



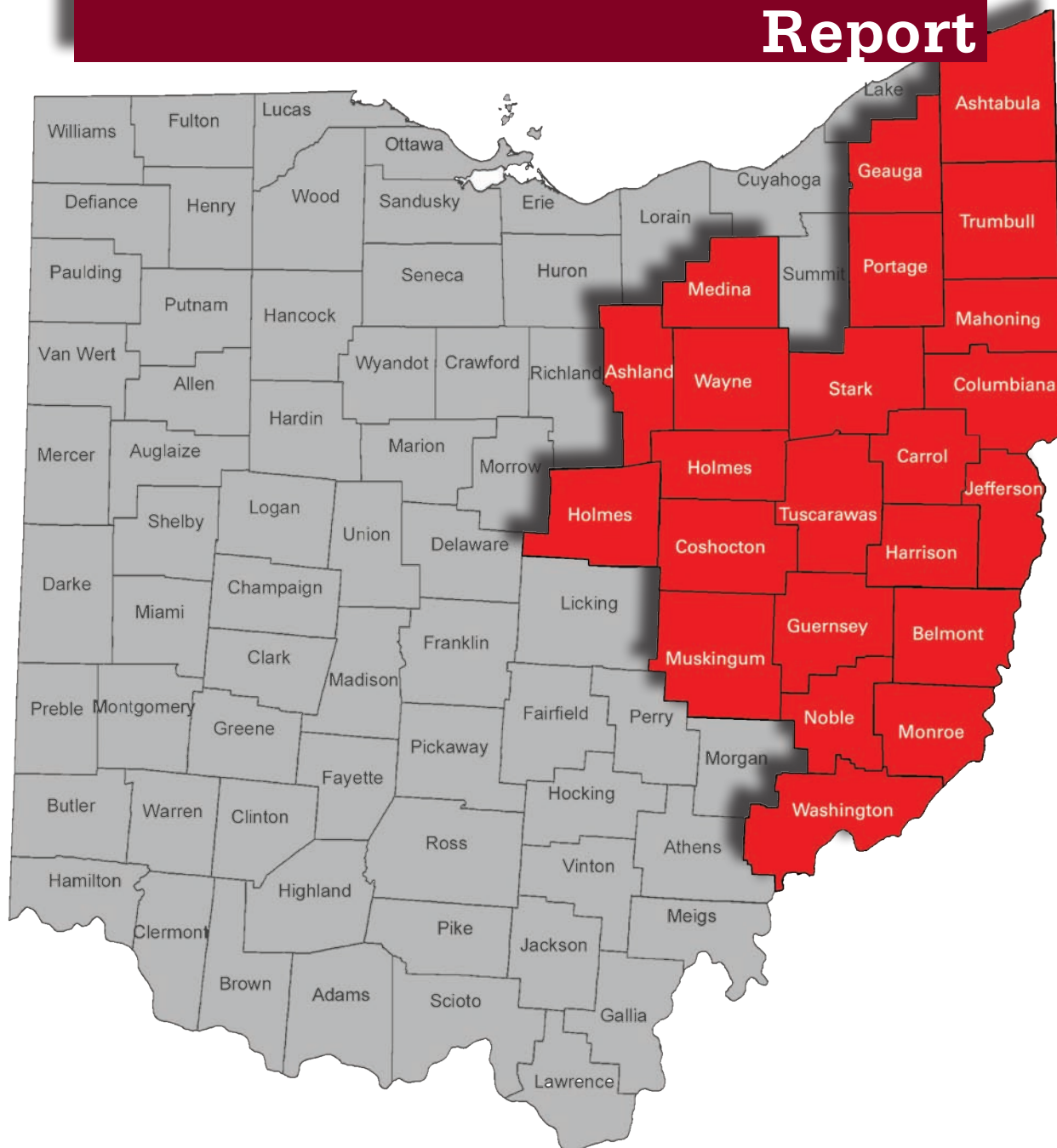
**Department of  
Job and Family Services**

TO STRENGTHEN OHIO'S FAMILIES WITH SOLUTIONS TO TEMPORARY CHALLENGES

**2012 ANNUAL**

# Ohio Shale

## Report



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### **A Message from Director Colbert**

Many positive developments have occurred in Ohio over the last year as a result of horizontal oil and gas drilling. Employment in core shale industries grew, the number of core shale-related businesses increased, and the demand for workers in ancillary shale-related industries also increased.

