

Ohio

**Department of
Job and Family Services**

Mike DeWine, Governor
Michael J. McCreight, Interim Director

OHIO SHALE

QUARTERLY ECONOMIC TRENDS FOR OHIO OIL AND GAS INDUSTRIES



JANUARY 2019

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A Message from Interim Director McCreight

Ohio is fortunate to have a natural resource that can provide good jobs for families and reinvigorate many of our communities, especially those in the eastern part of the state. As you'll see in the pages that follow, core shale-related employment, which includes such things as oil and gas pipeline construction and well drilling, increased 103.3 percent from the second quarter of 2011 to the second quarter of 2018. Ancillary employment – for example, freight trucking and environmental consulting – also increased. We expect non-shale industries, such as food and retail businesses near drilling sites and the surrounding communities, to benefit from shale activity, as well.

The average wages of shale-related jobs are excellent: \$93,448 in core industries and \$68,577 in ancillary industries. In both cases, this is higher than the average wage in all Ohio industries: \$49,795.

At the Ohio Department of Job and Family Services (ODJFS), we have been working hard to help more Ohioans take advantage of these opportunities. We've been working closely with local workforce investment areas, community colleges, other post-secondary educational institutions, and employers to identify the occupations most in need of workers and to make sure that appropriate training programs are in place. In any given month, thousands of shale-related job openings are posted online, at **OhioMeansJobs.com**. The Ohio Department of Higher Education also provides an overview of shale-related employment opportunities and information about education and training at **OhioEnergyPathways.org**.

Individuals can sign up for on-the-job training opportunities at any of the state's local OhioMeansJobs centers, which provide job training and other services to Ohioans looking for work and employers looking for workers. Individuals can post their resumes, and employers can post job openings at **OhioMeansJobs.com**.

We encourage any Ohioans in need of work or who may be considering new careers to explore these opportunities. We're committed to improving the well-being of Ohio's workforce and families, and are excited about the potential shale holds to make a difference in so many families' lives.



Michael J. McCreight, Interim Director
Ohio Department of Job and Family Services



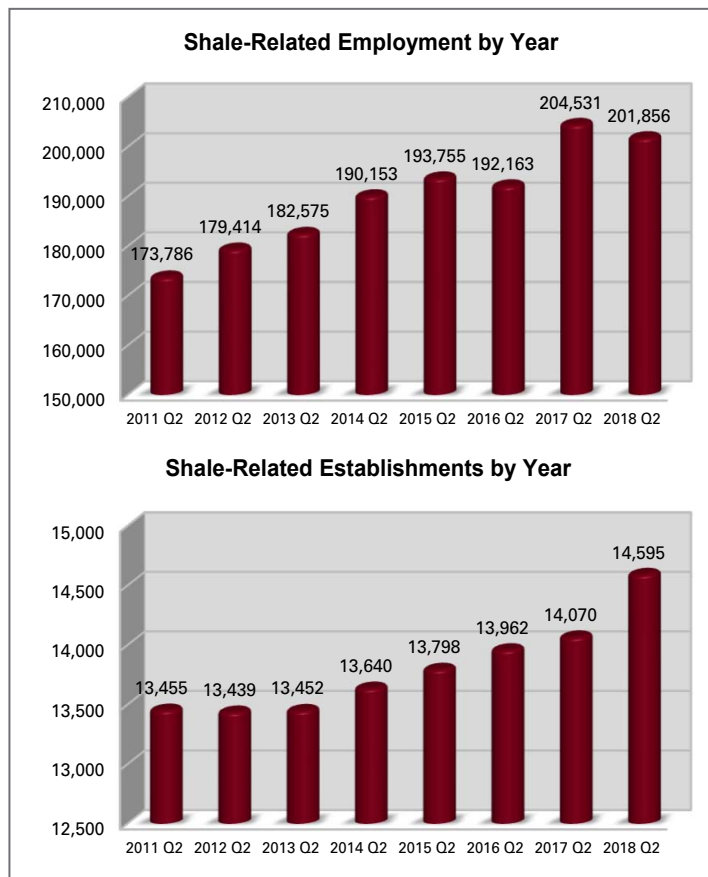
EXECUTIVE SUMMARY

Employment (2011 Q2 to 2018 Q2) See page 6.

- Core shale-related industry employment (such as pipeline construction and well drilling) was up by 7,100 (103.3 percent).
- Ancillary shale-related industry employment (such as freight trucking and environmental consulting) increased by 20,970 (12.6 percent).
- All industry employment was up by 438,475 (8.8 percent).

Business Establishments (2011 Q2 to 2018 Q2) See page 6.

- Core shale-related business establishments grew by 195 (33.0 percent).
- Ancillary shale-related establishments increased by 945 (7.3 percent).
- Over the same time period, Ohio experienced an increase of 8,470 (2.9 percent) business establishments in all industries.
- Shale-related business establishments totaled 14,595 during the second quarter of 2018.



Wages (2017 Q3 through 2018 Q2) See page 9.

- The four-quarter average wage across all industries was \$49,795.
- The four-quarter average wage in core shale-related industries was \$93,448, which was \$43,653 greater than the average for all industries.
- The four-quarter average wage in ancillary shale-related industries was \$68,577, which was \$18,782 higher than the average for all industries.

Online Job Postings (2018 Q4) See page 10.

- Ohio had 2,503 online job postings in core and ancillary shale-related industries in 2018 Q4.

Stable Employment, All Hires and Separations (2011 Q4 to 2017 Q4) See page 14.

- Stable jobs, those present at the beginning and end of a quarter, increased in three core shale-related industries: support activities for mining, utility system construction, and pipeline transportation of natural gas.

These data are meant to provide a barometer of shale-related economic activity and employment trends. While the vast majority of shale-related employment can be found in certain industries, not all business establishments in those industries are involved in shale activity. For those that are, not all of their products and services and, therefore, their employment, are necessarily linked to shale-related economic activity.

BACKGROUND INFORMATION

Data Sources

The purpose of this quarterly publication is to provide the most current available data on shale-related economic activity in Ohio as compared to the base year of 2011. Although several data sources are cited in this publication, the primary source is the Quarterly Census of Employment and Wages (QCEW).

The QCEW program derives its data from quarterly tax reports of employers subject to state and federal unemployment insurance laws. This includes 95 percent or more of all wage and salary employment in Ohio. Under the QCEW program, employment data represent the number of covered workers who worked during, or received pay for, the pay period including the 12th of the month. Excluded are members of the armed forces, the self-employed, unpaid family workers and railroad workers covered by the railroad unemployment insurance system. Data is published approximately six months after the quarter ends.

Also included in this publication are several additional data sources that capture Ohio's most current overall economic situation (Local Area Unemployment Statistics and Current Employment Statistics), employer demand (The Conference Board Help Wanted OnLine™ Data Set) and hiring activity (Quarterly Workforce Indicators). For an explanation of all data sources, please refer to the "Definitions" section on page 18.

In this edition, most current data from the QCEW program are for the second quarter of 2018. Because the data are not seasonally adjusted, the same quarter of a given year must be used when analyzing growth over time. This will ensure that seasonal factors are not influencing employment change. Therefore, second quarter 2018 QCEW data are compared to second quarter 2011 QCEW data.

Data Limitations

The North American Industry Classification System (NAICS), which is reviewed and revised every five years, was used to define shale-related industries. Much of the information included in this publication reflects data on a group of six industries identified as "core" and a group of 30 industries identified as "ancillary." See page 20 for the impact the NAICS 2017 revision had on the shale-related industries.

