



Department of
Job and Family Services

Mike DeWine, Governor
Kimberly Hall, Director

2018 ANNUAL OHIO SHALE REPORT

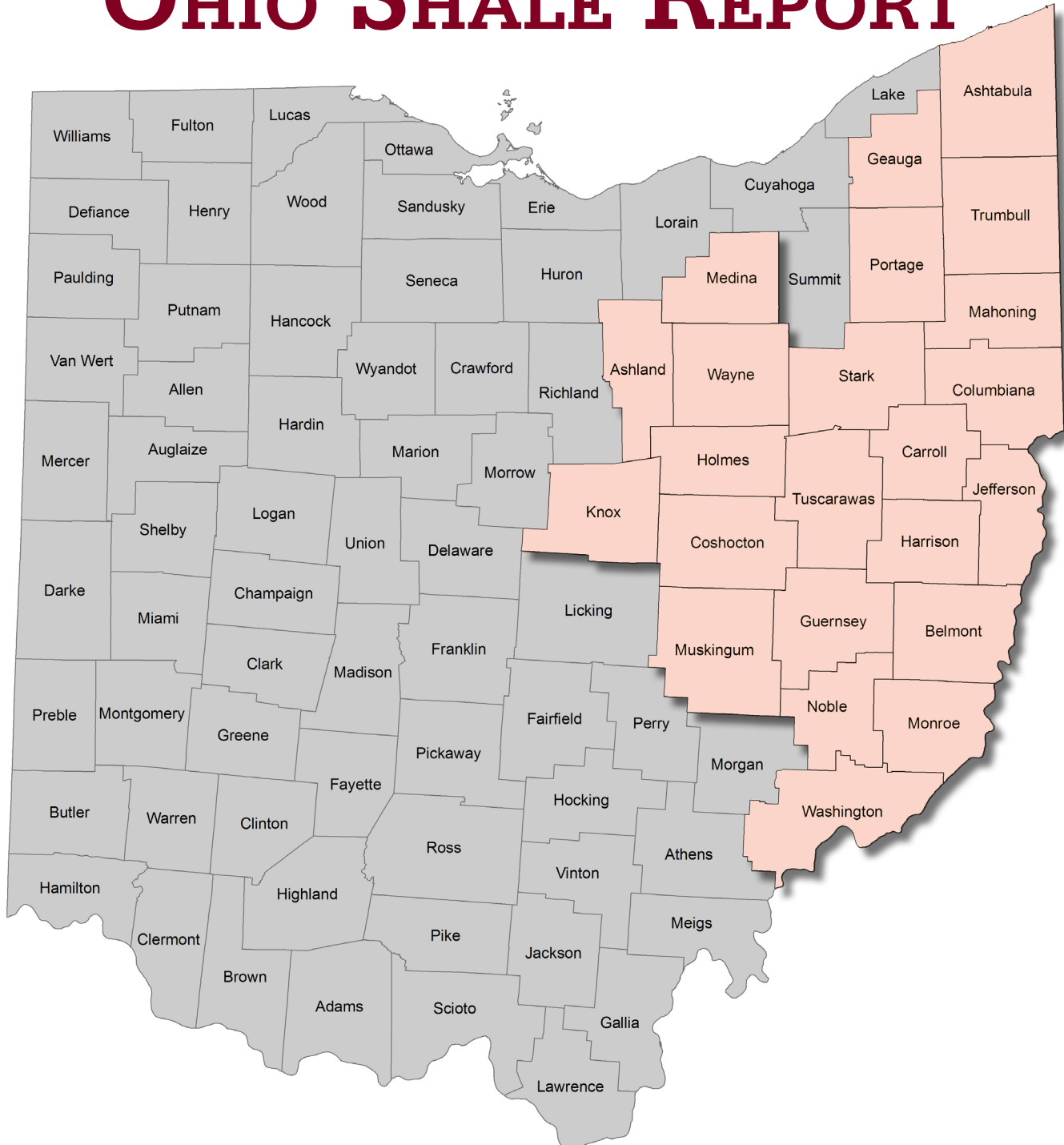


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Introduction

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 2017 to 2018. 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 2018. 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 435 new wells were drilled. In 2018, 309 new wells were drilled; the number of producing wells grew to 2,200. While the number of horizontal shale wells continues to grow, employment in the core shale-related industries has declined.