All of this is very promising news for Ohioans, especially those in the eastern part of our state. Not only is Ohio leading the way in recovering from the recent national recession, but we're fortunate to be home to a growing industry with tremendous potential for revitalizing our economy.

The pages that follow present a variety of data that together paint a more complete picture of the direct and indirect economic impact of shale business activity in Ohio. This annual report is meant to supplement the more detailed quarterly Ohio Shale report, which we post on our Bureau of Labor Market Information website at [www.ohiolmi.com](http://www.ohiolmi.com).

Shale holds great promise for workers in Ohio. The Ohio Department of Job and Family Services, along with our partners at Ohio's county agencies and the Ohio Board of Regents, is working hard to make sure Ohioans have the education and skills required to take advantage of these new opportunities. Not only are jobs available, but the average wages in shale-related industries are well above the average wages for all industries. We look forward to seeing the results of this work as the next 12 months unfold.

A stylized, handwritten signature in black ink, appearing to read 'MBC' followed by a large, sweeping flourish.

Michael B. Colbert, Director  
Ohio Department of Job and Family Services

## Introduction

Ohio Revised Code section 6301.12 calls for the publication of an annual report assessing the direct and indirect economic impact of businesses engaged in the production of horizontal wells. This report fulfills that requirement by presenting available economic data on businesses engaged in the production of oil and gas wells in Ohio. This report focuses on employment in core and ancillary shale industries. It does not encompass all economic activity related to Ohio's shale industry. For example, increased business and employment at restaurants and retail stores located near shale development is not reflected in this report. Much of the information in this report reflects data on a group of five industries defined as “core” shale-related industries and a group of 30 industries defined as “ancillary” shale-related industries. 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-related activity. For those that are, not all of their products and services and, therefore, their employment are necessarily linked to shale-related economic activity. This is particularly true for the ancillary industries.

This report shows quarterly employment and business establishment changes in core and ancillary shale-related industries. These data 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. It also shows worker demand, key occupations in shale-related industries, residency status of new hires in core and ancillary industries, average wages, and regional workforce development plans. The final page summarizes the impact of these factors.

## Core Shale-Related Industry Employment

Employment in core industries centrally involved with shale-related oil and gas well drilling and development grew significantly when average employment from 2010 Q4 to 2011 Q3 is compared to average employment from 2011Q4 to 2012 Q3. Overall, employment in the five core shale-related industries grew by 1,129 jobs, an increase of 16.8 percent. The growth of Ohio’s core shale-related industries was similar to growth in the national oil and gas industry, which grew by 14.5 percent during this period. Among the core industries, oil and gas pipeline construction had the highest growth at 34.0 percent (606 jobs), followed by support activities for oil and gas operations at 22.1 percent growth (275 jobs). See Figure 1 for details about employment growth in the core shale-related industries.

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

Core Industries		Average Empl.,	Average Empl.,	Numeric	Percent
NAICS	Title	2010 Q4 to 2011 Q3	2011 Q4 to 2012 Q3	Change	Change
2111*	Oil and gas extraction	2,840	3,009	169	6.0%
213111	Drilling oil and gas wells	564	633	69	12.2%
213112	Support activities for oil and gas operations	1,243	1,518	275	22.1%
237120	Oil and gas pipeline construction	1,782	2,388	606	34.0%
486210	Pipeline transportation of natural gas	309	319	10	3.2%
	Core Industries Totals	6,738	7,867	1,129	16.8%

Source: Quarterly Census of Employment and Wages program

\*Includes Crude Petroleum and Natural Gas Extraction (211111) and Natural Gas Liquid Extraction (211112)

## Ancillary Shale-Related Industry Employment

Ancillary shale-related industries are indirectly involved with shale oil and gas well drilling and development. These industries may provide support services or produce products used at any point in the drilling and development cycle. However, most provide services and products to other industries as well.

