



2022 ANNUAL OHIO SHALE REPORT

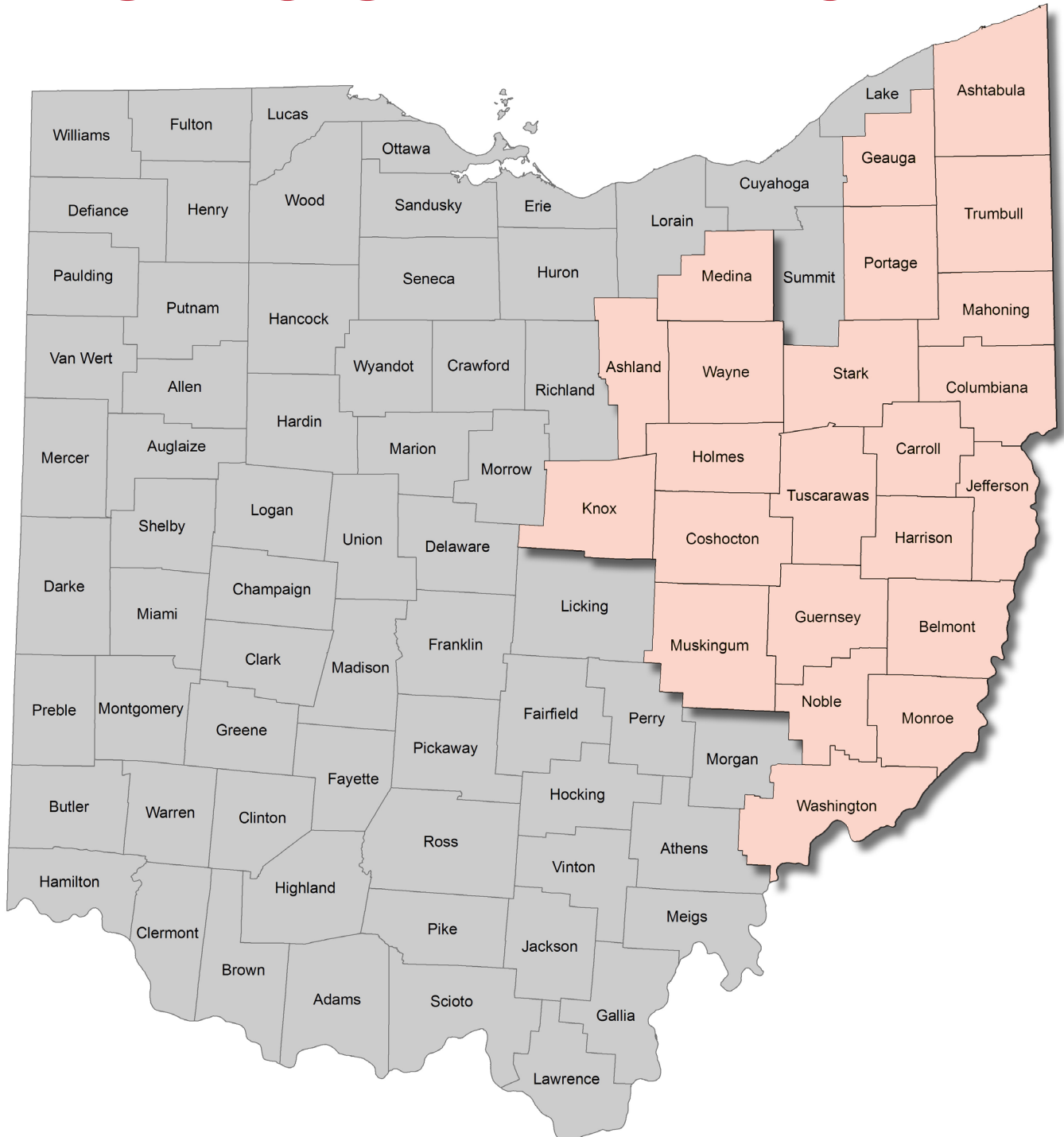


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Introduction

Ohio Revised Code Section 6301.12 calls for the publication of an annual report assessing the direct and indirect economic impact of businesses engaged in the production of horizontal wells. This report fulfills that requirement by presenting available economic data on businesses engaged in the production of oil and gas wells in Ohio. The focus is on employment in core and ancillary shale industries; it does not encompass all economic activity related to Ohio's shale industry. For example, increased business and employment at restaurants and retail stores located near shale development are not reflected in this report. Much of the information in this report reflects data for a group of five¹ industries defined as "core" shale-related industries and a group of 30 industries defined as "ancillary" shale-related industries. While most shale-related employment is in these industries, not all establishments in these industries are involved in shale-related activity. For those that are, not all their products and services and, therefore, their employment is necessarily linked to shale-related economic activity. This is particularly true for the ancillary industries.

