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MINORITY AND FEMALE EMPLOYMENT IN THE OIL & NATURAL GAS AND PETROCHEMICAL INDUSTRIES, 2015-2035



Prepared for:
energy **API**

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Prepared for:

American Petroleum Institute



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Preface

As the American Petroleum Institute (API) considers the future workforce needs of the oil and natural gas industry and how to attract and retain the best available talent, the changing demographics of the United States shape our efforts in a meaningful way. According to the U.S. Census Bureau, “By 2030, one in five Americans is projected to be 65 and over; by 2044, more than half of all Americans are projected to belong to a minority group.” Indeed, this report finds that, combined, African Americans and Hispanics will account for over 80% of the net increase in the labor force from 2015 to 2035. In addition, women are continuing to participate in the labor force in large numbers and more women than men are now receiving two- and four-year degrees and certificates.

API has been developing strategies, research, and programs to better understand the challenges and opportunities associated with engaging and growing high impact partnerships based on shared interests in job creation and workforce opportunities in the industry. This focus on greater collaboration, outreach and education with African Americans, Asian Americans, Hispanics, Native Americans, Millennials, Veterans, and Women begins with in-depth research and is in support of API’s primary objectives and vision.

This report, *Minority and Female Employment in the Oil & Natural Gas and Petrochemical Industries, 2015-2035*, continues a series of research studies commissioned by API to better understand our future workforce needs and how strategic partners can play an increasing role in our industry. The focus of this report is the long-term U.S. demographic and labor market trends that will create future job opportunities for minorities and women in the industry. We present projections of the job opportunities that will be created for minorities and women based on baseline industry growth and investment, jobs arising from pro-development policies, and the need to replace workers retiring from the industry over the next two decades. These projections should not be considered ceilings, but are estimates based on current and projected trends in factors such as labor force participation rates and population growth rates.

The nearly **1.9 million direct job opportunities** projected through 2035 in the oil & natural gas and petrochemical industries speak to the continuing importance of these industries in the U.S. economy as a whole and to individuals and families looking for well-paying career opportunities. As seen in this report and other API research studies, minority communities, women, and other strategic partners represent critically vital and available talent pools to help meet our future workforce demands.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
KEY TABLES	7
I. INTRODUCTION.....	9
II. MINORITY AND FEMALE EMPLOYMENT IN THE OIL & NATURAL GAS AND PETROCHEMICAL INDUSTRIES IN 2015.....	11
BENCHMARK INDUSTRY-WIDE EMPLOYMENT ESTIMATES	11
DEFINITION OF INDUSTRY SEGMENTS.....	12
<i>Upstream Oil and Natural Gas Industry Operations</i>	12
<i>Investment in the Upstream Oil and Natural Gas Industry</i>	12
<i>Midstream Oil and Natural Gas Industry Operations</i>	12
<i>Investment in the Midstream Oil and Natural Gas Industry</i>	13
<i>Downstream Oil and Natural Gas Industry Operations</i>	13
<i>Petrochemical Industry</i>	14
<i>Investment in the Petrochemical Industry</i>	14
OCCUPATIONS IN THE OIL & NATURAL GAS AND PETROCHEMICAL INDUSTRIES	14
INDUSTRY-WIDE EMPLOYMENT PROJECTIONS UNDER TWO SCENARIOS	16
MINORITY AND FEMALE EMPLOYMENT IN THE OIL & NATURAL GAS INDUSTRY IN 2015	18
III. PROJECTIONS OF MINORITY AND FEMALE JOB OPPORTUNITIES, 2015-2035.....	23
REGULATORY CONSTRAINTS SCENARIO.....	24
<i>Upstream Oil and Natural Gas Industry</i>	24
<i>Midstream Oil and Natural Gas Industry</i>	24
<i>Downstream Oil and Natural Gas Industry</i>	25
<i>Oil & Natural Gas Industry Employment Totals</i>	25
<i>Petrochemical Industry</i>	25
<i>Combined Employment in the Oil & Natural Gas and Petrochemical Industries</i>	25
JOB OPPORTUNITIES DUE TO REPLACEMENT REQUIREMENTS.....	33
EMPLOYMENT OUTLOOK INCLUDING BASELINE GROWTH AND REPLACEMENT DEMAND.....	36
PRO-DEVELOPMENT SCENARIO	41
IV. OPPORTUNITIES FOR ASIANS AND NATIVE AMERICANS IN THE OIL & NATURAL GAS AND PETROCHEMICAL INDUSTRIES.....	45
OPPORTUNITIES FOR ASIANS IN THE OIL & NATURAL GAS AND PETROCHEMICAL INDUSTRIES	45
OPPORTUNITIES FOR NATIVE AMERICANS IN THE OIL & NATURAL GAS AND PETROCHEMICAL INDUSTRIES.....	45
V. CONCLUSION: JOB OPPORTUNITIES FROM ALL SOURCES.....	48
APPENDIX A. POPULATION PROJECTIONS BY AGE, RACE AND GENDER	53
FERTILITY RATES	53
SURVIVAL RATES	55
NET INTERNATIONAL MIGRATION	56
DOMESTIC MIGRATION	56
POPULATION BY GENDER	58
PROJECTIONS.....	59
APPENDIX B. MINORITY AND FEMALE LABOR FORCE AND EMPLOYMENT	65
LABOR FORCE PARTICIPATION RATES.....	65
UNEMPLOYMENT RATES.....	68
EMPLOYMENT FORECASTS	70
ECONOMY-WIDE OCCUPATIONAL EMPLOYMENT TRENDS.....	73
TRENDS IN FEMALE EMPLOYMENT	79
APPENDIX C. OCCUPATION DESCRIPTIONS.....	83

APPENDIX D. BENCHMARK EMPLOYMENT BY REGION.....	86
APPENDIX E. MINORITY AND FEMALE EMPLOYMENT IN INDIVIDUAL SEGMENTS OF THE OIL & NATURAL GAS AND PETROCHEMICAL INDUSTRIES BY DETAILED OCCUPATION: 2015.....	91
APPENDIX F. PROJECTED BASELINE EMPLOYMENT IN THE OIL & NATURAL GAS AND PETROCHEMICAL INDUSTRIES BY BROAD OCCUPATION AND REGION	96
APPENDIX G. PROJECTED MINORITY AND FEMALE BASELINE EMPLOYMENT IN INDIVIDUAL SEGMENTS OF THE OIL & NATURAL GAS AND PETROCHEMICAL INDUSTRIES BY DETAILED OCCUPATION AND REGION	105
APPENDIX H. PROJECTED JOB OPPORTUNITIES FROM REPLACEMENT IN THE OIL & NATURAL GAS AND PETROCHEMICAL INDUSTRIES BY BROAD OCCUPATION	123
APPENDIX I. PROJECTED JOB OPPORTUNITIES FROM REPLACEMENT IN THE OIL & NATURAL GAS AND PETROCHEMICAL INDUSTRIES BY DETAILED OCCUPATION AND REGION	133
APPENDIX J. PROJECTED JOB OPPORTUNITIES FROM BASELINE GROWTH AND REPLACEMENT IN THE OIL & NATURAL GAS AND PETROCHEMICAL INDUSTRIES BY BROAD OCCUPATION AND REGION.....	136
APPENDIX K. PROJECTED EMPLOYMENT IN OIL & NATURAL GAS INDUSTRY OPERATIONS AND INVESTMENT: PRO-DEVELOPMENT SCENARIO	145
APPENDIX L. PROJECTED EMPLOYMENT OPPORTUNITIES IN THE OIL & NATURAL GAS AND PETROCHEMICAL INDUSTRIES (COMBINING PRO-DEVELOPMENT POLICY WITH BASELINE GROWTH AND REPLACEMENT, INCLUDING INVESTMENT).....	154

Executive Summary

This report examines the employment outlook of African American and Hispanic workers and employment by gender in the U.S. oil & natural gas and petrochemical industries. Employment estimates and projections are presented nationally and for nine regions over the period 2015 to 2035. Potential job opportunities for the minority groups and women are projected under two scenarios of overall industry growth:

- A baseline scenario that reflects growth under a policy and regulatory environment that includes factors that inhibit oil and natural gas development (identified as the Regulatory Constraints scenario).
- Additional jobs that would be created under a scenario of relaxation of certain regulatory constraints on the oil and natural gas industry resulting in more accelerated development (identified as the Pro-Development scenario).

In each case, we consider jobs created by projected capital investment in the industries as well as growth of industry operations. In addition, we project job opportunities that will be created by the need to replace workers who retire or otherwise leave these industries over this 20-year period.

The report presents estimates of employment by occupation, race/ethnicity, gender, and region in the upstream, midstream and downstream segments of the oil and natural gas industry and in the petrochemical industry in the base year of our forecast period, 2015.¹ Principal findings of this analysis are as follows:

- The three segments of the U.S. oil and natural gas industry and the petrochemical industry together employed a total of 1.4 million people in 2015, including employment stimulated by investment in the industry.
- The upstream segment, with employment of 797 thousand, accounted for 57% of the total, followed by the midstream segment with 320 thousand (23%).
- African American workers held 94 thousand jobs in these industries in 2015, accounting for 6.7% of total employment.
- Hispanic workers held 283 thousand jobs across all four industry segments – 20.4% of the total. They accounted for a higher share of employment in the midstream segment than in the other segments.
- Women accounted for 17% of total employment in the combined oil & natural gas and petrochemical industries (237 thousand jobs). Their shares are higher in the petrochemical segment (20%) and lower in the midstream segment (14%).