Employment in ancillary shale-related industries also increased when average employment from 2010 Q4 to 2011 Q3 is compared to average employment from 2011 Q4 to 2012 Q3. Overall, ancillary shale-related industries added 3,696 jobs during the analysis period, a 2.2 percent increase. The largest proportional increase was in oil and gas field machinery and equipment manufacturing, which increased by 112.8 percent (+159 jobs).

The largest absolute increase was for engineering services, with an increase of 878 jobs (+3.2%). See Figure 2 for details about employment growth in the 30 ancillary shale-related industries.

Figure 2. Ancillary Shale-Related Industry Four-Quarter Employment Averages and Year-to-Year Change

Ancillary Industries		Average Empl.,	Average Empl.,	Numeric	Percent
NAICS	Title	2010 Q4 to 2011 Q3	2011 Q4 to 2012 Q3	Change	Change
221112	Fossil fuel electric power generation	5,368	4,794	-574	-10.7%
221210	Natural gas distribution	3,767	4,056	289	7.7%
221310	Water supply and irrigation systems	6,073	6,086	13	0.2%
221320	Sewage treatment facilities	3,844	3,782	-62	-1.6%
237110	Water and sewer line system construction	5,010	4,993	-17	-0.3%
237310	Highway, street, and bridge construction	14,675	15,092	417	2.8%
238912	Nonresidential site preparation contractors	5,170	5,271	101	2.0%
325110	Petrochemical manufacturing	359	319	-40	-11.1%
325120	Industrial gas manufacturing	744	775	31	4.2%
331110*	Iron, steel mills and ferroalloy manufacturing	10,001	10,372	371	3.7%
331210	Iron, steel pipe and tube from purchased steel	3,102	3,159	57	1.8%
333131	Mining machinery and equipment manufacturing	458	496	38	8.3%
333132	Oil and gas field machinery and equipment	141	300	159	112.8%
423810	Construction equipment merchant wholesalers	2,531	3,000	469	18.5%
423830	Industrial machinery merchant wholesalers	15,264	15,890	626	4.1%
423840	Industrial supplies merchant wholesalers	4,772	4,760	-12	-0.3%
484110	General freight trucking, local	12,042	12,464	422	3.5%
484220	Other specialized trucking, local	6,966	7,333	367	5.3%
484230	Other specialized trucking, long-distance	4,484	4,845	361	8.1%
531190	Lessors of other real estate property	934	908	-26	-2.8%
532412	Other heavy machinery rental and leasing	1,295	1,468	173	13.4%
541330	Engineering services	27,559	28,437	878	3.2%
541360	Geophysical surveying and mapping services	253	275	22	8.7%
541380	Testing laboratories	6,508	5,917	-591	-9.1%
541620	Environmental consulting services	1,650	1,688	38	2.3%
562910	Remediation services	2,365	2,681	316	13.4%
811310	Commercial machinery repair and maintenance	7,215	7,598	383	5.3%
924110	Air, water, and waste program administration	6,218	6,155	-63	-1.0%
924120	Administration of conservation programs	6,003	5,567	-436	-7.3%
926130	Utility regulation and administration	484	470	-14	-2.9%
	Ancillary Industries Totals	165,255	168,951	3,696	2.2%

Source: Quarterly Census of Employment and Wages program

\*The NAICS 2012 revision merged NAICS 331111 (Iron and Steel Mills) with NAICS 33112 (Electrometallurgical ferroalloy product manufacturing) to form NAICS 331110 (Iron and steel mills and ferroalloy manufacturing).

## Business Establishments in Core Industries

The number of Ohio business establishments in the core shale-related industries also increased when the average number of establishments from 2010 Q4 to 2011 Q3 is compared to average number of establishments from 2011 Q4 to 2012 Q3. The latter period had 45 more core industry establishments than the previous period, an increase of 7.6 percent. The largest percent increase was in the drilling oil and gas wells industry, which grew by 13.6 percent. Nationally, the five core industries saw a 5.4 percent increase in the number of business establishments. See Figure 3 for details about establishment growth in the core shale-related industries.