From 2017 to 2018, core shale-related industries lost 2,939 jobs (-17.9 percent), primarily due to a decrease in employment in oil and gas pipeline construction. Employment in ancillary shale-related industries grew modestly, adding 2,905 jobs (+1.6 percent).

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 \$27,441 to \$95,029. Among the key shale-related occupations, 31 of the top 38 jobs had median annual wages above the state median wage of \$37,360.

Employer demand for occupations in the core shale-related industries, as measured by online job ads, was higher in 2018 than in 2017. The estimated number of construction trade jobs in the core shale-related industries decreased by 32.8 percent, driven by an employment drop in oil and gas pipeline construction. The number of extraction trade jobs increased 6.9 percent 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, 40.0 percent of new hires were Ohio residents in 2018. Among the ancillary industries, 76.5 percent of new hires were Ohio residents.

Core Shale-Related Industry Employment

Employment in core shale-related industries decreased from 2017 to 2018. Overall employment in the core industries shrank 17.9 percent, a loss of 2,939 jobs. Oil and gas pipeline construction led the losses, shedding 3,566 jobs; drilling oil and gas wells lost 184 jobs over the year. 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, 2017	Average Employment, 2018	Numeric Change	Percent Change
2111	Oil and Gas Extraction	1,072	1,104	32	3.0%
213111	Drilling Oil and Gas Wells	1,213	1,029	-184	-15.2%
213112	Support Activities for Oil and Gas Operations	3,939	4,713	774	19.6%
237120	Oil and Gas Pipeline Construction	9,644	6,078	-3,566	-37.0%
486210	Pipeline Transportation of Natural Gas	539	544	5	0.9%
Core Industries Totals		16,407	13,468	-2,939	-17.9%

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 shrank by 30 between 2017 and 2018, a 3.7 percent decrease. All industries except pipeline transportation for natural gas lost 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, 2016	Average Number of Establishments, 2017	Numeric Change	Percent Change
2111	Oil and Gas Extraction	130	129	-1	-0.8%
213111	Drilling Oil and Gas Wells	114	98	-16	-14.0%
213112	Support Activities for Oil and Gas Operations	321	313	-8	-2.5%
237120	Oil and Gas Pipeline Construction	193	188	-5	-2.6%
486210	Pipeline Transportation of Natural Gas	47	47	0	0.0%
Core Industries Totals		805	775	-30	-3.7%

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 2,903 jobs, a 1.6 percent increase from 2017 to 2018. 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, 2017	Average Employment, 2018	Numeric Change	Percent Change
221112	Fossil fuel electric power generation	3,264	3,203	-61	-1.9%
221210	Natural gas distribution	5,561	5,556	-5	-0.1%
221310	Water supply and irrigation systems	5,815	5,815	0	0.0%
221320	Sewage treatment facilities	3,824	3,851	27	0.7%
237110	Water and sewer line system construction	6,337	6,234	-103	-1.6%
237310	Highway, street, and bridge construction	16,746	17,265	519	3.1%
238912	Nonresidential site preparation contractors	6,775	6,967	192	2.8%
32511	Petrochemical manufacturing	ND	ND	NA	NA
32512	Industrial gas manufacturing	ND	ND	NA	NA
331110	Iron, steel mills and ferroalloy manufacturing	7,707	7,768	61	0.8%
331210	Iron, steel pipe and tube from purchased steel	3,519	3,385	-134	-3.8%
333131	Mining machinery and equipment manufacturing	274	389	115	42.0%
333132	Oil and gas field machinery and equipment	235	271	36	15.3%
423810	Construction equipment merchant wholesalers	2,792	2,973	181	6.5%
423830	Industrial machinery merchant wholesalers	17,328	19,073	1,745	10.1%
423840	Industrial supplies merchant wholesalers	5,520	5,673	153	2.8%
484110	General freight trucking, local	13,496	12,147	-1,349	-10.0%
484220	Other specialized trucking, local	8,550	9,135	585	6.8%
484230	Other specialized trucking, long-distance	6,305	6,633	328	5.2%
531190	Lessors of other real estate property	1,012	1,023	11	1.1%
532412	Other heavy machinery rental and leasing	2,118	2,045	-73	-3.4%
541330	Engineering services	29,815	29,982	167	0.6%
541360	Geophysical surveying and mapping services	180	215	35	19.4%
541380	Testing laboratories	6,972	6,921	-51	-0.7%
541620	Environmental consulting services	1,896	1,903	7	0.4%
562910	Remediation services	3,829	4,338	509	13.3%
811310	Commercial machinery repair and maintenance	9,427	9,520	93	1.0%
924110	Air, water, and waste program administration	6,214	6,155	-59	-0.9%
924120	Administration of conservation programs	5,980	5,944	-36	-0.6%
926130	Utility regulation and administration	202	212	10	5.0%
Ancillary Industry Totals		181,693	184,596	2,903	1.6%