¹ The upstream segment includes oil and gas exploration and production; midstream is pipeline transportation; and downstream includes refining, wholesale distribution and petroleum products manufacturing. Note that we do not include retail gasoline stations in our analysis of the downstream segment – an industry with employment of over 900 thousand in 2015.

The report presents projections of the growth of population, labor force and employment of the two minority groups through 2035, taking into account expected trends in their labor force participation rates and unemployment rates. We also analyze trends in female employment by occupation and trends in occupational employment of the two minority groups. Based on these demographic projections, we present forecasts of the employment outlook for minorities and women in these industries, including job opportunities associated with the need to replace retiring workers over the next two decades. We present only direct employment impacts in this report. If indirect and induced effects were considered, the total job impacts would be significantly larger. Our principal findings are as follows:

Projected Job Growth in the Oil & Natural Gas and Petrochemical Industries

- We project a total of nearly **1.9 million direct job opportunities over the period 2015-2035** considering all sources of job opportunities and all types of job growth (row 4 of the table below).
- Of those job opportunities, we project that Hispanic workers will account for 576 thousand jobs and African American workers 131 thousand over the 20-year period, combining to account for close to 40% of total job opportunities.
- Women are projected to fill more than 290 thousand of the job opportunities through 2035, or 16% of the total.
- The magnitude of these opportunities speaks to the continuing importance of the oil & natural gas and petrochemical industries in the U.S. economy as a whole as well as to individuals and families looking for well-paying career opportunities. As seen in this report, minority communities and women represent critically vital and available talent pools to help meet the industry’s future workforce demands.

Projected Job Opportunities in the Oil & Natural Gas and Petrochemical Industries*

	African American	Hispanic	Minority	Total Jobs	Of which, Female
<u>Increment from 2015 to 2025</u>					
1					
Regulatory Constraints Scenario (Growth and Capital Expenditures) plus Replacement Requirements	63	220	283	803	136
2					
Total Including Additional Employment from Pro-Development Policy	87	357	444	1,282	208

<u>Increment from 2015 to 2035</u>					
3					
Regulatory Constraints Scenario (Growth and Capital Expenditures) plus Replacement Requirements	91	351	443	1,074	178
4					
Total Including Additional Employment from Pro-Development Policy	131	576	707	1,864	290

*“Minority” is the sum of African American and Hispanic.
African American, Hispanic, Minority and Total columns include females.

Job Opportunities for Minorities

- The share of minorities employed in the upstream, midstream, and downstream oil & natural gas and petrochemicals industries is rising. Minority employment will rise from 27% of the total in 2015 to 36% of the total in 2035.
- Hispanic employment growth in the oil and natural gas industry is projected to show larger gains due to the fast growth of the Hispanic population, the higher labor force participation rate, and lower unemployment rate of Hispanics over the forecast period.
- African American and Hispanic workers are projected to make up more than one-fourth of the management, business, and financial job opportunities through 2035.
- There will be tremendous opportunities for workers in blue collar occupations as these jobs will make up 57% of job opportunities through 2035.

Female Employment Growth in the Industry

- Women will share in the growth of more skilled white collar jobs in the industry. We project that women will account for a rising share of job opportunities in management and professional occupations such as petroleum engineers, environmental scientists, accountants and technicians.
- The already-low shares of women in the semi-skilled and unskilled blue-collar occupational groups are projected to decline further, which will hold down the overall increase in female employment in the industry. However, there is significant potential for female blue collar employment due to the large number of job opportunities projected in blue collar positions.
- The share of women in the traditionally female-dominated 'Office and Administrative Support' (OAS) category will fall slightly over the forecast period, although this category remains a large source of potential job opportunities for women.

Job Growth by Occupation

- Our estimates of job growth by occupation suggest that 57% of all job opportunities created over the forecast period will be blue collar jobs. This suggests tremendous opportunity for workers with a high school diploma and some post-secondary training.
- A large share of the potential jobs—about 32%—would be in scientific and managerial occupations, e.g., petroleum engineers, most of which require a college degree.

**Total Projected Minority and Female Job Opportunities in the Oil & Natural Gas
and Petrochemical Industries, 2015-2035
by Broad Occupational Category***

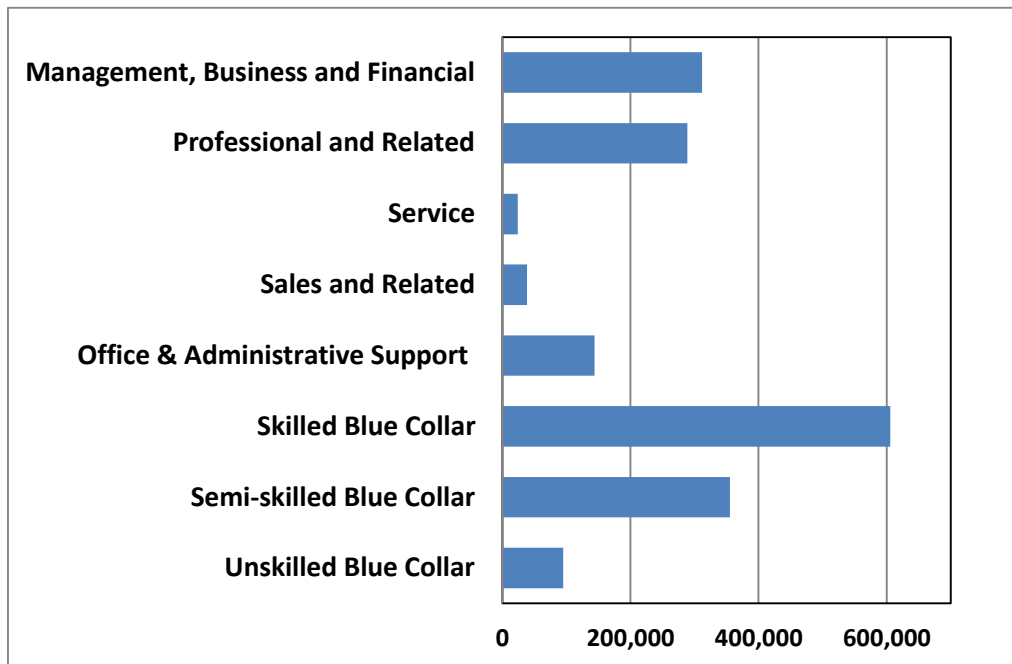
(Combining Pro-Development Policy with Baseline Growth and Replacement, Including Capital Investment)

	African American	Hispanic	Total	Female
Total	130,512	576,446	1,863,909	290,210
Management, Business and Financial	17,689	55,174	312,080	91,183
Professional and Related	18,317	57,469	288,912	62,376
Service	4,763	6,775	24,217	5,336
Sales and Related	1,070	7,174	38,728	6,937
Office & Administrative Support	10,161	33,529	143,920	91,855
Skilled Blue Collar	39,261	197,421	605,715	14,214
Semi-skilled Blue Collar	29,541	167,165	355,427	13,306
Unskilled Blue Collar	9,710	51,739	94,910	5,003

*African American, Hispanic and Total columns include females.

**Projected Job Opportunities in the Oil & Natural Gas and Petrochemical
Industries by Broad Occupational Category, 2015-2035**

(Combining Pro-Development Policy with Baseline Growth and Replacement, Including Capital Investment)



Projected Job Opportunities in the Oil & Natural Gas and Petrochemical Industries by Detailed Occupational Category, 2015-2035

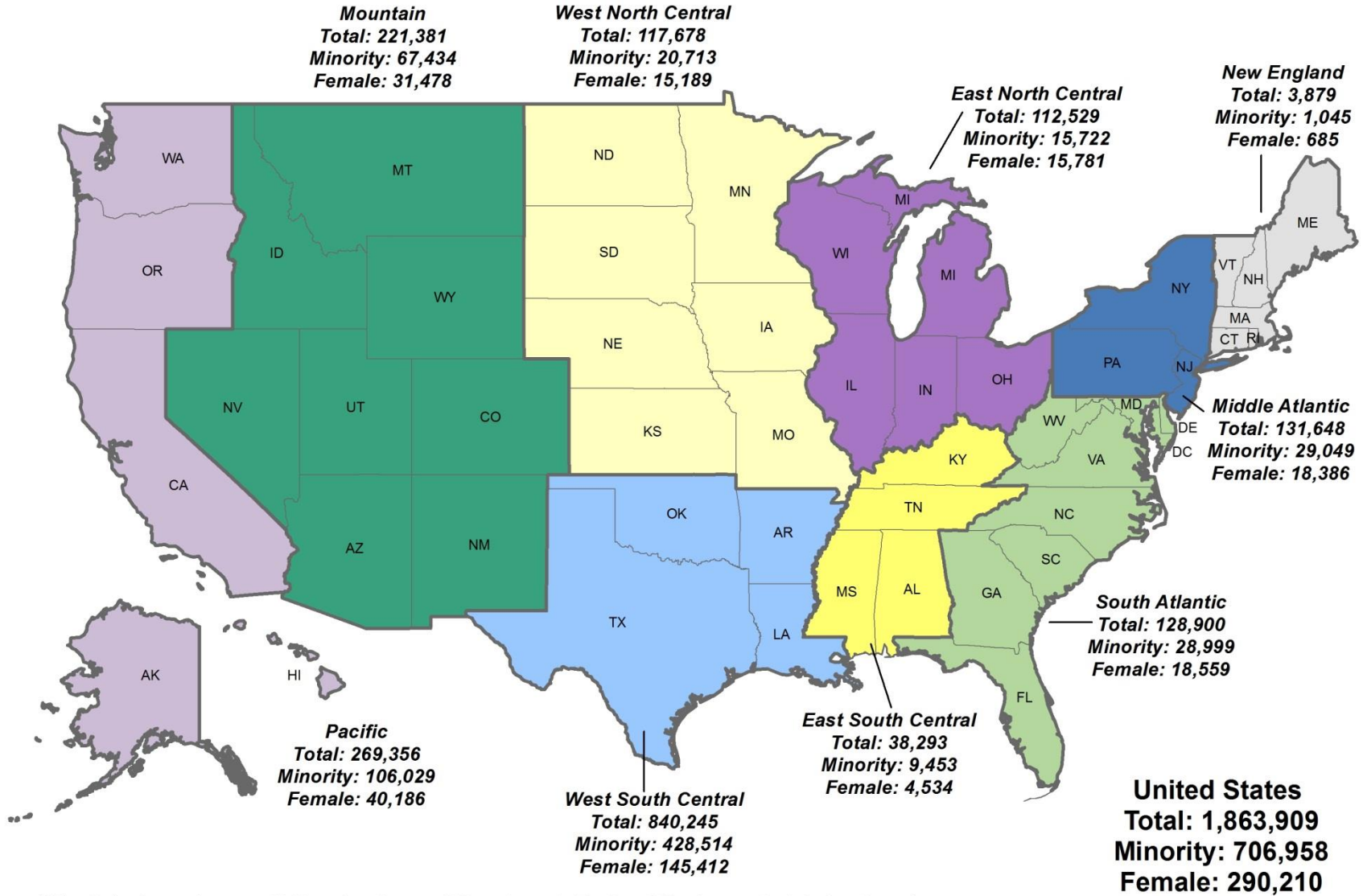
(Combining Pro-Development Policy with Baseline Growth and Replacement, Including Capital Investment)