Figure 3 Core Shale-Related Industry Four-Quarter Establishment Averages and Year-to-Year Change

Core Industries		Average Estbl.,	Average Estbl.,	Numeric Change	Percent Change
NAICS	Title	2010 Q4 to 2011 Q3	2011 Q4 to 2012 Q3		
2111*	Oil and gas extraction	199	209	10	5.0%
213111	Drilling oil and gas wells	81	92	11	13.6%
213112	Support activities for oil and gas operations	182	199	17	9.3%
237120	Oil and gas pipeline construction	96	103	7	7.3%
486210	Pipeline transportation of natural gas	37	37	0	0.0%
	Core Industries Totals	595	640	45	7.6%

Source: Quarterly Census of Employment and Wages program

\*Includes Crude Petroleum and Natural Gas Extraction (211111) and Natural Gas Liquid Extraction (211112)

## Business Establishments in Ancillary Industries

The number of Ohio business establishments in ancillary shale-related industries grew more modestly than in the core shale-related industries. There was an increase of 17 establishments among the ancillary industries, an increase of 0.1 percent. The largest percent increase was in the oil and gas field machinery and equipment manufacturing industry. See Figure 4 for details about establishment growth in the ancillary shale-related industries.

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

Ancillary Industries		Average Estbl.,	Average Estbl.,	Numeric	Percent
NAICS	Title	2010 Q4 to 2011 Q3	2011 Q4 to 2012 Q3	Change	Change
221112	Fossil fuel electric power generation	83	76	-7	-8.4%
221210	Natural gas distribution	143	148	5	3.5%
221310	Water supply and irrigation systems	249	252	3	1.2%
221320	Sewage treatment facilities	212	209	-3	-1.4%
237110	Water and sewer line system construction	391	375	-16	-4.1%
237310	Highway, street, and bridge construction	722	725	3	0.4%
238912	Nonresidential site preparation contractors	630	613	-17	-2.7%
325110	Petrochemical manufacturing	5	5	0	0.0%
325120	Industrial gas manufacturing	45	46	1	2.2%
331110	Iron, steel mills and ferroalloy manufacturing	59	62	3	5.1%
331210	Iron, steel pipe and tube from purchased steel	53	52	-1	-1.9%
333131	Mining machinery and equipment manufacturing	12	11	-1	-8.3%
333132	Oil and gas field machinery and equipment	6	9	3	50.0%
423810	Construction equipment merchant wholesalers	198	204	6	3.0%
423830	Industrial machinery merchant wholesalers	1,704	1,676	-28	-1.6%
423840	Industrial supplies merchant wholesalers	506	511	5	1.0%
484110	General freight trucking, local	1,356	1,364	8	0.6%
484220	Other specialized trucking, local	1,010	1,015	5	0.5%
484230	Other specialized trucking, long-distance	286	295	9	3.1%
531190	Lessors of other real estate property	296	285	-11	-3.7%
532412	Other heavy machinery rental and leasing	166	174	8	4.8%
541330	Engineering services	2,275	2,288	13	0.6%
541360	Geophysical surveying and mapping services	52	51	-1	-1.9%
541380	Testing laboratories	361	363	2	0.6%
541620	Environmental consulting services	296	306	10	3.4%
562910	Remediation services	176	200	24	13.6%
811310	Commercial machinery repair and maintenance	1,098	1,096	-2	-0.2%
924110	Air, water, and waste program administration	165	163	-2	-1.2%
924120	Administration of conservation programs	281	279	-2	-0.7%
926130	Utility regulation and administration	29	29	0	0.0%
	Ancillary Industries Totals	12,865	12,882	17	0.1%