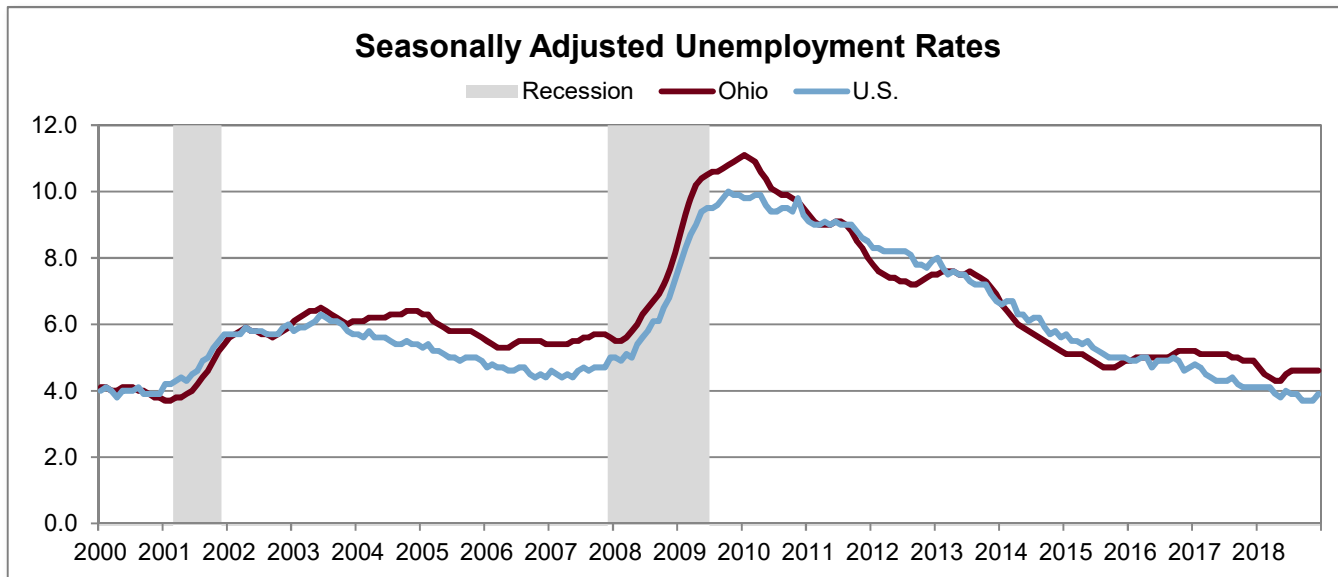
These data are meant to provide a barometer of shale-related economic activity and employment trends. While the vast majority of shale-related employment can be found in these industries, not all business establishments in these industries are involved in shale activity. For those that are, not all of their products and services and, therefore, their employment are necessarily linked to shale-related economic activity. This is particularly true for the ancillary industries.

The data in this publication include government employment (federal, state and local) in all shale-related industries because significant non-private employment is present in a number of these industries, most notably: highway, street and bridge construction; engineering services; water supply and irrigation systems; and sewage treatment facilities.

As shale-related activity develops further in Ohio, additional industries may be added to the ancillary group, based on such factors as significant employment gains in an industry in a geographic region or the identification of a group of companies in the same industry involved in shale-related activity.

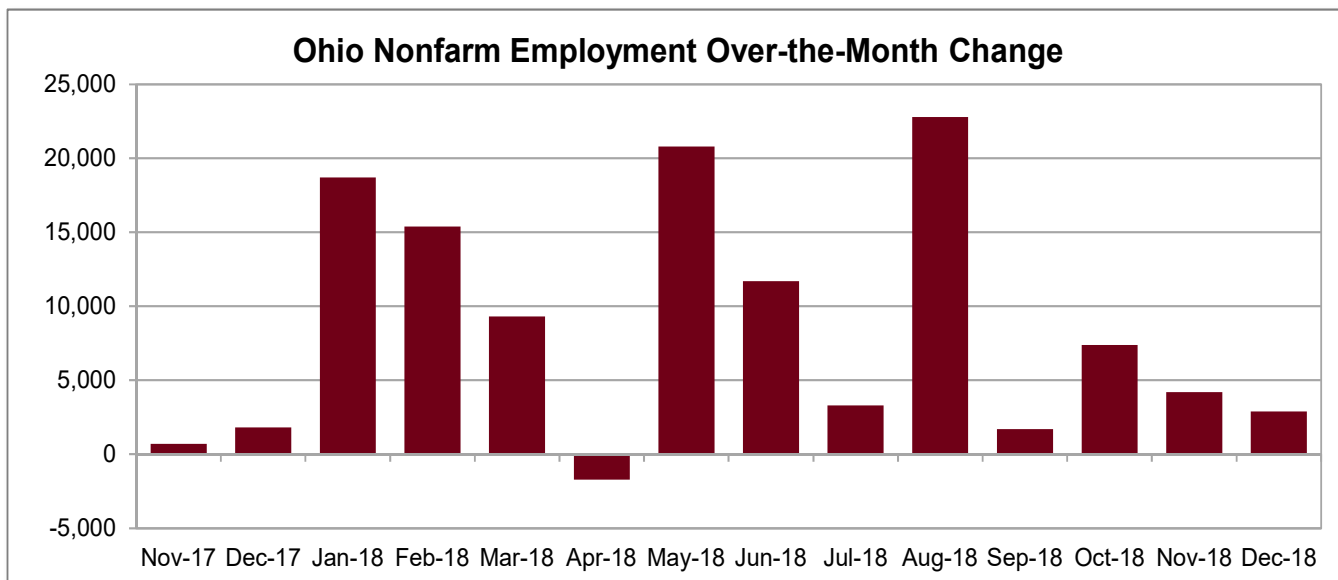
Snapshot of Employment in Ohio

- Ohio's seasonally adjusted unemployment rate for December 2018 was 4.6 percent.
 - The rate did not change from November.



Note: Recessionary periods are defined by the National Bureau of Economic Research (NBER).

- Ohio had 5,650,800 seasonally adjusted nonfarm jobs in December 2018.
 - Total nonfarm employment increased 2,900 over the month.
 - Over the year, Ohio added 116,500 jobs.



- In December 2018, 12,700 workers were employed in the mining and logging industry. This was an increase of 100 jobs from November and an increase of 1,300 from December 2017.

STATEWIDE SHALE-RELATED INDUSTRIES

- From 2011 Q2 to 2018 Q2, employment in core industries increased by 7,100 (103.3 percent). Over the same period, employment in ancillary industries increased by 20,970 (12.6 percent).
- From 2011 Q2 to 2018 Q2, the number of business establishments in the core industries grew by 195 (33.0 percent), while establishments in ancillary industries increased by 945 (7.3 percent).

Number of Business Establishments and Employment in Shale-Related Industries (2011 Q2 - 2018 Q2)