This report shows annual employment and business establishment changes in core and ancillary shale-related industries from 2020 to 2021. It includes data for government employment (federal, state, and local) in shale-related industries that have significant non-private employment, most notably engineering services, water supply and irrigation systems, sewage treatment facilities, and highway, street, and bridge construction. The report also shows worker demand, key occupations in shale-related industries, residency status of new hires in core and ancillary industries, and average wages. It also offers a summary of regional workforce development plans.

In partnership with the U.S. Department of Labor's Bureau of Labor Statistics, the Ohio Department of Job and Family Services' Bureau of Labor Market Information collects and analyzes shale-related employment data for Ohio. The pages that follow provide a synopsis of this information for 2022. Previous annual reports can be found at ohiolmi.com.

¹ In previous years, data were reported for six industries at the NAICS six-digit level. Starting in 2017, BLS stopped publishing annual data for two industries, NAICS 211111 (crude petroleum and natural gas extraction) and NAICS 211112 (natural gas liquid extraction), because the data did not meet disclosure standards. However, combined data for these industries are reported as NAICS 2111 (oil and gas extraction).

Executive Summary

Permits issued for shale wells peaked in 2014 at 660. In 2022, 275 permits were issued.²

Employment in the core shale-related industries in 2022 was 9,359, well below its peak of over 16,000 jobs in 2017. From 2021 to 2022, core shale-related industries added 730 jobs, an 8.5% increase. The largest increase, 334 jobs, was in oil and gas pipeline construction. Employment in ancillary shale-related industries increased by 6,485 jobs (3.5%).

The key occupations in core and ancillary shale-related industries provide family-sustaining wages and tend to require specialized skill sets. The median annual wages for key shale-related jobs ranged from \$31,200 to \$101,600. Among the key shale-related occupations, 29 of the top 38 jobs had median annual wages above the state median wage of \$44,750.

Employer demand for key shale-related occupations, as measured by online job ads, was slightly lower in 2022 than in 2021. The estimated number of construction trade jobs in the core shale-related industries increased by 8.7%, driven by an employment drop in oil and gas pipeline construction. The number of extraction trade jobs increased 7.4% over the year.

² Ohio Department of Natural Resources (<https://ohiodnr.gov/business-and-industry/energy-resources/oil-and-gas-wells/horizontal-wells>)

Core Shale-Related Industry Employment

Employment in core shale-related industries increased from 2021 to 2022. Overall employment in the core industries grew 8.5%, a gain of 730 jobs. Oil and gas pipeline construction added 324 jobs, and support activities for oil and gas operations added 268 jobs. Drilling oil and gas wells lost 45 jobs over the year. See Figure 1 for details about employment in the core shale-related industries.

Figure 1. Core Shale-Related Industry Annual Employment Averages and Year-to-Year Change

NAICS	Title	Average Employment, 2021	Average Employment, 2022	Numeric Change	Percent Change
2111	Oil and Gas Extraction	1,136	1,231	95	8.4%
213111	Drilling Oil and Gas Wells	419	374	-45	-10.7%
213112	Support Activities for Oil and Gas Operations	2,755	3,023	268	9.7%
237120	Oil and Gas Pipeline Construction	3,794	4,128	334	8.8%
486210	Pipeline Transportation of Natural Gas	525	603	78	14.9%
Core Industries Totals		8,629	9,359	730	8.5%

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

Business Establishments in Core Industries

The total number of Ohio business establishments in the core shale-related industries increased by 16 from 2021 to 2022, a 2.2% increase. Pipeline transportation of natural gas added 14 establishments. See Figure 2 for details about establishment growth in the core shale-related industries.