Source: Quarterly Census of Employment and Wages program

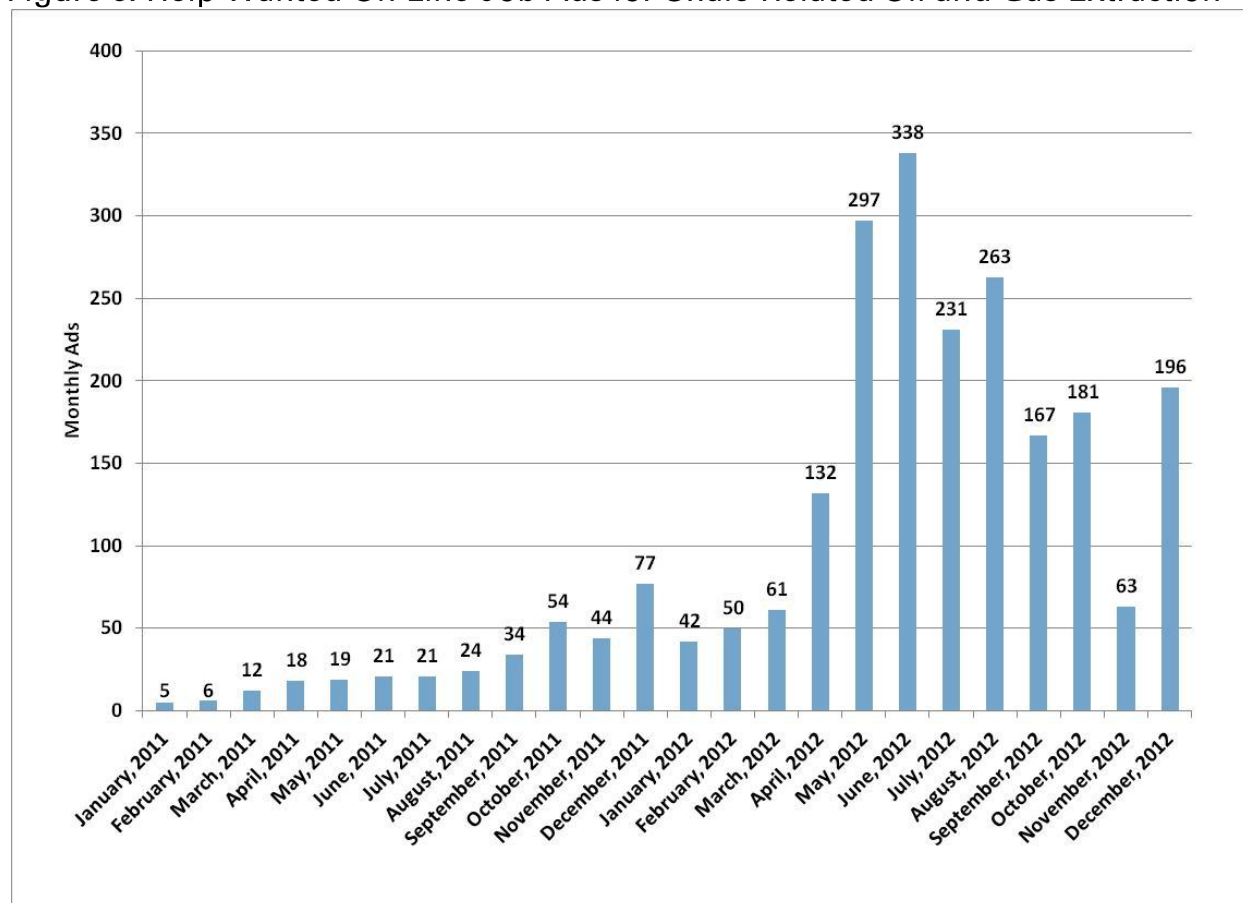
## Demand for Workers in Shale-Related Occupations

Employer demand for workers in shale-related industries has been increasing. Figure 5 shows the number of ads posted online from January 2011 to December 2012 for jobs in shale-related oil and gas extraction in Ohio. According to the Help Wanted OnLine© data series, the number of ads posted online accelerated



through 2011 and then increased sharply in April 2012. This data series does not capture all online job ads, and many jobs may not be advertised online. However, it does provide an indication of occupational demand.

