

Ohio

**Department of
Job and Family Services**

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

OHIO SHALE

QUARTERLY ECONOMIC TRENDS FOR OHIO OIL AND GAS INDUSTRIES



JANUARY 2016

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A Message from Director Dungey

Oil and gas drilling has only recently begun to accelerate in Ohio, and already many families and communities have begun to see a positive impact. As you'll see in the pages that follow, core shale-related employment, which includes such things as pipeline construction and well drilling, increased 96 percent from the second quarter of 2011 to the second quarter of 2015. 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 increasing shale activity, as well.

Ohio is fortunate to have this natural resource that can provide good jobs for families and reinvigorate many of our communities, especially those in the eastern part of the state. The average wages of shale-related jobs are excellent; \$75,071 in core industries and \$63,147 in ancillary industries. In both cases, this is higher than the average wage in all Ohio industries: \$46,393.

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 www.OhioMeansJobs.com. The Ohio Board of Regents also provides an overview of shale-related employment opportunities and information about education and training at www.OhioEnergyPathways.org.

Individuals can sign up for on-the-job training opportunities at any of the state's local OhioMeansJobs Centers, which provide free 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 www.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 significant difference in so many families' lives.

A handwritten signature in black ink that reads "Cynthia C. Dungey".

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



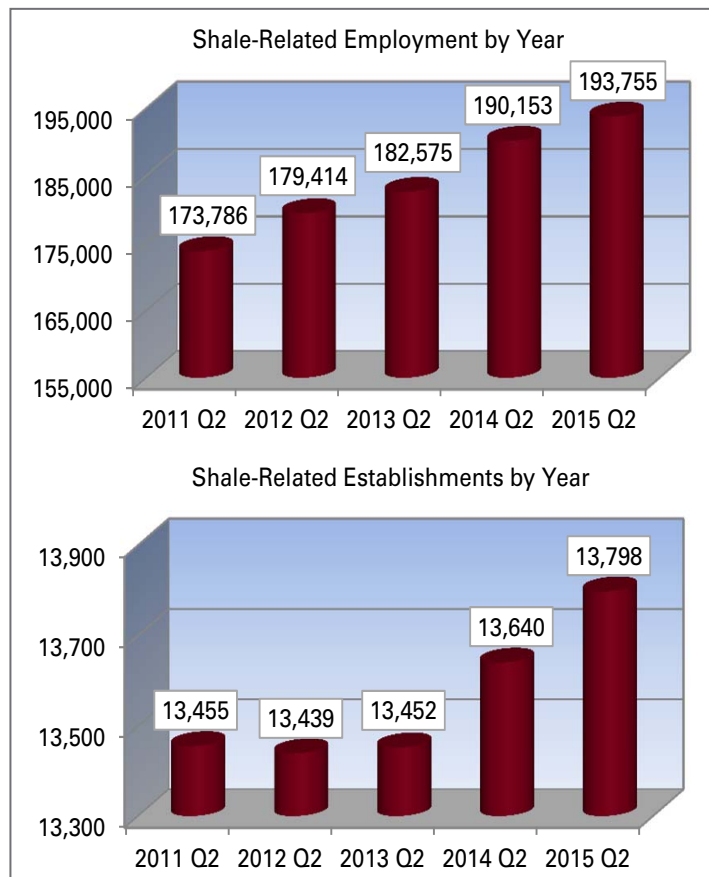
EXECUTIVE SUMMARY

Employment (2011 Q2 to 2015 Q2) See page 6.

- Core shale-related industry employment (such as pipeline construction and well drilling) was up 6,600 (96.0 percent).
- Ancillary shale-related industry employment (such as freight trucking and environmental consulting) increased 13,369 (8.0 percent).
- All industry employment was up 294,711 (5.9 percent).

Business Establishments (2011 Q2 to 2015 Q2) See page 6.

- Core shale-related business establishments increased by 246 (41.6 percent).
- Ancillary shale-related establishments increased by 97 (0.8 percent).
- Over the same time period, Ohio experienced an increase of 1,868 business establishments in all industries.
- Shale-related business establishments totaled 13,798 during the second quarter of 2015.



Wages (2014 Q3 through 2015 Q2) See page 9.

- The four-quarter average wage across all industries was \$46,393.
- The four-quarter average wage in core shale-related industries was \$75,071, which was \$28,678 greater than the average for all industries.
- The four-quarter average wage in ancillary shale-related industries was \$63,147, which was \$16,754 higher than the average for all industries.

Online Job Postings (2015 Q4) See page 10.

- Ohio had 5,432 online job postings in core and ancillary shale-related industries.

Stable Employment, All Hires and Separations (2011 Q4 to 2014 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 2015. 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 2015 QCEW data are compared to second quarter 2011 QCEW data.

Data Limitations

The North American Industry Classification System (NAICS) 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." 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.

