



Department of
Job and Family Services

Mike DeWine, Governor
Kimberly Hall, Director

2019 ANNUAL OHIO SHALE REPORT

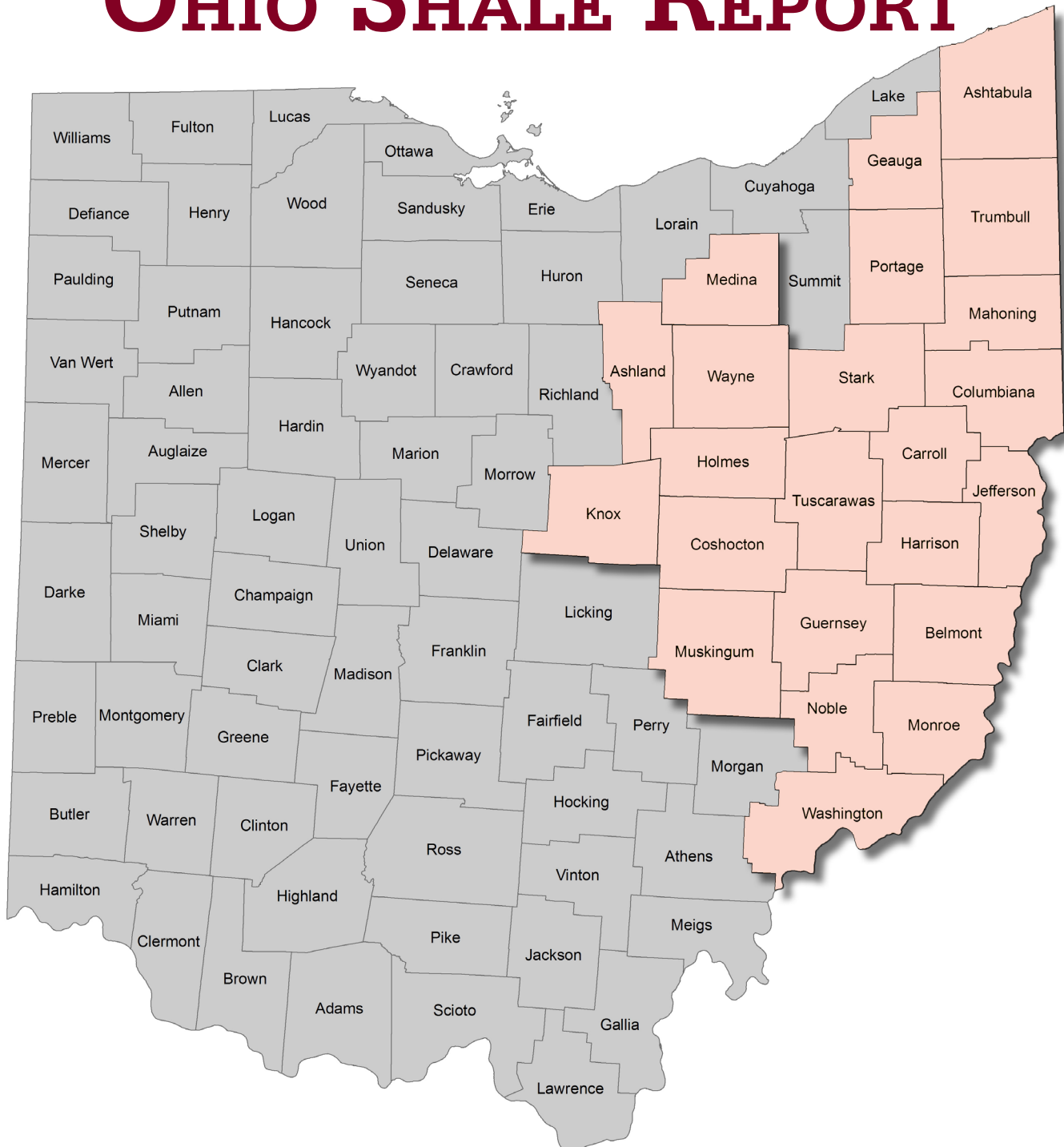


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Introduction

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 2018 to 2019. 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 2019. For more frequent reports, see *Ohio Shale: Quarterly Economic Trends for Ohio Oil and Gas Industries*. Both the quarterly and 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