Figure 5. Help Wanted On-Line Job Ads for Shale-Related Oil and Gas Extraction



Source: Help Wanted OnLine© data series

## Key Shale-Related Occupations

Industry staffing patterns provide information about occupations commonly found within a particular industry. The occupations examined in this report are not exclusive to one industry, but they have a high presence in shale-related industries. Figure 6 shows high-priority occupations typically found in core and ancillary shale-related industries. The high-priority occupations have higher skill needs and are likely to provide family-sustaining wages.

Figure 6. High-Priority Occupations among Shale-Related Industries

SOC Code	SOC Title	Median Annual Wage	Typical Education Level
53-7062	Laborers and Freight Stock and Material Movers Hand	\$22,490	Short-Term OJT
43-9061	Office Clerks General	\$27,000	Short-Term OJT
43-3021	Billing and Posting Clerks	\$31,400	Short-Term OJT
53-3032	Heavy and Tractor-Trailer Truck Drivers	\$37,380	Short-Term OJT
45-4022	Logging Equipment Operators	\$27,810	Moderate-Term OJT
43-4051	Customer Service Representatives	\$29,990	Moderate-Term OJT
43-6014	Secretaries and Administrative Assistants Except Legal Medical and Executive	\$30,970	Moderate-Term OJT
47-5071	Roustabouts Oil and Gas	\$30,980	Moderate-Term OJT
53-7073	Wellhead Pumpers	\$31,140	Moderate-Term OJT
47-5011	Derrick Operators Oil and Gas	\$31,700	Moderate-Term OJT
47-5012	Rotary Drill Operators Oil and Gas	\$32,750	Moderate-Term OJT
43-3031	Bookkeeping Accounting and Auditing Clerks	\$33,730	Moderate-Term OJT
47-5013	Service Unit Operators Oil Gas and Mining	\$34,610	Moderate-Term OJT
51-9061	Inspectors Testers Sorters Samplers and Weighers	\$34,650	Moderate-Term OJT
47-2061	Construction Laborers	\$36,100	Moderate-Term OJT
43-5061	Production Planning and Expediting Clerks	\$38,880	Moderate-Term OJT
47-2073	Operating Engineers and Other Construction Equipment Operators	\$45,030	Moderate-Term OJT
53-7072	Pump Operators Except Wellhead Pumpers	\$46,030	Moderate-Term OJT
53-7071	Gas Compressor and Gas Pumping Station Operators	\$57,440	Moderate-Term OJT
49-9052	Telecommunications Line Installers and Repairers	\$42,340	Long-Term OJT
49-3042	Mobile Heavy Equipment Mechanics Except Engines	\$43,420	Long-Term OJT
49-9041	Industrial Machinery Mechanics	\$44,600	Long-Term OJT
47-2152	Plumbers Pipefitters and Steamfitters	\$45,220	Long-Term OJT
49-9051	Electrical Power-Line Installers and Repairers	\$58,040	Long-Term OJT
53-1031	First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	\$51,410	Related Work Exp.
51-1011	First-Line Supervisors of Production and Operating Workers	\$52,260	Related Work Exp.
49-1011	First-Line Supervisors of Mechanics Installers and Repairers	\$57,060	Related Work Exp.
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	\$57,670	Related Work Exp.
41-4011	Sales Representatives Wholesale and Manufacturing Technical and Scientific Products	\$66,250	Related Work Exp.
51-4122	Welding Soldering and Brazing Machine Setters Operators and Tenders	\$31,830	Postsec. Voc. Award
51-4121	Welders Cutters Solderers and Brazers	\$34,740	Postsec. Voc. Award
17-3025	Environmental Engineering Technicians	\$38,730	Associate Degree
17-3023	Electrical and Electronics Engineering Technicians	\$53,780	Associate Degree
19-4041	Geological and Petroleum Technicians	\$54,410	Associate Degree
13-1051	Cost Estimators	\$54,820	Bachelor's Degree
17-2151	Mining and Geological Engineers Including Mining Safety Engineers	\$56,660	Bachelor's Degree
17-2112	Industrial Engineers	\$70,840	Bachelor's Degree
19-2042	Geoscientists Except Hydrologists and Geographers	\$71,020	Master's Degree

Source: U.S. Bureau of Labor Statistics, Occupational Employment Statistics program, May 2011

Increased shale-related oil and gas extraction and production in Ohio present employment opportunities for many workers hurt by the recession of 2007 to 2009. Average wages for construction and extraction occupations are generally above the state median, and their entry-level training and education requirements are modest.