Derrick, Rotary Drill, and Service Unit Operators	232,043
Roustabouts, Oil & Gas	107,307
Petroleum Engineers	67,547
Industrial Machinery Installation and Repair Workers	55,715
First-Line Supervisors of Construction and Extraction Workers	54,895
Pumping Station Operators	54,406
Construction Laborers	53,566
Driver/Sales Workers and Truck Drivers	52,538
Secretaries and Administrative Assistants	41,283
General and Operations and Investment Managers	39,584
Welding, Soldering, and Brazing Workers	37,620
Operating Engineers and Other Construction Equipment Operators	35,551
Laborers and Freight, Stock, and Material Movers, Hand	28,977
Environmental Scientists and Geoscientists	27,686
Accountants and Auditors	27,152
Office Clerks, General	24,620
Bookkeeping, Accounting, and Auditing Clerks	19,480
Maintenance and Repair Workers, General	18,553
Geological and Petroleum Technicians	17,986
Miscellaneous Production Workers	17,874
Pipelayers, Plumbers, Pipefitters, and Steamfitters	17,083
Civil Engineers	16,587
Sales Representatives, Wholesale and Manufacturing	15,081
Electricians	12,034
Helpers, Extraction Workers	8,905
Managers, n.e.c.	5,704

Job Growth by Region

- The West South Central region, which accounted for 58% of total oil & natural gas and petrochemical employment in 2015, will see the largest growth in job opportunities – 840 thousand, or 45% of the total.
- However, under the Pro-Development scenario policies that boost total job opportunities to nearly 1.9 million, other regions will also see significant growth. The Pacific region will have 14% of total job opportunities and the Mountain region 12%.

Total Projected Job Opportunities by Region, 2015-2035*



*"Minority" refers to the sum of African American and Hispanic totals. Total and Minority rows include female workers.

Key Tables

Of the total projected 1.9 million employment opportunities from all sources, 2015-2035, about one-quarter are due to base-line growth and investment, 31% to replacement requirements, and 42% to Pro-Development policy.

Projected Employment Opportunities by Source, 2015-2035

(Combining Pro-Development Policy with Baseline Growth and Replacement, Including Investment)

	Job Opportunities	Share of Total
Total Job Opportunities	1,863,909	100.0%
Baseline Growth and Capital Expenditures	489,010	26.2%
Industry Operations	383,980	20.6%
Capital Expenditures	105,030	5.6%
Replacement Requirements	585,097	31.4%
Pro-Development Policy	789,802	42.4%
Industry Operations	322,558	17.3%
Capital Expenditures	467,244	25.1%

Of the total projected 1.9 million employment opportunities from all sources, 2015-2035, nearly 1.4 million, or 75%, will result from growth and replacement in the upstream oil and natural gas industry.

Projected Employment Opportunities by Industry Segment and Source, 2015-2035

(Combining Pro-Development Policy with Baseline Growth and Replacement, Including Investment)

	Total	Industry Operations and Investment	Replacement
Total Job Opportunities	1,863,909	1,278,812	585,097
Upstream Oil & Gas Industry	1,390,201	1,057,786	332,415
Midstream Oil & Gas Industry	349,953	214,387	135,566
Downstream Oil & Gas Industry	30,005	-162	30,167
Petrochemical Industry	93,750	6,801	86,949
		Shares	
Total Job Opportunities	100.0%	68.6%	31.4%
Upstream Oil & Gas Industry	100.0%	76.1%	23.9%
Midstream Oil & Gas Industry	100.0%	61.3%	38.7%
Downstream Oil & Gas Industry	100.0%	-0.5%	100.5%
Petrochemical Industry	100.0%	7.3%	92.7%

Of the total projected 1.9 million employment opportunities from all sources, 2015-2035, minorities are projected to account for a slightly lower share in the upstream segment.

Projected Employment Opportunities by Industry Segment, 2015-2035
(Combining Pro-Development Policy with Baseline Growth and Replacement, Including Investment)

	African American	Hispanic	Minority	Total	Female
Total Job Opportunities	130,512	576,446	706,958	1,863,909	290,210
Upstream Oil & Gas Industry	81,066	411,633	492,699	1,390,201	218,625
Midstream Oil & Gas Industry	32,279	126,805	159,084	349,953	47,268
Downstream Oil & Gas Industry	3,403	10,494	13,897	30,005	5,245
Petrochemical Industry	13,764	27,514	41,278	93,750	19,072
	Minority and Female Shares of Total				
Total Job Opportunities	7.0%	30.9%	37.9%	100.0%	15.6%
Upstream Oil & Gas Industry	5.8%	29.6%	35.4%	100.0%	15.7%
Midstream Oil & Gas Industry	9.2%	36.2%	45.5%	100.0%	13.5%
Downstream Oil & Gas Industry	11.3%	35.0%	46.3%	100.0%	17.5%
Petrochemical Industry	14.7%	29.3%	44.0%	100.0%	20.3%

I. Introduction

This report presents estimates of the number of African Americans, Hispanics, and women currently employed in the oil & gas² and petrochemical industries and projections of future employment opportunities in these industries for those groups. The starting point for our estimates and projections is a set of long-term forecasts of the growth of the oil and gas industry under alternative assumptions, which were produced for the American Petroleum Institute (API) by Wood Mackenzie.³ The Wood Mackenzie study included projections of industry growth and capital investment under a ‘Regulatory Constraints’ scenario and a ‘Pro-Development’ scenario.

- The Regulatory Constraints scenario reflects a combination of recently enacted and proposed policy and regulatory changes that could inhibit oil and natural gas development, transportation, and refining.
- The Pro-Development scenario considers various policy measures to support growth in oil and natural gas development and transportation such as increasing federal permitting rates, opening new areas for exploration and development, and other policy actions.⁴

In both scenarios, Wood Mackenzie projected employment impacts at the state level, 2015 to 2035, in three broad segments of the oil and gas industry – upstream, midstream, and downstream. The Wood Mackenzie study – prepared in mid-2015 – anticipated lower oil prices, but not to the extent of the decline that has subsequently occurred. This has impacted employment in the near term, and the recent heavy cuts in capital expenditures in the industry likely mean a lower net increase in jobs through 2025 than projected in the Regulatory Constraints scenario. However, the differential impact of policy and regulatory changes on the long run growth of the industry projected by Wood Mackenzie remains relevant. And the focus of this report is the long-term U.S. demographic and labor market trends that will create future job opportunities for minorities and women in the industry.

The projections of minority and female job opportunities in the oil & gas and petrochemical industries presented in this report are based on IHS forecasts for the growth of the U.S. population by age, race/ethnicity and gender and on analysis and forecasts of the labor force participation rates and occupational employment trends of these groups. Details of these demographic and labor market forecasts and the data sources and methods used to produce them are presented in two appendices. In Appendix A we present projections of the African American and Hispanic populations, which are based on recent trends in fertility rates and immigration, nationally and in nine regions (the Census Bureau “divisions”), and we present

² The term ‘gas’ as used throughout the report refers to natural gas.

³ Wood Mackenzie, “A Comparison of U.S. Oil and Natural Gas Policies Pro-Development Policies vs. Proposed Regulatory Constraints,” June 22nd, 2015. Available at:

<http://www.api.org/~media/files/policy/american-energy/pro-v-regulatory-constraints-22-june15.pdf>

⁴ For details, see Wood Mackenzie, pp. 16-21.

projections of population by age, gender and race/ethnicity at five year intervals from 2010 through 2035.

