

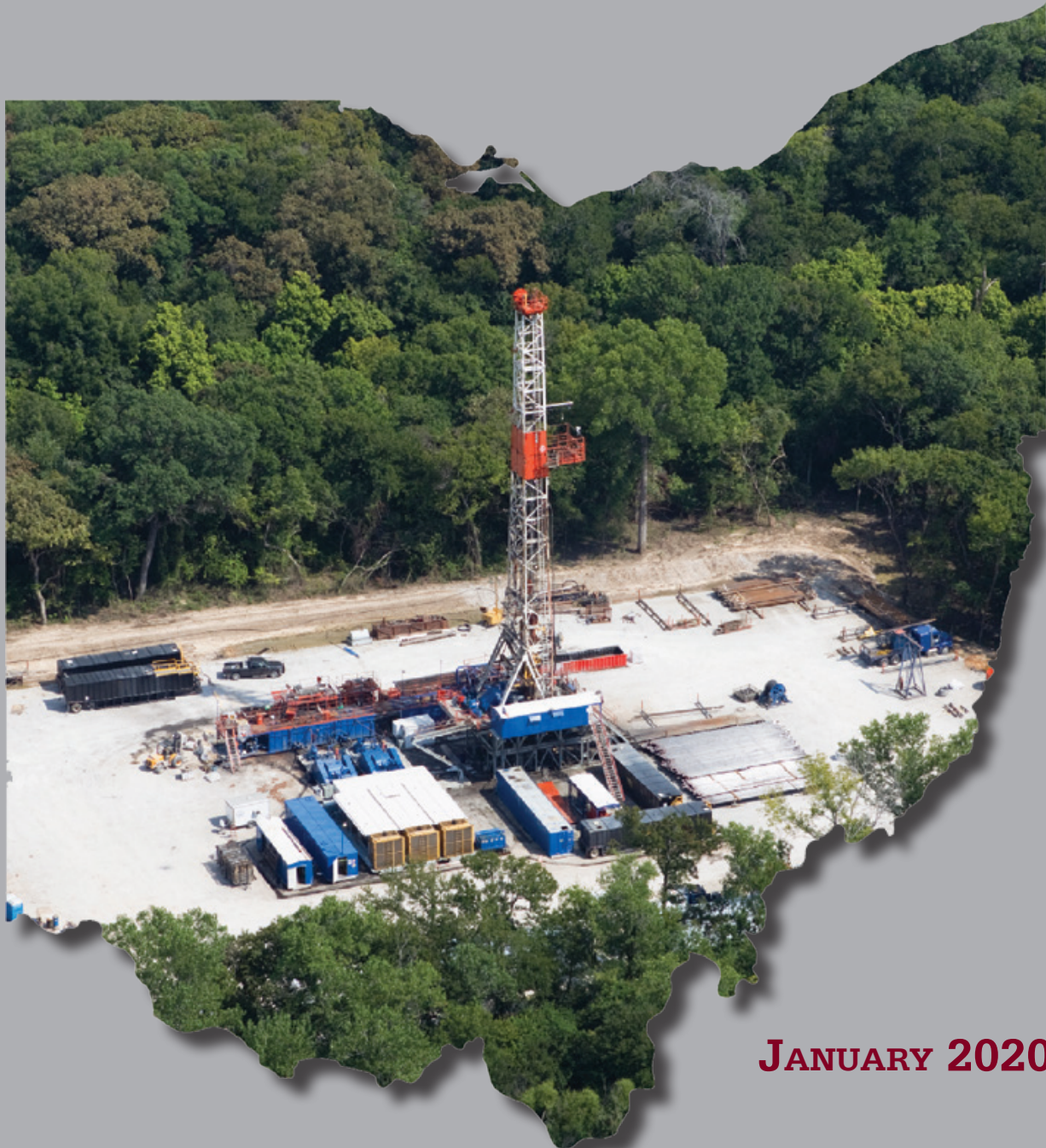
Ohio

**Department of
Job and Family Services**

Mike DeWine, Governor
Kimberly Hall, Director

OHIO SHALE

QUARTERLY ECONOMIC TRENDS FOR OHIO OIL AND GAS INDUSTRIES



JANUARY 2020

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A Message from Director Hall

In 2011, we began tracking shale employment in Ohio. Since that time, opportunities in this field have nearly doubled. Core shale-related employment, such as oil and gas pipeline construction and well drilling, increased 90.8 percent from the second quarter of 2011 to the second quarter of 2019. Ancillary shale employment, including freight trucking and environmental consulting, also increased. Non-shale industries, such as food and retail businesses near drilling sites and the surrounding communities, also benefit from shale activity. The average wages of shale-related jobs are excellent: \$83,753 in core industries and \$70,456 in ancillary industries. In both cases, this is higher than the average wage in all Ohio industries: \$51,359.

The Ohio Department of Job and Family Services (ODJFS) Workforce Development team has been working hard to help more Ohioans take advantage of these opportunities. We work 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**.

Individuals can sign up for 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 are 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.

A handwritten signature in black ink that reads "Kim Hall". The signature is written in a cursive, flowing style.

Kimberly Hall, Director
Ohio Department of Job and Family Services



EXECUTIVE SUMMARY

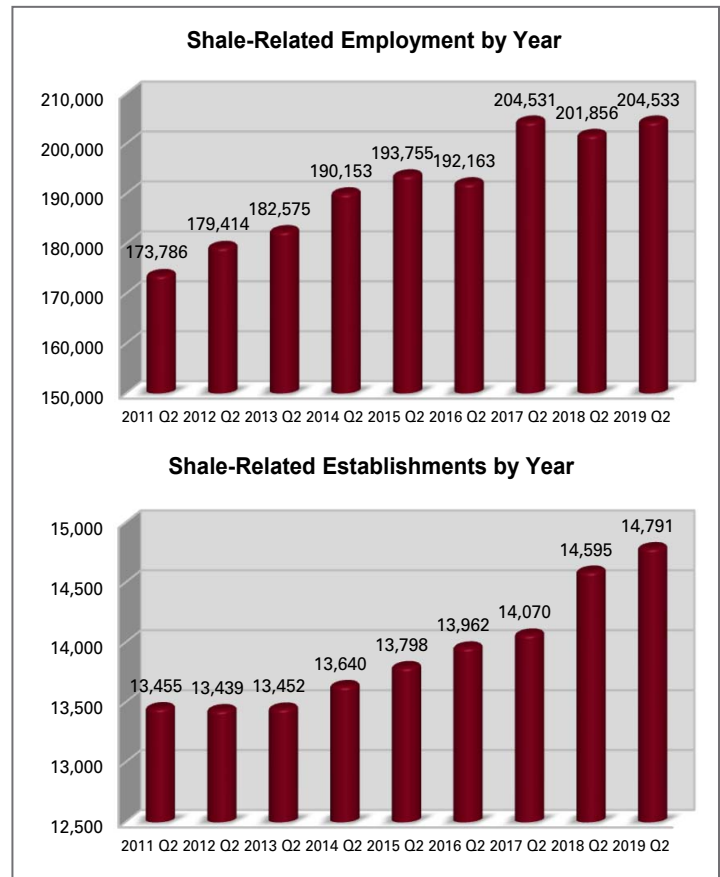
Employment (2011 Q2 to 2019 Q2) See page 6.

