographic citation
Wright, C.E., 2024, Map of active mineral industry operations in Ohio 2023, Columbus, Ohio: Department of Natural Resources, Division of Geological Survey, Map M-1 (2023 ed.), Scale: 1:500,000.

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REPORTING COAL AND INDUSTRIAL MINERAL OPERATORS, BY COUNTY

County	Operator Name	State Mine No.	Production (Tons)	Total Sales (\$)
Adams County	Hendling Mineral Midwest Agg., Inc.	Ad-1	1,172,762	108,224
	Blue Est. Ltd.	Ad-2	138,540	138,540
	Bullfinch Stone Co.	Ad-3	364,800	303,215
	National Lime & Stone Co.	Ad-4	564,648	564,648
	Local Stone, LLC	Ad-5	1,704	1,704
	Young Sand & Gravel Co.	Ad-6	138,287	138,287
	W. S. Stone, Inc.	Ad-7	1,000	1,000
	W. S. Stone, Inc.	Ad-8	1,000	1,000
	W. S. Stone, Inc.	Ad-9	1,000	1,000
	W. S. Stone, Inc.	Ad-10	1,000	1,000
Allen County	W. S. Stone, Inc.	Al-1	1,000	1,000
	W. S. Stone, Inc.	Al-2	1,000	1,000
	W. S. Stone, Inc.	Al-3	1,000	1,000
	W. S. Stone, Inc.	Al-4	1,000	1,000
	W. S. Stone, Inc.	Al-5	1,000	1,000
	W. S. Stone, Inc.	Al-6	1,000	1,000
	W. S. Stone, Inc.	Al-7	1,000	1,000
	W. S. Stone, Inc.	Al-8	1,000	1,000
	W. S. Stone, Inc.	Al-9	1,000	1,000
	W. S. Stone, Inc.	Al-10	1,000	1,000
Ashland County	W. S. Stone, Inc.	As-1	1,000	1,000
	W. S. Stone, Inc.	As-2	1,000	1,000
	W. S. Stone, Inc.	As-3	1,000	1,000
	W. S. Stone, Inc.	As-4	1,000	1,000
	W. S. Stone, Inc.	As-5	1,000	1,000
	W. S. Stone, Inc.	As-6	1,000	1,000
	W. S. Stone, Inc.	As-7	1,000	1,000
	W. S. Stone, Inc.	As-8	1,000	1,000
	W. S. Stone, Inc.	As-9	1,000	1,000
	W. S. Stone, Inc.	As-10	1,000	1,000

EXPLANATION OF SYMBOLS

- Blue circle: Coal
- Red circle: Oil and gas
- Green circle: Limestone and dolomite
- Yellow circle: Sand and gravel
- Purple circle: Other minerals
- WM-SM: State mine number

SCALE 1:500,000

Projection of data in Ohio coordinate system, south zone, North American Datum 1983.