Based on industry staffing patterns, core oil and gas industries in Ohio saw an estimated increase of 284 skilled construction jobs and 189 extraction jobs during the analysis period. The one-year period from the fourth quarter of 2011 through the third quarter of 2012 had an estimated 1,204 skilled construction jobs and 1,437 extraction jobs. See Figure 7 below for more detail.

Figure 7. Estimated Number of Construction and Extraction Occupations in the Core Industries

Core Industries		Employment Estimates, 2010 Q4 to 2011 Q3		Employment Estimates, 2011 Q4 to 2012 Q3		Numeric Change	
NAICS	Title	Construction Trades	Extraction Trades	Construction Trades	Extraction Trades	Construction Trades	Extraction Trades
2111*	Oil and gas extraction	34	435	36	460	2	26
213111	Drilling oil and gas wells	33	238	37	267	4	29
213112	Support activities for oil and gas operations	73	525	90	641	16	116
237120	Oil and gas pipeline construction	770	52	1,032	69	262	18
486210	Pipeline transportation of natural gas	9	--	9	--	0	--
Core Industries Totals		919	1,249	1,204	1,437	284	189

Source: Quarterly Census of Employment and Wages program

\*Includes Crude Petroleum and Natural Gas Extraction (211111) and Natural Gas Liquid Extraction (211112)

## Shale-Related Industries' Worker State of Residence

Although data are not available on the state of residence for all workers, limited information is available from the State Directory of New Hires. This database was developed as a tool to assist in collecting child support. State law requires all Ohio employers to report all independent contractors and newly hired or rehired employees to the directory within 20 days of the hire or rehire date.<sup>1</sup> Hiring activities that generate W-4 tax forms are included in the data. Figure 8 shows that during third quarter 2011, there were 405 new hires from Ohio in the five core shale-related industries. There were 595 new hires from Ohio in third quarter 2012 in the core shale-related industries.

<sup>1</sup> Ohio Revised Code Section 3121.89-3121.8911 and the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) of 1996, 42 U.S.C 653a.

Figure 8. Third Quarter 2011 and 2012 New Hires in the Core Shale-Related Industries

State of Residence	2011	2012
<b>Ohio</b>	<b>405</b>	<b>595</b>
<b>Total Out-of-State</b>	<b>279</b>	<b>396</b>
Indiana	12	11
Kentucky	31	21
Michigan	44	39
Pennsylvania	24	83
West Virginia	47	54
All other States	121	188

Source: Ohio Directory of New Hires

Figure 9. Third Quarter 2011 and 2012 New Hires in the Ancillary Shale-Related Industries

State of Residence	2011	2012
<b>Ohio</b>	<b>10,549</b>	<b>7,940</b>
<b>Total Out-of-State</b>	<b>7,748</b>	<b>7,485</b>
Indiana	578	542
Kentucky	404	410
Michigan	491	518
Pennsylvania	769	479
West Virginia	363	177
All other States	5,143	5,359

Source: Ohio Directory of New Hires

In third quarter 2012, there were 7,940 new hires from Ohio among the ancillary shale-related industries. Figure 9 provides more detail.

### Total Wage Growth among the Core Shale-Related Industries

Overall, total wages among the core shale-related industries grew slightly more slowly than employment did during the analysis period. Total wages increased by 15.2 percent (about \$75 million), while average employment grew by 16.8 percent. The slower wage growth suggests that, overall, there were no worker or skills shortages, which can increase wages as employers compete for workers from a limited pool. However, two core industries had total wage growth significantly stronger than their employment growth, suggesting possible worker or skills shortages. Oil and gas pipeline construction had the highest total wage growth, at 45.9 percent (about \$45 million). At the same time, average employment for the industry increased by 34.0 percent. Drilling oil and gas wells had the second

highest total wage increase, at 27.7 percent (about \$6.5 million); average employment for this industry increased by 13.6 percent. See Figure 10 for detailed industry wage growth.