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 498 from 2017 to 2018, a 3.8 percent increase. See Figure 4 for details.

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

NAICS	Title	Average Establishments, 2017	Average Establishments, 2018	Numeric Change	Percent Change
221112	Fossil fuel electric power generation	73	78	5	6.8%
221210	Natural gas distribution	152	156	4	2.6%
221310	Water supply and irrigation systems	260	259	-1	-0.4%
221320	Sewage treatment facilities	212	210	-2	-0.9%
237110	Water and sewer line system construction	361	369	8	2.2%
237310	Highway, street, and bridge construction	739	748	9	1.2%
238912	Nonresidential site preparation contractors	648	641	-7	-1.1%
325110	Petrochemical manufacturing	4	4	0	0.0%
325120	Industrial gas manufacturing	42	41	-1	-2.4%
331110	Iron, steel mills and ferroalloy manufacturing	62	61	-1	-1.6%
331210	Iron, steel pipe and tube from purchased steel	41	40	-1	-2.4%
333131	Mining machinery and equipment manufacturing	11	12	1	9.1%
333132	Oil and gas field machinery and equipment	10	12	2	20.0%
423810	Construction equipment merchant wholesalers	184	200	16	8.7%
423830	Industrial machinery merchant wholesalers	1,651	2,038	387	23.4%
423840	Industrial supplies merchant wholesalers	497	542	45	9.1%
484110	General freight trucking, local	1,398	1,403	5	0.4%
484220	Other specialized trucking, local	1,120	1,141	21	1.9%
484230	Other specialized trucking, long-distance	334	350	16	4.8%
531190	Lessors of other real estate property	286	288	2	0.7%
532412	Other heavy machinery rental and leasing	210	213	3	1.4%
541330	Engineering services	2,463	2,429	-34	-1.4%
541360	Geophysical surveying and mapping services	59	58	-1	-1.7%
541380	Testing laboratories	418	422	4	1.0%
541620	Environmental consulting services	327	321	-6	-1.8%
562910	Remediation services	220	223	3	1.4%
811310	Commercial machinery repair and maintenance	1,073	1,095	22	2.1%
924110	Air, water, and waste program administration	157	157	0	0.0%
924120	Administration of conservation programs	173	173	0	0.0%
926130	Utility regulation and administration	7	6	-1	-14.3%
Ancillary Industry Totals		13,192	13,690	498	3.8%

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 2017 and 2018. The number of online job ads for the core industries was higher in 2018 than 2017, and much higher in the third and fourth quarters of 2018. The number of online job ads for the ancillary shale-related industries was higher for 2018 than in 2017 in all but the third quarter.

These data are from a Gartner® TalentNeuron data series; they are an indicator of occupational demand. 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	2017	2018	Numeric Change	Percent Change
Q1	77	104	27	35.1%
Q2	99	134	35	35.4%
Q3	80	165	85	106.3%
Q4	53	152	99	186.8%

Source: Gartner® TalentNeuron

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

Quarter	2016	2017	Numeric Change	Percent Change
Q1	4,311	4,375	64	1.5%
Q2	3,965	4,121	156	3.9%
Q3	3,987	3,440	-547	-13.7%
Q4	3,158	3,672	514	16.3%

Source: Gartner® TalentNeuron

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-one of the 38 occupations had median annual wages above the state median occupational wage of \$37,360 for 2018.