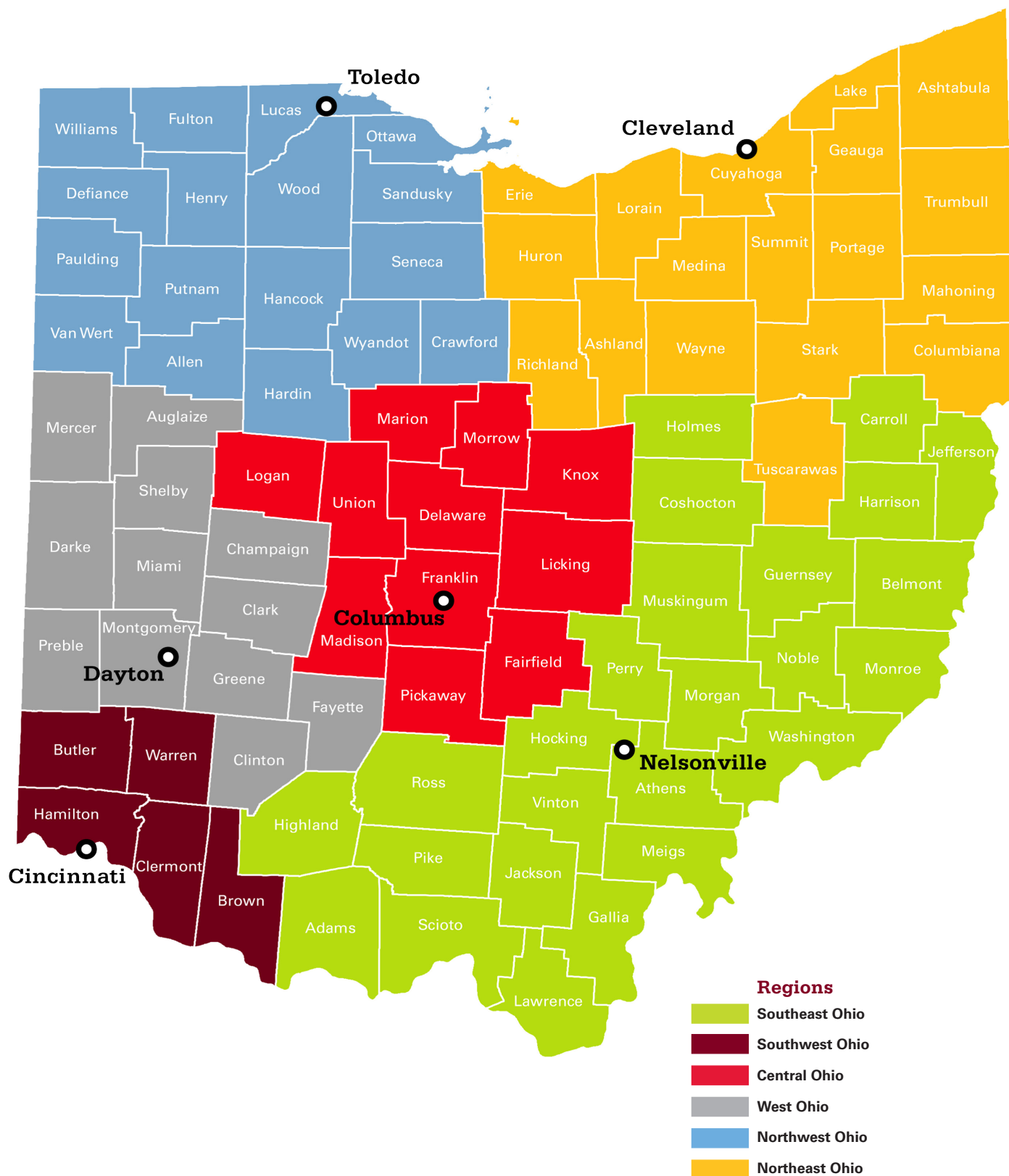
Core Industries		2011 Q2		2018 Q2		Change	
NAICS	Title	Estab.	Empl.	Estab.	Empl.	Estab.	Empl.
2111**	Oil and gas extraction	197	2,887	131	1,101	-66	-1,786
213111	Drilling oil and gas wells	79	525	97	1,122	18	597
213112	Support activities for oil and gas operations	181	1,292	317	4,681	136	3,389
237120	Oil and gas pipeline construction	98	1,862	195	6,526	97	4,664
486210	Pipeline transportation of natural gas	36	307	46	543	10	236
Core Industry Totals		591	6,873	786	13,973	195	7,100
Ancillary Industries		2011 Q2		2018 Q2		Change	
NAICS	Title	Estab.	Empl.	Estab.	Empl.	Estab.	Empl.
221112	Fossil fuel electric power generation	83	5,292	78	3,517	-5	-1,775
221210	Natural gas distribution	142	3,723	152	5,553	10	1,830
221310	Water supply and irrigation systems	248	6,049	260	5,798	12	-251
221320	Sewage treatment facilities	212	3,846	210	3,840	-2	-6
237110	Water and sewer system construction	390	5,029	368	6,374	-22	1,345
237310	Highway, street, and bridge construction	724	15,156	750	18,171	26	3,015
238912	Nonresidential site preparation contractors	628	5,117	650	7,054	22	1,937
325110	Petrochemical manufacturing	5	357	4	ND	-1	ND
325120	Industrial gas manufacturing	47	748	39	ND	-8	ND
331110	Iron and steel mills and ferroalloy manufacturing	58	9,982	61	7,648	3	-2,334
331210	Iron, steel pipe and tube from purchase steel	53	3,122	40	3,356	-13	234
333131	Mining machinery and equipment manufacturing	12	453	11	383	-1	-70
333132	Oil and gas field machinery and equipment	6	137	11	276	5	139
423810	Construction equipment merchant wholesalers	200	2,575	205	2,974	5	399
423830	Industrial machinery merchant wholesalers	1,693	15,287	2,050	18,911	357	3,624
423840	Industrial supplies merchant wholesalers	503	4,803	538	5,632	35	829
484110	General freight trucking, local	1,361	12,206	1,387	12,173	26	-33
484220	Other specialized trucking, local	1,008	7,094	1,143	9,274	135	2,180
484230	Other specialized trucking, long-distance	284	4,540	343	6,717	59	2,177
531190	Lessors of other real estate property	291	949	289	1,066	-2	117
532412	Other heavy machinery rental and leasing	167	1,318	210	2,013	43	695
541330	Engineering services	2,285	27,611	2,433	30,010	148	2,399
541360	Geophysical surveying and mapping services	51	257	60	213	9	-44
541380	Testing laboratories	359	6,535	418	6,912	59	377
541620	Environmental consulting services	299	1,676	322	1,918	23	242
562910	Remediation services	178	2,394	230	4,334	52	1,940
811310	Commercial machinery repair and maintenance	1,102	7,328	1,090	9,600	-12	2,272
924110	Air, water, and waste program administration	165	6,259	157	6,252	-8	-7
924120	Administration of conservation programs	281	6,586	271	6,360	-10	-226
926130	Utility regulation and administration	29	484	29	503	0	19
Ancillary Industry Totals		12,864	166,913	13,809	187,883	945	20,970
Core Industries and Ancillary Industries Totals		13,455	173,786	14,595	201,856	1,140	28,070
All Industries Totals		288,288	4,987,972	296,758	5,426,447	8,470	438,475

Source: Quarterly Census of Employment and Wages.

ND - Not Disclosable.

**See page 20 for explanation of 2111.

JOB SOHIO NETWORK REGIONS

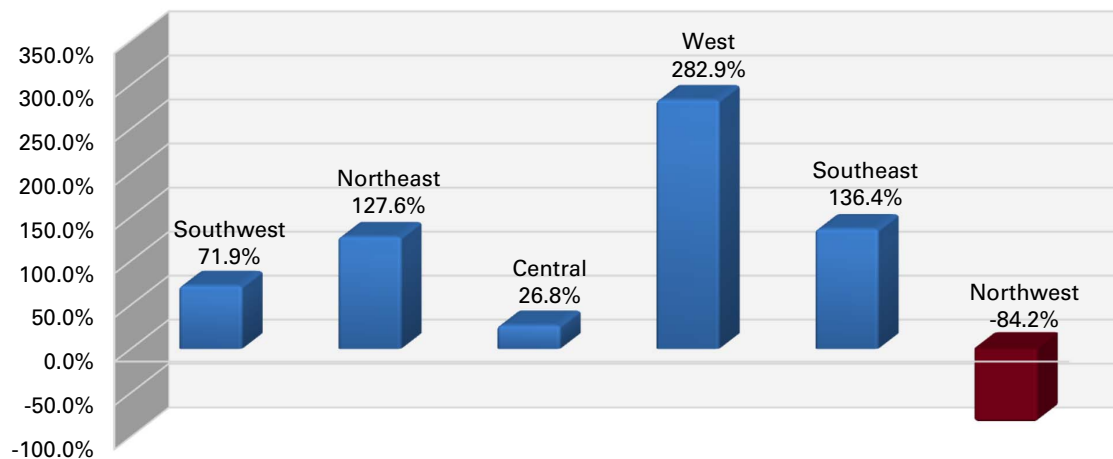


REGIONAL SHALE-RELATED INDUSTRIES

The JobsOhio Network is a partnership of statewide economic development organizations with deep ties to their business communities. The following charts show trends in shale-related employment for each of the six JobsOhio regions.

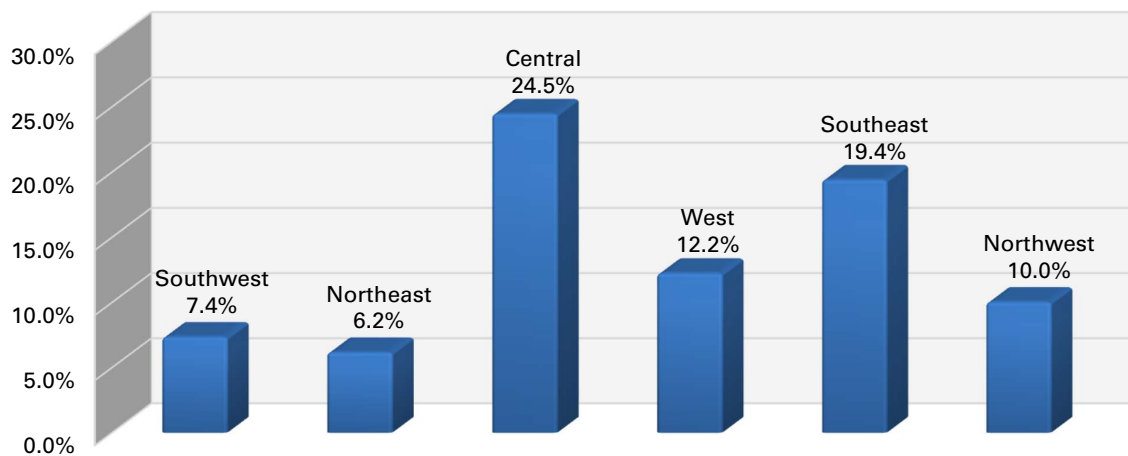
Large percentage increases and decreases in employment may be the result of a change in industry classification following a routine NAICS assignment review. Changes in NAICS assignments are typically done with the publication of the first-quarter data.