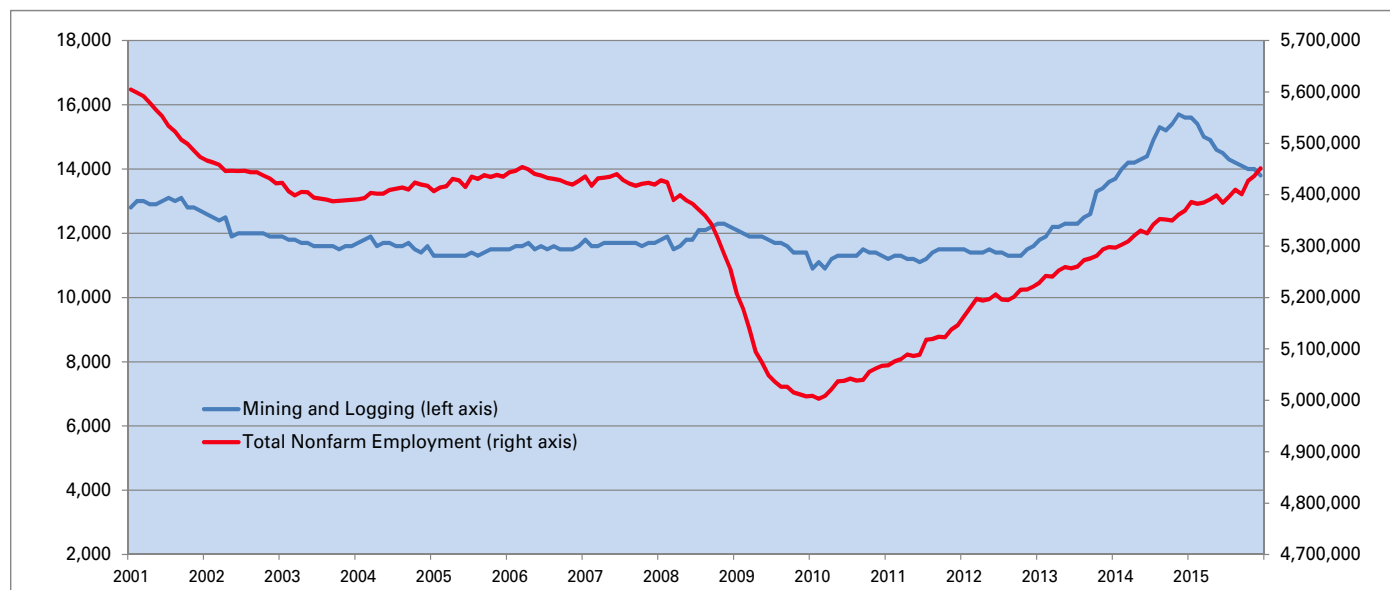
As shale-related activity develops further in Ohio, additional industries may be added to the ancillary group, based on such factors as significant employment gains in an industry in a geographic region or the identification of a group of companies in the same industry involved in shale-related activity.

Snapshot of Ohio's Economy

- **Ohio's seasonally adjusted unemployment rate for December 2015 was 4.7 percent.**
 - The rate was 0.4 percentage points lower than the December 2014 rate.
- **Ohio had 5,451,500 seasonally adjusted nonfarm jobs in December 2015.**
 - Compared to December 2014, employment increased by 82,700 jobs.
- **Ohio's hiring activity increased from the fourth quarter of 2011 to the fourth quarter of 2014.**
 - Across all industries, an estimated 870,191 workers started new jobs (new hires and rehires) during the fourth quarter of 2014, an increase of 15,102 hires from the fourth quarter of 2011.
- **Employer demand increased in Ohio.**
 - Ohio had 277,416 job ads posted online in the fourth quarter of 2015, an increase of 24,424 from the fourth quarter of 2014.
- **Ohio's supply/demand rate, which is the ratio of the number of unemployed people to advertised job vacancies, is lower than the U.S. rate (The Conference Board).**
 - The seasonally adjusted supply/demand rate for Ohio was 1.08 in November, which was below the U.S. rate of 1.40. A lower rate is better.

Mining and Logging Jobs vs. Total Jobs in Ohio

**Total Mining and Logging Employment from January 2001
(Seasonally Adjusted)**



Source: Current Employment Statistics (CES) survey. Estimates represent nonagricultural wage and salary jobs by place of work. Data for the latest month are preliminary, although other months are subject to revision.

- **In December 2015, 13,800 workers were employed in the mining and logging industries.**
 - From December 2011 to December 2015, employment in the mining and logging industries increased by 2,300 jobs.

STATEWIDE SHALE-RELATED INDUSTRIES

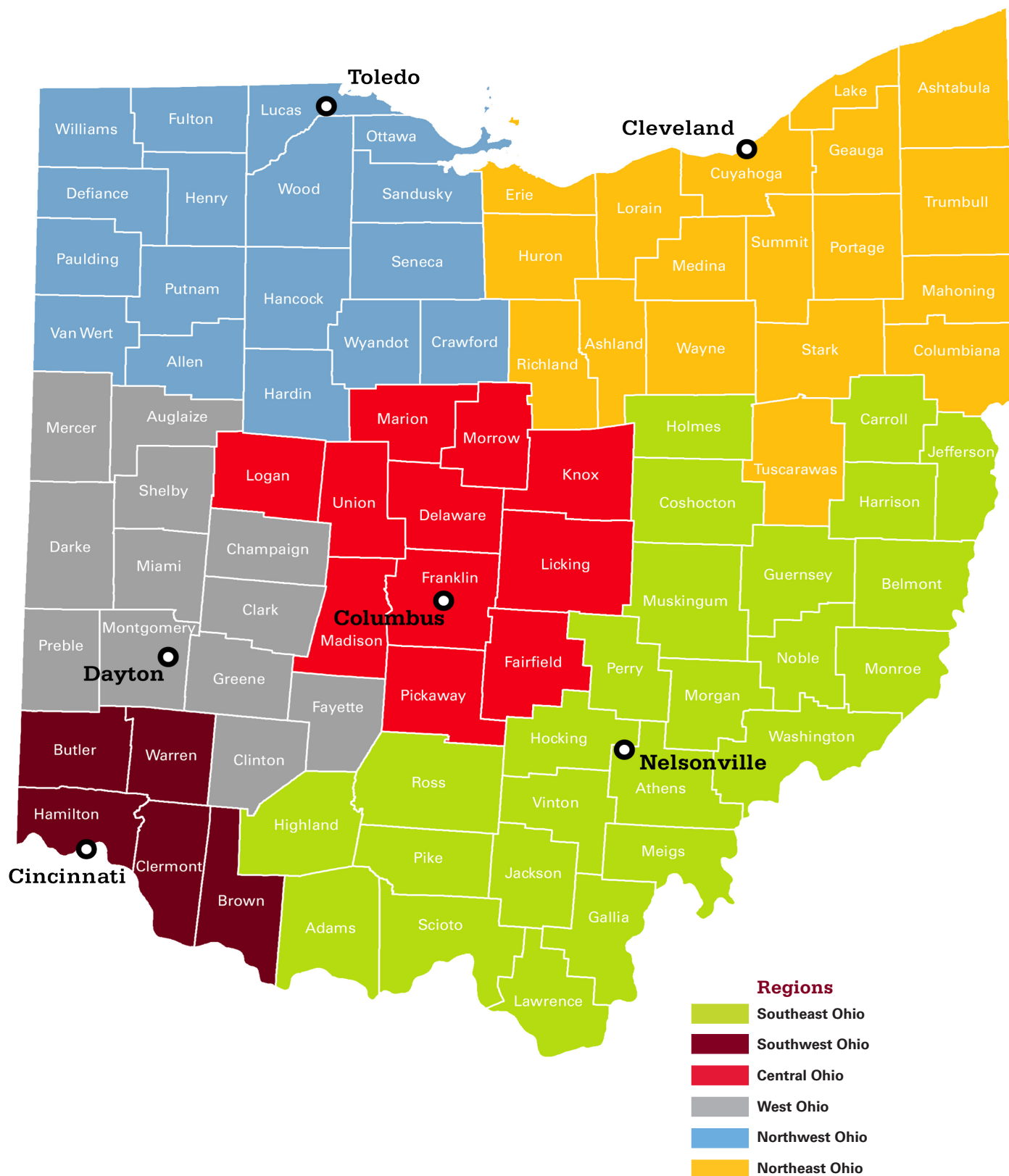
- From 2011 Q2 to 2015 Q2, employment in core industries increased by 6,600 (96.0 percent). Over the same period, employment in ancillary industries increased by 13,369 (8.0 percent).
- From 2011 Q2 to 2015 Q2, the number of business establishments in the core industries grew by 246 (41.6 percent), while establishments in ancillary industries increased by 97 (0.8 percent).

