



Department of
Job and Family Services

John R. Kasich, Governor
Cynthia C. Dungey, Director

2017 ANNUAL OHIO SHALE REPORT

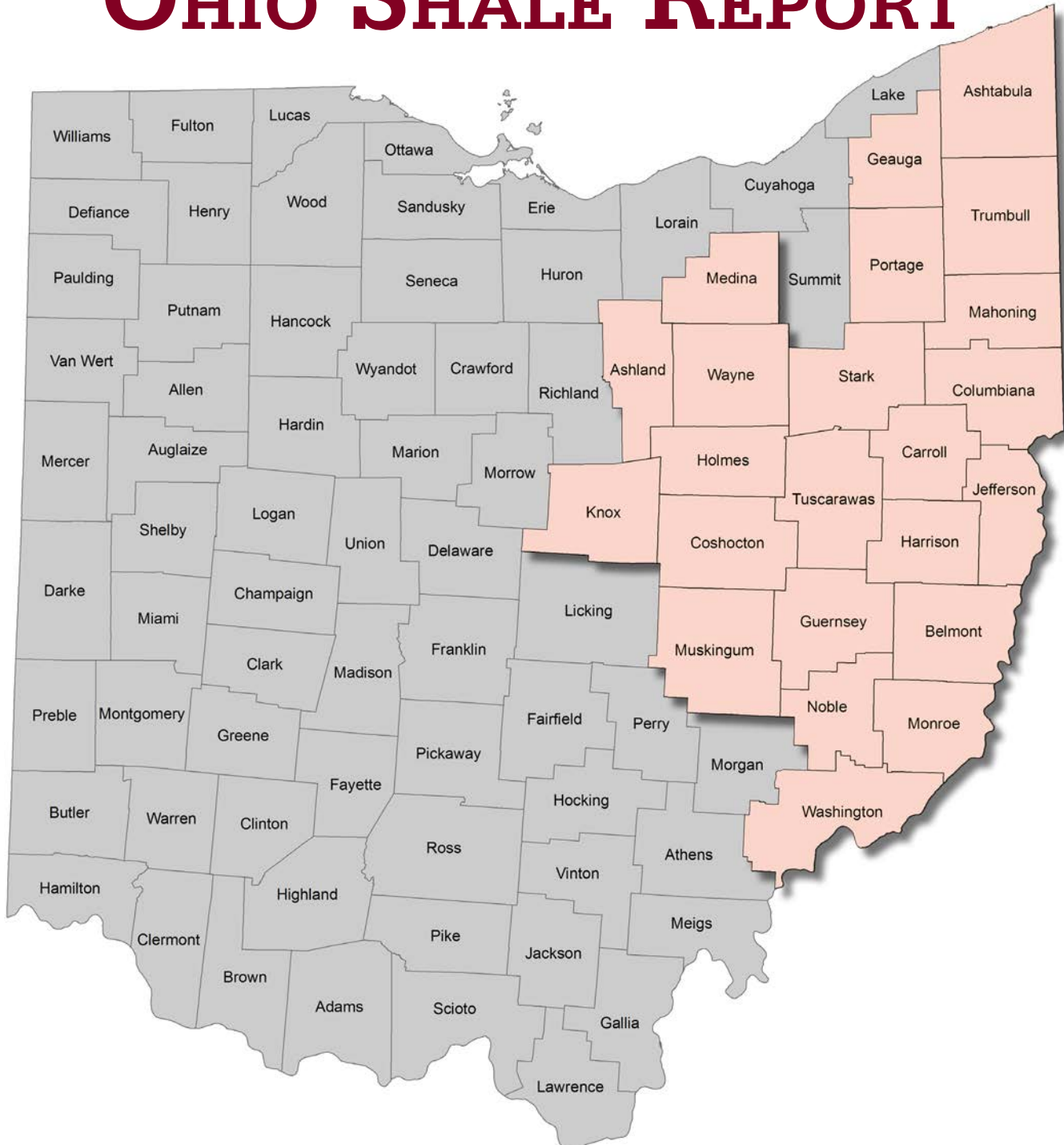


Table of Contents

A Message from Director Dungey.....	2
Introduction.....	3
Core Shale-Related Industry Employment	3
Business Establishments in Core Industries.....	4
Ancillary Shale-Related Industry Employment	5
Business Establishments in Ancillary Industries.....	6
Demand for Workers in Shale-Related Occupations	7
Key Shale-Related Occupations	7
Shale-Related Industries' Worker State of Residence	9
Total Wage Growth in the Core Shale-Related Industries.....	10
Regional Workforce Development Plans	11
Summary.....	12



A Message from Director Dungey

As a result of lower oil and gas prices worldwide, the number of oil and gas drilling rigs nationally and in Ohio declined after 2015 and bottomed out in 2016. Since then, the number of oil and gas rigs has slowly increased. By late 2017, Ohio's rig count had risen to more than 60 percent of its peak in 2015, and oil and gas pipeline construction was increasing.

Core shale-related industries – primarily oil and gas pipeline construction – added 5,730 jobs in 2017, an increase of 53.7 percent over the previous year. Employment in ancillary shale-related industries grew modestly, adding 3,488 jobs (+2.0%).

The key occupations in core and ancillary shale-related industries provide family-sustaining wages and tend to require specialized skill sets. Among the key shale-related occupations, 32 of the top 38 jobs had median annual wages above the state median wage of \$36,500.

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 2017. 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.

A handwritten signature in black ink that reads "Cynthia C. Dungey". The signature is fluid and cursive.

Cynthia C. Dungey, Director
Ohio Department of Job and Family Services

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. This report focuses 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 is 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 of their products and services and, therefore, their employment are 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 2016 to 2017. This 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. This 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. The final section summarizes the impact of these factors.

Core Shale-Related Industry Employment