Figure 7. Key Occupations in Shale-Related Industries

SOC Code	SOC Title	Median Annual Wage	Typical Education, Work Experience, On-the-Job Training Needed
47-5081	Helpers--Extraction Workers	\$27,441	HS dipl./GED, No exper., Moderate-term OJT
53-7062	Laborers and Freight Stock and Material Movers Hand	\$27,766	No formal ed. credential, No exper., Short-term OJT
43-9061	Office Clerks General	\$31,670	HS dipl./GED, No exper., Short-term OJT
53-7072	Pump Operators Except Wellhead Pumps	\$32,394	HS dipl./GED, No exper., Moderate-term OJT
43-4051	Customer Service Representatives	\$33,001	HS dipl./GED, No exper., Short-term OJT
43-6014	Secretaries and Administrative Assistants Except Legal Medical	\$35,396	HS dipl./GED, No exper., Short-term OJT
47-5071	Roustabouts Oil and Gas	\$35,818	No formal ed. credential, No exper., Moderate-term OJT
51-9061	Inspectors Testers Sorters Samplers and Weighers	\$38,557	HS dipl./GED, No exper., Moderate-term OJT
43-3031	Bookkeeping Accounting and Auditing Clerks	\$38,600	Some college-no degree, No exper., Moderate-term OJT
53-7073	Wellhead Pumps	\$39,119	HS dipl./GED, Less than 5 years exp., Moderate-term OJT
51-4121	Welders Cutters Solderers and Brazers	\$39,550	HS dipl./GED, No exper., Moderate-term OJT
47-2061	Construction Laborers	\$39,686	No formal ed. credential, No exper., Short-term OJT
47-5021	Earth Drillers Except Oil and Gas	\$42,709	HS dipl./GED, No exper., Moderate-term OJT
47-5013	Service Unit Operators Oil Gas and Mining	\$43,086	No formal ed. credential, No exper., Moderate-term OJT
53-3032	Heavy and Tractor-Trailer Truck Drivers	\$43,168	Postsecondary nondegree award, No exper., Short-term OJT
19-4041	Geological and Petroleum Technicians	\$45,818	Associate deg., No exper., Moderate-term OJT
47-2031	Carpenters	\$46,323	HS dipl./GED, No exper., Apprenticeship
47-2151	Pipelayers	\$46,394	No formal ed. credential, No exper., Short-term OJT
47-5011	Derrick Operators Oil and Gas	\$47,086	No formal ed. credential, No exper., Short-term OJT
49-9041	Industrial Machinery Mechanics	\$50,990	HS dipl./GED, No exper., Long-term OJT
47-5012	Rotary Drill Operators Oil and Gas	\$51,259	No formal ed. credential, No exper., Moderate-term OJT
47-2152	Plumbers Pipefitters and Steamfitters	\$53,244	HS dipl./GED, No exper., Apprenticeship
43-6011	Executive Secretaries and Executive Administrative Assistants	\$54,803	HS dipl./GED, Less than 5 years exp., No OJT
49-3042	Mobile Heavy Equipment Mechanics Except Engines	\$55,062	HS dipl./GED, No exper., Long-term OJT
47-2073	Operating Engineers and Other Construction Equipment Operators	\$55,371	HS dipl./GED, No exper., Moderate-term OJT
51-1011	First-Line Supervisors of Production and Operating Workers	\$59,949	HS dipl./GED, Less than 5 years exp., No OJT
13-1051	Cost Estimators	\$60,563	Bachelor's Deg., No exper., No OJT
49-1011	First-Line Supervisors of Mechanics Installers and Repairers	\$62,648	HS dipl./GED, Less than 5 years exp., No OJT
47-1011	First-Line Supervisors of Construction Trades and Extraction Work	\$63,616	HS dipl./GED, 5 years or more exp., No OJT
51-8093	Petroleum Pump System Operators Refinery Operators and Gaugers	\$65,568	HS dipl./GED, No exper., Long-term OJT
19-2042	Geoscientists Except Hydrologists and Geographers	\$68,869	Bachelor's Deg., No exper., No OJT
51-8092	Gas Plant Operators	\$71,290	HS dipl./GED, No exper., Long-term OJT
53-7071	Gas Compressor and Gas Pumping Station Operators	\$73,093	HS dipl./GED, No exper., Moderate-term OJT
17-2112	Industrial Engineers	\$80,780	Bachelor's Deg., No exper., No OJT
17-2171	Petroleum Engineers	\$82,253	Bachelor's Deg., No exper., No OJT
15-1121	Computer Systems Analysts	\$85,888	Bachelor's Deg., No exper., No OJT
11-9021	Construction Managers	\$92,682	Bachelor's Deg., No exper., Moderate-term OJT
11-1021	General and Operations Managers	\$95,029	Bachelor's Deg., 5 years or more exp., No OJT