Drilling of new horizontal shale wells peaked in 2015 and has slowed since. In 2015, about 446 new wells were drilled. In 2019, 274 new wells were drilled; the number of producing wells grew to more than 2,450. While the number of horizontal shale wells continues to grow, employment in the core shale-related industries has declined.

From 2018 to 2019, core shale-related industries lost 1,040 jobs (-7.7%), primarily due to a decrease in employment in oil and gas pipeline construction. Employment in ancillary shale-related industries grew modestly, adding 1,879 jobs (+1.1%).

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 \$30,010 to \$114,000. Among the key shale-related occupations, 32 of the top 38 jobs had median annual wages above the state median wage of \$38,560.

Employer demand for occupations in the core shale-related industries, as measured by online job ads, was higher in 2019 than in 2018. The estimated number of construction trade jobs in the core shale-related industries decreased by 11.3%, driven by an employment drop in oil and gas pipeline construction. The number of extraction trade jobs decreased 5.7% over the year.

Although data are not available on the state of residence for all workers, limited information is available from the State Directory of New Hires. Among the core shale-related industries, 37.9% of new hires were Ohio residents in 2019. Among the ancillary industries, 78.7% of new hires were Ohio residents.

Core Shale-Related Industry Employment

Employment in core shale-related industries decreased from 2018 to 2019. Overall employment in the core industries shrank 7.7%, a loss of 1,040 jobs. Oil and gas pipeline construction led the losses, shedding 755 jobs; drilling oil and gas wells lost 233 jobs over the year. Small gains by the other core shale-related industries could not offset these losses. 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, 2018	Average Employment, 2019	Numeric Change	Percent Change
2111	Oil and Gas Extraction	1,101	1,124	23	2.1%
213111	Drilling Oil and Gas Wells	1,030	797	-233	-22.6%
213112	Support Activities for Oil and Gas Operations	4,717	4,608	-109	-2.3%
237120	Oil and Gas Pipeline Construction	6,073	5,318	-755	-12.4%
486210	Pipeline Transportation of Natural Gas	543	577	34	6.3%
Core Industries Totals		13,464	12,424	-1,040	-7.7%

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 remained the same from 2018 to 2019, with offsetting increases and decreases among the industries. 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, 2018	Average Number of Establishments, 2019	Numeric Change	Percent Change
2111	Oil and Gas Extraction	129	122	-7	-5.4%
213111	Drilling Oil and Gas Wells	98	99	1	1.0%
213112	Support Activities for Oil and Gas Operations	314	325	11	3.5%
237120	Oil and Gas Pipeline Construction	189	185	-4	-2.1%
486210	Pipeline Transportation of Natural Gas	47	46	-1	-2.1%
Core Industries Totals		777	777	0	0.0%