Number of Business Establishments and Employment in Shale-Related Industries (2011 Q2 - 2015 Q2)

Core Industries		2011 Q2		2015 Q2		Change	
NAICS	Title	Estab.	Empl.	Estab.	Empl.	Estab.	Empl.
211111	Crude petroleum and natural gas extraction	194	2,863	191	1,601	-3	-1,262
211112	Natural gas liquid extraction	3	24	20	465	17	441
213111	Drilling oil and gas wells	79	525	108	1,436	29	911
213112	Support activities for oil and gas operations	181	1,292	309	4,252	128	2,960
237120	Oil and gas pipeline construction	98	1,862	166	5,321	68	3,459
486210	Pipeline transportation of natural gas	36	307	43	398	7	91
Core Industry Totals		591	6,873	837	13,473	246	6,600
Ancillary Industries		2011 Q2		2015 Q2		Change	
NAICS	Title	Estab.	Empl.	Estab.	Empl.	Estab.	Empl.
221112	Fossil fuel electric power generation	83	5,292	72	4,198	-11	-1,094
221210	Natural gas distribution	142	3,723	149	5,263	7	1,540
221310	Water supply and irrigation systems	248	6,049	267	5,912	19	-137
221320	Sewage treatment facilities	212	3,846	211	3,815	-1	-31
237110	Water and sewer system construction	390	5,029	364	5,369	-26	340
237310	Highway, street, and bridge construction	724	15,156	723	16,764	-1	1,608
238912	Nonresidential site preparation contractors	628	5,117	626	6,231	-2	1,114
325110	Petrochemical manufacturing	5	357	5	326	0	-31
325120	Industrial gas manufacturing	47	748	42	717	-5	-31
331110	Iron and steel mills and ferroalloy manufacturing	58	9,982	59	8,618	1	-1,364
331210	Iron, steel pipe and tube from purchase steel	53	3,122	38	2,764	-15	-358
333131	Mining machinery and equipment manufacturing	12	453	12	438	0	-15
333132	Oil and gas field machinery and equipment	6	137	10	252	4	115
423810	Construction equipment merchant wholesalers	200	2,575	201	3,558	1	983
423830	Industrial machinery merchant wholesalers	1,693	15,287	1,594	17,353	-99	2,066
423840	Industrial supplies merchant wholesalers	503	4,803	490	5,651	-13	848
484110	General freight trucking, local	1,361	12,206	1,387	12,803	26	597
484220	Other specialized trucking, local	1,008	7,094	1,050	8,314	42	1,220
484230	Other specialized trucking, long-distance	284	4,540	344	6,052	60	1,512
531190	Lessors of other real estate property	291	949	278	973	-13	24
532412	Other heavy machinery rental and leasing	167	1,318	192	2,353	25	1,035
541330	Engineering services	2,285	27,611	2,387	29,215	102	1,604
541360	Geophysical surveying and mapping services	51	257	59	406	8	149
541380	Testing laboratories	359	6,535	379	6,296	20	-239
541620	Environmental consulting services	299	1,676	317	1,919	18	243
562910	Remediation services	178	2,394	203	3,667	25	1,273
811310	Commercial machinery repair and maintenance	1,102	7,328	1,042	8,117	-60	789
924110	Air, water, and waste program administration	165	6,259	159	6,261	-6	2
924120	Administration of conservation programs	281	6,586	269	6,237	-12	-349
926130	Utility regulation and administration	29	484	32	440	3	-44
Ancillary Industry Totals		12,864	166,913	12,961	180,282	97	13,369
Core Industries and Ancillary Industries Totals		13,455	173,786	13,798	193,755	343	19,969
All Industry Totals		288,288	4,987,972	290,156	5,282,683	1,868	294,711

Source: Quarterly Census of Employment and Wages.