Figure 2. Core Shale-Related Industry Annual Establishment Averages and Year-to-Year Change

NAICS	Title	Average Number of Establishments, 2021	Average Number of Establishments, 2022	Numeric Change	Percent Change
2111	Oil and Gas Extraction	116	123	7	6.0%
213111	Drilling Oil and Gas Wells	95	92	-3	-3.2%
213112	Support Activities for Oil and Gas Operations	298	293	-5	-1.7%
237120	Oil and Gas Pipeline Construction	175	178	3	1.7%
486210	Pipeline Transportation of Natural Gas	46	60	14	30.4%
Core Industries Totals		730	746	16	2.2%

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

Ancillary Shale-Related Industry Employment

Ancillary shale-related industries are indirectly involved with shale oil and gas well drilling and development. These industries provide products or support services to the core shale-related industries and to many other industries, as well. Employment in ancillary shale-related industries grew 6,485 jobs, a 3.5% increase from 2021 to 2022. Starred industries have some employment that is not disclosed for confidentiality. Employment for the petrochemical and industrial gas manufacturing industries is confidential. See Figure 3 for details about employment in the ancillary shale-related industries.

Figure 3. Ancillary Shale-Related Industry Annual Employment Averages and Year-to-Year Change

NAICS	Title	Average Employment, 2021	Average Employment, 2022	Numeric Change	Percent Change
221112	Fossil fuel electric power generation *	2,454	2,478	24	1.0%
221210	Natural gas distribution	5,441	5,425	-16	-0.3%
221310	Water supply and irrigation systems	5,836	5,808	-28	-0.5%
221320	Sewage treatment facilities *	3,605	3,633	28	0.8%
237110	Water and sewer line system construction *	5,926	6,124	198	3.3%
237310	Highway, street, and bridge construction	17,075	17,532	457	2.7%
238912	Nonresidential site preparation contractors	6,952	7,304	352	5.1%
32511	Petrochemical manufacturing	ND	ND		
32512	Industrial gas manufacturing	ND	ND		
331110	Iron, steel mills and ferroalloy manufacturing	9,326	9,596	270	2.9%
331210	Iron, steel pipe and tube from purchased steel	3,142	3,103	-39	-1.2%
333131	Mining machinery and equipment manufacturing	243	185	-58	-23.9%
333132	Oil and gas field machinery and equipment	180	197	17	9.4%
423810	Construction equipment merchant wholesalers	2,851	3,039	188	6.6%
423830	Industrial machinery merchant wholesalers	17,756	18,751	995	5.6%
423840	Industrial supplies merchant wholesalers	5,973	6,239	266	4.5%
484110	General freight trucking, local	13,034	13,192	158	1.2%
484220	Other specialized trucking, local	9,275	9,335	60	0.6%
484230	Other specialized trucking, long-distance	6,265	6,449	184	2.9%
531190	Lessors of other real estate property	916	880	-36	-3.9%
532412	Other heavy machinery rental and leasing	2,296	2,461	165	7.2%
541330	Engineering services	30,667	32,329	1,662	5.4%
541360	Geophysical surveying and mapping services	270	338	68	25.2%
541380	Testing laboratories	6,398	6,494	96	1.5%
541620	Environmental consulting services	2,157	2,331	174	8.1%
562910	Remediation services	3,962	4,336	374	9.4%
811310	Commercial machinery repair and maintenance	9,867	10,431	564	5.7%
924110	Air, water, and waste program administration	6,037	6,078	41	0.7%
924120	Administration of conservation programs	5,526	5,832	306	5.5%
926130	Utility regulation and administration	519	534	15	2.9%
Ancillary Industry Totals		183,949	190,434	6,485	3.5%

* Industry has some non-disclosable employment

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

Business Establishments in Ancillary Industries

The reported number of business establishments in ancillary shale-related industries increased 510 from 2021 to 2022, a 3.5% increase. See Figure 4 for details.