- Core shale-related industry employment (such as pipeline construction and well drilling) was up by 6,241 (90.8 percent).
- Ancillary shale-related industry employment (such as freight trucking and environmental consulting) increased by 24,506 (14.7 percent).
- All industry employment was up by 403,056 (8.1 percent).

Business Establishments (2011 Q2 to 2019 Q2)

See page 6.

- Core shale-related business establishments grew by 187 (31.6 percent).
- Ancillary shale-related establishments increased by 1,149 (8.9 percent).
- Over the same time period, Ohio experienced an increase of 12,419 (4.3 percent) business establishments in all industries.
- Shale-related business establishments totaled 14,791 during the second quarter of 2019.



Wages (2018 Q3 through 2019 Q2) See page 9.

- The four-quarter average wage across all industries was \$51,359.
- The four-quarter average wage in core shale-related industries was \$83,753, which was \$32,394 greater than the average for all industries.
- The four-quarter average wage in ancillary shale-related industries was \$70,456, which was \$19,097 higher than the average for all industries.

Online Job Postings (2019 Q4) See page 10.

- Ohio had 2,662 online job postings in core and ancillary shale-related industries in 2019 Q4.

Stable Employment, All Hires and Separations (2011 Q4 to 2018 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 (Gartner TalentNeuron™ job posting analytics platform) 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 2019. 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 2019 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.

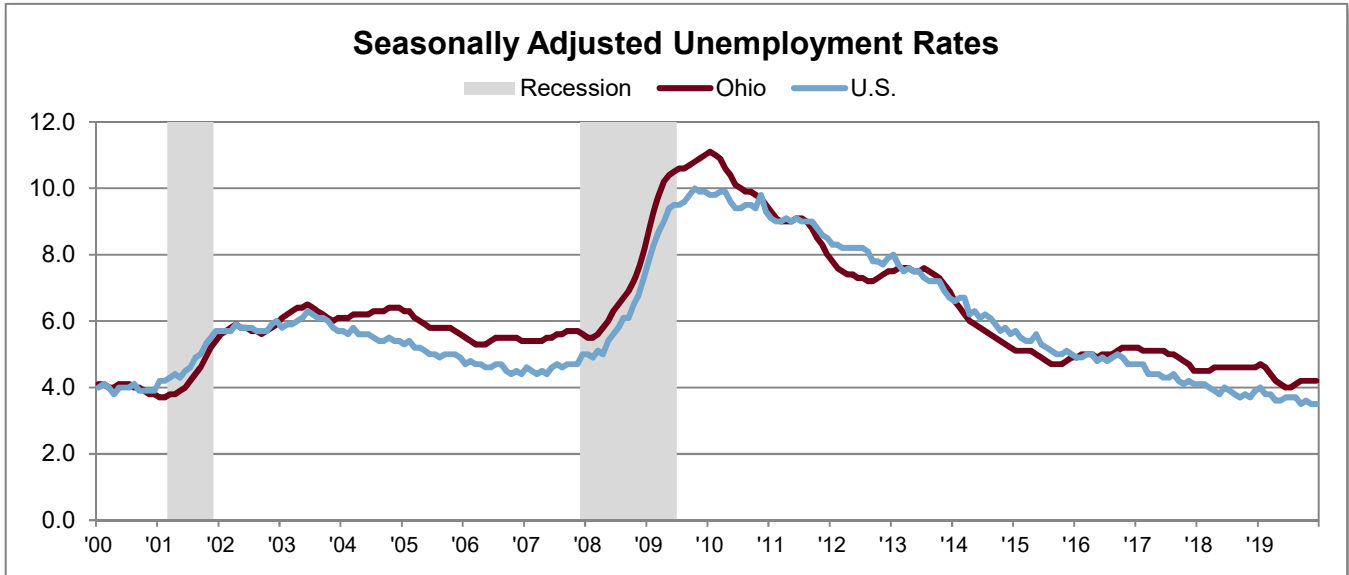
These data are meant to provide a barometer of shale-related economic activity and employment trends. While the vast majority of shale-related employment can be found in these industries, not all business establishments in these industries are involved in shale activity. For those that are, not all of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

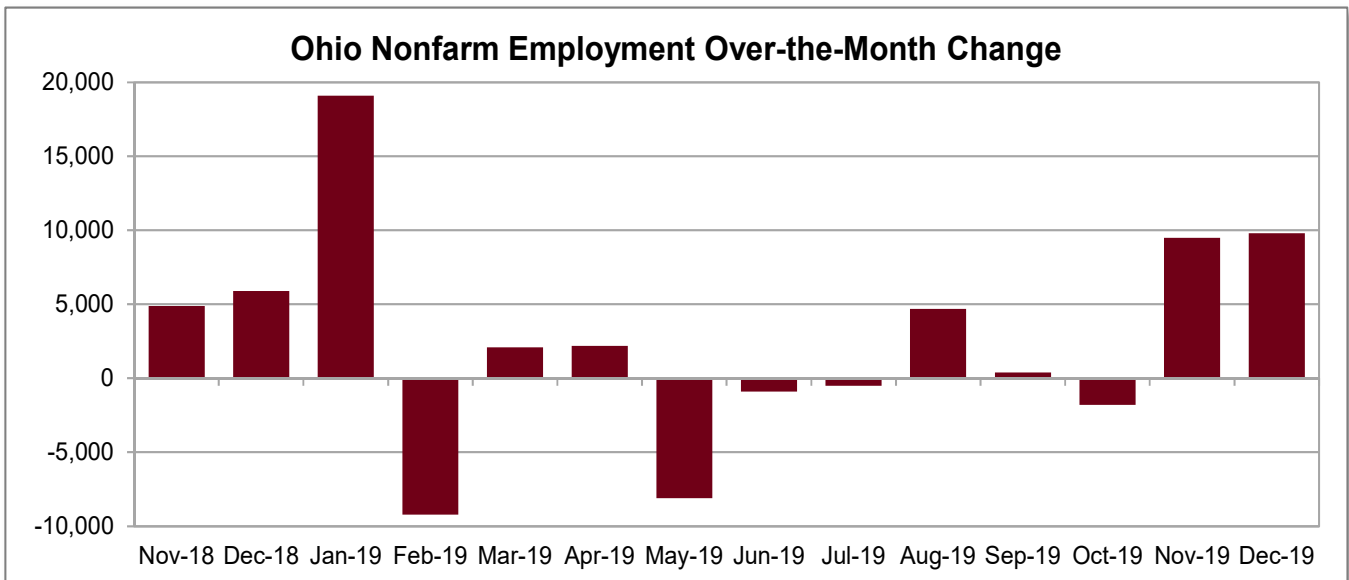
Snapshot of Employment in Ohio

- Ohio's seasonally adjusted unemployment rate for December 2019 was 4.2 percent.
 - The rate was unchanged from November.