JOB SOHIO NETWORK REGIONS

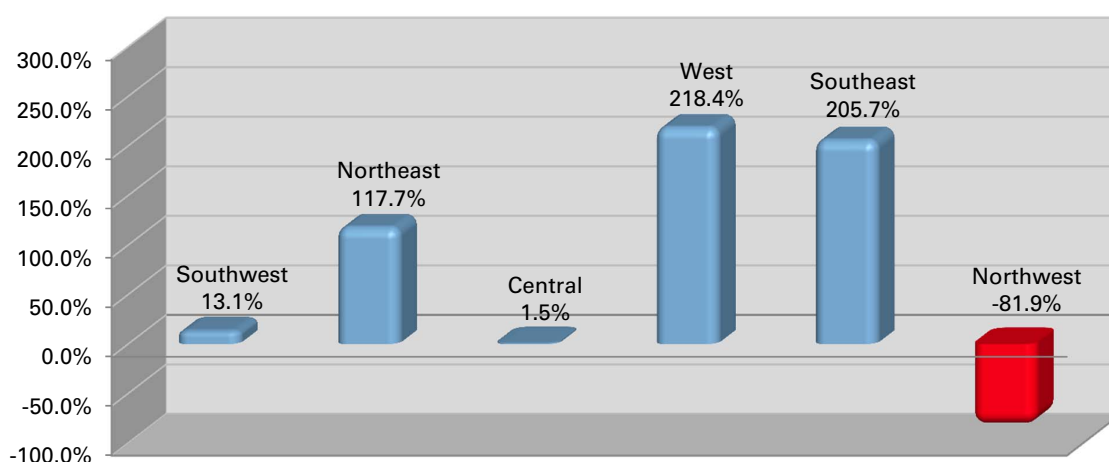


REGIONAL SHALE-RELATED INDUSTRIES

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.

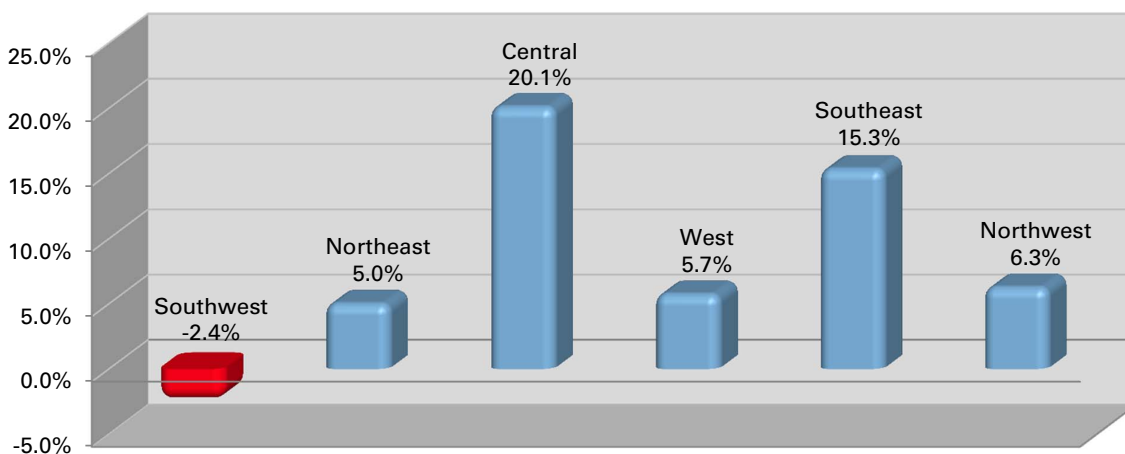
Large percentage increases and decreases in employment may be the result of a change in industry classification following a routine NAICS assignment review. Changes in NAICS assignments are typically done with the publication of the first-quarter data.

Core Shale-Related Industries Percent Employment Change (2011 Q2 - 2015 Q2)



- The largest percent growth in employment for the core shale-related industries was in the West region (218.4 percent), followed by the Southeast region (205.7 percent).

Ancillary Shale-Related Industries Percent Employment Change (2011 Q2 - 2015 Q2)



- For the ancillary shale-related industries, the largest percent growth in employment was in the Central region (20.1 percent), followed by the Southeast region (15.3 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 2014 Q3 through 2015 Q2 was \$46,393.
- The four-quarter average wage in the core industries was \$28,678 greater than the average wage for all industries.
- The four-quarter average wage in the ancillary industries was \$16,754 higher than the average wage for all industries.

**Core Shale-
Related Industries
(2014 Q3 - 2015 Q2)**

\$75,071

**Ancillary Shale-
Related Industries
(2014 Q3 - 2015 Q2)**

\$63,147

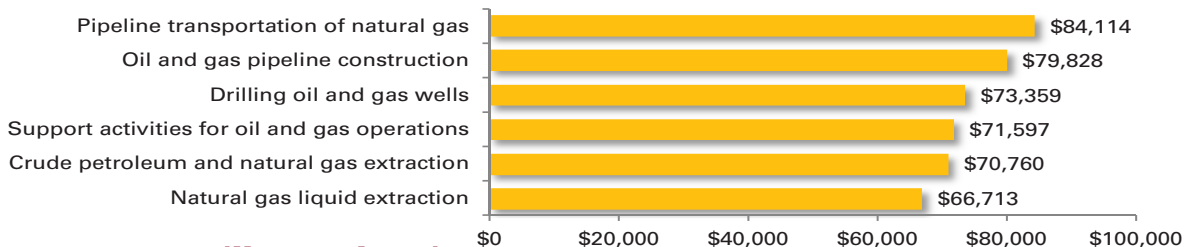
**All Ohio Industries
(2014 Q3 - 2015 Q2)**