Core Shale-Related Industries Percent Employment Change (2011 Q2 - 2018 Q2)



- The largest percent growth in employment for core shale-related industries was in the West region (282.9 percent), followed by the Southeast region (136.4 percent).

Ancillary Shale-Related Industries Percent Employment Change (2011 Q2 - 2018 Q2)



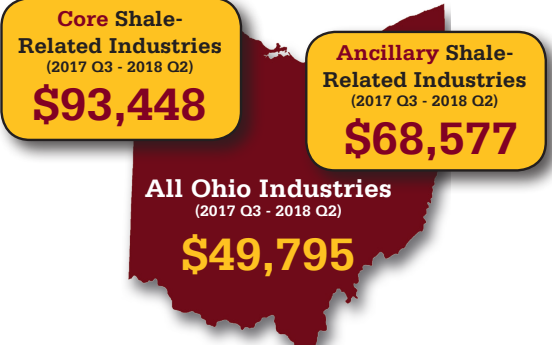
- For ancillary shale-related industries, the largest percent growth in employment was in the Central region (24.5 percent), followed by the Southeast region (19.4 percent).

Source: Quarterly Census of Employment and Wages program, Enhanced Quarterly Unemployment Insurance file.

WAGES FOR OHIO SHALE-RELATED CORE AND ANCILLARY INDUSTRIES

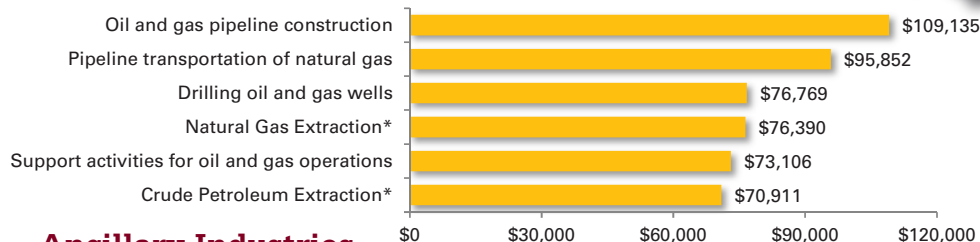
- The four-quarter average wage across all industries for 2017 Q3 through 2018 Q2 was \$49,795.
- The four-quarter average wage in the core industries was \$43,653 greater than the average wage for all industries.
- The four-quarter average wage in the ancillary industries was \$18,782 higher than the average wage for all industries.

Large changes in average wages may be the result of a change in industry classification following a routine NAICS assignment review.

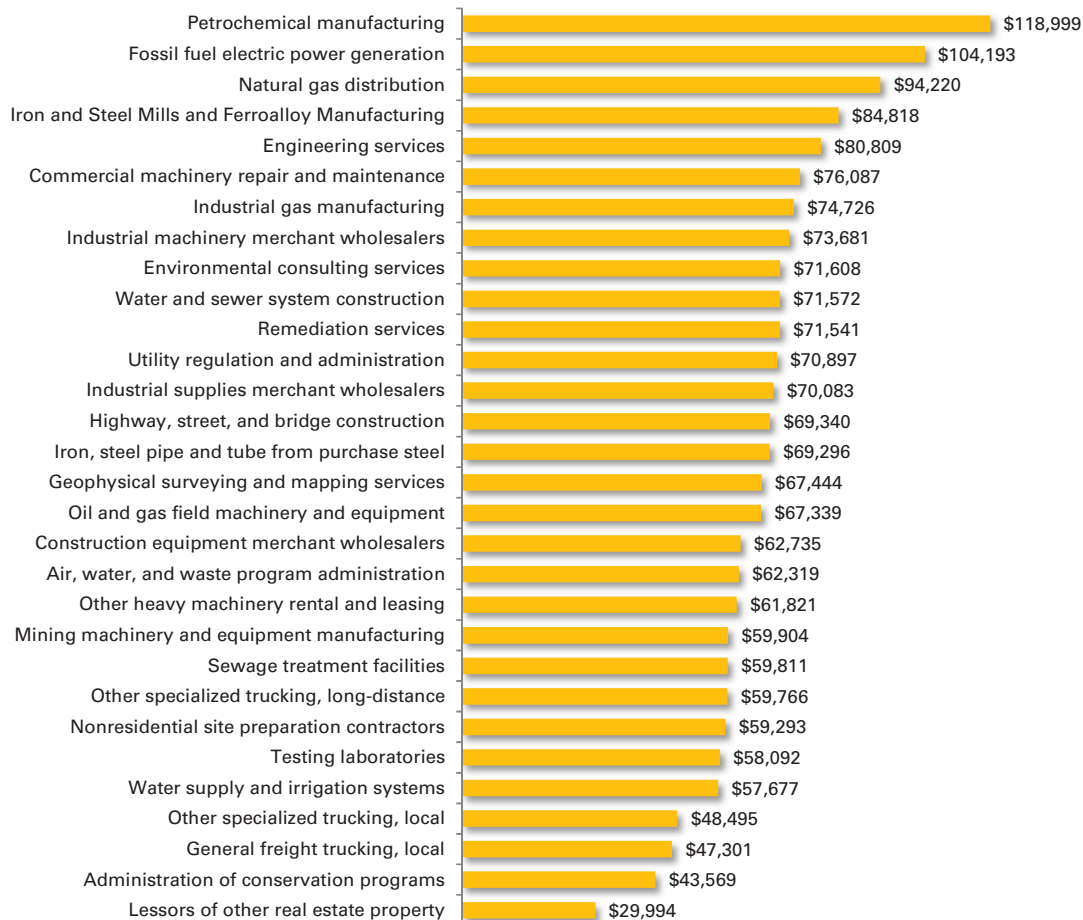


Four-Quarter Average Wage by Industry

Core Industries



Ancillary Industries



Source: Quarterly Census of Employment and Wages.

* NAICS codes are reviewed and revised every five years to keep the classification system current with changes in economic activities. Due to the 2017 NAICS revision, there is a series break. For more information on the 2017 NAICS revision, please visit https://www.bls.gov/cew/bls_naics/v2/bls_naics_app.htm#tab=transition.

OHIO SHALE-RELATED ONLINE JOB POSTINGS

Statewide Online Job Postings

	2017 Q4	2018 Q4	% Change
Core Industries	51	149	192.2%
Ancillary Industries	2,907	2,352	-19.1%
Total: ALL Industries	170,834	141,611	-17.1%

Regional Online Job Postings

Core and Ancillary Combined	2017 Q4	2018 Q4	% Change
Southwest Ohio	435	346	-20.5%
Northeast Ohio	898	693	-22.8%
Central Ohio	565	587	3.9%
West Ohio	560	394	-29.6%
Southeast Ohio	214	138	-35.5%
Northwest Ohio	194	254	30.9%
Total*	2,598	2,503	-3.7%

Source: The Conference Board Help Wanted Online® (HWOL). New ads only. Data are subject to revision. Not seasonally adjusted. Excludes miscellaneous ads.

Data for this quarter incorporates annual benchmark revisions, which bring them up-to-date with revisions to the composite Ohio economic index and incorporate other improvements in accuracy. These revisions do not affect long-term trends. However, they do result in changes to data reported during the previous six months.

**The total includes job ads that may have listed Ohio as the only geographical area. As a result, the sum of the job ads for the regions may be lower, since it does not include ads without a city or metropolitan statistical area specification.*

Statewide Online Job Postings

- Total job postings across all Ohio industries decreased in 2018 Q4 compared to 2017 Q4.
- Overall, job postings increased in core (192.2 percent) and decreased in ancillary (19.1 percent) shale-related industries.

Regional Online Job Postings

- Job postings increased in the Central Ohio (3.9 percent) and Northwest Ohio (30.9 percent) regions in 2018 Q4 compared to 2017 Q4.