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

- Ohio had 5,610,600 seasonally adjusted nonfarm jobs in December 2019.
 - Total nonfarm employment increased by 9,800 over the month.
 - Over the past 12 months, Ohio added 27,300 jobs.



- In December 2019, 12,400 workers were employed in the mining and logging industry.

STATEWIDE SHALE-RELATED INDUSTRIES

- From 2011 Q2 to 2019 Q2, employment in core industries increased by 6,241 (90.8 percent). Over the same period, employment in ancillary industries increased by 24,506 (14.7 percent).
- From 2011 Q2 to 2019 Q2, the number of business establishments in the core industries grew by 187 (31.6 percent), while establishments in ancillary industries increased by 1,149 (8.9 percent).

Number of Business Establishments and Employment in Shale-Related Industries (2011 Q2 - 2019 Q2)

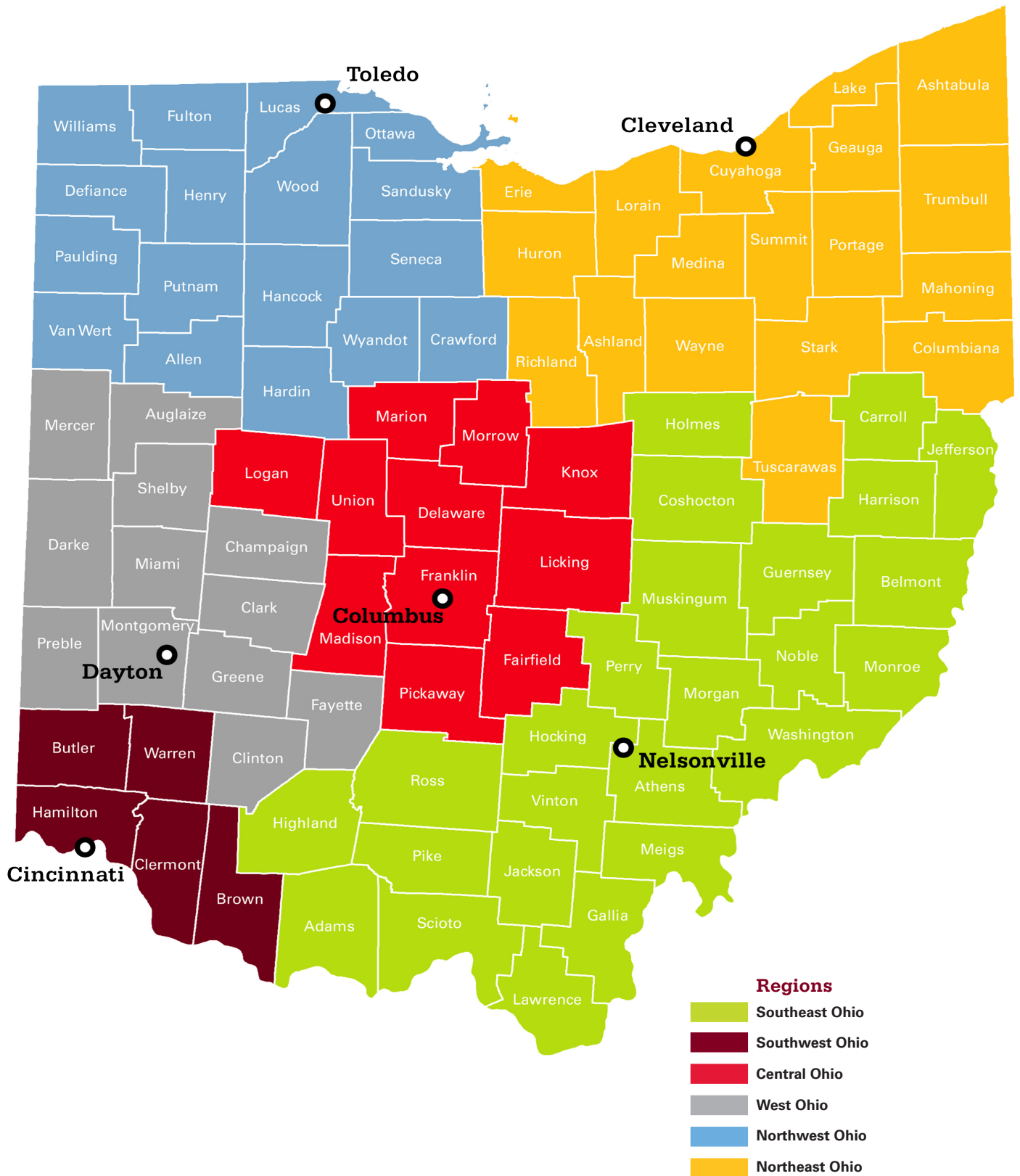
Core Industries		2011 Q2		2019 Q2		Change	
NAICS	Title	Estab.	Empl.	Estab.	Empl.	Estab.	Empl.
2111**	Oil and gas extraction	197	2,887	123	1,157	-74	-1,730
213111	Drilling oil and gas wells	79	525	99	840	20	315
213112	Support activities for oil and gas operations	181	1,292	321	4,818	140	3,526
237120	Oil and gas pipeline construction	98	1,862	189	5,725	91	3,863
486210	Pipeline transportation of natural gas	36	307	46	574	10	267
Core Industry Totals		591	6,873	778	13,114	187	6,241
Ancillary Industries		2011 Q2		2019 Q2		Change	
NAICS	Title	Estab.	Empl.	Estab.	Empl.	Estab.	Empl.
221112	Fossil fuel electric power generation	83	5,292	89	3,047	6	-2,245
221210	Natural gas distribution	142	3,723	160	5,458	18	1,735
221310	Water supply and irrigation systems	248	6,049	259	5,922	11	-127
221320	Sewage treatment facilities	212	3,846	210	3,856	-2	10
237110	Water and sewer system construction	390	5,029	372	6,395	-18	1,366
237310	Highway, street, and bridge construction	724	15,156	745	18,847	21	3,691
238912	Nonresidential site preparation contractors	628	5,117	637	7,470	9	2,353
325110	Petrochemical manufacturing	5	357	4	ND	-1	ND
325120	Industrial gas manufacturing	47	748	42	ND	-5	ND
331110	Iron and steel mills and ferroalloy manufacturing	58	9,982	61	8,162	3	-1,820
331210	Iron, steel pipe and tube from purchase steel	53	3,122	40	3,437	-13	315
333131	Mining machinery and equipment manufacturing	12	453	12	388	0	-65
333132	Oil and gas field machinery and equipment	6	137	13	214	7	77
423810	Construction equipment merchant wholesalers	200	2,575	205	3,056	5	481
423830	Industrial machinery merchant wholesalers	1,693	15,287	2,073	19,275	380	3,988
423840	Industrial supplies merchant wholesalers	503	4,803	561	5,925	58	1,122
484110	General freight trucking, local	1,361	12,206	1,451	12,391	90	185
484220	Other specialized trucking, local	1,008	7,094	1,166	9,474	158	2,380
484230	Other specialized trucking, long-distance	284	4,540	363	6,281	79	1,741
531190	Lessors of other real estate property	291	949	290	1,003	-1	54
532412	Other heavy machinery rental and leasing	167	1,318	223	2,440	56	1,122
541330	Engineering services	2,285	27,611	2,444	30,838	159	3,227
541360	Geophysical surveying and mapping services	51	257	62	248	11	-9
541380	Testing laboratories	359	6,535	431	6,848	72	313
541620	Environmental consulting services	299	1,676	324	2,074	25	398
562910	Remediation services	178	2,394	216	4,445	38	2,051
811310	Commercial machinery repair and maintenance	1,102	7,328	1,105	9,703	3	2,375
924110	Air, water, and waste program administration	165	6,259	153	6,215	-12	-44
924120	Administration of conservation programs	281	6,586	272	6,407	-9	-179
926130	Utility regulation and administration	29	484	30	516	1	32
Ancillary Industry Totals		12,864	166,913	14,013	191,419	1,149	24,506
Core Industries and Ancillary Industries Totals		13,455	173,786	14,791	204,533	1,336	30,747
All Industries Totals		288,288	4,987,972	300,707	5,391,028	12,419	403,056