\$46,393

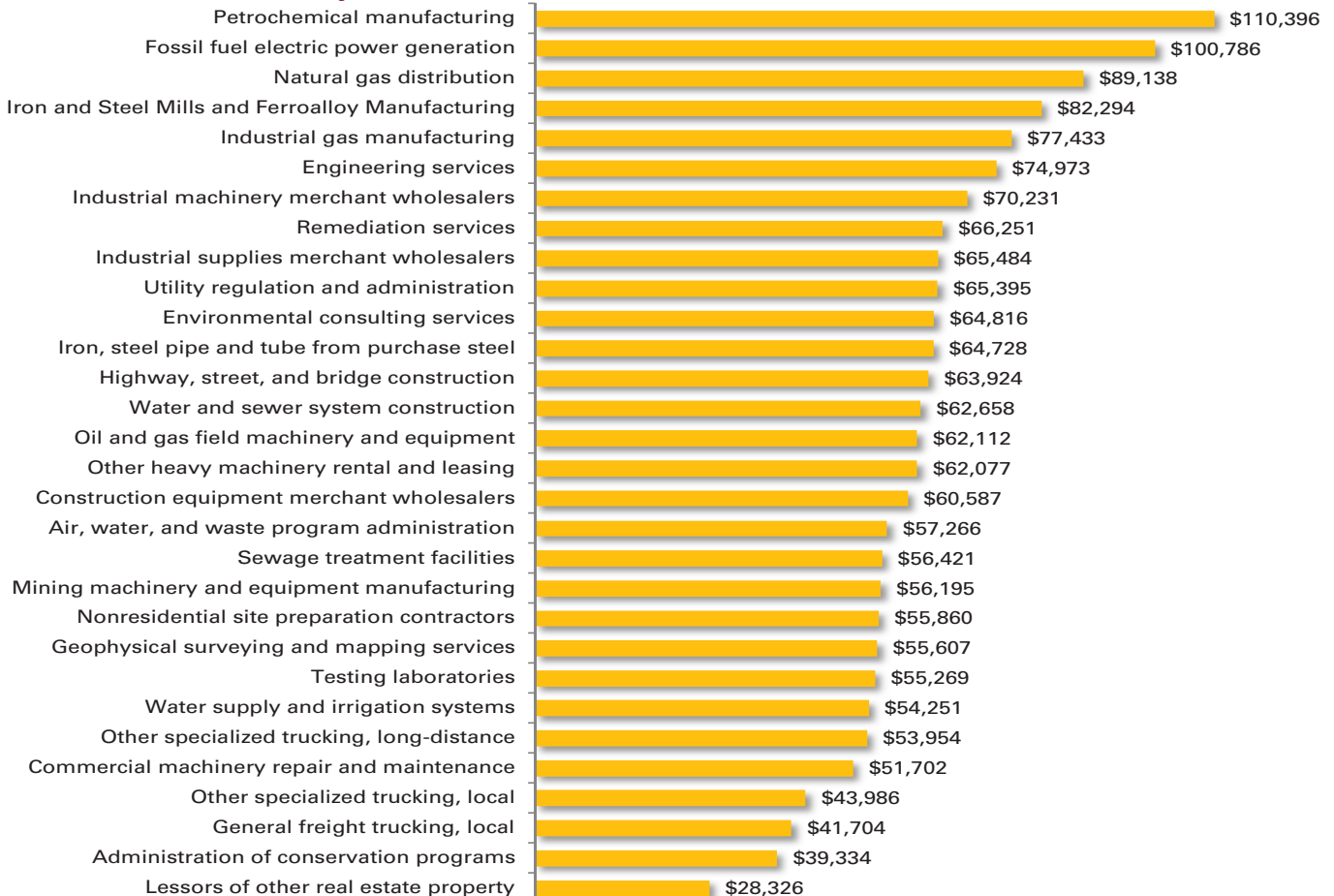
Large changes in average wages may be the result of a change in industry classification following a routine NAICS assignment review.

Four-Quarter Average Wage by Industry

Core Industries



Ancillary Industries



Source: Quarterly Census of Employment and Wages.

OHIO SHALE-RELATED ONLINE JOB POSTINGS

Statewide Online Job Postings

	2014 Q4	2015 Q4	% Change
Core Industries	89	177	98.9%
Ancillary Industries	2,961	5,255	77.5%
Total: ALL Industries	252,992	277,416	9.7%

Regional Online Job Postings

Core and Ancillary Combined	2014 Q4	2015 Q4	% Change
Southwest Ohio	509	966	89.8%
Northeast Ohio	1,038	1,741	67.7%
Central Ohio	594	972	63.6%
West Ohio	395	640	62.0%
Southeast Ohio	176	445	152.8%
Northwest Ohio	228	623	173.2%
Total*	3,050	5,432	78.1%

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

Data are not comparable to previous *Ohio Shale Quarterly Economic Trends for Ohio Oil and Gas Industries* reports due to HWOL 2015 methodological revisions.

**The total includes job ads that may have listed the entire state as the 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

- Job postings across all Ohio industries were 9.7 percent higher in the fourth quarter of 2015 compared to the fourth quarter of 2014.
- Overall, job postings increased in core (98.9 percent) and ancillary (77.5 percent) shale-related industries.

Regional Online Job Postings

- Job postings increased in the Southwest Ohio (89.8 percent), Northeast Ohio (67.7 percent), Central Ohio (63.6 percent), West Ohio (62.0 percent), Southeast Ohio (152.8 percent), and Northwest Ohio (173.2 percent) regions in fourth quarter 2015 compared to fourth quarter 2014.

WELL ACTIVITY STATUS AS OF JANUARY 16, 2016

HORIZONTAL OIL AND GAS WELLS IN THE UTICA/POINT PLEASANT AND MARCELLUS FORMATIONS OHIO DEPARTMENT OF NATURAL RESOURCES 2016

ODNR OFFICE OF INFORMATION TECHNOLOGY
January 2016

Horizontal Wells Activity Status at end of Saturday 01/16/2016:

Wells Permitted To Date:

Utica: 2117
Marcellus: 44
(1 Utica-Permitted well is not mapped
due to bad locational coordinates.)
(1 Utica-Permitted well is not mapped
due to well length ≥ 15000 feet.)

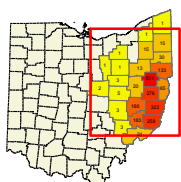
Wells Drilled To Date:

Utica: 1669

Wells Producing To Date:

Utica: 1125
Marcellus: 20

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



Well Head Count by County

0 - 10
11 - 50
51 - 100
101 - 200
201 - 400
401 - 600

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

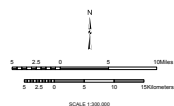
- PERMITTED-Permitted, Not Drilled, Cancelled
- DRILLED-Drilling Well Drilled
- PRODUCING-Producing, Plugged Back
- INACTIVE-Drilled Inactive, Shut in
- Last Hole of First Restoration
- Dry and Abandoned
- Plugged and Abandoned

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 NationalAeronautics and Space Administration provided the federal lands; Ohio Department of Transportation provided the city boundaries, roads, and water 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, all are in the top 20 of one or more of these industries.