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 by 1,879 jobs, a 1.1% increase from 2018 to 2019. Employment for the petrochemical and industrial gas manufacturing industries are not disclosed to protect business confidentiality. 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, 2018	Average Employment, 2019	Numeric Change	Percent Change
221112	Fossil fuel electric power generation	3,203	2,646	-557	-17.4%
221210	Natural gas distribution	5,498	5,450	-48	-0.9%
221310	Water supply and irrigation systems	950	966	16	1.7%
221320	Sewage treatment facilities	187	196	9	4.8%
237110	Water and sewer line system construction	6,234	6,229	-5	-0.1%
237310	Highway, street, and bridge construction	10,918	10,965	47	0.4%
238912	Nonresidential site preparation contractors	6,967	7,053	86	1.2%
32511	Petrochemical manufacturing	ND	ND	NA	NA
32512	Industrial gas manufacturing	ND	ND	NA	NA
331110	Iron, steel mills and ferroalloy manufacturing	7,769	8,082	313	4.0%
331210	Iron, steel pipe and tube from purchased steel	3,385	3,409	24	0.7%
333131	Mining machinery and equipment manufacturing	389	381	-8	-2.1%
333132	Oil and gas field machinery and equipment	271	228	-43	-15.9%
423810	Construction equipment merchant wholesalers	2,974	3,029	55	1.8%
423830	Industrial machinery merchant wholesalers	19,074	19,273	199	1.0%
423840	Industrial supplies merchant wholesalers	5,673	5,899	226	4.0%
484110	General freight trucking, local	12,120	12,416	296	2.4%
484220	Other specialized trucking, local	9,138	9,298	160	1.8%
484230	Other specialized trucking, long-distance	6,634	6,220	-414	-6.2%
531190	Lessors of other real estate property	1,023	1,000	-23	-2.2%
532412	Other heavy machinery rental and leasing	2,045	2,402	357	17.5%
541330	Engineering services	27,004	27,803	799	3.0%
541360	Geophysical surveying and mapping services	215	236	21	9.8%
541380	Testing laboratories	6,918	6,811	-107	-1.5%
541620	Environmental consulting services	1,902	2,091	189	9.9%
562910	Remediation services	4,342	4,401	59	1.4%
811310	Commercial machinery repair and maintenance	9,519	9,747	228	2.4%
924110	Air, water, and waste program administration	6,154	6,170	16	0.3%
924120	Administration of conservation programs	5,944	5,930	-14	-0.2%
926130	Utility regulation and administration	212	210	-2	-0.9%
Ancillary Industry Totals		166,662	168,541	1,879	1.1%

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

Business Establishments in Ancillary Industries

The number of business establishments in ancillary shale-related industries increased by 249 from 2018 to 2019, a 1.8% increase. See Figure 4 for details.

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

NAICS	Title	Average Establishments, 2018	Average Establishments, 2019	Numeric Change	Percent Change
221112	Fossil fuel electric power generation	79	88	9	11.4%
221210	Natural gas distribution	156	161	5	3.2%
221310	Water supply and irrigation systems	259	260	1	0.4%
221320	Sewage treatment facilities	210	210	0	0.0%
237110	Water and sewer line system construction	370	376	6	1.6%
237310	Highway, street, and bridge construction	748	748	0	0.0%
238912	Nonresidential site preparation contractors	642	638	-4	-0.6%
325110	Petrochemical manufacturing	4	4	0	0.0%
325120	Industrial gas manufacturing	41	42	1	2.4%
331110	Iron, steel mills and ferroalloy manufacturing	61	61	0	0.0%
331210	Iron, steel pipe and tube from purchased steel	40	39	-1	-2.5%
333131	Mining machinery and equipment manufacturing	12	12	0	0.0%
333132	Oil and gas field machinery and equipment	12	13	1	8.3%
423810	Construction equipment merchant wholesalers	201	206	5	2.5%
423830	Industrial machinery merchant wholesalers	2,041	2,073	32	1.6%
423840	Industrial supplies merchant wholesalers	542	569	27	5.0%
484110	General freight trucking, local	1,404	1,466	62	4.4%
484220	Other specialized trucking, local	1,142	1,174	32	2.8%
484230	Other specialized trucking, long-distance	350	361	11	3.1%
531190	Lessors of other real estate property	288	290	2	0.7%
532412	Other heavy machinery rental and leasing	213	226	13	6.1%
541330	Engineering services	2,428	2,440	12	0.5%
541360	Geophysical surveying and mapping services	58	62	4	6.9%
541380	Testing laboratories	422	436	14	3.3%
541620	Environmental consulting services	321	326	5	1.6%
562910	Remediation services	224	221	-3	-1.3%
811310	Commercial machinery repair and maintenance	1,095	1,114	19	1.7%
924110	Air, water, and waste program administration	157	153	-4	-2.5%
924120	Administration of conservation programs	173	173	0	0.0%
926130	Utility regulation and administration	6	6	0	0.0%
Ancillary Industry Totals		13,699	13,948	249	1.8%