In Appendix B we use these population projections as a basis for forecasting the employment of African Americans and Hispanics, nationally and by region. We analyze trends in the labor force participation and unemployment rates of these two groups as well as their employment by occupation in broad occupational categories. We also examine labor market research on female employment by occupation that supports our projections of female employment in the oil & gas and petrochemical industries.

The two minority groups analyzed here will account for a substantial share of U.S. labor force growth over the next 20 years. The Hispanic population, in particular, will play an increasingly significant role in future U.S. labor force growth, because the Hispanic population is a younger and faster growing segment of the population. We project that Hispanic labor force growth will average 2.5% per year over the next 20 years, compared with 0.7% for the overall labor force. As a result, the Hispanic population will account for nearly two-thirds of the increase in the labor force over this period. The African American labor force will also grow somewhat faster than the national average (1.0% over the 20-year period). Thus, the two minority groups combined will account for over 80% of the net increase in the labor force from 2015 to 2035. The white non-Hispanic population will continue to have millions of new entrants to the labor force, but this inflow will be largely offset by the wave of retiring Baby Boomers over the next 20 years.

Our estimates of minority and female employment in the oil & gas and petrochemical industries in 2015 are presented in Section II. We describe our approach to estimating the composition of employment in individual components of the industry by occupation, gender and race/ethnicity based on Census Bureau and Department of Labor sources, and we present detailed estimates of minority and female employment in each industry segment – benchmarked to industry-wide employment estimates from the Wood Mackenzie Regulatory Constraints scenario.

In Section III, we then present projections of minority and female employment opportunities in the industry, first under the Regulatory Constraints scenario. We then project the additional job opportunities that will be created for minorities and women by the need to replace workers retiring from the industry over the next two decades. Finally, we project the additional gains in minority and female employment opportunities under the Wood Mackenzie Pro-Development scenario.

Section IV is a brief discussion of opportunities for Asians and Native Americans in the oil & gas and petrochemical industries.

In Section V, we present summary results of the total job opportunities projected for minorities and women in the oil & gas and petrochemical industries when the added job gains under pro-development policy are combined with the increase in employment projected in the Regulatory Constraints scenario and replacement requirements through 2035.

II. Minority and Female Employment in the Oil & Natural Gas and Petrochemical Industries in 2015

Benchmark Industry-wide Employment Estimates

The IHS projections of the population, labor force and economy-wide employment of minorities and women through 2035 that are presented in Appendices A and B provide the basis for our projections of potential employment opportunities for minorities and women in the oil and gas and petrochemical industries. All estimates and projections of minority and female employment in the oil and gas industry that we present below are tied to a set of projections of employment growth in the industry under two alternative scenarios that were produced for the American Petroleum Institute by Wood Mackenzie.⁵ That study identified job creation in three broad segments of the oil and gas industry – upstream, midstream, and downstream. Within the upstream and midstream segments, Wood Mackenzie projected employment separately for the ongoing operations of the industries and for the impact of investment in the industries. Investment impacts were not projected for the downstream segment.

Wood Mackenzie projected employment impacts at the state level, 2015 to 2035. In this report, we present estimates of minority and female employment for nine regions of the country and focus on employment at five year intervals – 2015, 2020, 2025, 2030, and 2035.

The two scenarios for which Wood Mackenzie projected employment growth included a ‘Regulatory Constraints’ scenario and a ‘Pro-Development’ scenario. The Regulatory Constraints scenario reflects a combination of recently enacted and proposed policy and regulatory changes that could inhibit oil and natural gas development, transportation, and refining. The Pro-Development scenario considers various policy measures to support growth in oil and natural gas development and transportation such as increasing federal permitting rates, opening new areas for exploration and development, and other policy actions.⁶

Our analysis of minority and female employment in this report also extends to the petrochemical industry. Benchmark estimates of employment in petrochemical operations and employment stimulated by future investment in the petrochemical industry, nationally and by region, were produced by the IHS Chemicals group.

Wood Mackenzie’s employment estimates were produced with the IMPLAN model, which is widely used for estimating employment impacts. IMPLAN employment data measure the total number of full-time and part-time workers and include sole proprietors. Therefore, in utilizing other sources such as the American Community Survey and the Current Population Survey to estimate minority and female employment within industries, we included the self-employed in our tabulations of these data.

⁵ Wood Mackenzie, “A Comparison of U.S. Oil and Natural Gas Policies Pro-Development Policies vs. Proposed Regulatory Constraints,” June 22nd, 2015. Available at:

<http://www.api.org/~media/files/policy/american-energy/pro-v-regulatory-constraints-22-june15.pdf>

⁶ For details, see Wood Mackenzie, pp. 16-21.

The employment estimates presented in this report include only the direct employment in oil and gas and petrochemical industry operations and the direct employment stimulated by capital expenditures in these industries. If indirect and induced effects were considered, the total job impacts would be significantly larger.

Definition of Industry Segments

Within each broad segment of the oil and gas industry for which Wood Mackenzie produced employment projections, we identified the component industries as defined in the North American Industry Classification System (NAICS) in order to estimate employment on a more disaggregated basis by occupation, race/ethnicity and gender. We gathered data on employment in these component industries, nationally and by region, drawing primarily on the Bureau of Labor Statistics' (BLS) Quarterly Census of Employment and Wages and the IMPLAN model.

As described further below, we use data from the Bureau of Labor Statistics' Occupational Employment Statistics to estimate employment by occupation and data from the American Community Survey (ACS) to estimate the distribution of employment by minority group and gender within occupations in each NAICS industry within the oil and gas and petrochemical industries. The ACS uses an industry classification for employment that in some instances is broader than the level of NAICS detail at which we define the oil and gas industry. In all instances, we use the closest possible match of an ACS industry to each NAICS industry category to estimate the distribution of employment by occupation, race/ethnicity and gender. The NAICS-based definition of all industry segments is shown below.

Upstream Oil and Natural Gas Industry Operations

- NAICS 2111, Oil and gas extraction
 - ACS industry 0370
- NAICS 2131, Support activities for mining
 - ACS industry 0490

Investment in the Upstream Oil and Natural Gas Industry

- NAICS 2131, Support activities for mining
 - ACS industry 0490
- NAICS 23712, Oil and gas pipeline and related structures construction
 - ACS industry 0770
- NAICS 54136, Geophysical surveying and mapping services
 - ACS industry 7290

Midstream Oil and Natural Gas Industry Operations

- NAICS 486, Pipeline transportation
 - ACS industry 6270

- NAICS 4821, Line haul railroads
 - ACS industry 6080
- NAICS 49319, Other warehousing and storage
 - ACS industry 6390

Investment in the Midstream Oil and Natural Gas Industry

- NAICS 23712, Oil and gas pipeline and related structures construction
 - ACS industry 0770
- NAICS 3312, Iron and steel pipe and tube manufacturing
 - ACS industry 2670
- NAICS 33242, Metal tank (heavy-gauge) manufacturing
 - ACS industry 2870
- NAICS 33291, Industrial valve manufacturing, and 332196, Fabricated pipe and pipe fitting manufacturing
 - ACS industry 2980
- NAICS 333132, Oil and gas field machinery and equipment manufacturing
 - ACS industry 3080
- NAICS 5413 Architectural, engineering, and related services
 - ACS industry 7290

Downstream Oil and Natural Gas Industry Operations

- NAICS 32411, Petroleum refineries
 - ACS industry 2070

Because the projections in this report are benchmarked to the more recent Wood Mackenzie study, the specific NAICS industries included in the definitions of certain segments of the oil and gas industry in this study differ from the definitions employed in previous studies of minority and female employment in the industry prepared by IHS for API.⁷ For example, only the petroleum refining industry is included in our analysis of the downstream segment here, while in the earlier studies petroleum product manufacturers and wholesalers and fuel oil dealers were included in the downstream segment. There are also minor differences in the NAICS-based industry definitions of investment activity in some other segments. These differences in industry definition are one source of differences in the number of projected job opportunities by region and minority group in this report compared to the previous studies. In particular, industry-wide we now estimate a slightly lower share of African American employment.

Our analysis of employment by occupation, race/ethnicity and gender in the petrochemical industry is based on data drawn from a study of the unconventional oil and natural gas value chain conducted by IHS in 2013, which assessed the economic contributions associated with the capital and operational expenditures required to build out midstream and downstream energy

⁷ IHS, *Employment Outlook for African Americans and Latinos in the Upstream Oil and Natural Gas Industry*, report for the American Petroleum Institute, Nov. 2012, and IHS, *Minority and Female Employment: Regional Forecasts for the Oil & Gas and Petrochemical Industries*, report for the American Petroleum Institute, June 2014.

and the energy-related chemicals industrial base to support the expansion of unconventional oil and gas.⁸ These projections were extended to 2035 for this study. The component industries for the petrochemical industry and investment in the petrochemical industry are as follows:

Petrochemical Industry

- NAICS 325211, Plastic Material and Resin Manufacturing
 - ACS industry 2170
- NAICS 32531, Fertilizer Manufacturing
 - ACS industry 2180
- NAICS 32511, Petrochemical Manufacturing [Alkalies and Chlorine Manufacturing (325181) and Other Basic Chemical Manufacturing (32519)]
 - ACS industry 2290

Investment in the Petrochemical Industry

- NAICS 23712, Oil and gas pipeline and related structures construction
 - ACS industry 0770
- NAICS 33242, Metal tank (heavy-gauge) manufacturing
 - ACS industry 2870
- NAICS 33291, Industrial valve manufacturing, and 332196, Fabricated pipe and pipe fitting manufacturing
 - ACS industry 2980
- NAICS 333132, Oil and gas field machinery and equipment manufacturing
 - ACS industry 3080
- NAICS 5413 Architectural, engineering, and related services
 - ACS industry 7290

Occupations in the Oil & Natural Gas and Petrochemical Industries

As described in Appendix B, in order to make comprehensive estimates of job creation in the oil and gas and petrochemical industries, we present employment projections in eight broad occupational categories:

- Management, business and financial
- Professional and related
- Service
- Sales and related
- Office & administrative support
- Skilled blue-collar
- Semi-skilled blue collar
- Unskilled blue collar

⁸ IHS, *America's New Energy Future: The Unconventional Oil and Gas Revolution and the U.S. Economy, Volume 3: Manufacturing Renaissance*, August 2013

In addition to projecting employment in these eight broad categories, we also estimate and project employment in selected detailed occupations that have high employment counts in individual segments of the oil and gas and petrochemical industries or are common in many segments of these industries. These occupations are listed in Table II.1 (grouped into the eight broad occupational categories). Descriptions of these 26 occupations are provided in Appendix C. They include the top 20 occupations in oil and gas industry operations as well as key occupations in oil and gas investment industries.