Source: U.S. Bureau of Labor Statistics, Occupational Employment Statistics, June 2018

From 2017 to 2018, the estimated number of construction trade jobs in core shale-related industries in Ohio shrank 32.8 percent, from 5,783 to 3,883. Oil and gas pipeline construction had the largest loss. The number of extraction trade jobs grew 6.9 percent, from 2,173 to 2,324. Most of the increase in extraction jobs was in support activities for oil and gas operations. See Figure 8 for details.

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

NAICS	Title	2017		2018		2017-2018 Numeric Change	
		Construction Trades	Extraction Trades	Construction Trades	Extraction Trades	Construction Trades	Extraction Trades
211111	Oil and Gas Extraction	55	157	56	161	1	4
213111	Drilling Oil and Gas Wells	101	432	85	366	-16	-66
213112	Support Activities for Oil and Gas Operations	327	1,402	391	1,678	64	276
237120	Oil and Gas Pipeline Construction	5,275	174	3,325	109	-1,950	-65
486210	Pipeline Transportation of Natural Gas	25	9	26	9	1	0
Core Industries Totals		5,783	2,173	3,883	2,324	-1,900	151

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.² Hiring activities that generate W-4 tax forms are included in the data.

On average in 2018, core-industry Ohio employers reported an average of 662 new hires from Ohio and 993 new hires from other states each quarter. This was a 30.0 percent decrease from 2017 for in-state new hires and a 29.8 percent decrease for out-of-state new hires. Comparatively, 40.0 percent of new hires were from Ohio in 2017 and 2018. See Figure 9 for details.

Ancillary shale-related industry employers reported an average of 9,617 Ohio new hires and 2,958 out-of-state new hires each quarter during 2018. This was a 3.1 percent increase over 2017 for Ohio new hires and a -5.9 percent decrease for out-of-state new hires. About 76.5 percent of new hires in ancillary industries were Ohio residents. See Figure 10 for details.

² 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. 2017 and 2018 Average Quarterly
New Hires in the Core Shale-Related Industries**

State of Residence	2017	2018	Numeric Change	Percent Change
Ohio	946	662	-284	-30.0%
Total Out-of-State	1,415	993	-422	-29.8%
Indiana	20	26	6	30.0%
Kentucky	49	40	-9	-18.4%
Michigan	28	15	-13	-46.4%
Pennsylvania	210	225	15	7.1%
West Virginia	162	113	-49	-30.2%
All Other States	946	574	-372	-39.3%

Source: Ohio Directory of New Hires

**Figure 10. 2017 and 2018 Average Quarterly
New Hires in the Ancillary Shale-Related Industries**

State of Residence	2017	2018	Numeric Change	Percent Change
Ohio	9,332	9,617	285	3.1%
Total Out-of-State	3,143	2,958	-185	-5.9%
Indiana	271	259	-12	-4.4%
Kentucky	247	234	-13	-5.3%
Michigan	176	166	-10	-5.7%
Pennsylvania	317	262	-55	-17.4%
West Virginia	281	265	-16	-5.7%
All Other States	1,851	1,772	-79	-4.3%

Source: Ohio Directory of New Hires

Total Wage Growth in the Core Shale-Related Industries

Total wages in the core shale-related industries decreased 28.8 percent from 2017 to 2018. In comparison, total wages across all industries in Ohio increased 3.8 percent 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), 2017	Total Wages (thousands), 2018	Numeric Change (thousands)	Percent Change
2111	Oil and Gas Extraction	\$77,628	\$82,476	\$4,848	6.2%
213111	Drilling Oil and Gas Wells	\$93,928	\$74,604	-\$19,324	-20.6%
213112	Support Activities for Oil and Gas Operations	\$282,975	\$350,812	\$67,837	24.0%
237120	Oil and Gas Pipeline Construction	\$1,109,428	\$593,614	-\$515,814	-46.5%
486210	Pipeline Transportation of Natural Gas	\$53,985	\$50,237	-\$3,748	-6.9%
Core Industries Totals		\$1,617,944	\$1,151,743	-\$466,201	-28.8%

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.

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

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