WELL ACTIVITY STATUS AS OF JANUARY 12, 2019

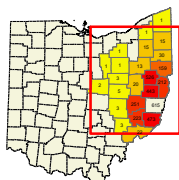
HORIZONTAL OIL AND GAS WELLS IN THE UTICA/POINT PLEASANT AND MARCELLUS FORMATIONS OHIO DEPARTMENT OF NATURAL RESOURCES 2019

ODNR OFFICE OF INFORMATION TECHNOLOGY
January 2019

Horizontal Wells Activity Status at end of Saturday 01/12/2019:

Wells Permitted To Date:
Utica: 2976
Marcellus: 63
(1 Utica-Permitted well is not mapped
due to well length >= 22000 feet.)
Wells Drilled To Date:
Utica: 2505
Marcellus: 40
Wells Producing To Date:
Utica: 2128
Marcellus: 22

Utica/Point Pleasant and Marcellus Horizontal Well Head Counts by County



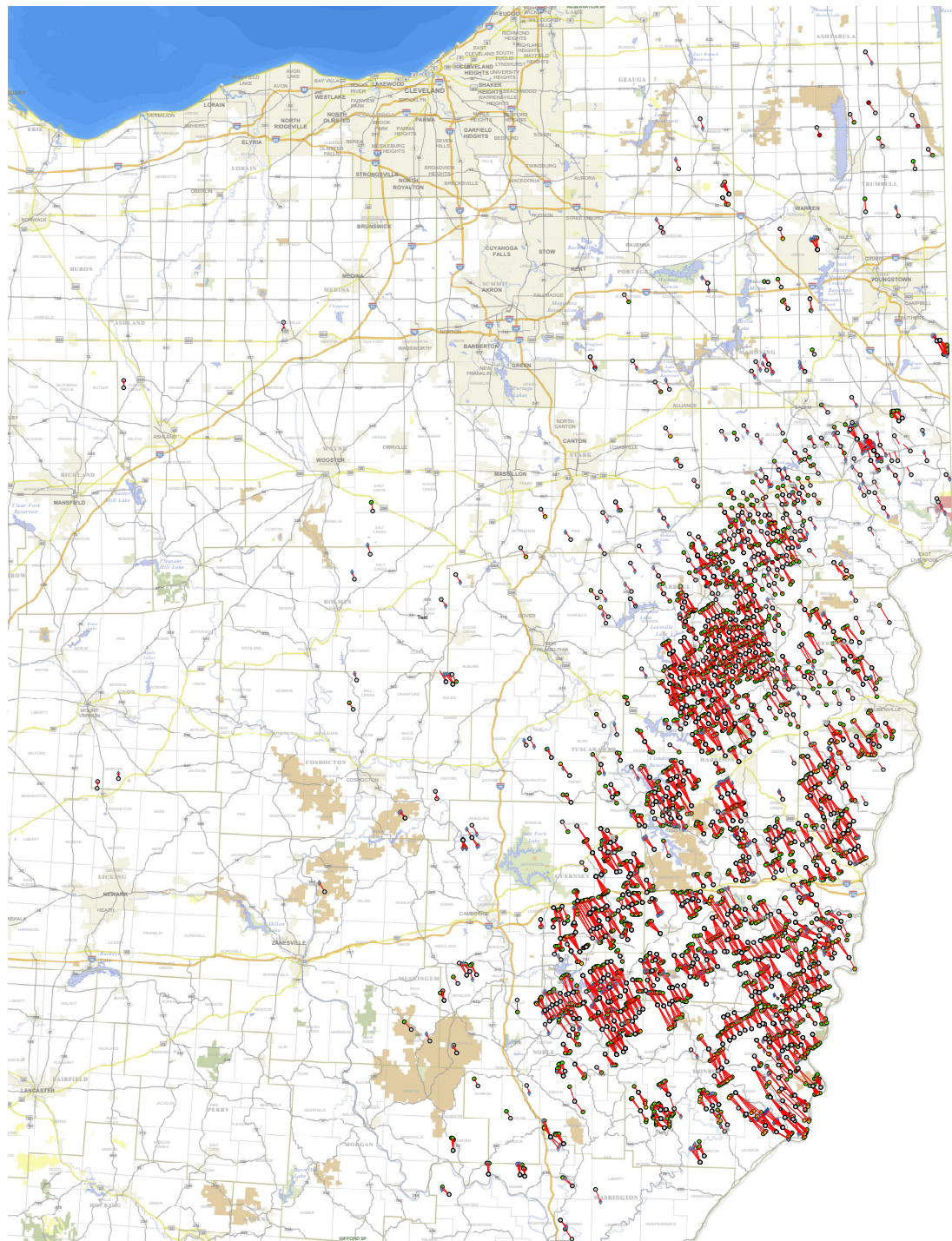
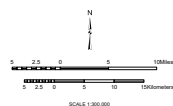
Projection is Ohio state plane coordinate system, south zone
North American Datum 1983.

○ Utica/Point Pleasant Well Heads
● Marcellus Well Heads
— Horizontal Wellbores

Utica/Point Pleasant Bottom Hole
● PERMITTED-Permitted, Not Drilled, Cancelled
● DRILLED-Drilling, Well Drilled
● PRODUCING-Producing, Plugged Back
● INACTIVE-Drilled Inactive, Shut in
● Lost Hole or First Restoration
● Dry and Abandoned
● Plugged and Abandoned

Marcellus Bottom Hole
● PERMITTED-Permitted, Not Drilled, Cancelled
● DRILLED-Drilling, Well Drilled
● PRODUCING-Producing, Plugged Back
● Inactive

ODNR Lands
■ Division of Forestry
■ Department
■ Division of Parks
■ Division of Watercraft
■ Division of Wildlife
■ Natural Areas and Preserves



Data source: The ODNR Division of Oil and Gas Resources provided the Well data from RBOMS; The ODNR Division of Geological Survey provided the S-SUB1₋ data; The ODNR Office of Information Technology provided the ODNR lands data; The NationalAtlas.gov provided the federal lands; Ohio Department of Transportation provided the city boundaries, roads, and lake data.

KEY OCCUPATIONS IN CORE SHALE-RELATED INDUSTRIES

The occupations listed in the table below are found within the national staffing patterns of core shale-related industries. While these occupations are not exclusive to the core shale-related industries, the 2017 base employment count within these industries was above 50.

A standard occupation classification (SOC) code is provided for each occupation. For a complete list of terms and definitions, please refer to the Staffing Patterns definition on page 19.

SOC Code	SOC Title	Median Annual Wage ¹	Typical Education, Work Experience, On-the-Job Training (OJT)
17-2171	Petroleum Engineers	\$80,995	Bachelor's degree
19-2042	Geoscientists, Except Hydrologists and Geographers	\$67,808	Bachelor's degree
19-4041	Geological and Petroleum Technicians	\$45,115	Associate's degree, Moderate-term OJT
47-2151	Pipelayers	\$45,573	HS/GED, Short-term OJT
47-5011	Derrick Operators, Oil and Gas	\$46,259	Less than HS, Short-term OJT
47-5012	Rotary Drill Operators, Oil and Gas	\$50,357	Less than HS, Moderate-term OJT
47-5013	Service Unit Operators, Oil, Gas and Mining	\$42,328	Less than HS, Moderate-term OJT
47-5071	Roustabouts, Oil and Gas	\$35,194	Less than HS, Moderate-term OJT
47-5081	Helpers--Extraction Workers	\$26,957	HS/GED, Moderate-term OJT
51-8092	Gas Plant Operators	\$69,638	HS/GED, Long-term OJT
51-8093	Petroleum Pump System Oper./Refinery Oper./Gaugers	\$64,064	HS/GED, Long-term OJT
53-7071	Gas Compressor and Gas Pumping Station Operators	\$70,762	HS/GED, Moderate-term OJT
53-7073	Wellhead Pumpers	\$37,877	HS/GED, Moderate-term OJT, Less than 5 years

¹Annual wages have been calculated by multiplying hourly median wage by 2,080 hours.
Source: U.S. Bureau of Labor Statistics, Occupational Employment Statistics, May 2017.

IN-DEMAND SHALE-RELATED OCCUPATIONS

The occupations listed below have been identified as in-demand occupations through the Ohio Workforce Information Exchange — Job Forecast initiative as of July 2017. This initiative works directly with employers with at least one Ohio location to identify employers' most in-demand occupations over the next one, three, and five years. While the occupations below are not exclusive to the core shale-related industries, the 2017 base employment count within these industries was above 20.

For more information on the Workforce Information Exchange, please refer to page 20.