Figure 10. Core Shale-Related Industry Four-Quarter Total Wages and Year-to-Year Change

Core Industries		Total Wages (thousands),	Total Wages (thousands),	Numeric Change	Percent Change
NAICS	Title	2010 Q4 to 2011 Q3	2011 Q4 to 2012 Q3		
2111*	Oil and gas extraction	\$282,979	\$291,566	\$8,587	3.0%
213111	Drilling oil and gas wells	\$23,380	\$29,849	\$6,469	27.7%
213112	Support activities for oil and gas operations	\$69,552	\$83,555	\$14,003	20.1%
237120	Oil and gas pipeline construction	\$99,315	\$144,892	\$45,577	45.9%
486210	Pipeline transportation of natural gas	\$22,306	\$23,402	\$1,096	4.9%
	Core Industries Totals	\$497,532	\$573,264	\$75,732	15.2%

Source: Quarterly Census of Employment and Wages program

\*Includes Crude Petroleum and Natural Gas Extraction (211111) and Natural Gas Liquid Extraction (211112)

## Regional Workforce Development Plans

Ohio's workforce investment boards establish local policies for workforce services funded by the federal Workforce Investment Act. They also develop five-year plans to identify target populations, in-demand occupations and employment trends, in order to guide service delivery to support growing industries and successful job placement. They are required to submit these plans to the Ohio Department of Job and Family Services (ODJFS), which reviews them for viability, especially as it relates to compliance and performance.

Local workforce investment boards also are required to submit biannual amendments to their plans, as part of their memorandums of understanding with the state. The amendments reflect planned changes in service delivery to respond to evolving economic and occupational needs. Local areas that identify occupations in shale-related core and ancillary industries as in-demand occupations will include that information in their local plans and policies.

## Summary

Employment in shale-related oil and gas industries has been increasing in Ohio. In the core shale-related industries, average quarterly employment increased by 1,129 to 7,867, about a 16.8 percent increase.<sup>2</sup> Average quarterly employment in

<sup>2</sup> The analysis compared data from two four-quarter periods: 2010 Q4 to 2011 Q3 and 2011 Q4 to 2012 Q3. The use of four-quarter periods reduces seasonal effects.

ancillary shale-related industries increased by 3,696 jobs to 168,951, about 2.2 percent. The number of business establishments increased, as well. Core shale-related industries saw an increase of 45 establishments, an increase of about 7.6 percent. Ancillary shale-related industries saw an increase of 17 establishments, about a 0.1 percent increase.

Employer demand for shale-related occupations increased, as well. Starting in April 2012, there was a sharp increase in the number of online job advertisements for shale-related occupations. Shale industries employ a wide range of occupations. Some of these – especially in construction and extraction – generally offer good wages and do not require extensive postsecondary training. The estimated number of construction trade jobs in core shale-related industries increased by 284 to 1,204 jobs; the number of extraction jobs increased by 189 to 1,437.

The increase in shale-related jobs has been benefitting primarily Ohio residents. In third quarter 2011 there were 405 new hires from Ohio and there were 595 new hires from Ohio in third quarter 2012 in the core shale-related industries. Overall, there were more new hires from Ohio than from out of state in the core and ancillary shale-related industries.

Wages in core shale-related industries grew slightly slower than employment. Over a four-quarter period, total wages grew by \$75 million to more than \$573 million. This was a 15.2 percent increase in wages compared to a 16.8 percent increase in employment. Two of the five core shale-related industries had significantly higher total wage increases. Total wages for oil and gas pipeline construction increased 45.9 percent over four quarters, and wages for drilling oil and gas wells increased 27.7 percent. Such rapid rises in wages could indicate worker or skill shortages, as employers may be competing for workers from a limited pool. Local workforce investment areas with in-demand shale occupations will include that information in their local plans and policies, in order to help individuals become trained in the skills employers need.

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Bureau of Labor Market Information  
<http://OhioLMI.com>

(August 2013)

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