Table II.1
Detailed Occupations for Employment Analysis

Management, Business and Financial

- General and operations managers
- Managers, all other
- Accountants and auditors

Professional and Related

- Civil engineers
- Petroleum engineers
- Environmental scientists and geoscientists
- Geological and petroleum technicians

Service - none

Sales & Related

- Sales representatives, wholesale and manufacturing

Office & Administrative Support

- Bookkeeping, accounting, and auditing clerks
- Secretaries and administrative assistants
- Office clerks, general

Skilled Blue Collar

- First-Line supervisors of construction trades and extraction workers
- Operating engineers and other construction equipment operators
- Electricians
- Pipelayers, plumbers, pipefitters, and steamfitters
- Derrick, rotary drill, and service unit operators
- Industrial machinery installation, maintenance and repair mechanics
- Pumping station operators

Semi-skilled Blue Collar

- Roustabouts, oil and gas
- Maintenance and repair workers, general
- Welding, soldering, and brazing workers
- Miscellaneous production workers
- Driver/sales workers and truck drivers

Unskilled Blue Collar

- Construction laborers
 - Helpers, extraction workers
 - Laborers and freight, stock, and material movers, hand
-

To determine the current mix of jobs by occupation in each NAICS industry within each segment of the oil and gas and petrochemical industries, we rely on data from the Bureau of Labor Statistics' Occupational Employment Statistics (OES), which contains detailed data on employment by occupation within individual industries. We then use data from the 2012-2014 public-use microdata files of the American Community Survey (ACS) to estimate the distribution of employment by minority group and gender within occupations in each NAICS industry in each segment of the oil and gas industry and the petrochemical industry – nationally and by region.

As we developed our estimates of employment in all demographic groups using the ACS data, we maintained full detail by gender within each race/ethnicity group within each occupation and industry for each region. However, the small amounts of total oil and gas industry employment in some industries and regions (and, thus, the small sample sizes in the ACS data) limit the extent of detail we can report by gender within minority groups. Nonetheless, across all industry segments, we report estimates of the overall male/female breakdown of employment at the level of eight major occupations separately for each region.

Industry-wide Employment Projections under Two Scenarios

As noted above, the Wood Mackenzie report that provides benchmark employment projections for oil and gas industry employment under two alternative scenarios identifies employment in five industry segments. Data from the Wood Mackenzie Regulatory Constraints scenario aggregated to the level of nine regions at five year intervals are shown in Table II.2. Industry-wide employment is projected to increase by over 500 thousand jobs between 2015 and 2025 in this scenario.

Table II.2
Wood Mackenzie Employment Projections:
Regulatory Constraints Scenario

	2015	2020	2025	2030	2035
Total	1,188,279	1,581,534	1,694,960	1,674,475	1,670,488
Upstream Oil and Gas Industry	797,174	1,187,334	1,266,459	1,236,905	1,217,315
Industry Operations	384,764	622,242	689,823	700,310	671,314
Investment	412,410	565,092	576,636	536,595	546,001
Midstream Oil and Gas Industry	319,553	322,345	356,646	365,715	381,318
Industry Operations	114,557	135,463	152,843	165,358	166,423
Investment	204,996	186,882	203,803	200,357	214,895
Downstream Oil and Gas Industry	71,552	71,855	71,855	71,855	71,855

The Wood Mackenzie forecast of U.S. oil and natural gas development, capital spending, and employment projects a modest decline after 2025. This is due to the conservative nature of the forecast. There is a projected slowdown post-2025 in many of the known formations and basins currently being developed as these areas mature and potential drilling locations are

reduced. The Wood Mackenzie forecast does not include development in any formations and basins that have not yet been identified or have not yet been proven commercially viable. However, it is likely that new formations and basins not in the forecast will be found and developed. Therefore, the Wood Mackenzie forecast should be considered as conservative especially in the latter half of the projection.

In Wood Mackenzie's Pro-Development scenario, industry-wide employment is projected to increase by 1.2 million over the period 2015-2035 (see Table II.3). Employment projections for nine regions corresponding to the national data shown in Tables II.2 and II.3 are provided in Appendix D.

Table II.3
Wood Mackenzie Employment Projections:
Pro-Development Scenario

	2015	2020	2025	2030	2035
Total	1,261,670	1,910,320	2,173,790	2,370,690	2,460,290
Upstream Oil and Gas Industry	827,810	1,392,720	1,624,560	1,785,430	1,854,960
Industry Operations	384,940	703,710	826,980	930,220	953,800
Investment	442,870	689,010	797,580	855,210	901,160
Midstream Oil and Gas Industry	362,470	446,210	477,840	513,870	533,940
Industry Operations	115,250	153,840	181,260	207,110	206,960
Investment	247,220	292,370	296,580	306,760	326,980
Downstream Oil and Gas Industry	71,390	71,390	71,390	71,390	71,390

Our projections of minority and female employment in the petrochemical industry are based on a single IHS scenario for future investment in and growth of operations of the industry (Table II.4).

Table II.4
Projections of Employment in the Petrochemical Industry

	2015	2020	2025	2030	2035
Total Petrochemical	202,135	214,548	216,827	217,316	208,936
Industry Operations	161,576	187,220	196,983	203,425	206,837
Investment	40,559	27,328	19,844	13,891	2,099

The petrochemical industry is concentrated in the West South Central region, and the majority of investment is also projected to be in that region. Employment projections for the petrochemical industry by region are provided in Appendix D.

Minority and Female Employment in the Oil & Natural Gas Industry in 2015

Estimates of employment by occupation in all segments of the oil & gas and petrochemical industries in 2015 are presented in Table II.5. The oil and gas industry is characterized by a high share of skilled blue-collar jobs, especially in midstream oil and gas operations where skilled blue-collar jobs account for 35% of total employment. Management and professional occupations account for a higher share of employment in the downstream segment – 38% of the total, compared to an industry-wide average of 33%.

The petrochemical industry has a higher share of employment in semi-skilled jobs, including miscellaneous types of production workers. Office and administrative support jobs account for about 9% of employment in both the petrochemical and oil and gas industries.

Summary data on minority and female employment in the oil & gas and petrochemical industries in 2015 are presented in Table II.6. Hispanic workers held 283 thousand jobs across the combined oil and gas and petrochemical industry – 20% of the total. They accounted for a higher share of employment in industries involved in investment in the industry than in industry operations. African American workers held 94 thousand jobs in these industries in 2015, accounting for 6.7% of total employment. Women accounted for 17% of total employment in the combined oil & gas and petrochemical industries. Their share is higher in petrochemical industry operations (21%) and lower in the investment industries (14%).

Data on minority and female employment in detailed occupations in the oil & gas and petrochemical industries in 2015 are in Table II.7. Data in this format for each segment of the industry (upstream, midstream, downstream and petrochemical) are in Appendix E.

**Table II.5
Employment in the Oil & Gas and Petrochemical Industries by Broad Occupation: 2015**

	Industry Operations						Investment in the Industry				
	Total	Total	Upstream	Midstream	Downstream	Petro-chemical	Total	Upstream	Midstream	Petro-chemical	
Total	1,390,414	732,449	384,764	114,557	71,552	161,576	657,965	412,410	204,996	40,559	
Management, Business and Financial	246,184	140,191	80,917	16,011	14,066	29,197	105,993	67,499	32,463	6,031	
Professional and Related	209,141	113,902	66,978	9,860	12,852	24,212	95,239	64,949	24,451	5,839	
Service	16,549	10,742	3,379	1,861	1,589	3,913	5,807	3,584	1,850	373	
Sales and Related	29,269	14,126	6,464	1,153	977	5,532	15,143	7,402	6,784	957	
Office & Administrative Support	119,524	66,718	34,808	10,131	6,677	15,102	52,806	33,911	15,771	3,124	
Skilled Blue Collar	403,487	207,402	121,602	40,038	19,221	26,541	196,085	132,398	52,971	10,716	
Semi-skilled Blue Collar	296,226	153,361	64,652	26,810	13,546	48,353	142,865	80,198	53,029	9,638	
Unskilled Blue Collar	70,034	26,007	5,964	8,693	2,624	8,726	44,027	22,469	17,677	3,881	
					Shares						
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
Management, Business and Financial	17.7%	19.1%	21.0%	14.0%	19.7%	18.1%	16.1%	16.4%	15.8%	14.9%	
Professional and Related	15.0%	15.6%	17.4%	8.6%	18.0%	15.0%	14.5%	15.7%	11.9%	14.4%	
Service	1.2%	1.5%	0.9%	1.6%	2.2%	2.4%	0.9%	0.9%	0.9%	0.9%	
Sales and Related	2.1%	1.9%	1.7%	1.0%	1.4%	3.4%	2.3%	1.8%	3.3%	2.4%	
Office & Administrative Support	8.6%	9.1%	9.0%	8.8%	9.3%	9.3%	8.0%	8.2%	7.7%	7.7%	
Skilled Blue Collar	29.0%	28.3%	31.6%	35.0%	26.9%	16.4%	29.8%	32.1%	25.8%	26.4%	
Semi-skilled Blue Collar	21.3%	20.9%	16.8%	23.4%	18.9%	29.9%	21.7%	19.4%	25.9%	23.8%	
Unskilled Blue Collar	5.0%	3.6%	1.6%	7.6%	3.7%	5.4%	6.7%	5.4%	8.6%	9.6%	