SOC Code	SOC Title	Median Annual Wage ¹	Typical Education, Work Experience, On-the-Job Training (OJT)
11-3031	Financial Managers	\$116,085	Bachelor's degree, 5+ Years
11-9021	Construction Managers	\$90,813	Bachelor's degree, Moderate-term OJT
11-9041	Architectural and Engineering Managers	\$126,547	Bachelor's degree, 5+ Years Experience
11-1021	General and Operations Managers	\$93,122	Bachelor's degree, 5+ Years Experience
13-1051	Cost Estimators	\$59,342	Bachelor's degree, Moderate-term OJT
13-1199	Business Operations Specialists, All Other	\$64,979	Bachelor's degree
13-2011	Accountants and Auditors	\$64,522	Bachelor's degree
13-2051	Financial Analysts	\$72,758	Bachelor's degree
15-1121	Computer Systems Analysts	\$84,594	Bachelor's degree
17-2112	Industrial Engineers	\$79,539	Bachelor's degree
43-3031	Bookkeeping, Accounting and Auditing Clerks	\$37,710	HS/GED, Moderate-term OJT
43-4051	Customer Service Representatives	\$32,240	HS/GED, Short-term OJT
43-6011	Executive Secretaries and Executive Administrative Assistant	\$53,539	HS/GED, 1-5 Years Experience
43-6014	Secretaries and Administrative Assistants, Ex. Legal, Medical and Executive	\$34,570	HS/GED, Short-term OJT
43-9061	Office Clerks, General	\$30,950	HS/GED, Short-term OJT
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	\$62,504	HS/GED, 5+ Years Experience
47-2031	Carpenters	\$45,510	HS/GED, Apprenticeship
47-2061	Construction Laborers	\$39,000	Less than HS, Short-term OJT
47-2073	Operating Engineers and Other Construction Equipment Operators	\$54,392	HS/GED, Moderate-term OJT
47-2152	Plumbers, Pipefitters and Steamfitters	\$52,312	HS/GED, Apprenticeship
49-1011	First-Line Supervisors of Mechanics, Installers and Repairers	\$61,693	HS/GED, 1-5 Years Experience
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	\$54,226	HS/GED, Long-term OJT
49-9041	Industrial Machinery Mechanics	\$50,211	HS/GED, Long-term OJT
51-1011	First-Line Supervisors of Production and Operating Workers	\$58,573	HS/GED, 1-5 Years Experience
51-4121	Welders, Cutters, Solderers and Brazers	\$38,646	HS/GED, Moderate-term OJT
51-9061	Inspectors, Testers, Sorters, Samplers and Weighers	\$37,669	HS/GED, Moderate-term OJT
53-3032	Heavy and Tractor-Trailer Truck Drivers	\$41,787	Post-sec non-degree, Short-term OJT

¹Annual wages have been calculated by multiplying hourly median wage by 2,080 hours.
Source: U.S. Bureau of Labor Statistics, Occupational Employment Statistics, May 2017.

STATEWIDE SHALE-RELATED EMPLOYMENT DATA

The Quarterly Workforce Indicators (QWI) are a set of economic indicators derived from state administrative records and basic demographic information from the Census Bureau. They can be examined based on geography, industry, gender and age of workers. Data presented are the most recent available. Because QWI data are not seasonally adjusted, the same quarter must be used when analyzing changes over time. This will ensure that seasonal factors are not influencing employment change. Therefore, in the table below and on the following page, 2011 Q4 data is presented with 2017 Q4 data.

The tables below and on the following page show Ohio shale-related employment. “Stable Employment” is an estimate of the number of jobs that were present at the beginning and end of a quarter. “All Hires” is the estimated number of workers who started a job during the quarter; it includes new and recalled employees. “Separations” is the estimated number of workers whose jobs with a given employer ended during a quarter.

Ohio	2011 Q4			2017 Q4		
	Stable Employment	All Hires	Separations	Stable Employment	All Hires	Separations
All industry groups	4,411,915	849,960	785,816	4,670,535	922,284	974,286
2111 Oil and Gas Extraction	2,919	190	180	1,008	103	128
2131 Support Activities for Mining	2,597	746	839	5,289	1,540	1,625
2371 Utility System Construction	9,432	2,209	3,439	13,770	4,565	9,521
4862 Pipeline Transportation of Natural Gas	337	14	3	544	28	37

Source: U.S. Census Bureau, Longitudinal Employer-Household Dynamics, Quarterly Workforce Indicators.

QWI are available only at the four-digit NAICS level. Consequently, although these industry groups contain some employment from non-shale-related core industries, they provide an indication of labor activity for these shale-related industries.

- Stable jobs, those present at the beginning and end of a quarter, increased in three core shale-related industries from 2011 Q4 to 2017 Q4: support activities for mining, utility system construction, and pipeline transportation of natural gas.
- The job market has significant turnover as demonstrated by the number of hires and separations.

JOB OHIO NETWORK SHALE-RELATED EMPLOYMENT

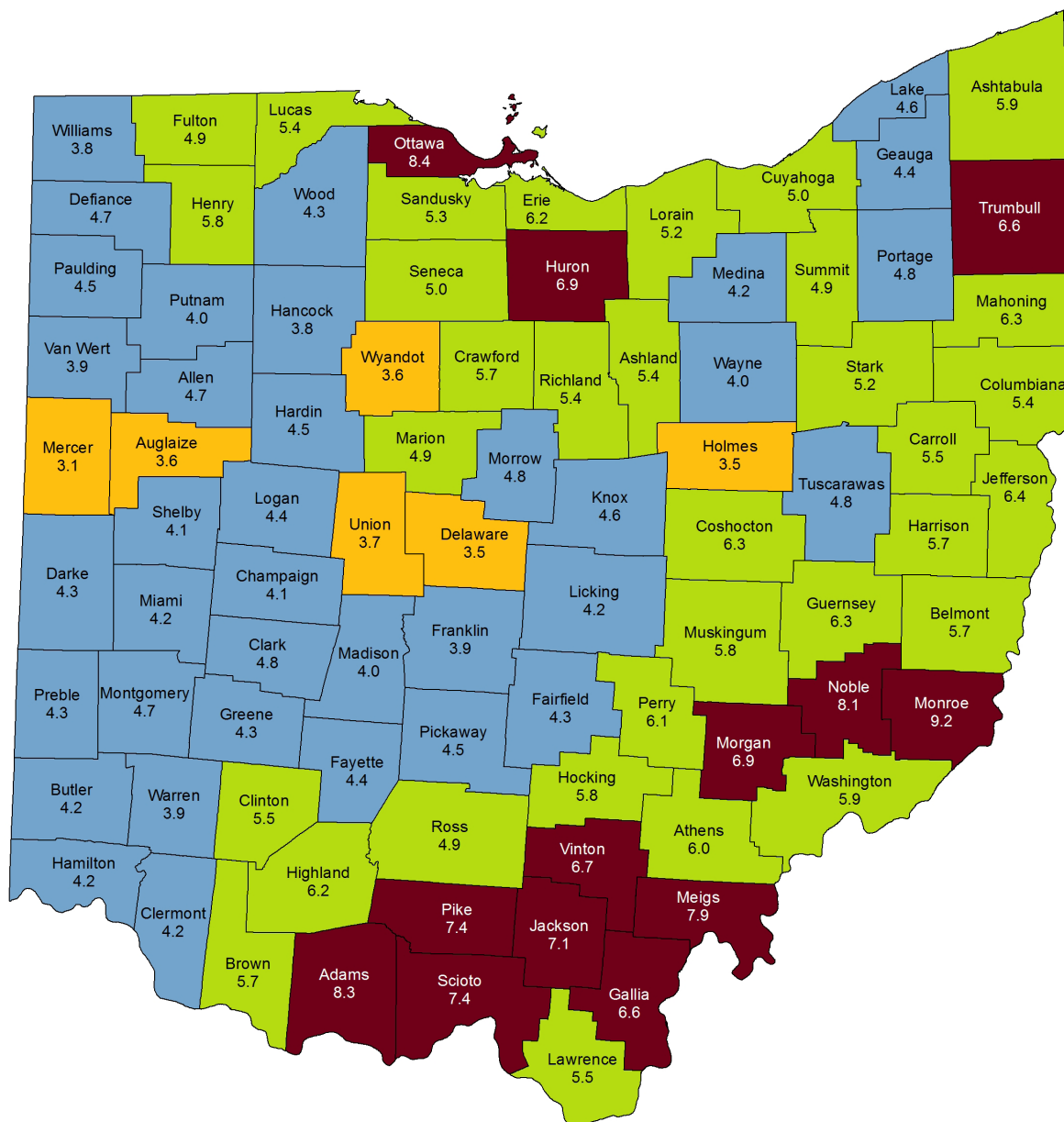
Central Ohio	2011 Q4			2017 Q4		
	Stable Employment	All Hires	Separations	Stable Employment	All Hires	Separations
All industry groups	877,526	181,601	160,681	962,710	210,836	222,838
2111 Oil and Gas Extraction	184	7	11	89	5	20
2131 Support Activities for Mining	211	64	154	262	56	56
2371 Utility System Construction	1,960	308	484	3,936	878	1,828
4862 Pipeline Transportation of Natural Gas	123	5	***	237	12	13
Northeast Ohio						
All industry groups	1,659,468	323,539	291,757	1,725,226	320,435	343,012
2111 Oil and Gas Extraction	663	76	73	558	52	71
2131 Support Activities for Mining	646	98	156	1,872	461	452
2371 Utility System Construction	3,371	919	1,522	4,200	1,333	4,972
4862 Pipeline Transportation of Natural Gas	94	4	***	91	6	9
Northwest Ohio						
All industry groups	459,641	97,380	86,052	484,186	96,171	97,830
2111 Oil and Gas Extraction	1,640	42	46	0	***	***
2131 Support Activities for Mining	9	5	0	31	3	5
2371 Utility System Construction	1,206	312	712	1,519	733	724
4862 Pipeline Transportation of Natural Gas	27	***	0	24	***	5
Southeast Ohio						
All industry groups	269,313	44,304	46,759	271,967	52,820	56,275
2111 Oil and Gas Extraction	403	60	47	326	37	32
2131 Support Activities for Mining	1,715	572	513	2,986	1,011	1,101
2371 Utility System Construction	694	259	218	1,117	814	1,093
4862 Pipeline Transportation of Natural Gas	80	***	0	98	4	6
Southwest Ohio						
All industry groups	678,387	126,967	127,520	747,665	146,392	155,181
2111 Oil and Gas Extraction	28	6	4	***	***	***
2131 Support Activities for Mining	6	0	***	***	0	0
2371 Utility System Construction	1,496	310	357	2,135	442	591
4862 Pipeline Transportation of Natural Gas	***	***	0	90	5	3
West Ohio						
All industry groups	467,581	76,170	73,048	478,782	95,631	99,150
2111 Oil and Gas Extraction	***	0	0	***	***	***
2131 Support Activities for Mining	10	7	15	135	9	11
2371 Utility System Construction	704	101	147	864	366	313
4862 Pipeline Transportation of Natural Gas	***	0	0	***	0	0