Source: Quarterly Census of Employment and Wages.

ND - Not Disclosable.

**See page 20 for explanation of 2111.

JOB SOHIO NETWORK REGIONS

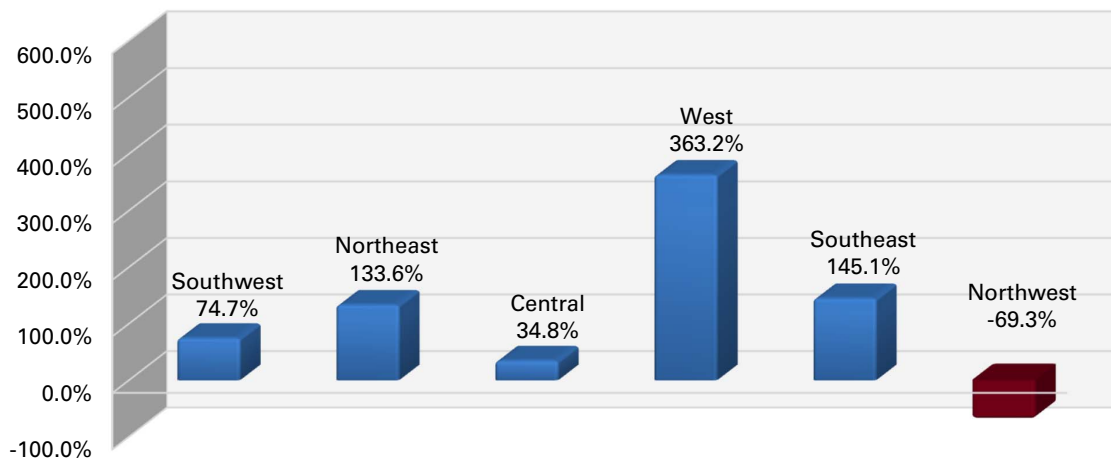


REGIONAL SHALE-RELATED INDUSTRIES

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.

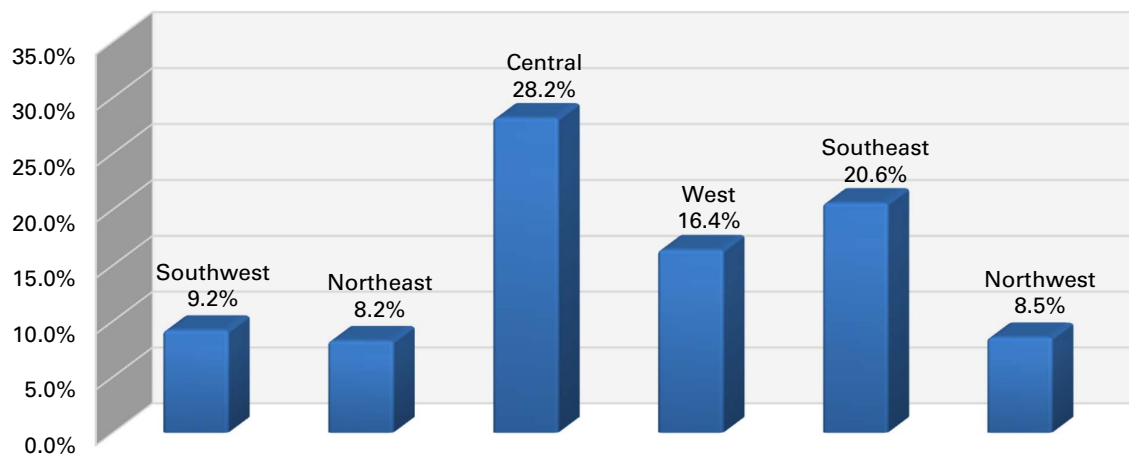
Large percentage increases and decreases in employment may be the result of a change in industry classification following a routine NAICS assignment review. Changes in NAICS assignments are typically done with the publication of the first-quarter data.

**Core Shale-Related Industries
Percent Employment Change (2011 Q2 - 2019 Q2)**



- The largest percent growth in employment for core shale-related industries was in the West region (363.2 percent), followed by the Southeast region (145.1 percent).

**Ancillary Shale-Related Industries
Percent Employment Change (2011 Q2 - 2019 Q2)**



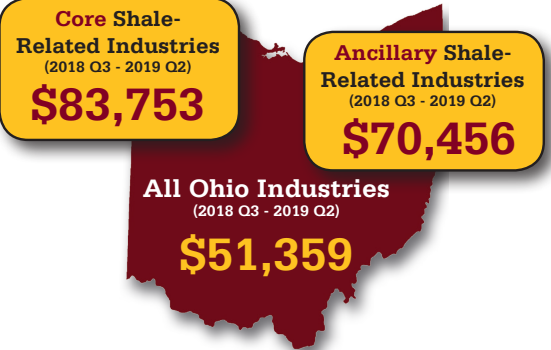
- For ancillary shale-related industries, the largest percent growth in employment was in the Central region (28.2 percent), followed by the Southeast region (20.6 percent).