**Table II.6
Minority and Female Employment in the Oil & Gas and Petrochemical Industries: 2015**

	Industry Operations						Investment in the Industry			
	Total	Total	Upstream	Midstream	Downstream	Petro-chemical	Total	Upstream	Midstream	Petro-chemical
Total	1,390,414	732,449	384,764	114,557	71,552	161,576	657,965	412,410	204,996	40,559
Minority	377,072	168,740	80,799	28,204	20,167	39,570	208,332	121,906	71,074	15,352
share of total	27.1%	23.0%	21.0%	24.6%	28.2%	24.5%	31.7%	29.6%	34.7%	37.9%
Hispanic	283,470	114,323	61,351	16,744	13,394	22,834	169,147	97,723	58,482	12,942
share of total	20.4%	15.6%	15.9%	14.6%	18.7%	14.1%	25.7%	23.7%	28.5%	31.9%
African American	93,602	54,417	19,448	11,460	6,773	16,736	39,185	24,183	12,592	2,410
share of total	6.7%	7.4%	5.1%	10.0%	9.5%	10.4%	6.0%	5.9%	6.1%	5.9%
Female	237,231	143,091	78,087	16,812	13,312	34,880	94,140	58,770	29,473	5,897
share of total	17.1%	19.5%	20.3%	14.7%	18.6%	21.6%	14.3%	14.3%	14.4%	14.5%

*Total and minority categories include females.

Table II.7
Minority and Female Employment in the Oil & Gas and Petrochemical Industries
By Detailed Occupation: 2015

	Total	African American	Hispanic	Minority Share	Female	Female Share
General and Operations and Investment Managers	30,440	710	2,885	12%	2,012	7%
Managers, All Other	4,519	195	463	15%	807	18%
Accountants and Auditors	17,343	1,239	1,329	15%	10,557	61%
Civil Engineers	10,844	561	1,126	16%	1,245	11%
Petroleum Engineers	30,604	1,332	2,791	13%	3,888	13%
Environmental Scientists and Geoscientists	15,643	370	1,057	9%	3,283	21%
Geological and Petroleum Technicians	10,071	638	1,403	20%	2,398	24%
Sales Representatives, Wholesale and Manufacturing	13,128	323	1,195	12%	1,875	14%
Bookkeeping, Accounting, and Auditing Clerks	17,275	722	2,078	16%	15,599	90%
Secretaries and Administrative Assistants	33,087	854	3,771	14%	32,116	97%
Office Clerks, General	21,699	1,586	3,950	26%	18,263	84%
First-Line Supervisors of Construction Trades and Extraction Workers	41,975	1,704	8,329	24%	1,080	3%
Construction Laborers	45,588	2,570	21,797	53%	1,185	3%
Operating Engineers and Other Construction Equipment Operators	28,093	887	6,753	27%	430	2%
Electricians	10,978	587	2,103	25%	119	1%
Pipelayers, Plumbers, Pipefitters, and Steamfitters	17,125	1,379	5,764	42%	141	1%
Derrick, Rotary Drill, and Service Unit Operators	118,897	6,082	32,955	33%	2,665	2%
Roustabouts, Oil & Gas	64,727	3,270	18,079	33%	1,451	2%
Helpers, Extraction Workers	6,302	305	2,129	39%	139	2%
Industrial Machinery Installation, Repair, and Maintenance Workers	29,699	1,715	6,086	26%	716	2%
Maintenance and Repair Workers, General	16,849	1,179	2,413	21%	342	2%
Welding, Soldering, and Brazing Workers	24,483	1,346	9,212	43%	432	2%
Miscellaneous Production Workers	15,667	1,397	4,547	38%	1,277	8%
Driver/Sales Workers and Truck Drivers	41,481	3,921	12,626	40%	1,040	3%
Laborers and Freight, Stock, and Material Movers, Hand	18,725	2,192	5,852	43%	1,177	6%
Pumping Station Operators	30,198	838	4,037	16%	818	3%

In the West South Central region, which has the largest share of national employment in both the oil & gas and petrochemical industries, Hispanic workers account for one-fourth of the region's total (see Table II.8). Data in this table, as above, include employment in both industry operations and investment in the industry. The African American share of employment in the oil & gas and petrochemical industries is highest in the East South Central (14.4%) and South Atlantic (13.1%) regions. The female share of employment in the oil and gas and petrochemical industries varies among regions largely due to differences in their industry mix within this complex of industries.

Table II.8
Minority and Female Employment in the Oil and Gas and Petrochemical Industries by Region: 2015

**Minority and Female Employment in the Oil & Gas and Petrochemical Industries
 By Census Division: 2015**

	Total	Hispanic		African American		Female	
		Number	Share of Total	Number	Share of Total	Number	Share of Total
U.S.	1,390,414	283,470	20.4%	93,602	6.7%	237,231	17.1%
New England	7,829	940	12.0%	256	3.3%	1,549	19.8%
Middle Atlantic	87,145	8,837	10.1%	4,455	5.1%	13,584	15.6%
East North Central	80,651	6,178	7.7%	4,231	5.2%	13,675	17.0%
West North Central	93,927	6,640	7.1%	2,268	2.4%	13,800	14.7%
South Atlantic	60,537	6,556	10.8%	7,931	13.1%	10,892	18.0%
East South Central	33,826	1,042	3.1%	4,856	14.4%	5,404	16.0%
West South Central	804,154	200,481	24.9%	63,723	7.9%	143,753	17.9%
Mountain	133,020	26,314	19.8%	1,783	1.3%	20,214	15.2%
Pacific	89,325	26,482	29.6%	4,099	4.6%	14,360	16.1%

*Total and minority categories include females

Additional detail on employment in 2015 in the oil and gas and petrochemical industries by occupation, race/ethnicity, and gender – nationally and by region – is included in various tables in the following section where we present projections of minority and female job opportunities in these industries.

III. Projections of Minority and Female Job Opportunities, 2015-2035

In this section we present projections of job opportunities for minority groups and women in the oil & gas and petrochemical industries over the period 2015-2035. These job opportunities can be subdivided as follows:

- The growth in employment under a baseline scenario of overall industry growth as defined by the Wood Mackenzie Regulatory Constraints scenario described above.
- Job opportunities that will be created by the need to replace retiring workers in all industry segments through 2035.
- The additional job opportunities that would be created (above those projected in the baseline scenario) in Wood Mackenzie’s Pro-Development scenario.

Both the Regulatory Constraints and Pro-Development scenarios include employment stimulated by investment in these industries as well as ongoing industry operations.

Summary results for projected job opportunities from all sources are presented in Table III.1. We project a total of nearly 1.9 million job opportunities over the period 2015-2035 considering all sources and types of job growth. Of those nearly 1.9 million job opportunities, we project that Hispanic workers will account for 576 thousand jobs and African American workers 131 thousand over the 20-year period, combining to account for close to 40% of total job opportunities. Women are projected to fill more than 290 thousand of the job opportunities through 2035, or 16% of the total.

**Table III.1
Projected Job Opportunities in the Oil & Natural Gas and Petrochemical
Industries from All Sources**

	Total	African American	Hispanic	Minority	Female
2015-2025					
Total	1,282,246	86,885	357,403	444,288	207,509
Baseline Growth (Operations and Investment)	521,373	45,181	179,898	225,079	87,250
Replacement	282,043	18,243	39,865	58,108	48,420
Pro-Development Policy	478,830	23,461	137,640	161,101	71,839
2015-2035					
Total	1,863,909	130,512	576,446	706,958	290,210
Baseline Growth (Operations and Investment)	489,010	52,386	251,958	304,344	77,382
Replacement	585,097	39,005	99,276	138,281	100,527
Pro-Development Policy	789,802	39,121	225,212	264,333	112,301

These projections of job opportunities for minorities and women should not be interpreted as a ceiling or cap on their potential future employment opportunities. These are expected outcomes based on current and projected trends in factors such as population growth rates, labor force participation rates, and the occupational mix of employment in these demographic groups.

Below we present the detailed estimates for each component of job opportunities underlying these aggregate results, including projections of minority and female employment by occupation and region in individual industry segments under both scenarios.

Regulatory Constraints Scenario

Projections of the growth of employment by broad occupation in individual segments of the oil & gas and petrochemical industries under the Regulatory Constraints scenario – in total and separately for minority groups and women – are presented in Tables III.2-III.7. Additional detail is provided in two appendices: projections of total employment across all segments by broad occupation for minority groups and women by region are in Appendix F; projections of employment by detailed occupation and region in individual segments of the oil & gas and petrochemical industries are in Appendix G.