Employment in core shale-related industries increased from 2016 to 2017. Overall employment in the core industries rose 53.7 percent, a gain of 5,730 jobs. Four of the five industries saw increases. Oil and gas pipeline construction accounted for most of the increase, adding 5,272 jobs. Only oil and gas extraction lost jobs (-582). See Figure 1 for details about employment in the core shale-related industries.

¹ In the past this report has reported data for six industries at the NAICS six-digit level. For 2017, annual data were not published by the U.S. Bureau of Labor Statistics for two industries, NAICS 211111 (crude petroleum and natural gas extraction) and NAICS 211112 (natural gas liquid extraction), because of data quality issues. However, data for these industries were combined and reported as NAICS 2111 (oil and gas extraction).

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

NAICS	Title	Average Employment, 2016	Average Employment, 2017	Numeric Change	Percent Change
2111	Oil and Gas Extraction	1,654	1,072	-582	-35.2%
213111	Drilling Oil and Gas Wells	1,117	1,213	96	8.6%
213112	Support Activities for Oil and Gas Operations	3,045	3,937	892	29.3%
237120	Oil and Gas Pipeline Construction	4,369	9,641	5,272	120.7%
486210	Pipeline Transportation of Natural Gas	487	539	52	10.7%
Core Industries Totals		10,672	16,402	5,730	53.7%

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 shrank by 19 between 2016 and 2017, a 2.3 percent decrease. Three industries (drilling oil and gas wells, support activities for oil and gas operations, and oil and gas pipeline construction) partially offset losses in oil and gas extraction and pipeline transportation of natural gas. 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	189	130	-59	-31.2%
213111	Drilling Oil and Gas Wells	110	115	5	4.5%
213112	Support Activities for Oil and Gas Operations	304	321	17	5.6%
237120	Oil and Gas Pipeline Construction	174	193	19	10.9%
486210	Pipeline Transportation of Natural Gas	48	47	-1	-2.1%
Core Industries Totals		825	806	-19	-2.3%

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 many other industries, as well. Employment in ancillary shale-related industries grew by 3,488 jobs, a 2.0 percent increase from 2016 to 2017. Note that 2017 data for two industries were suppressed for confidentiality. See Figure 3 for details about employment in the 30 ancillary shale-related industries.