Figure 4. Ancillary Shale-Related Industry Annual Establishment Averages and Year-to-Year Change

NAICS	Title	Average Establishments, 2021	Average Establishments, 2022	Numeric Change	Percent Change
221112	Fossil fuel electric power generation	87	87	0	0.0%
221210	Natural gas distribution	168	182	14	8.3%
221310	Water supply and irrigation systems	267	270	3	1.1%
221320	Sewage treatment facilities	210	211	1	0.5%
237110	Water and sewer line system construction	375	381	6	1.6%
237310	Highway, street, and bridge construction	753	757	4	0.5%
238912	Nonresidential site preparation contractors	618	639	21	3.4%
325110	Petrochemical manufacturing	3	3	0	0.0%
325120	Industrial gas manufacturing	39	37	-2	-5.1%
331110	Iron, steel mills and ferroalloy manufacturing	61	61	0	0.0%
331210	Iron, steel pipe and tube from purchased steel	36	38	2	5.6%
333131	Mining machinery and equipment manufacturing	9	9	0	0.0%
333132	Oil and gas field machinery and equipment	10	10	0	0.0%
423810	Construction equipment merchant wholesalers	204	210	6	2.9%
423830	Industrial machinery merchant wholesalers	2,134	2,201	67	3.1%
423840	Industrial supplies merchant wholesalers	625	635	10	1.6%
484110	General freight trucking, local	1,601	1,711	110	6.9%
484220	Other specialized trucking, local	1,270	1,299	29	2.3%
484230	Other specialized trucking, long-distance	347	357	10	2.9%
531190	Lessors of other real estate property	278	268	-10	-3.6%
532412	Other heavy machinery rental and leasing	237	248	11	4.6%
541330	Engineering services	2,540	2,685	145	5.7%
541360	Geophysical surveying and mapping services	61	63	2	3.3%
541380	Testing laboratories	458	458	0	0.0%
541620	Environmental consulting services	343	353	10	2.9%
562910	Remediation services	237	250	13	5.5%
811310	Commercial machinery repair and maintenance	1,151	1,209	58	5.0%
924110	Air, water, and waste program administration	151	154	3	2.0%
924120	Administration of conservation programs	173	171	-2	-1.2%
926130	Utility regulation and administration	42	41	-1	-2.4%
Ancillary Industry Totals		14,488	14,998	510	3.5%

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

Key Shale-Related Occupations

The occupations listed in this report are not exclusive to any industry, but they have a high presence in shale-related industries. Figure 7 shows key occupations in core and ancillary shale-related industries. These occupations are likely to provide family-sustaining wages and tend to require higher skill sets. Twenty-nine of the 38 occupations had median annual wages above the state median occupational wage of \$44,750 for 2022.