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	Typical Education, Work Experience, On-the-Job Training (OJT)
17-2171	Petroleum engineers	\$107,940	Bachelor's degree
19-2042	Geoscientists, except hydrologists and geographers	\$68,210	Bachelor's degree
19-4041	Geological and petroleum technicians	\$55,620	Associate's degree; Moderate-term OJT
47-2011	Boilermakers	\$55,370	HS/GED; Apprenticeship
47-2051	Cement masons and concrete finishers	\$39,260	Less than HS; Moderate-term OJT
47-2151	Pipelayers	\$42,820	Less than HS; Short-term OJT
47-2221	Structural iron and steel workers	\$57,490	HS/GED; Apprenticeship
47-3015	Helpers--pipelayers, plumbers, pipefitters, and steamfitters	\$24,350	HS/GED; Short-term OJT
47-5011	Derrick Operators, oil and gas	\$36,780	Less than HS; Short-term OJT
47-5012	Rotary drill operators, oil and gas	\$33,430	Less than HS; Moderate-term OJT
47-5021	Earth drillers, except oil and gas	\$39,450	HS/GED; Moderate-term OJT
47-5071	Roustabouts, oil and gas	\$29,150	Less than HS; Moderate-term OJT
47-5081	Helpers--extraction workers	\$28,610	HS/GED; Moderate-term OJT
49-9098	Helpers--installation, maintenance, and repair workers	\$24,710	HS/GED; Moderate-term OJT
53-7021	Crane and tower operators	\$37,450	HS/GED; 1-5 years experience; Moderate-term OJT
53-7032	Excavating and loading machine and dragline operators	\$37,330	HS/GED; 1-5 years experience; Moderate-term OJT
53-7062	Laborers and freight, stock, and material movers, hand	\$23,310	Less than HS; Short-term OJT

Source: U.S. Bureau of Labor Statistics, Occupational Employment Statistics, May 2014.

IN-DEMAND SHALE-RELATED OCCUPATIONS

The occupations listed below have 2014 employment levels above 80 in the core shale-related industries and have been identified as in-demand occupations through the Ohio Workforce Information Exchange — Job Forecast initiative as of November 2015. 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.

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

SOC Code	SOC Title	Median Annual Wage	Typical Education, Work Experience, On-the-Job Training (OJT)
11-1021	General and Operations Managers	\$90,180	Bachelor's degree, 1-5 Years Experience
11-9021	Construction Managers	\$82,170	Bachelor's degree, Moderate-Term OJT
11-9041	Architectural and engineering managers	\$116,640	Bachelor's degree; 5+ years experience
13-1051	Cost Estimators	\$55,890	Bachelor's degree
13-1071	Human resources specialists	\$53,860	Bachelor's degree
13-2011	Accountants and auditors	\$61,740	Bachelor's degree
13-2051	Financial Analysts	\$71,110	Bachelor's degree
13-1199	Business Operations Specialists, All Other	\$62,030	HS/GED, Long-Term OJT
15-1199	Computer Occupations, All Other	\$79,040	Bachelor's degree
17-2051	Civil Engineers	\$73,940	Bachelor's degree
43-3031	Bookkeeping, Accounting, and Auditing Clerks	\$35,600	HS/GED, Moderate-Term OJT
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	\$59,450	HS/GED, 5+ Years Experience
47-2031	Carpenters	\$42,640	HS/GED; Apprenticeship
47-2061	Construction Laborers	\$36,080	Less than HS, Short-term OJT
47-2073	Operating Engineers and Other Construction Equipment Operators	\$47,470	HS/GED, Moderate-Term OJT
47-2111	Electricians	\$50,190	HS/GED, Apprenticeship
47-2152	Plumbers, Pipefitters, and Steamfitters	\$52,010	HS/GED, Apprenticeship
47-5013	Service unit operators, oil, gas, and mining	\$33,190	Less than HS, Moderate-term OJT
49-1011	First-line supervisors of mechanics, installers, and repairers	\$58,770	HS/GED, 1-5 Years Experience
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	\$43,340	HS/GED, Long-Term OJT
49-3042	Mobile heavy equipment mechanics, except engines	\$44,020	HS/GED; Long-term OJT
49-9012	Control and valve installers and repairers, except mechanical door	\$55,020	HS/GED, Moderate-term OJT
49-9041	Industrial machinery mechanics	\$46,590	HS/GED, Long-term OJT
49-9071	Maintenance and Repair Workers, General	\$37,120	HS/GED, Long-Term OJT
51-1011	First-line supervisors of production and operating workers	\$53,570	Post-HS cert, 1-5 Years Experience
51-4121	Welders, Cutters, Solderers and Brazers	\$35,890	HS/GED, Moderate-Term OJT
51-8093	Petroleum pump system operators, refinery operators, and gaugers	\$63,830	HS/GED, Long-term OJT
51-9199	Production workers, all other	\$32,300	HS/GED, Moderate-Term OJT
53-3032	Heavy and Tractor-Trailer Truck Drivers	\$39,860	HS/GED, Short-Term OJT
53-7073	Wellhead Pumpers	\$31,780	Less than HS, Moderate-Term OJT

Source: U.S. Bureau of Labor Statistics, Occupational Employment Statistics, May 2014.

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, fourth quarter data from 2011 is presented with fourth quarter data from 2014.