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

NAICS	Title	Average Employment, 2016	Average Employment, 2017	Numeric Change	Percent Change
221112	Fossil fuel electric power generation	3,668	3,264	-404	-11.0%
221210	Natural gas distribution	5,493	5,561	68	1.2%
221310	Water supply and irrigation systems	5,852	5,815	-37	-0.6%
221320	Sewage treatment facilities	3,781	3,824	43	1.1%
237110	Water and sewer line system construction	5,774	6,345	571	9.9%
237310	Highway, street, and bridge construction	16,045	16,744	699	4.4%
238912	Nonresidential site preparation contractors	6,404	6,771	367	5.7%
325110	Petrochemical manufacturing	303	ND	NA	NA
325120	Industrial gas manufacturing	809	ND	NA	NA
331110	Iron, steel mills and ferroalloy manufacturing	7,747	7,707	-40	-0.5%
331210	Iron, steel pipe and tube from purchased steel	2,701	3,519	818	30.3%
333131	Mining machinery and equipment manufacturing	312	274	-38	-12.2%
333132	Oil and gas field machinery and equipment	209	235	26	12.4%
423810	Construction equipment merchant wholesalers	2,757	2,791	34	1.2%
423830	Industrial machinery merchant wholesalers	17,478	17,328	-150	-0.9%
423840	Industrial supplies merchant wholesalers	5,671	5,520	-151	-2.7%
484110	General freight trucking, local	13,210	13,494	284	2.1%
484220	Other specialized trucking, local	8,221	8,556	335	4.1%
484230	Other specialized trucking, long-distance	5,935	6,312	377	6.4%
531190	Lessors of other real estate property	972	1,011	39	4.0%
532412	Other heavy machinery rental and leasing	2,003	2,122	119	5.9%
541330	Engineering services	28,922	29,812	890	3.1%
541360	Geophysical surveying and mapping services	249	180	-69	-27.7%
541380	Testing laboratories	6,728	6,972	244	3.6%
541620	Environmental consulting services	1,949	1,895	-54	-2.8%
562910	Remediation services	3,779	3,830	51	1.3%
811310	Commercial machinery repair and maintenance	9,043	9,442	399	4.4%
924110	Air, water, and waste program administration	6,169	6,214	45	0.7%
924120	Administration of conservation programs	5,848	5,980	132	2.3%
926130	Utility regulation and administration	200	202	2	1.0%
Ancillary Industry Totals		178,232	181,720	3,488	2.0%

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 166 from 2016 to 2017, a 1.3 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, 2016	Average Establishments, 2017	Numeric Change	Percent Change
221112	Fossil fuel electric power generation	72	73	1	1.4%
221210	Natural gas distribution	151	152	1	0.7%
221310	Water supply and irrigation systems	261	260	-1	-0.4%
221320	Sewage treatment facilities	214	212	-2	-0.9%
237110	Water and sewer line system construction	356	360	4	1.1%
237310	Highway, street, and bridge construction	734	740	6	0.8%
238912	Nonresidential site preparation contractors	645	647	2	0.3%
325110	Petrochemical manufacturing	5	4	-1	-20.0%
325120	Industrial gas manufacturing	45	42	-3	-6.7%
331110	Iron, steel mills and ferroalloy manufacturing	61	62	1	1.6%
331210	Iron, steel pipe and tube from purchased steel	37	41	4	10.8%
333131	Mining machinery and equipment manufacturing	11	11	0	0.0%
333132	Oil and gas field machinery and equipment	10	10	0	0.0%
423810	Construction equipment merchant wholesalers	189	185	-4	-2.1%
423830	Industrial machinery merchant wholesalers	1,636	1,652	16	1.0%
423840	Industrial supplies merchant wholesalers	499	496	-3	-0.6%
484110	General freight trucking, local	1,389	1,397	8	0.6%
484220	Other specialized trucking, local	1,071	1,120	49	4.6%
484230	Other specialized trucking, long-distance	338	334	-4	-1.2%
531190	Lessors of other real estate property	289	286	-3	-1.0%
532412	Other heavy machinery rental and leasing	202	211	9	4.5%
541330	Engineering services	2,428	2,464	36	1.5%
541360	Geophysical surveying and mapping services	59	58	-1	-1.7%
541380	Testing laboratories	396	417	21	5.3%
541620	Environmental consulting services	326	328	2	0.6%
562910	Remediation services	209	220	11	5.3%
811310	Commercial machinery repair and maintenance	1,049	1,071	22	2.1%
924110	Air, water, and waste program administration	161	157	-4	-2.5%
924120	Administration of conservation programs	173	173	0	0.0%
926130	Utility regulation and administration	8	7	-1	-12.5%
Ancillary Industry Totals		13,024	13,190	166	1.3%