Upstream Oil and Natural Gas Industry

In the upstream segment of the oil and gas industry (including industry operations and employment stimulated by investment in the industry), we project that the share of Hispanic and African American employment will rise from an estimated 25% in 2015 to 35% in 2035, with a net increase of 223 thousand minority jobs (see Table III.2).

Within upstream oil and gas industry operations, the share of minority employment is projected to rise from 21% in 2015 to 26% in 2035, with most of the growth accounted for by a strong increase in Hispanic employment. The share of female employment in this industry is projected to remain stable near 20% as much of the employment growth will be in traditionally male-dominated blue collar occupations. Our separate projections of employment stimulated by investment in the upstream oil and gas industry show that in this heavy-construction related industry segment, female employment shares are lower. However, the shares of both minority groups are slightly higher.

Midstream Oil and Natural Gas Industry

Projections of job opportunities in the midstream oil and gas industry (including industry operations and employment stimulated by investment in the industry) are in Table III.3. We project that the share of Hispanic and African American employment will rise from an estimated 31% in 2015 to 40% in 2035.

In midstream oil and gas industry operations, the share of minority employment is projected to rise from 25% in 2015 to 34% in 2035, with most of the growth accounted for by a strong increase in Hispanic employment. The minority share is higher in employment stimulated by

investment in this industry, and the combined share of African American and Hispanic workers in these investment-related jobs in the midstream industry is projected to rise from 35% in 2015 to 44% in 2035.

Downstream Oil and Natural Gas Industry

Projections of minority and female employment by broad occupation in downstream oil and gas industry operations are presented in Table III.4. No investment in the downstream industry is projected in either of Wood Mackenzie's two scenarios, and employment in industry operations is projected to be unchanged through 2035. Nonetheless, we project changes in the occupational mix of employment in the industry, with the share of professional and related occupations rising and blue collar and office and administrative support employment falling. The share of minority employment is also projected to rise, from 28% in 2015 to 37% in 2035.

Oil & Natural Gas Industry Employment Totals

Projections of combined employment for all segments of the oil and gas industry, including both industry operations and investment, are summarized in Table III.5. Wood Mackenzie projects a net increase in employment in all industry segments between 2015 and 2035 of 482 thousand in its Regulatory Constraints scenario. Based on the demographic and labor force trends summarized in Appendices A and B, we project that the net increase in employment of Hispanics and African Americans will total 284 thousand, or nearly 60% of the net gain in jobs.

Petrochemical Industry

Projections of employment in the petrochemical industry, including industry operations and employment stimulated by investment, are shown in Table III.6. Employment levels in 2035 are just slightly above those of 2015. The share of minority employment in the industry rises from 27% in 2015 to 36% in 2035.

Combined Employment in the Oil & Natural Gas and Petrochemical Industries

Employment estimates and projections combining the petrochemical industry with all segments of the oil and gas industry, including both baseline industry operations and investment, are presented in Table III.7. Employment across all segments is projected to increase by 521 thousand between 2015 and 2025 and then decline by 32 thousand between 2025 and 2035 for a net gain over the 20-year forecast period of 489 thousand. We project that the increase in employment of Hispanics and African Americans over the 20 years will total 304 thousand, or over 60% of the net increase in jobs. In particular, Hispanic employment as a percentage of the total across the oil and gas and petrochemical industries will increase from 20.4% of the total in 2015 to 28.5% in 2035.

With the strongest growth among industry segments projected for the upstream oil and gas industry, the biggest increases in employment over the 20-year forecast period will be seen in the skilled blue collar and professional/technical jobs that account for a large share of employment in that industry.

Table III.2
Projected Baseline Employment in Upstream Oil & Gas Industry Operations and Investment

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015						
Total	797,174	43,631	159,074	25%	136,857	17%
Management, Business and Financial	148,416	7,630	13,451	14%	44,870	30%
Professional and Related	131,927	6,825	14,545	16%	28,328	21%
Service	6,963	1,509	1,662	46%	1,256	18%
Sales and Related	13,866	245	1,682	14%	2,184	16%
Office & Administrative Support	68,719	3,743	9,510	19%	48,819	71%
Skilled Blue Collar	254,000	12,301	60,308	29%	6,199	2%
Semi-skilled Blue Collar	144,850	9,586	46,761	39%	4,459	3%
Unskilled Blue Collar	28,433	1,792	11,155	46%	742	3%
2020						
Total	1,187,334	70,626	261,750	28%	203,897	17%
Management, Business and Financial	220,727	12,470	24,045	17%	67,862	31%
Professional and Related	196,728	11,209	25,630	19%	42,964	22%
Service	10,552	2,347	2,776	49%	1,880	18%
Sales and Related	20,645	446	3,046	17%	3,270	16%
Office & Administrative Support	101,939	6,091	16,304	22%	71,172	70%
Skilled Blue Collar	379,849	19,950	97,946	31%	9,306	2%
Semi-skilled Blue Collar	216,234	15,310	74,714	42%	6,391	3%
Unskilled Blue Collar	40,660	2,803	17,289	49%	1,052	3%
2025						
Total	1,266,459	77,287	304,513	30%	216,771	17%
Management, Business and Financial	233,169	13,638	29,382	18%	73,570	32%
Professional and Related	208,638	12,307	31,042	21%	46,723	22%
Service	11,310	2,505	3,210	51%	2,036	18%
Sales and Related	21,625	510	3,651	19%	3,427	16%
Office & Administrative Support	106,665	6,577	19,070	24%	73,425	69%
Skilled Blue Collar	410,450	22,162	113,341	33%	9,932	2%
Semi-skilled Blue Collar	230,839	16,497	85,072	44%	6,496	3%
Unskilled Blue Collar	43,763	3,091	19,745	52%	1,162	3%
2030						
Total	1,236,905	77,058	319,635	32%	210,579	17%
Management, Business and Financial	227,187	13,660	32,496	20%	72,087	32%
Professional and Related	204,903	12,352	34,293	23%	46,324	23%
Service	11,077	2,451	3,291	52%	2,001	18%
Sales and Related	21,039	518	3,983	21%	3,335	16%
Office & Administrative Support	102,823	6,456	20,183	26%	69,818	68%
Skilled Blue Collar	404,354	22,453	118,696	35%	9,820	2%
Semi-skilled Blue Collar	224,922	16,216	87,784	46%	6,108	3%
Unskilled Blue Collar	40,600	2,952	18,909	54%	1,086	3%
2035						
Total	1,217,315	80,342	345,138	35%	206,268	17%
Management, Business and Financial	224,177	14,267	36,257	23%	71,203	32%
Professional and Related	204,927	13,121	38,510	25%	46,355	23%
Service	10,877	2,461	3,503	55%	1,985	18%
Sales and Related	20,922	566	4,390	24%	3,320	16%
Office & Administrative Support	100,428	6,675	21,793	28%	67,074	67%
Skilled Blue Collar	396,278	23,589	127,487	38%	9,541	2%
Semi-skilled Blue Collar	219,700	16,648	93,415	50%	5,694	3%
Unskilled Blue Collar	40,006	3,015	19,783	57%	1,096	3%

Table III.3
Projected Baseline Employment in Midstream Oil & Gas Industry Operations and Investment

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015						
Total	319,553	24,052	75,226	31%	46,285	14%
Management, Business and Financial	48,474	2,185	4,849	15%	12,984	27%
Professional and Related	34,311	2,047	4,014	18%	6,200	18%
Service	3,711	578	690	34%	1,149	31%
Sales and Related	7,937	145	847	12%	1,457	18%
Office & Administrative Support	25,902	2,526	4,445	27%	15,915	61%
Skilled Blue Collar	93,009	7,043	21,837	31%	2,167	2%
Semi-skilled Blue Collar	79,839	7,161	26,657	42%	4,855	6%
Unskilled Blue Collar	26,370	2,367	11,887	54%	1,558	6%
2020						
Total	322,345	26,161	78,245	32%	45,808	14%
Management, Business and Financial	47,877	2,380	5,364	16%	12,860	27%
Professional and Related	33,654	2,180	4,357	19%	6,235	19%
Service	4,037	702	770	36%	1,269	31%
Sales and Related	7,247	173	931	15%	1,425	20%
Office & Administrative Support	26,020	2,715	4,810	29%	15,645	60%
Skilled Blue Collar	97,480	7,879	23,169	32%	2,182	2%
Semi-skilled Blue Collar	78,662	7,569	26,512	43%	4,540	6%
Unskilled Blue Collar	27,368	2,563	12,332	54%	1,652	6%
2025						
Total	356,646	30,456	95,015	35%	50,530	14%
Management, Business and Financial	52,580	2,818	6,797	18%	14,461	28%
Professional and Related	37,159	2,568	5,482	22%	7,019	19%
Service	4,549	806	973	39%	1,442	32%
Sales and Related	7,781	211	1,177	18%	1,584	20%
Office & Administrative Support	28,627	3,111	5,859	31%	16,979	59%
Skilled Blue Collar	109,036	9,274	28,370	35%	2,384	2%
Semi-skilled Blue Collar	86,712	8,706	31,865	47%	4,761	5%
Unskilled Blue Collar	30,202	2,962	14,492	58%	1,900	6%
2030						
Total	365,715	31,967	105,032	37%	51,315	14%
Management, Business and Financial	53,910	2,983	7,856	20%	14,851	28%
Professional and Related	37,781	2,703	6,270	24%	7,257	19%
Service	4,713	865	1,095	42%	1,518	32%
Sales and Related	8,042	227	1,374	20%	1,675	21%
Office & Administrative Support	29,089	3,221	6,513	33%	17,015	58%
Skilled Blue Collar	113,530	9,955	31,735	37%	2,423	2%
Semi-skilled Blue Collar	87,874	8,982	34,530	50%	4,621	5%
Unskilled Blue Collar	30,776	3,031	15,659	61%	1,955	6%
2035						
Total	381,318	33,383	120,034	40%	52,888	14%
Management, Business and Financial	56,323	3,175	9,262	22%	15,476	27%
Professional and Related	39,510	2,881	7,358	26%	7,549	19%
Service	4,820	865	1,238	44%	1,552	32%
Sales and Related	8,708	254	1,655	22%	1,825	21%
Office & Administrative Support	29,882	3,303	7,301	35%	17,308	58%
Skilled Blue Collar	118,635	10,479	36,400	40%	2,519	2%
Semi-skilled Blue Collar	91,686	9,305	39,527	53%	4,648	5%
Unskilled Blue Collar	31,754	3,121	17,293	64%	2,011	6%