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			2014 Q4		
	Stable Employment	All Hires	Separations	Stable Employment	All Hires	Separations
All industry groups	4,408,362	855,089	792,493	4,543,630	870,191	906,184
2111 Oil and Gas Extraction	2,867	188	185	2,039	637	521
2131 Support Activities for Mining	2,570	746	871	5,982	1,981	1,846
2371 Utility System Construction	9,418	2,212	3,458	11,941	5,812	8,654
4862 Pipeline Transportation of Natural Gas	337	14	3	402	17	3

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 fourth quarter 2011 to fourth quarter 2014: 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

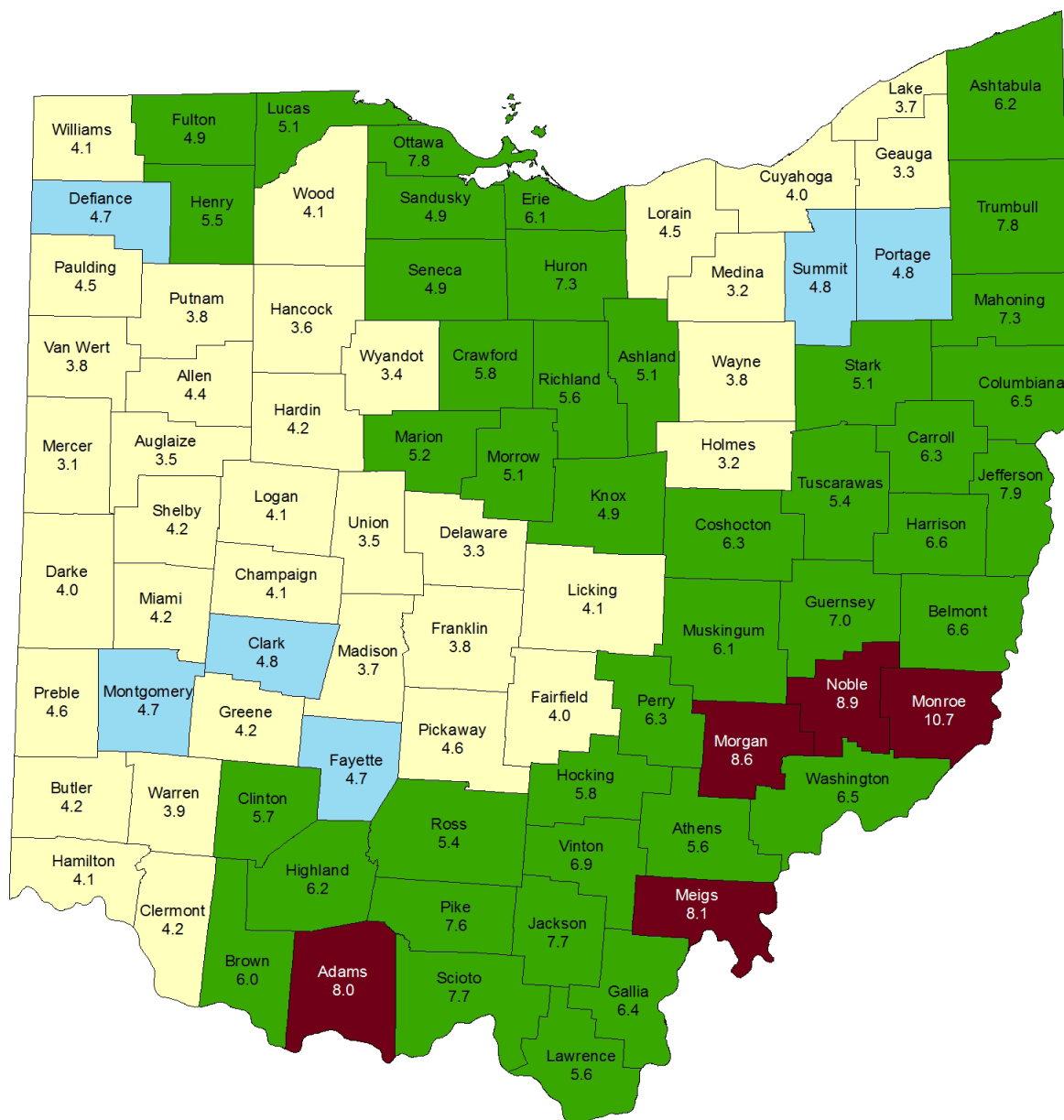
Central Ohio	2011 Q4			2014 Q4		
	Stable Employment	All Hires	Separations	Stable Employment	All Hires	Separations
All industry groups	878,059	180,970	161,328	910,345	198,579	197,654
2111 Oil and Gas Extraction	183	6	11	170	14	12
2131 Support Activities for Mining	203	52	141	272	39	60
2371 Utility System Construction	1,840	279	420	2,354	527	1,043
4862 Pipeline Transportation of Natural Gas	123	6	***	128	4	***
Northeast Ohio						
All industry groups	1,658,490	327,101	296,181	1,704,670	304,636	325,690
2111 Oil and Gas Extraction	663	79	75	1,104	299	207
2131 Support Activities for Mining	653	148	222	1,883	653	444
2371 Utility System Construction	3,324	858	1,485	3,866	1,501	2,155
4862 Pipeline Transportation of Natural Gas	94	3	0	139	12	0
Northwest Ohio						
All industry groups	458,361	96,813	85,563	471,562	91,596	95,913
2111 Oil and Gas Extraction	1,584	38	48	13	17	27
2131 Support Activities for Mining	9	4	3	29	31	23
2371 Utility System Construction	1,282	365	770	1,517	2,335	2,855
4862 Pipeline Transportation of Natural Gas	27	***	0	31	0	0
Southeast Ohio						
All industry groups	269,112	44,417	46,559	271,071	49,879	53,404
2111 Oil and Gas Extraction	407	61	46	753	307	275
2131 Support Activities for Mining	1,689	533	487	3,749	1,250	1,310
2371 Utility System Construction	687	259	220	1,396	920	1,661
4862 Pipeline Transportation of Natural Gas	78	***	0	86	***	***
Southwest Ohio						
All industry groups	675,759	128,463	128,832	716,428	139,071	145,722
2111 Oil and Gas Extraction	***	***	***	***	***	***
2131 Support Activities for Mining	5	4	4	***	***	***
2371 Utility System Construction	1,556	335	391	1,911	382	721
4862 Pipeline Transportation of Natural Gas	***	***	0	***	0	0
West Ohio						
All industry groups	468,581	77,325	74,030	469,554	86,429	87,802
2111 Oil and Gas Extraction	***	0	0	***	***	***
2131 Support Activities for Mining	10	7	15	49	9	10
2371 Utility System Construction	731	116	172	898	147	219
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 2015 (Not Seasonally Adjusted)