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

Demand for Workers in Shale-Related Occupations

Figures 5 and 6 show the number of online job ads by quarter for the core and ancillary shale-related industries during 2018 and 2019. The number of online job ads for the core industries were mostly higher in 2019 than 2018. The number of online job ads for the ancillary shale-related industries was lower for 2018 than in 2019 in all but the fourth quarter.

These data are from a Burning Glass data series; they are an indicator of occupational demand.² The series does not include all online job ads, nor does it include jobs not advertised online.

Figure 5. Online Job Ads
for Core Shale-Related Industries

Quarter	2018	2019	Numeric Change	Percent Change
Q1	162	178	16	9.9%
Q2	175	172	-3	-1.7%
Q3	165	181	16	9.7%
Q4	199	259	60	30.2%

Source: © 2020 Burning Glass International Inc.

Figure 6. Online Job Ads
for Ancillary Shale-Related Industries

Quarter	2017	2019	Numeric Change	Percent Change
Q1	1,318	811	-507	-38.5%
Q2	1,652	827	-825	-49.9%
Q3	3,493	757	-2,736	-78.3%
Q4	913	1,072	159	17.4%

Source: © 2020 Burning Glass International Inc.

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. Thirty-two of the 38 occupations had median annual wages above the state median occupational wage of \$38,560 for 2019.

² The data source for these tables has changed; these data are not directly comparable to data in previous reports.