Figure 5. Key Occupations in Shale-Related Industries

SOC Code	SOC Title	Median Annual Wage	Typical Education, Work Experience, On-the-Job Training Needed
47-5071	Roustabouts, Oil and Gas	\$31,200	No formal ed. credential, No exper., Moderate-term OJT
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	\$35,240	No formal ed. credential, No exper., Short-term OJT
47-5081	Helpers--Extraction Workers	\$36,380	HS dipl./GED, No exper., Moderate-term OJT
53-7073	Wellhead Pumpers	\$37,580	HS dipl./GED, Less than 5 years exp., Moderate-term OJT
43-9061	Office Clerks, General	\$38,050	HS dipl./GED, No exper., Short-term OJT
43-4051	Customer Service Representatives	\$38,060	HS dipl./GED, No exper., Short-term OJT
43-6014	Secretaries and Administrative Assistants, Except Legal Medical	\$38,710	HS dipl./GED, No exper., Short-term OJT
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	\$43,420	HS dipl./GED, No exper., Moderate-term OJT
43-3031	Bookkeeping, Accounting, and Auditing Clerks	\$44,150	Some college-no degree, No exper., Moderate-term OJT
51-8092	Gas Plant Operators	\$46,220	HS dipl./GED, No exper., Long-term OJT
51-4121	Welders, Cutters, Solderers, and Brazers	\$46,360	HS dipl./GED, No exper., Moderate-term OJT
47-2061	Construction Laborers	\$47,550	No formal ed. credential, No exper., Short-term OJT
47-5013	Service Unit Operators, Oil, Gas, and Mining	\$47,820	No formal ed. credential, No exper., Moderate-term OJT
53-3032	Heavy and Tractor-Trailer Truck Drivers	\$49,820	Postsecondary nondegree award, No exper., Short-term OJT
47-5023	Earth Drillers, Except Oil and Gas	\$50,590	HS dipl./GED, No exper., Moderate-term OJT
47-2151	Pipelayers	\$50,660	No formal ed. credential, No exper., Short-term OJT
47-5011	Derrick Operators, Oil and Gas	\$51,220*	No formal ed. credential, No exper., Short-term OJT
47-2031	Carpenters	\$54,530	HS dipl./GED, No exper., Apprenticeship
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	\$56,940	HS dipl./GED, No exper., Long-term OJT
47-2073	Operating Engineers and Other Construction Equipment Operators	\$59,190	HS dipl./GED, No exper., Moderate-term OJT
49-9041	Industrial Machinery Mechanics	\$59,570	HS dipl./GED, No exper., Long-term OJT
47-5012	Rotary Drill Operators, Oil and Gas	\$60,180	No formal ed. credential, No exper., Moderate-term OJT
51-1011	First-Line Supervisors of Production and Operating Workers	\$61,910	HS dipl./GED, Less than 5 years exp., No OJT
43-6011	Executive Secretaries and Executive Administrative Assistants	\$62,240	HS dipl./GED, Less than 5 years exp., No OJT
19-4043	Geological Technicians, Except Hydrologic Technicians	\$62,770	Associate deg., No exper., Moderate-term OJT
47-2152	Plumbers, Pipefitters, and Steamfitters	\$62,930	HS dipl./GED, No exper., Apprenticeship
53-7072	Pump Operators, Except Wellhead Pumpers	\$67,480	HS dipl./GED, No exper., Moderate-term OJT
13-1051	Cost Estimators	\$68,500	Bachelor's Deg., No exper., No OJT
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	\$70,270	HS dipl./GED, Less than 5 years exp., No OJT
47-1011	First-Line Supervisors of Construction Trades and Extraction Work	\$72,020	HS dipl./GED, 5 years or more exp., No OJT
19-2042	Geoscientists, Except Hydrologists and Geographers	\$78,100	Bachelor's Deg., No exper., No OJT
53-7071	Gas Compressor and Gas Pumping Station Operators	\$83,750	HS dipl./GED, No exper., Moderate-term OJT
17-2112	Industrial Engineers	\$87,120	Bachelor's Deg., No exper., No OJT
11-1021	General and Operations Managers	\$87,970	Bachelor's Deg., 5 years or more exp., No OJT
11-9021	Construction Managers	\$91,600	Bachelor's Deg., No exper., Moderate-term OJT
15-1211	Computer Systems Analysts	\$100,960	Bachelor's Deg., No exper., No OJT
17-2171	Petroleum Engineers	\$101,210	Bachelor's Deg., No exper., No OJT
51-8093	Petroleum Pump System Operators, Refinery Operators and Gaugers	\$101,600	HS dipl./GED, No exper., Long-term OJT

* U.S. Median Annual Wage

Source: U.S. Bureau of Labor Statistics, Occupational Employment Statistics, May 2023

Demand for Workers in Key Shale-Related Occupations

Overall, job demand for key shale-related occupations, as measured by online job ads, decreased very slightly from 2021 to 2022. Many of the key shale-related occupations are common in other industries as well. See Figure 6 for details.

Figure 6. Demand for Workers in Key Shale-Related Occupations

SOC Code	Occupation Title	Job Ad Counts	
		2021	2022
53-3032	Heavy and Tractor-Trailer Truck Drivers	42,768	43,027
43-4051	Customer Service Representatives	17,019	15,672
17-2112	Industrial Engineers	9,306	11,856
51-1011	First-Line Supervisors of Production and Operating Workers	8,683	9,665
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	16,357	7,095
11-1021	General and Operations Managers	6,836	6,781
15-1211	Computer Systems Analysts	6,761	6,770
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	3,856	4,859
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	3,931	4,721
43-3031	Bookkeeping, Accounting, and Auditing Clerks	3,041	3,965
43-9061	Office Clerks, General	2,645	2,735
43-6011	Executive Secretaries and Executive Administrative Assistants	2,029	2,577
49-9041	Industrial Machinery Mechanics	2,009	2,506
11-9021	Construction Managers	1,462	2,410
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	1,630	2,022
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	1,344	1,560
47-2061	Construction Laborers	1,253	1,498
51-4121	Welders, Cutters, Solderers, and Brazers	905	1,037
47-2031	Carpenters	574	674
47-2152	Plumbers, Pipefitters, and Steamfitters	457	655
13-1051	Cost Estimators	486	643
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	250	405
47-2073	Operating Engineers and Other Construction Equipment Operators	343	376
47-5013	Service Unit Operators, Oil, Gas, and Mining	72	111
19-2042	Geoscientists, Except Hydrologists and Geographers	57	76
17-2171	Petroleum Engineers	52	67
47-5012	Rotary Drill Operators, Oil and Gas	50	56
47-5081	Helpers--Extraction Workers	36	56
47-5097	Earth Drillers, Except Oil and Gas	24	52
47-2151	Pipelayers	15	18
47-5071	Roustabouts, Oil and Gas	16	14
51-8092	Gas Plant Operators	14	9
51-8093	Petroleum Pump System Operators, Refinery Operators, and Gaugers	7	8
53-7071	Gas Compressor and Gas Pumping Station Operators	3	5
47-5011	Derrick Operators, Oil and Gas	1	2
	Total	134,292	133,983