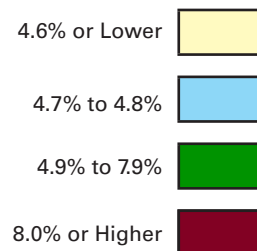


Unemployment Rates

Not Seasonally Adjusted Seasonally Adjusted

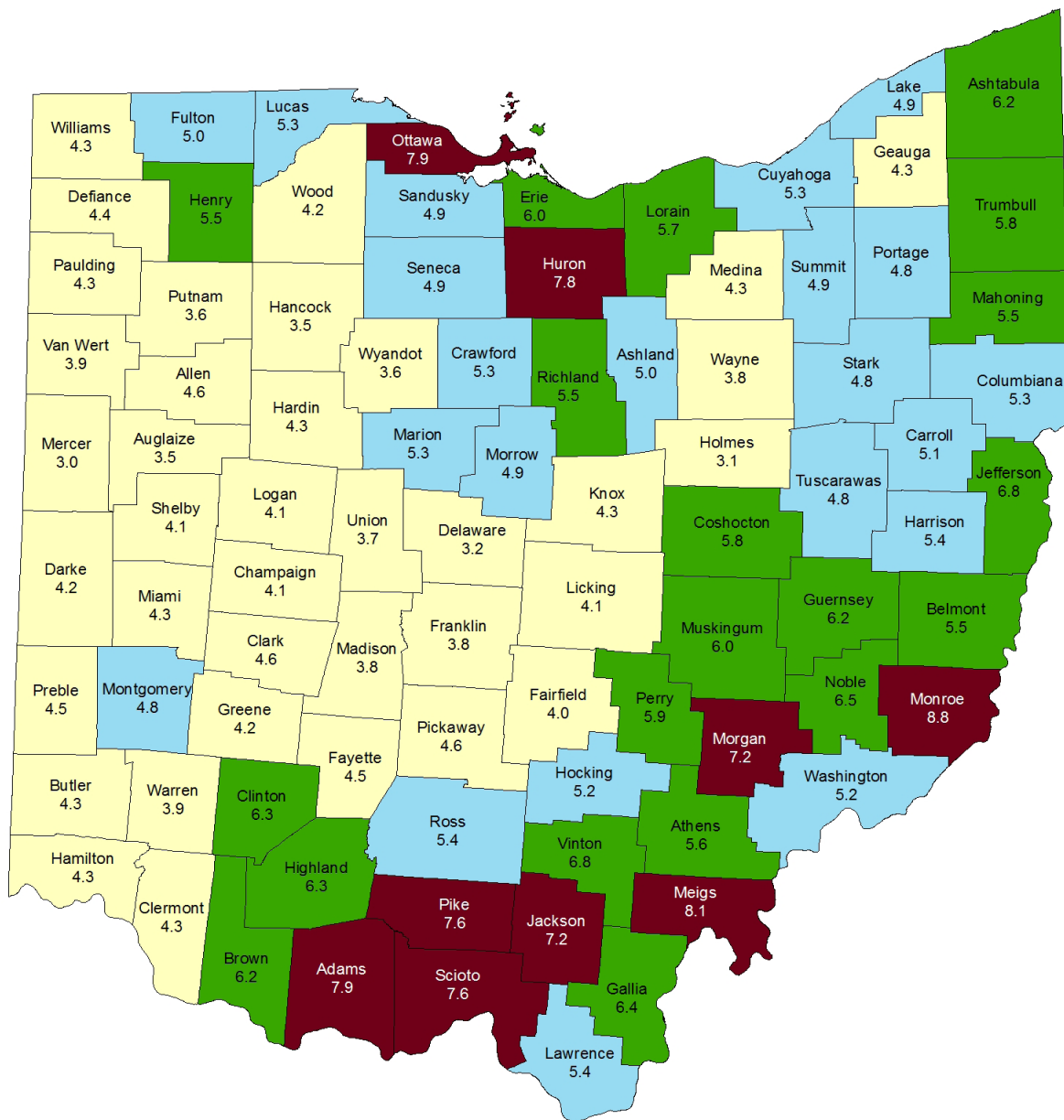
United States
Ohio

4.8% 5.0%
4.6% 4.7%



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

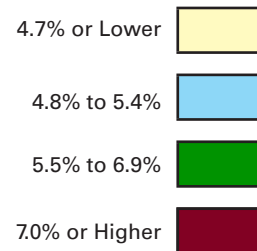
COUNTY UNEMPLOYMENT RATES IN DECEMBER 2014 (Not Seasonally Adjusted)



Unemployment Rates

Not Seasonally Adjusted Seasonally Adjusted

United States	5.4%	5.6%
Ohio	4.7%	5.1%



Source: Ohio Department of Job and Family Services
Office of Workforce Development
Bureau of Labor Market Information
*Data based on 2014 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 140,000 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 www.bls.gov/emp/ep_definitions_edtrain.pdf.

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 2012, was implemented by BLS in the QCEW program with the release of first quarter 2011 data. As part of this revision, the NAICS code of only one shale-related industry was impacted: NAICS 331111 (Iron & Steel Mills). The NAICS 2012 structure eliminated NAICS 331111, combining it with NAICS 331112 (Electrometallurgical Ferroalloy Product Manufacturing) to form NAICS 331110 (Iron & Steel Mills and Ferroalloy Manufacturing).

Core Shale-Related Industries (NAICS):

Crude Petroleum & Natural Gas Extraction (211111); Natural Gas Liquid Extraction (211112); 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

[\(http://workforce.ohio.gov/\)](http://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.

John R. Kasich, Governor
State of Ohio

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

January 2016

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