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 2016 and 2017. The number of online job ads for the core industries was higher during the first three quarters of 2017 than in 2016. The number of online job ads for the ancillary shale-related industries was higher for 2017 than in 2016 in all but the third quarter.

These data are from the Help-Wanted OnLine® 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. Help Wanted OnLine® Job Ads
for Core Shale-Related Industries

Quarter	2016	2017	Numeric Change	Percent Change
Q1	55	86	31	56.4%
Q2	60	138	78	130.0%
Q3	79	96	17	21.5%
Q4	75	62	-13	-17.3%

Source: The Conference Board, Help Wanted OnLine® data series

Figure 6. Help Wanted 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: The Conference Board, Help Wanted OnLine® data series

Key Shale-Related Occupations

The occupations listed in this report are not exclusive to any particular 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. In June 2017, 32 of the 38 occupations had median annual wages above the state annual median wage of \$36,500.

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	\$26,328	No formal ed. credential, No exper., Short-term OJT
47-5081	Helpers--Extraction Workers	\$27,464	HS dipl./GED, No exper., Moderate-term OJT
43-9061	Office Clerks General	\$30,006	HS dipl./GED, No exper., Short-term OJT
43-4051	Customer Service Representatives	\$31,895	HS dipl./GED, No exper., Short-term OJT
47-5071	Roustabouts Oil and Gas	\$33,098	No formal ed. credential, No exper., Moderate-term OJT
43-6014	Secretaries and Administrative Assistants Except Legal Medical	\$34,688	HS dipl./GED, No exper., Short-term OJT
53-7073	Wellhead Pumpers	\$37,045	HS dipl./GED, Less than 5 years exp., Moderate-term OJT
43-3031	Bookkeeping Accounting and Auditing Clerks	\$37,901	Some college-no degree, No exper., Moderate-term OJT
47-2061	Construction Laborers	\$38,178	No formal ed. credential, No exper., Short-term OJT
51-9061	Inspectors Testers Sorters Samplers and Weighers	\$38,261	HS dipl./GED, No exper., Moderate-term OJT
51-4121	Welders Cutters Solderers and Brazers	\$38,858	HS dipl./GED, No exper., Moderate-term OJT
47-5013	Service Unit Operators Oil Gas and Mining	\$39,872	No formal ed. credential, No exper., Moderate-term OJT
47-5012	Rotary Drill Operators Oil and Gas	\$43,053	No formal ed. credential, No exper., Moderate-term OJT
53-3032	Heavy and Tractor-Trailer Truck Drivers	\$43,095	Postsecondary nondegree award, No exper., Short-term OJT
47-5021	Earth Drillers Except Oil and Gas	\$43,299	HS dipl./GED, No exper., Moderate-term OJT
47-5011	Derrick Operators Oil and Gas	\$44,151	No formal ed. credential, No exper., Short-term OJT
47-2031	Carpenters	\$45,424	HS dipl./GED, No exper., Apprenticeship
47-2151	Pipelayers	\$45,691	No formal ed. credential, No exper., Short-term OJT
53-7072	Pump Operators Except Wellhead Pumpers	\$49,248	HS dipl./GED, No exper., Moderate-term OJT
49-9041	Industrial Machinery Mechanics	\$49,539	HS dipl./GED, No exper., Long-term OJT
47-2073	Operating Engineers and Other Construction Equipment Operators	\$52,238	HS dipl./GED, No exper., Moderate-term OJT