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

WAGES FOR OHIO SHALE-RELATED CORE AND ANCILLARY INDUSTRIES

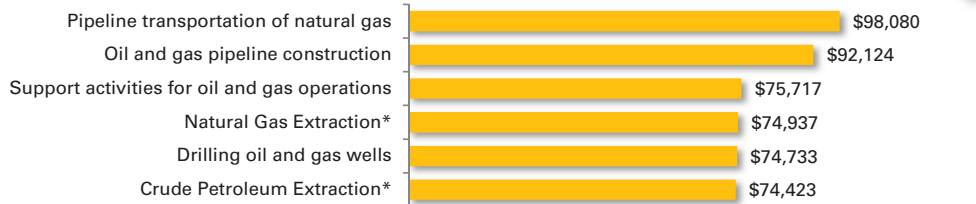
- The four-quarter average wage across all industries for 2018 Q3 through 2019 Q2 was \$51,359.
- The four-quarter average wage in the core industries was \$32,394 greater than the average wage for all industries.
- The four-quarter average wage in the ancillary industries was \$19,097 higher than the 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.

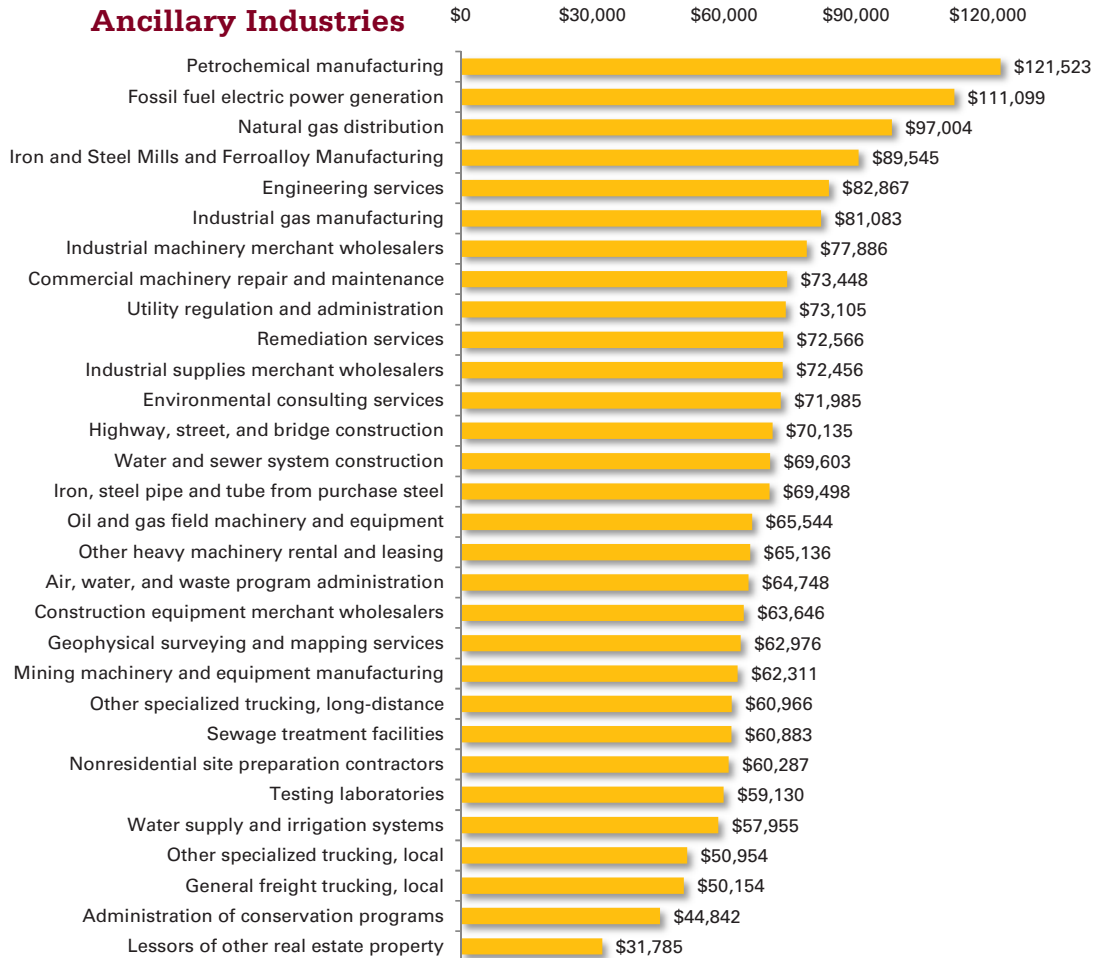


Four-Quarter Average Wage by Industry

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

	2018 Q4	2019 Q4	% Change
Core Industries	156	57	-63.5%
Ancillary Industries	2,673	2,605	-2.5%
Total: ALL Industries	117,743	127,368	8.2%

Regional Online Job Postings

Core and Ancillary Combined	2018 Q4	2019 Q4	% Change
Southwest Ohio	0	0	0.0%
Northeast Ohio	766	759	-0.9%
Central Ohio	665	581	-12.6%
West Ohio	457	489	7.0%
Southeast Ohio	177	139	-21.5%
Northwest Ohio	261	222	-14.9%
Total*	2,829	2,662	-5.9%

Source: Gartner TalentNeuron™. New unique ads only. Data are subject to revision. Not seasonally adjusted.

Statewide Online Job Postings

- Total job postings across all Ohio industries increased in 2019 Q4 compared to 2018 Q4.
- Overall, job postings decreased in core (-63.5 percent) and ancillary (-2.5 percent) shale-related industries.

Regional Online Job Postings

- Job postings increased in the West Ohio (7.0 percent) JobsOhio Network Region in 2019 Q4 compared to 2018 Q4.

* Data are not directly comparable to data in reports published prior to 2019 Q3 due to methodological improvements that have become available over time.

* 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.