Source: U.S. Census Bureau, Longitudinal Employer-Household Dynamics, Quarterly Workforce Indicators.

***Indicates data cannot be disclosed due to confidentiality restrictions or data quality standards.

Quarterly Workforce Indicators are available only at the four-digit NAICS level. Consequently, although these industry groups contain some employment from non-shale-related core industries, they help provide an indication of labor activity for these shale-related industries.

COUNTY UNEMPLOYMENT RATES IN DECEMBER 2018 (Not Seasonally Adjusted)

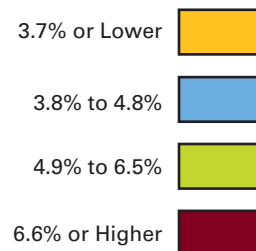


Unemployment Rates

Not Seasonally Adjusted Seasonally Adjusted

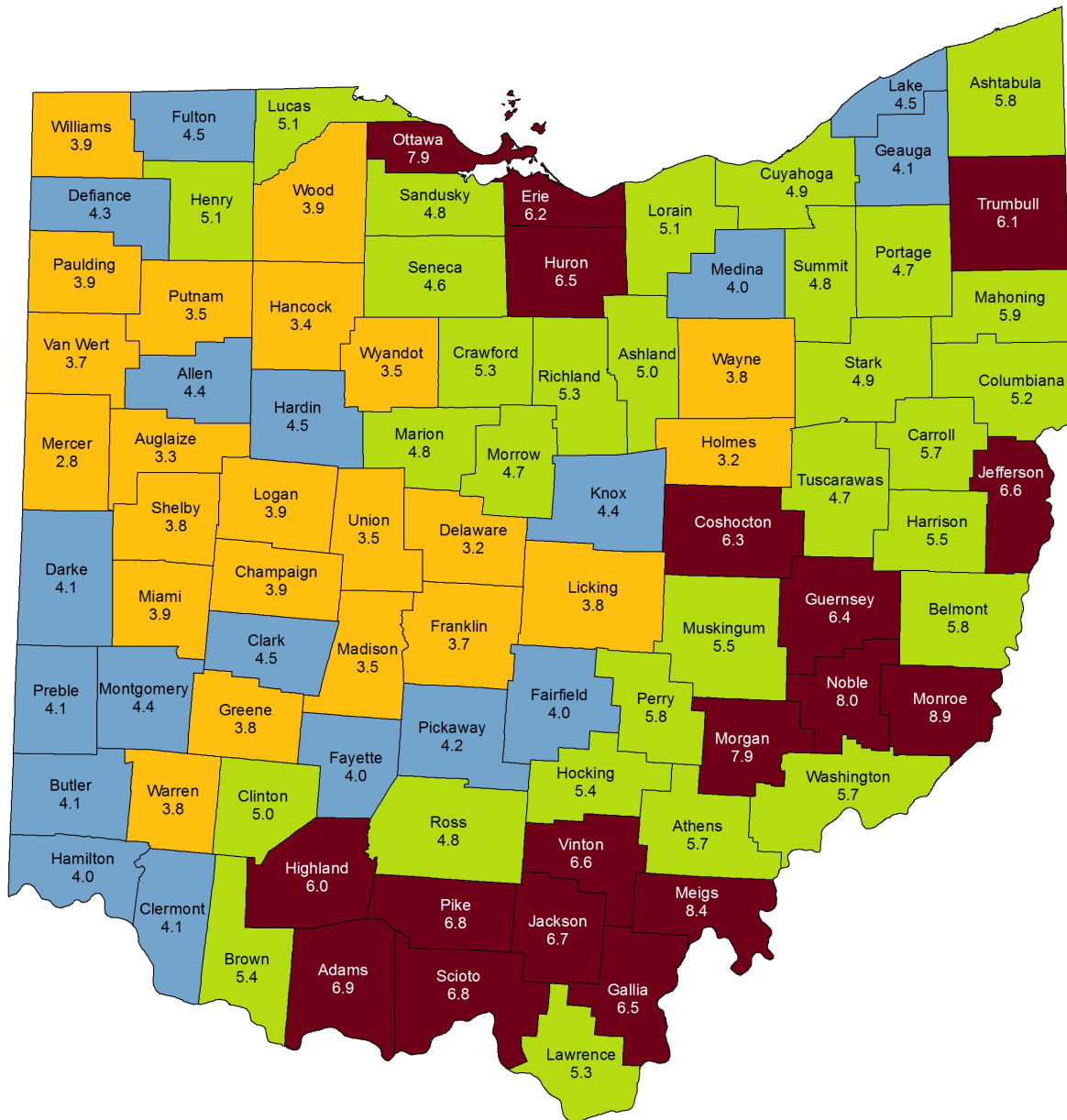
United States
Ohio

3.7% 3.9%
4.8% 4.6%



Source: Ohio Department of Job and Family Services
Office of Workforce Development
Bureau of Labor Market Information
*Data are preliminary and subject to revision.

COUNTY UNEMPLOYMENT RATES IN DECEMBER 2017 (Not Seasonally Adjusted)

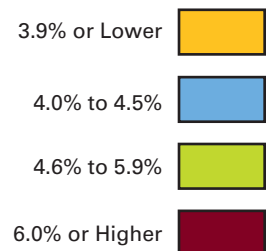


Unemployment Rates

Not Seasonally Adjusted Seasonally Adjusted

United States
Ohio

3.9% 4.1%
4.5% 4.9%



Source: Ohio Department of Job and Family Services
Office of Workforce Development
Bureau of Labor Market Information
*Data based on 2017 benchmark.

DEFINITIONS

OHIO LABOR FORCE STATISTICS*

Source: Ohio Department of Job and Family Services' Bureau of Labor Market Information, Local Area Unemployment Statistics (LAUS)

The labor force and unemployment data are based on the same concepts and definitions as those used for the official national estimates obtained from the Current Population Survey (CPS). The LAUS program measures employment and unemployment on a place-of-residence basis and produces estimates using equations based on regression techniques. This method uses data from several sources, including the CPS, the Current Employment Statistics (CES) program and state unemployment insurance programs. The LAUS program does not produce estimates for any demographic groups.

Employment – A count of all persons who, during the week that includes the 12th day of the month, (a) did any work as paid employees, worked in their own businesses or professions or on their own farm, or worked 15 hours or more as unpaid workers in enterprises operated by members of their families, or (b) were not working but who had jobs from which they were temporarily absent. Each employed person is counted only once, even if the person holds more than one job. Included are the self-employed, unpaid family workers, agricultural workers and private household workers, who are excluded by the CES survey.