49-3042	Mobile Heavy Equipment Mechanics Except Engines	\$52,536	HS dipl./GED, No exper., Long-term OJT
43-6011	Executive Secretaries and Executive Administrative Assistants	\$52,550	HS dipl./GED, Less than 5 years exp., No OJT
19-4041	Geological and Petroleum Technicians	\$53,140	Associate deg., No exper., Moderate-term OJT
47-2152	Plumbers Pipefitters and Steamfitters	\$54,732	HS dipl./GED, No exper., Apprenticeship
51-1011	First-Line Supervisors of Production and Operating Workers	\$58,867	HS dipl./GED, Less than 5 years exp., No OJT
13-1051	Cost Estimators	\$59,737	Bachelor's Deg., No exper., No OJT
49-1011	First-Line Supervisors of Mechanics Installers and Repairers	\$62,768	HS dipl./GED, Less than 5 years exp., No OJT
47-1011	First-Line Supervisors of Construction Trades and Extraction Work	\$63,045	HS dipl./GED, 5 years or more exp., No OJT
53-7071	Gas Compressor and Gas Pumping Station Operators	\$66,171	HS dipl./GED, No exper., Moderate-term OJT
51-8093	Petroleum Pump System Operators Refinery Operators and Gaugers	\$66,260	HS dipl./GED, No exper., Long-term OJT
19-2042	Geoscientists Except Hydrologists and Geographers	\$70,380	Bachelor's Deg., No exper., No OJT
51-8092	Gas Plant Operators	\$71,309	HS dipl./GED, No exper., Long-term OJT
17-2112	Industrial Engineers	\$80,624	Bachelor's Deg., No exper., No OJT
15-1121	Computer Systems Analysts	\$85,260	Bachelor's Deg., No exper., No OJT
11-9021	Construction Managers	\$89,488	Bachelor's Deg., No exper., Moderate-term OJT
11-1021	General and Operations Managers	\$93,563	Bachelor's Deg., 5 years or more exp., No OJT
17-2171	Petroleum Engineers	\$97,955	Bachelor's Deg., No exper., No OJT

Source: U.S. Bureau of Labor Statistics, Occupational Employment Statistics, June 2017

From 2016 to 2017, the estimated number of construction trade jobs in core shale-related industries in Ohio grew 100.4 percent, from 2,807 to 5,625. Oil and gas pipeline construction had the largest gain. The number of extraction trade jobs grew 23.9 percent, from 2,020 to 2,503. 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	2016		2017		2016-2017 Numeric Change	
		Construction Trades	Extraction Trades	Construction Trades	Extraction Trades	Construction Trades	Extraction Trades
211111	Oil and Gas Extraction	60	223	39	145	-21	-79
213111	Drilling Oil and Gas Wells	126	443	137	482	11	38
213112	Support Activities for Oil and Gas Operations	344	1,209	445	1,563	101	354
237120	Oil and Gas Pipeline Construction	2,259	140	4,984	309	2,726	169
486210	Pipeline Transportation of Natural Gas	19	5	20	5	2	1
Core Industries Totals		2,807	2,020	5,625	2,503	2,818	483

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 2017, core-industry Ohio employers reported an average of 946 new hires from Ohio and 1,414 new hires from other states each quarter. This was a 57.1 percent increase from 2016 for in-state new hires and a 234.3 percent increase for out-of-state new hires. Only 40.1 percent of new hires were from Ohio. It is possible much of the increase in out-of-state hires was driven by the employment increase in oil and gas pipeline construction. See Figure 9 for details.