WELL ACTIVITY STATUS AS OF JANUARY 11, 2020

HORIZONTAL OIL AND GAS WELLS IN THE UTICA/POINT PLEASANT AND MARCELLUS FORMATIONS OHIO DEPARTMENT OF NATURAL RESOURCES 2020

ODNR OFFICE OF INFORMATION TECHNOLOGY
January 2020

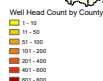
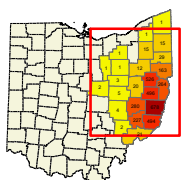
Horizontal Wells Activity Status at end of Saturday 01/11/2020:

Wells Permitted To Date:
Utica: 3154
Marcellus: 77

Wells Drilled To Date:
Utica: 2711
Marcellus: 51

Wells Producing To Date:
Utica: 2423
Marcellus: 35

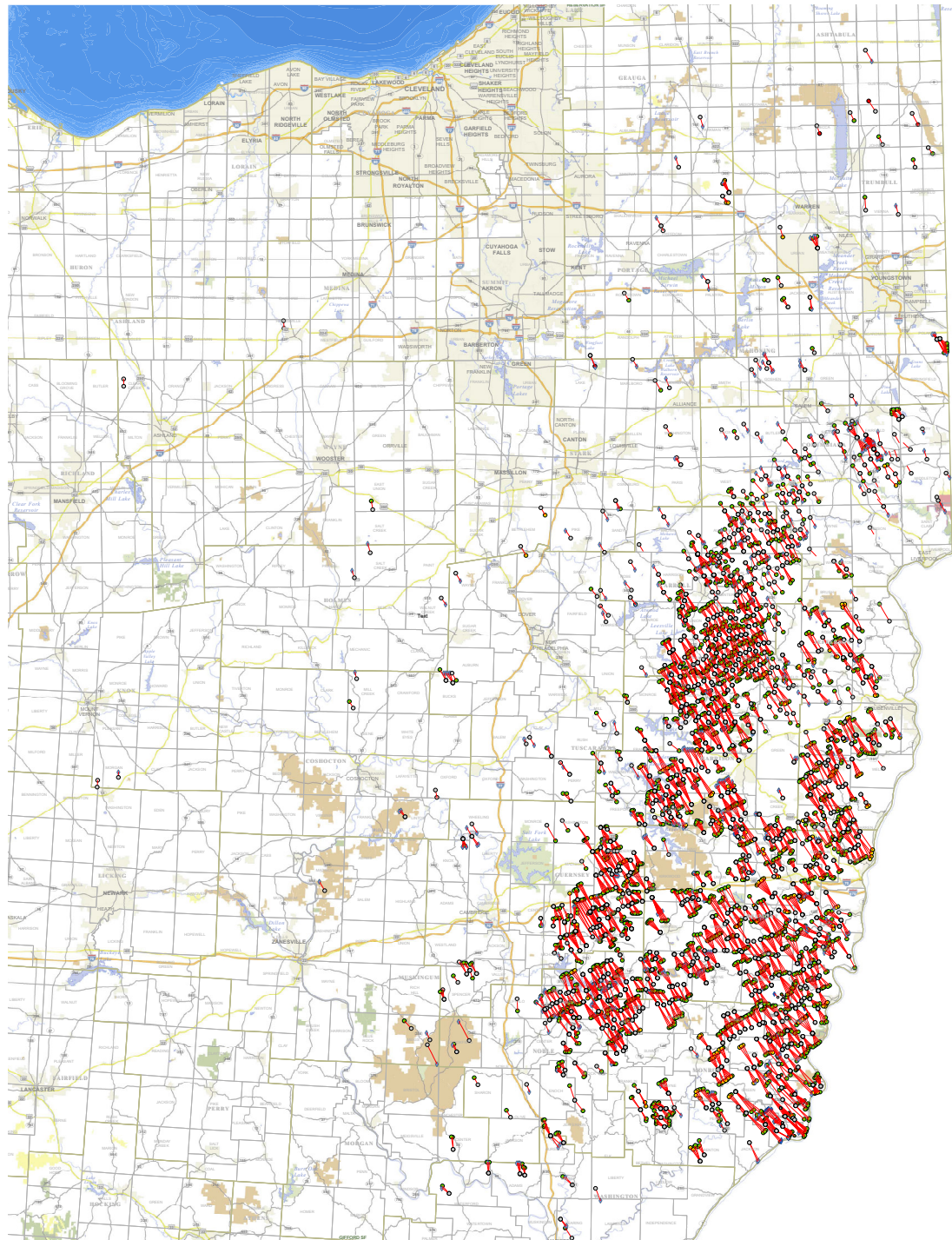
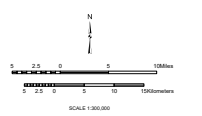
Utica/Point Pleasant and Marcellus Horizontal Well Head Counts by County



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 Fracture Treatment
 - 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-BUB1₋ 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 2018 base employment count within these industries was above 100.

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	\$82,760	Bachelor's degree
47-2151	Pipelayers	\$47,310	No formal educational credential, Short-term OJT
47-3015	Helpers--pipelayers, plumbers, pipefitters, and steamfitters	\$30,480	HS/GED, Short-term OJT
47-5011	Derrick operators, oil and gas	\$47,630 ²	No formal educational credential, Short-term OJT
47-5012	Rotary drill operators, oil and gas	\$45,320	No formal educational credential, Moderate-term OJT
47-5013	Service unit operators, oil, gas, and mining	\$49,340	No formal educational credential, Moderate-term OJT
47-5021	Earth drillers, except oil and gas	\$43,090	HS/GED, Moderate-term OJT
47-5071	Roustabouts, oil and gas	\$35,630	No formal educational credential, Moderate-term OJT
47-5081	Helpers--extraction workers	\$36,820	HS/GED, Moderate-term OJT
49-3042	Mobile heavy equipment mechanics, except engines	\$54,640	HS/GED, Long-term OJT
49-9098	Helpers--installation, maintenance, and repair workers	\$28,620	HS/GED, Short-term OJT
51-8093	Petroleum pump system operators, refinery operators, and gaugers	\$66,760	HS/GED, Moderate-term OJT
53-7021	Crane and tower operators	\$44,030	HS/GED, 1-5 Years Experience, Moderate-term OJT
53-7032	Excavating and loading machine and dragline operators	\$42,580	HS/GED, 1-5 Years Experience, Moderate-term OJT
53-7073	Wellhead pumpers	\$39,040	HS/GED, 1-5 Years Experience, Moderate-term OJT

¹Annual wages have been calculated by multiplying hourly median wage by 2,080 hours.

²National wage estimate.

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

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 December 2019. 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 2018 base employment count within these industries was above 100.