Labor Force – The population of people either working or looking for work, or classified as employed or unemployed.

Unemployment – A count of all persons age 16 and older who had no employment during the reference week (the week containing the 12th day of the month), who were available for work (except for temporary illness), and who had made specific efforts to find employment sometime during the four-week period ending with the reference week. This includes those waiting to be recalled to jobs from which they had been laid off.

Unemployment Rate – The number of unemployed workers as a percent of the labor force.

JOB DATA*

Source: Ohio Department of Job and Family Services' Bureau of Labor Market Information, Current Employment Statistics

Each month the CES program surveys about 149,000 national businesses and government agencies to provide detailed industry data on employment, hours, and earnings of workers on non-farm payrolls. This is a collaborative effort between the U.S. Bureau of Labor Statistics (BLS) and the states. CES produces a count of jobs, not of people.

Nonfarm Jobs – The total number of persons on established payrolls employed full- or part-time who received pay for any part of the pay period that includes the 12th day of the month. Temporary and intermittent employees are included, as are any employees who are on paid sick leave, on paid holiday, or who worked during only part of the specified pay period. A striking employee who works only a small portion of the survey period, and is paid, is included as employed. Those on payrolls of more than one establishment are counted in each establishment. Data exclude proprietors, self-employed workers, unpaid family or volunteer workers, farm workers, and domestic workers. Those on layoff, strike or leave without pay for the entire pay period, or who have not yet reported for work, are not counted as employed. Government employment covers only civilian employees.

QUARTERLY WORKFORCE INDICATORS

Source: U.S. Census Bureau

The Quarterly Workforce Indicators are data that can be examined by region, industry, gender and age of workers. These indicators are built on wage records in the unemployment insurance system and information from state Quarterly Census of Employment and Wages (QCEW) data.

*THESE DATA ARE SEASONALLY ADJUSTED. Seasonal adjustment removes changes in employment due to normal seasonal hiring or layoffs (such as holidays, weather, etc.).

DEFINITIONS

QUARTERLY CENSUS OF EMPLOYMENT AND WAGES

Source: Ohio Department of Job and Family Services' Bureau of Labor Market Information, Quarterly Census of Employment and Wages

Business Establishment – An establishment is the location of a certain economic activity, such as a factory, store, office or mine, which produces goods or services. It is typically at a single physical location and engaged in one, or predominantly one, type of economic activity. An employer may have one or more establishments.

Employment – Employment data include all employment covered under federal and Ohio unemployment insurance laws for each of the three months in a quarter. The employment count represents the number of full- and part-time employees who worked during or received pay for the payroll period including the 12th day of the month. The employment totals for each month are averaged for the quarter employment count. Those on paid vacations or paid sick leave are included. Workers temporarily earning no wages due to labor-management disputes, layoffs or other reasons are not reported as employed. Those on the payroll of more than one employer during the same reference week are reported more than once.

Wages – Wages include total compensation paid during a calendar quarter, including bonuses. Average wages are calculated by dividing total wages for a quarter by average employment in that quarter.

STAFFING PATTERNS

Source: Ohio Department of Job and Family Services' Bureau of Labor Market Information

A staffing pattern is a list of the occupations most commonly found within a particular industry. This information comes from the biennial Long-Term Occupational Employment Projections data.

Annual Median Wage – The annual median wage earned by workers in an occupation, assuming 40 hours of work per week, 52 weeks a year. Wage data is derived from the annual Occupational Employment Statistics survey.

Typical Education, Training and Experience – To assist with career planning, the BLS has determined the typical education needed for entry into an occupation, years of commonly needed work experience in a related occupation, and typical on-the-job training needed to attain competency in the occupation. For definitions of available categories, see bls.gov/emp/ep_education_tech.htm.

Typical Education Levels

- Less than high school
- High school diploma or equivalent (HS/GED)
- Postsecondary non-degree award (Post-HS Cert.)
- Associate's degree
- Bachelor's degree
- Master's degree
- Doctoral or professional degree

Work Experience in a Related Occupation

- Five years or more
- One to five years
- Less than one year

Typical On-The-Job (OJT) Training

- Long-term OJT – More than 12 months OJT or combined work experience and formal classroom instruction
- Moderate-term OJT – One to 12 months OJT and informal training
- Short-term OJT – Less than one month OJT

ONLINE JOB POSTINGS

Source: The Conference Board Help Wanted OnLine™ Data Set

The Conference Board HWOL data set provides real-time insight into the employment marketplace through the world's largest database of online job ads. Job ads can be classified by industry, occupation, employer and geographic area. Data are analyzed for employment trends and to forecast economic conditions. The underlying data for The Conference Board HWOL are provided by Wanted Technologies Corporation.

DEFINITIONS

NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (NAICS) CHANGES

NAICS, established in 1997, is reviewed for potential revisions every five years. The latest revision, in 2017, was implemented by BLS in the QCEW program with the release of first quarter 2017 data. As part of this revision, the NAICS code of two core shale-related industries were impacted: NAICS 211111 (Crude Petroleum and Natural Gas Extraction) and NAICS 211112 (Natural Gas Liquid Extraction). The NAICS 2017 structure regrouped those NAICS into 211120 (Crude Petroleum Extraction) and 211130 (Natural Gas Extraction). A portion of the former 211111 was moved to 211120; while 211130 contains all of 211112 and a portion of 211111. These data are comparable at the 4-digit level, as all are contained within 2111 (Oil and Gas Extraction), but they are not comparable at 5- or 6-digit level. Because the employment from year 2011 is not defined in NAICS 2017 codes and year 2017 employment is not defined under old codes, we provide only the 4-digit level data for NAICS 2111 on page 6.

Core Shale-Related Industries (NAICS):

Crude Petroleum Extraction (211120); Natural Gas Extraction (211130); Drilling Oil & Gas Wells (213111); Support Activities for Oil & Gas Operations (213112); Oil & Gas Pipeline & Related Structures Construction (237120); and Pipeline Transportation of Natural Gas (486210).

Ancillary Shale-Related Industries (NAICS):

Fossil Fuel Electric Power Generation (221112); Natural Gas Distribution (221210); Water Supply & Irrigation Systems (221310); Sewage Treatment Facilities (221320); Water & Sewer Line & Related Structures Construction (237110); Highway, Street, and Bridge Construction (237310); Nonresidential Site Preparation Contractors (238912); Petrochemical Manufacturing (325110); Industrial Gas Manufacturing (325120); Iron & Steel Mills & Ferroalloy Manufacturing (3311101); Iron & Steel Pipe & Tube Manufacturing from Purchased Steel (331210); Mining Machinery & Equipment Manufacturing (333131); Oil & Gas Field Machinery & Equipment Manufacturing (333132); Construction and Mining (except Oil Well) Machinery and Equipment Merchant Wholesalers (423810); Industrial Machinery and Equipment Merchant Wholesalers (423830); Industrial Supplies Merchant Wholesalers (423840); General Freight Trucking, Local (484110); Specialized

Freight Trucking, Local (484220); Specialized Freight Trucking, Long-Distance (484230); Lessors of Other Real Property (531190); Construction, Mining & Forestry Machinery & Equipment Rental & Leasing (532412); Engineering Services (541330); Geophysical Surveying & Mapping Services (541360); Testing Laboratories (541380); Environmental Consulting Services (541620); Remediation Services (562910); Commercial & Industrial Machinery & Equipment Repair & Maintenance (811310); Administration of Air and Water Resource and Solid Waste Management Programs (924110); Administration of Conservation Programs (924120); and Regulation and Administration of Communications, Electric, Gas, and Other Utilities (926130).

WORKFORCE INFORMATION EXCHANGE

Source: Governor's Office of Workforce Transformation
(workforce.ohio.gov)

The Governor's Office of Workforce Transformation deployed a statewide jobs forecasting tool to the top companies of predefined industry clusters. These companies represent small, medium and large businesses with at least 10 employees and at least one Ohio location. Through the forecasting tool, businesses identify the top five critical, difficult-to-fill job needs over the next one, three and five years. The information from the forecast tool is aggregated with current job postings and occupation projections from ODJFS to better align the in-demand jobs with education and training providers and Ohio's workforce development system.

Mike DeWine, Governor
State of Ohio

Michael J. McCreight, Interim Director
Ohio Department of Job and Family Services

January 2019

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