Ancillary shale-related industry employers reported an average of 9,332 Ohio new hires and 3,143 out-of-state new hires each quarter during 2017. This was a 6.7 percent increase over 2016 for Ohio new hires and a 7.7 percent increase for out-of-state new hires. About 74.8 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. 2016 and 2017 Average Quarterly
New Hires in the Core Shale-Related Industries

State of Residence	2016	2017	Numeric Change	Percent Change
Ohio	602	946	344	57.1%
Total Out-of-State	423	1,414	991	234.3%
Indiana	10	20	10	100.0%
Kentucky	30	49	19	63.3%
Michigan	29	28	-1	-3.4%
Pennsylvania	100	209	109	109.0%
West Virginia	120	162	42	35.0%
All Other States	134	946	812	606.0%

Source: Ohio Directory of New Hires

Figure 10. 2016 and 2017 Average Quarterly
New Hires in the Ancillary Shale-Related Industries

State of Residence	2016	2017	Numeric Change	Percent Change
Ohio	8,748	9,332	584	6.7%
Total Out-of-State	2,919	3,143	224	7.7%
Indiana	269	271	2	0.7%
Kentucky	229	247	18	7.9%
Michigan	163	176	13	8.0%
Pennsylvania	321	317	-4	-1.2%
West Virginia	212	281	69	32.5%
All Other States	1,725	1,851	126	7.3%

Source: Ohio Directory of New Hires

Total Wage Growth in the Core Shale-Related Industries

Total wages in the core shale-related industries increased 105.0 percent from 2016 to 2017. In comparison, total wages across all industries in Ohio increased 3.9 percent over the same period. The increase was largely driven by an increase in employment in oil and gas pipeline construction. Wages for oil and gas extraction, which lost workers, declined. 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), 2016	Total Wages (thousands), 2017	Numeric Change (thousands)	Percent Change
2111	Oil and Gas Extraction	\$121,957	\$77,591	-\$44,366	-36.4%
213111	Drilling Oil and Gas Wells	\$77,688	\$93,956	\$16,268	20.9%
213112	Support Activities for Oil and Gas Operations	\$197,275	\$282,959	\$85,684	43.4%
237120	Oil and Gas Pipeline Construction	\$349,860	\$1,109,492	\$759,632	217.1%
486210	Pipeline Transportation of Natural Gas	\$42,529	\$53,985	\$11,456	26.9%
Core Industries Totals		\$789,309	\$1,617,983	\$828,674	105.0%

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, in order 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 submit biannual amendments to their plans. The amendments 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. Amendments to the plan will be considered in winter 2019.

Summary

Employment increased in all but one of Ohio's five core shale-related industries from 2016 to 2017. Oil and gas pipeline construction employment increased by 120.7 percent over the year. The number of Ohio jobs in core industries rose from 10,672 to 16,402; the number of business establishments in core industries dropped from 825 to 806.

Employment in the ancillary shale-related industries increased from 178,232 to 181,720. Ancillary shale-related businesses serve other industries in addition to the core shale-related industries.

Overall, employer demand for occupations in the shale-related industries, as measured by online job ads, was higher for 2017 compared to 2016. The estimated number of construction trade jobs in the core shale-related industries increased by 100.4 percent, mostly because of growth in oil and gas pipeline construction. The number of extraction trade jobs increased 23.9 percent over the previous year.

The median annual wages for key shale-related jobs ranged from \$26,328 to \$97,955. Total wages for the core shale-related industries increased 105.0 percent from 2016 to 2017, largely driven by the employment increase in oil and gas pipeline construction.

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, 40.1 percent of new hires were Ohio residents in 2017. Among the ancillary industries, 74.8 percent of new hires were Ohio residents.

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<http://jfs.ohio.gov>

Office of Workforce Development

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Bureau of Labor Market Information

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