Figure 7. Key Occupations in Shale-Related Industries

SOC Code	SOC Title	Median Annual Wage	Typical Education, Work Experience, On-the-Job Training Needed
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	\$30,010	No formal ed. credential, No exper., Short-term OJT
43-9061	Office Clerks, General	\$34,310	HS dipl./GED, No exper., Short-term OJT
43-4051	Customer Service Representatives	\$34,730	HS dipl./GED, No exper., Short-term OJT
43-6014	Secretaries and Administrative Assistants, Except Legal Medical	\$36,230	HS dipl./GED, No exper., Short-term OJT
47-5081	Helpers--Extraction Workers	\$37,540	HS dipl./GED, No exper., Moderate-term OJT
53-7073	Wellhead Pumpers	\$37,640	HS dipl./GED, Less than 5 years exp., Moderate-term OJT
47-5071	Roustabouts, Oil and Gas	\$38,830	No formal ed. credential, No exper., Moderate-term OJT
43-3031	Bookkeeping, Accounting, and Auditing Clerks	\$39,000	Some college-no degree, No exper., Moderate-term OJT
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	\$39,450	HS dipl./GED, No exper., Moderate-term OJT
51-4121	Welders, Cutters, Solderers, and Brazers	\$39,930	HS dipl./GED, No exper., Moderate-term OJT
47-2061	Construction Laborers	\$41,690	No formal ed. credential, No exper., Short-term OJT
53-7072	Pump Operators, Except Wellhead Pumpers	\$42,020	HS dipl./GED, No exper., Moderate-term OJT
53-3032	Heavy and Tractor-Trailer Truck Drivers	\$45,060	Postsecondary nondegree award, No exper., Short-term OJT
47-5097	Earth Drillers, Except Oil and Gas	\$45,180	HS dipl./GED, No exper., Moderate-term OJT
47-5012	Rotary Drill Operators, Oil and Gas	\$45,710	No formal ed. credential, No exper., Moderate-term OJT
47-5011	Derrick Operators, Oil and Gas	\$46,140*	No formal ed. credential, No exper., Short-term OJT
47-2151	Pipelayers	\$47,810	No formal ed. credential, No exper., Short-term OJT
47-2031	Carpenters	\$48,550	HS dipl./GED, No exper., Apprenticeship
19-4045	Geological and Hydrological Technicians	\$51,130*	Associate deg., No exper., Moderate-term OJT
47-5013	Service Unit Operators, Oil, Gas, and Mining	\$51,140	No formal ed. credential, No exper., Moderate-term OJT
47-2073	Operating Engineers and Other Construction Equipment Operators	\$51,560	HS dipl./GED, No exper., Moderate-term OJT
49-9041	Industrial Machinery Mechanics	\$53,370	HS dipl./GED, No exper., Long-term OJT
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	\$53,910	HS dipl./GED, No exper., Long-term OJT
47-2152	Plumbers, Pipefitters, and Steamfitters	\$55,280	HS dipl./GED, No exper., Apprenticeship
43-6011	Executive Secretaries and Executive Administrative Assistants	\$57,390	HS dipl./GED, Less than 5 years exp., No OJT
51-1011	First-Line Supervisors of Production and Operating Workers	\$60,870	HS dipl./GED, Less than 5 years exp., No OJT
13-1051	Cost Estimators	\$62,710	Bachelor's Deg., No exper., No OJT
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	\$64,460	HS dipl./GED, Less than 5 years exp., No OJT
47-1011	First-Line Supervisors of Construction Trades and Extraction Work	\$66,360	HS dipl./GED, 5 years or more exp., No OJT
51-8093	Petroleum Pump System Operators, Refinery Operators and Gaugers	\$72,940	HS dipl./GED, No exper., Long-term OJT
51-8092	Gas Plant Operators	\$73,050	HS dipl./GED, No exper., Long-term OJT
53-7071	Gas Compressor and Gas Pumping Station Operators	\$75,840	HS dipl./GED, No exper., Moderate-term OJT
19-2042	Geoscientists, Except Hydrologists and Geographers	\$76,180	Bachelor's Deg., No exper., No OJT
17-2112	Industrial Engineers	\$80,630	Bachelor's Deg., No exper., No OJT
15-1121	Computer Systems Analysts	\$84,690	Bachelor's Deg., No exper., No OJT
11-9021	Construction Managers	\$89,650	Bachelor's Deg., No exper., Moderate-term OJT
11-1021	General and Operations Managers	\$97,370	Bachelor's Deg., 5 years or more exp., No OJT
17-2171	Petroleum Engineers	\$114,000	Bachelor's Deg., No exper., No OJT

* U.S. median annual wage.

Source: U.S. Bureau of Labor Statistics, Occupational Employment Statistics, June 2019

From 2018 to 2019, the estimated number of construction trade jobs in core shale-related industries in Ohio shrank 11.3%, from 3,881 to 3,442. Oil and gas pipeline construction had the largest loss. The number of extraction trade jobs shrank 5.7%, from 2,325 to 2,193. Most of the decrease in extraction jobs was in drilling oil and gas wells. See Figure 8 for details.

Figure 8. Estimated Number of Construction and Extraction Jobs in the Core Shale-Related Industries

NAICS	Title	2018		2019		2018-2019 Numeric Change	
		Construction Trades	Extraction Trades	Construction Trades	Extraction Trades	Construction Trades	Extraction Trades
211111	Oil and Gas Extraction	56	161	57	164	1	4
213111	Drilling Oil and Gas Wells	85	367	66	284	-16	-83
213112	Support Activities for Oil and Gas Operations	392	1,679	382	1,640	-9	-39
237120	Oil and Gas Pipeline Construction	3,322	109	2,909	96	-1,950	-65
486210	Pipeline Transportation of Natural Gas	26	9	27	9	1	1
Core Industries Totals		3,881	2,325	3,442	2,193	-439	-131

Source: Ohio Bureau of Labor Market Information

Shale-Related Industries' Worker State of Residence

Although data are not available on the state of residence for all workers, limited information is available from the State Directory of New Hires. This database was developed to help collect child support. State law requires all Ohio employers to report all independent contractors and newly hired and rehired employees to the directory within 20 days of the hire or rehire date.³ Hiring activities that generate W-4 tax forms are included in the data.