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)
11-1021	General and operations managers	\$96,110	Bachelor's degree, 5+ Years Experience
13-1051	Cost estimators	\$60,640	Bachelor's degree, Moderate-term OJT
11-9021	Construction managers	\$91,130	Bachelor's degree, Moderate-term OJT
13-2011	Accountants and auditors	\$64,630	Bachelor's degree
43-1011	First-line supervisors of office and administrative support workers	\$53,930	HS/GED, 1-5 Years Experience
43-3031	Bookkeeping, accounting, and auditing clerks	\$38,470	Some college -no degree, Moderate-term OJT
43-6011	Executive secretaries and executive administrative assistants	\$56,140	HS/GED, 1-5 Years Experience
43-6014	Secretaries and administrative assistants, except legal, medical, and executive	\$35,550	HS/GED, Short-term OJT
43-9061	Office clerks, general	\$32,730	HS/GED, Short-term OJT
47-1011	First-line supervisors of construction trades and extraction workers	\$64,680	HS/GED, 5+ Years Experience
47-2031	Carpenters	\$46,240	HS/GED, Apprenticeship
47-2051	Cement masons and concrete finishers	\$46,280	No formal educational credential, Moderate-term OJT
47-2061	Construction laborers	\$39,970	No formal educational credential, Short-term OJT
47-2073	Operating engineers and other construction equipment operators	\$53,060	HS/GED, Moderate-term OJT
47-2111	Electricians	\$52,170	HS/GED, Apprenticeship
47-2152	Plumbers, pipefitters, and steamfitters	\$55,330	HS/GED, Apprenticeship
47-2221	Structural iron and steel workers	\$60,360	HS/GED, Apprenticeship
49-1011	First-line supervisors of mechanics, installers, and repairers	\$63,180	HS/GED, 1-5 Years Experience
49-9041	Industrial machinery mechanics	\$51,650	HS/GED, Long-term OJT
49-9071	Maintenance and repair workers, general	\$39,830	HS/GED, Moderate-term OJT
51-1011	First-line supervisors of production and operating workers	\$59,700	HS/GED, 1-5 Years Experience
51-4121	Welders, cutters, solderers, and brazers	\$39,390	HS/GED, Moderate-term OJT
51-9198	Helpers--production workers	\$29,970	HS/GED, Short-term OJT
53-3032	Heavy and tractor-trailer truck drivers	\$42,970	Post-sec non-degree, Short-term OJT
53-7062	Laborers and freight, stock, and material movers, hand	\$28,440	No formal educational credential, 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 2018.

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 2018 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			2018 Q4		
	Stable Employment	All Hires	Separations	Stable Employment	All Hires	Separations
All industry groups	4,418,091	772,244	764,081	4,724,418	943,424	956,420
2111 Oil and Gas Extraction	2,841	174	170	1,028	122	128
2131 Support Activities for Mining	2,566	730	820	5,370	1,517	1,585
2371 Utility System Construction	9,307	2,156	3,391	14,249	4,279	6,736
4862 Pipeline Transportation of Natural Gas	332	14	3	565	20	21

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 2018 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.



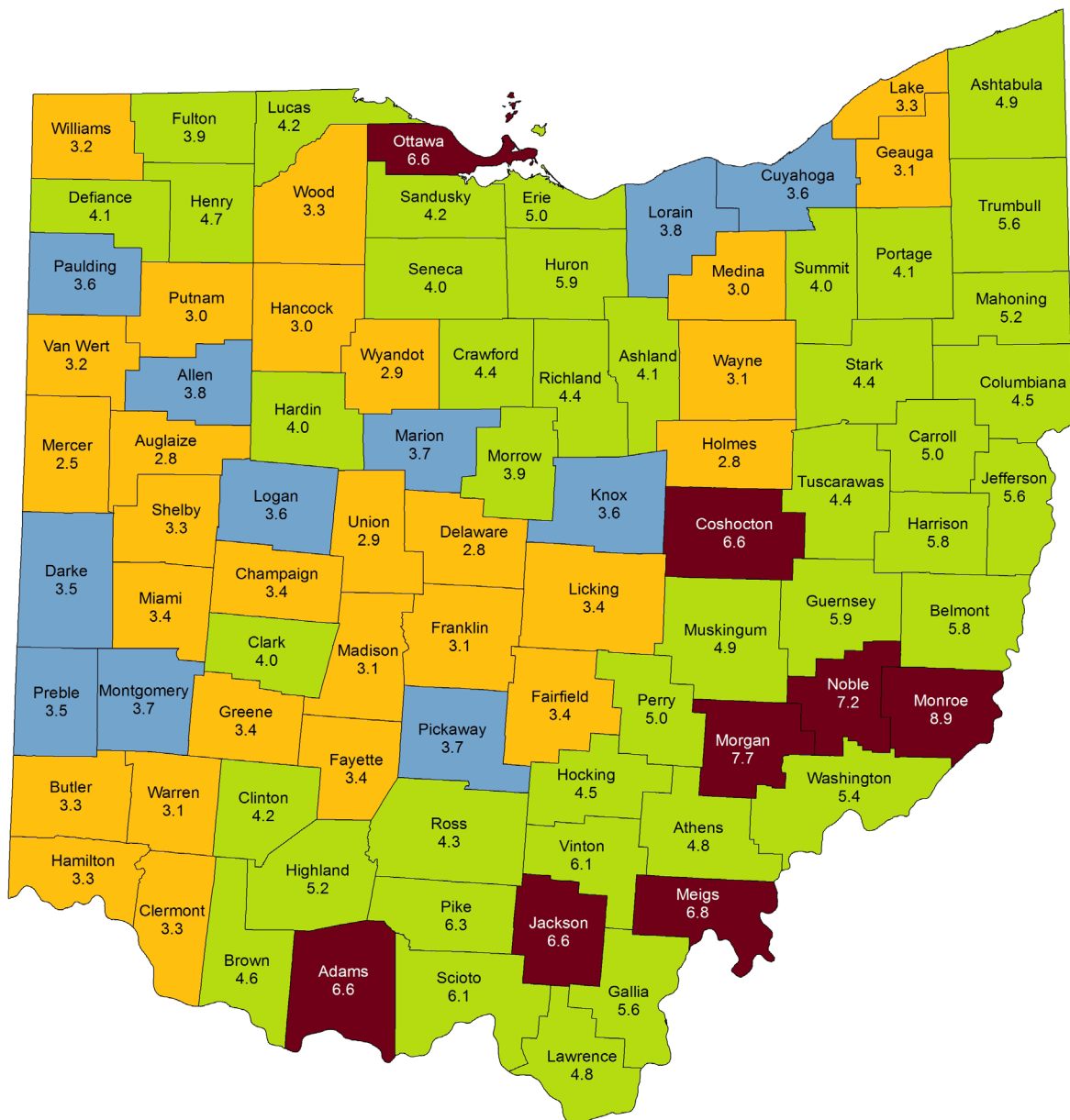
JOBSOHIO NETWORK SHALE-RELATED EMPLOYMENT