Source: TalentNeuron

From 2020 to 2021, the estimated number of construction trade jobs in core shale-related industries in Ohio grew by 152 jobs or about 8.7%. Oil and gas pipeline construction had the largest gain. The number of extraction trade jobs grew by 92 jobs or 7.4%. Most of the increase in extraction jobs was in support activities for oil and gas operations. See Figure 7 for details.

Figure 7. Estimated Number of Construction and Extraction Jobs in the Core Shale-Related Industries

NAICS	Title	2021		2022		2020-2021 Numeric Change	
		Construction Trades	Extraction Trades	Construction Trades	Extraction Trades	Construction Trades	Extraction Trades
2111	Oil and Gas Extraction	10	169	11	183	1	14
213111	Drilling Oil and Gas Wells	22	129	20	116	-2	-14
213112	Support Activities for Oil and Gas Operations	146	851	160	934	14	83
237120	Oil and Gas Pipeline Construction	1,537	99	1,672	107	135	9
486210	Pipeline Transportation of Natural Gas	25	4	28	5	4	-1
Core Industries Totals		1,740	1,253	1,891	1,345	152	92

Source: Ohio Bureau of Labor Market Information

Total Wage Growth in the Core Shale-Related Industries

Total wages in the core shale-related industries increased 14.4% from 2021 to 2022. In comparison, total wages across all industries in Ohio increased 7.4% over the same period. The increase in wages among core shale-related industries was driven by support activities for oil and gas operations. See Figure 10 for detailed industry wage data.

Figure 8. Core Shale-Related Industry Total Wages and Year to Year Change

NAICS	Title	Total Wages (thousands), 2021	Total Wages (thousands), 2022	Numeric Change (thousands)	Percent Change
2111	Oil and Gas Extraction	\$93,976	\$108,769	\$14,793	15.7%
213111	Drilling Oil and Gas Wells	\$27,267	\$26,668	-\$599	-2.2%
213112	Support Activities for Oil and Gas Operations	\$214,799	\$261,772	\$46,973	21.9%
237120	Oil and Gas Pipeline Construction	\$305,849	\$337,372	\$31,523	10.3%
486210	Pipeline Transportation of Natural Gas	\$57,746	\$65,966	\$8,220	14.2%
Core Industries Totals		\$699,637	\$800,547	\$100,910	14.4%

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

Local and Regional Workforce Development Plans

Ohio's workforce development boards establish local policies for workforce services funded by the federal Workforce Innovation and Opportunity Act. They also develop four-year plans to identify target populations, in-demand occupations, and employment trends to guide service delivery to support growing industries and successful job placement. The four-year local plans may also include regional plans developed by multiple local areas assigned by the state. The workforce development boards are required to submit these plans to the Ohio Department of Job and Family Services, which reviews them for viability, especially as they relate to compliance and performance. The most recent plans became effective July 1, 2023.

Local workforce development boards are required to review their local and regional plans and submit biannual modifications to their plans, if needed. The modifications reflect planned changes in service delivery to respond to evolving economic and occupational needs. Local areas that identify occupations in shale-related core and ancillary industries as in-demand occupations include that information in their local plans and policies. Modifications to plans will be due to the Ohio Department of Job and Family Services in January 2024.

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