On average in 2019, core-industry Ohio employers reported an average of 596 new hires from Ohio and 977 new hires from other states each quarter. This was a 10.0% decrease from 2018 for in-state new hires and a 1.6% decrease for out-of-state new hires. The percentage of core-industry new hires from Ohio decreased from 40.0% to 37.9% from 2018 to 2019. See Figure 9 for details.

Ancillary shale-related industry employers reported an average of 11,150 Ohio new hires and 3,019 out-of-state new hires each quarter during 2019. This was a 15.9% increase over 2019 for Ohio new hires and a 2.1% increase for out-of-state new hires. Among the ancillary industry, the percentage of new hires from Ohio increased from 76.5% in 2018 to 78.7% in 2019. See Figure 10 for details.

³ Ohio Revised Code Section 3121.89-3121.8911 and the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) of 1996, 42 U.S.C. 653a.

**Figure 9. 2018 and 2019 Average Quarterly
New Hires in the Core Shale-Related Industries**

State of Residence	2018	2019	Numeric Change	Percent Change
Ohio	662	596	-66	-10.0%
Total Out-of-State	993	977	-16	-1.6%
Indiana	26	26	0	0.0%
Kentucky	40	38	-2	-5.0%
Michigan	15	21	6	41.7%
Pennsylvania	225	154	-71	-31.4%
West Virginia	113	77	-36	-31.6%
All Other States	574	661	87	15.1%

Source: Ohio Directory of New Hires

**Figure 10. 2018 and 2019 Average Quarterly
New Hires in the Ancillary Shale-Related Industries**

State of Residence	2018	2019	Numeric Change	Percent Change
Ohio	9617	11,150	1,533	15.9%
Total Out-of-State	2958	3,019	61	2.1%
Indiana	259	310	51	19.7%
Kentucky	234	299	65	27.8%
Michigan	166	177	11	6.3%
Pennsylvania	262	250	-13	-4.8%
West Virginia	265	296	31	11.6%
All Other States	1772	1,688	-84	-4.7%

Source: Ohio Directory of New Hires

Total Wage Growth in the Core Shale-Related Industries

Total wages in the core shale-related industries decreased 12.1% from 2018 to 2019. In comparison, total wages across all industries in Ohio increased 3.7% over the same period. The decrease in wages among core shale-related industries was driven by an employment decline in oil and gas pipeline construction. See Figure 11 for detailed industry wage data.

Figure 11. Core Shale-Related Industry Total Wages and Year-to-Year Change

NAICS	Title	Total Wages (thousands), 2018	Total Wages (thousands), 2019	Numeric Change (thousands)	Percent Change
2111	Oil and Gas Extraction	\$82,194	\$86,609	\$4,415	5.4%
213111	Drilling Oil and Gas Wells	\$74,724	\$58,571	-\$16,153	-21.6%
213112	Support Activities for Oil and Gas Operations	\$351,083	\$341,028	-\$10,055	-2.9%
237120	Oil and Gas Pipeline Construction	\$593,025	\$466,315	-\$126,710	-21.4%
486210	Pipeline Transportation of Natural Gas	\$50,233	\$59,433	\$9,200	18.3%
Core Industries Totals		\$1,151,259	\$1,011,956	-\$139,303	-12.1%

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 recently submitted plans have been approved and became effective July 1, 2017.

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 the plan were completed and submitted to the Ohio Department of Job and Family Services in January 2019.

Mike DeWine, Governor

State of Ohio
<http://Ohio.gov>

Kimberly Hall, Director

Ohio Department of Job and Family Services
<http://jfs.ohio.gov>

Office of Workforce Development
<http://jfs.ohio.gov/owd/>

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