Central Ohio	2011 Q4			2018 Q4		
	Stable Employment	All Hires	Separations	Stable Employment	All Hires	Separations
All industry groups	875,605	163,556	156,432	988,358	208,655	210,353
2111 Oil and Gas Extraction	178	6	10	64	4	8
2131 Support Activities for Mining	205	51	138	182	16	21
2371 Utility System Construction	1,931	312	466	3,673	957	1,312
4862 Pipeline Transportation of Natural Gas	123	6	***	155	4	4
Northeast Ohio						
All industry groups	1,680,166	279,007	283,878	1,738,205	338,474	343,351
2111 Oil and Gas Extraction	640	62	64	543	43	59
2131 Support Activities for Mining	629	106	155	2,063	406	382
2371 Utility System Construction	3,249	884	1,451	4,006	1,164	2,041
4862 Pipeline Transportation of Natural Gas	94	***	***	200	7	9
Northwest Ohio						
All industry groups	457,435	91,776	83,410	484,809	96,061	98,174
2111 Oil and Gas Extraction	1,594	43	46	***	***	***
2131 Support Activities for Mining	12	16	14	65	4	6
2371 Utility System Construction	1,261	368	781	1,990	907	923
4862 Pipeline Transportation of Natural Gas	28	***	0	27	***	0
Southeast Ohio						
All industry groups	267,547	43,146	45,043	274,571	55,592	57,344
2111 Oil and Gas Extraction	399	58	46	373	63	49
2131 Support Activities for Mining	1,699	551	505	2,973	1,076	1,134
2371 Utility System Construction	687	243	223	1,290	550	1,729
4862 Pipeline Transportation of Natural Gas	74	***	0	89	4	***
Southwest Ohio						
All industry groups	673,758	121,267	123,855	752,287	151,477	154,217
2111 Oil and Gas Extraction	***	***	***	***	***	***
2131 Support Activities for Mining	5	0	0	5	0	0
2371 Utility System Construction	1,497	249	331	2,344	541	598
4862 Pipeline Transportation of Natural Gas	***	***	0	89	3	5
West Ohio						
All industry groups	463,580	73,492	71,464	486,187	93,164	92,982
2111 Oil and Gas Extraction	***	0	0	***	***	***
2131 Support Activities for Mining	16	7	8	82	15	42
2371 Utility System Construction	683	101	139	945	160	133
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 SEPTEMBER 2019 (Not Seasonally Adjusted)

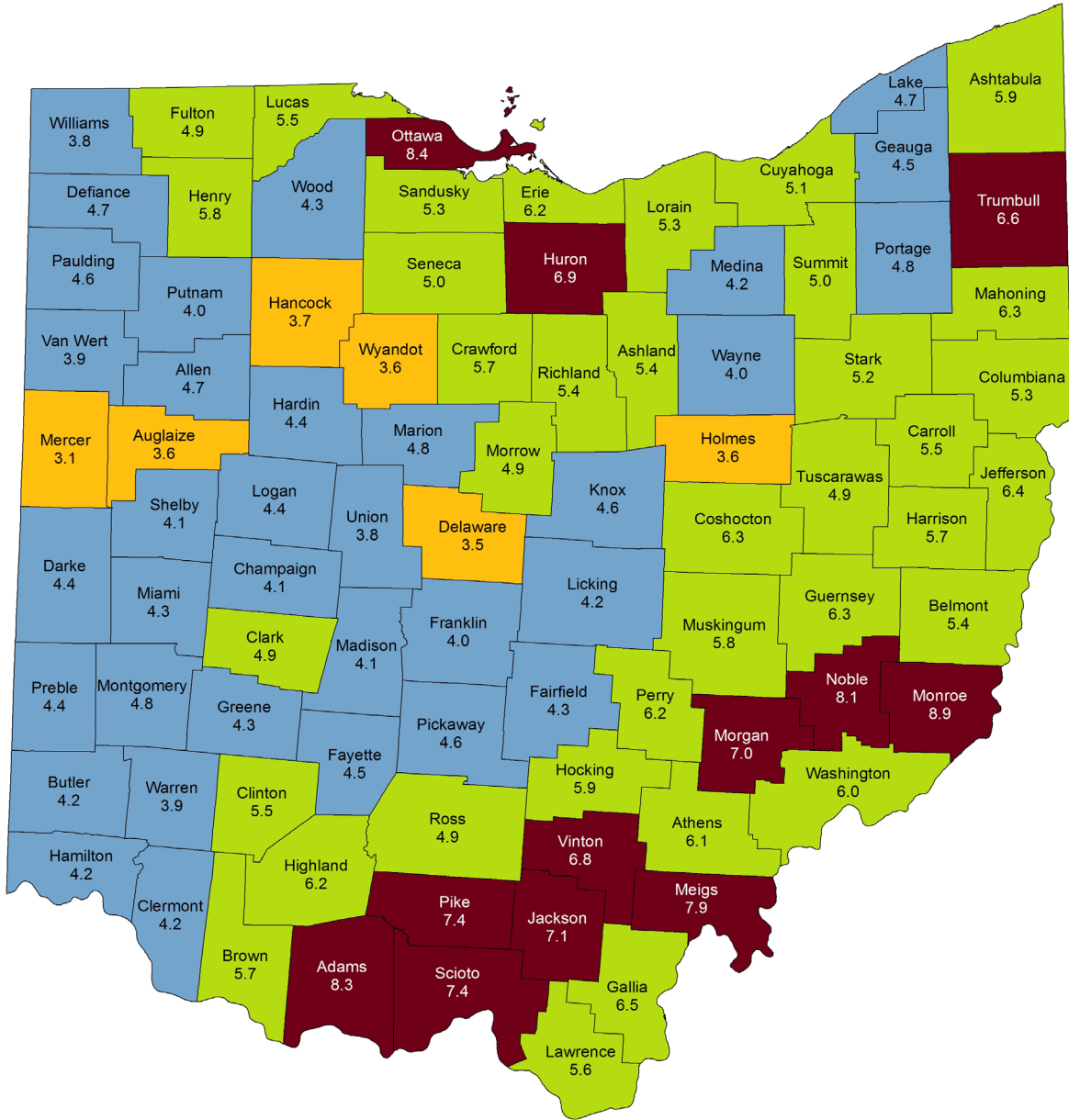


Unemployment Rates

	Not Seasonally Adjusted	Seasonally Adjusted	Color Key
United States	3.4%	3.5%	3.4% or Lower (Orange)
Ohio	3.8%	4.2%	3.5% to 3.8% (Blue)
			3.9% to 6.5% (Light Green)
			6.6% or Higher (Dark Red)

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 2018 (Not Seasonally Adjusted)

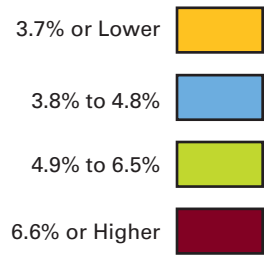


Unemployment Rates

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 based on 2018 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 142,000 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: Gartner TalentNeuron™

Gartner TalentNeuron™ provides real-time insight into the employment marketplace through its 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.

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

Kimberly Hall, Director
Ohio Department of Job and Family Services

January 2020

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