Table III.4
Projected Baseline Employment in Downstream Oil & Gas Industry Operations

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015						
Total	71,552	6,773	13,394	28%	13,312	19%
Management, Business and Financial	14,066	860	1,562	17%	4,365	31%
Professional and Related	12,852	1,055	1,664	21%	2,865	22%
Service	1,589	396	257	41%	516	32%
Sales and Related	977	27	78	11%	199	20%
Office & Administrative Support	6,677	918	1,089	30%	4,042	61%
Skilled Blue Collar	19,221	1,434	4,010	28%	515	3%
Semi-skilled Blue Collar	13,546	1,597	3,890	41%	668	5%
Unskilled Blue Collar	2,624	486	844	51%	142	5%
2020						
Total	71,855	7,007	15,267	31%	13,323	19%
Management, Business and Financial	14,019	897	1,809	19%	4,384	31%
Professional and Related	13,315	1,142	2,007	24%	2,979	22%
Service	1,645	412	304	44%	526	32%
Sales and Related	965	29	100	13%	198	21%
Office & Administrative Support	6,560	926	1,231	33%	3,940	60%
Skilled Blue Collar	19,262	1,492	4,545	31%	507	3%
Semi-skilled Blue Collar	13,527	1,627	4,360	44%	647	5%
Unskilled Blue Collar	2,562	482	911	54%	142	6%
2025						
Total	71,855	7,178	16,873	33%	13,421	19%
Management, Business and Financial	13,905	923	2,027	21%	4,466	32%
Professional and Related	13,719	1,218	2,341	26%	3,131	23%
Service	1,698	424	348	45%	542	32%
Sales and Related	946	31	119	16%	197	21%
Office & Administrative Support	6,410	922	1,336	35%	3,830	60%
Skilled Blue Collar	19,236	1,540	4,996	34%	493	3%
Semi-skilled Blue Collar	13,448	1,643	4,746	48%	619	5%
Unskilled Blue Collar	2,493	477	960	58%	143	6%
2030						
Total	71,855	7,258	18,347	36%	13,372	19%
Management, Business and Financial	13,787	935	2,231	23%	4,448	32%
Professional and Related	14,132	1,281	2,682	28%	3,237	23%
Service	1,753	434	392	47%	553	32%
Sales and Related	926	30	134	18%	196	21%
Office & Administrative Support	6,262	909	1,425	37%	3,717	59%
Skilled Blue Collar	19,201	1,567	5,397	36%	486	3%
Semi-skilled Blue Collar	13,368	1,637	5,089	50%	594	4%
Unskilled Blue Collar	2,426	465	997	60%	141	6%
2035						
Total	71,855	7,366	19,504	37%	13,333	19%
Management, Business and Financial	13,670	949	2,397	24%	4,422	32%
Professional and Related	14,551	1,353	3,006	30%	3,348	23%
Service	1,809	447	428	48%	566	31%
Sales and Related	909	31	146	19%	194	21%
Office & Administrative Support	6,114	896	1,480	39%	3,608	59%
Skilled Blue Collar	19,161	1,602	5,696	38%	482	3%
Semi-skilled Blue Collar	13,281	1,633	5,340	53%	572	4%
Unskilled Blue Collar	2,360	455	1,011	62%	141	6%

Table III.5
Projected Baseline Employment in All Segments of the Oil & Gas Industry

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015						
Total	1,188,279	74,456	247,694	27%	196,454	17%
Management, Business and Financial	210,956	10,675	19,862	14%	62,219	29%
Professional and Related	179,090	9,927	20,223	17%	37,393	21%
Service	12,263	2,483	2,609	42%	2,921	24%
Sales and Related	22,780	417	2,607	13%	3,840	17%
Office & Administrative Support	101,298	7,187	15,044	22%	68,776	68%
Skilled Blue Collar	366,230	20,778	86,155	29%	8,881	2%
Semi-skilled Blue Collar	238,235	18,344	77,308	40%	9,982	4%
Unskilled Blue Collar	57,427	4,645	23,886	50%	2,442	4%
2020						
Total	1,581,534	103,794	355,262	29%	263,028	17%
Management, Business and Financial	282,623	15,747	31,218	17%	85,106	30%
Professional and Related	243,697	14,531	31,994	19%	52,178	21%
Service	16,234	3,461	3,850	45%	3,675	23%
Sales and Related	28,857	648	4,077	16%	4,893	17%
Office & Administrative Support	134,519	9,732	22,345	24%	90,757	67%
Skilled Blue Collar	496,591	29,321	125,660	31%	11,995	2%
Semi-skilled Blue Collar	308,423	24,506	105,586	42%	11,578	4%
Unskilled Blue Collar	70,590	5,848	30,532	52%	2,846	4%
2025						
Total	1,694,960	114,921	416,401	31%	280,722	17%
Management, Business and Financial	299,654	17,379	38,206	19%	92,497	31%
Professional and Related	259,516	16,093	38,865	21%	56,873	22%
Service	17,557	3,735	4,531	47%	4,020	23%
Sales and Related	30,352	752	4,947	19%	5,208	17%
Office & Administrative Support	141,702	10,610	26,265	26%	94,234	67%
Skilled Blue Collar	538,722	32,976	146,707	33%	12,809	2%
Semi-skilled Blue Collar	330,999	26,846	121,683	45%	11,876	4%
Unskilled Blue Collar	76,458	6,530	35,197	55%	3,205	4%
2030						
Total	1,674,475	116,283	443,014	33%	275,266	16%
Management, Business and Financial	294,884	17,578	42,583	20%	91,386	31%
Professional and Related	256,816	16,336	43,245	23%	56,818	22%
Service	17,543	3,750	4,778	49%	4,072	23%
Sales and Related	30,007	775	5,491	21%	5,206	17%
Office & Administrative Support	138,174	10,586	28,121	28%	90,550	66%
Skilled Blue Collar	537,085	33,975	155,828	35%	12,729	2%
Semi-skilled Blue Collar	326,164	26,835	127,403	47%	11,323	3%
Unskilled Blue Collar	73,802	6,448	35,565	57%	3,182	4%
2035						
Total	1,670,488	121,091	484,676	36%	272,489	16%
Management, Business and Financial	294,170	18,391	47,916	23%	91,101	31%
Professional and Related	258,988	17,355	48,874	26%	57,252	22%
Service	17,506	3,773	5,169	51%	4,103	23%
Sales and Related	30,539	851	6,191	23%	5,339	17%
Office & Administrative Support	136,424	10,874	30,574	30%	87,990	64%
Skilled Blue Collar	534,074	35,670	169,583	38%	12,542	2%
Semi-skilled Blue Collar	324,667	27,586	138,282	51%	10,914	3%
Unskilled Blue Collar	74,120	6,591	38,087	60%	3,248	4%

Table III.6
Projected Employment in Petrochemical Industry Operations and Investment

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015						
Total	202,135	19,146	35,776	27%	40,777	20%
Management, Business and Financial	35,228	1,820	2,739	13%	8,883	25%
Professional and Related	30,051	2,536	2,324	16%	5,908	20%
Service	4,286	861	414	30%	932	22%
Sales and Related	6,489	140	646	12%	1,449	22%
Office & Administrative Support	18,226	1,358	2,123	19%	10,992	60%
Skilled Blue Collar	37,257	3,145	7,645	29%	1,635	4%
Semi-skilled Blue Collar	57,991	7,637	15,610	40%	8,962	15%
Unskilled Blue Collar	12,607	1,649	4,275	47%	2,016	16%
2020						
Total	214,548	22,411	43,308	31%	43,187	20%
Management, Business and Financial	37,357	2,156	3,566	15%	9,449	25%
Professional and Related	32,324	3,031	3,078	19%	6,327	20%
Service	4,864	1,064	592	34%	1,090	22%
Sales and Related	6,933	172	849	15%	1,574	23%
Office & Administrative Support	19,287	1,579	2,656	22%	11,303	59%
Skilled Blue Collar	39,228	3,728	8,989	32%	1,786	5%
Semi-skilled Blue Collar	62,039	8,848	18,912	45%	9,444	15%
Unskilled Blue Collar	12,516	1,833	4,666	52%	2,214	18%
2025						
Total	216,827	23,862	46,967	33%	43,759	20%
Management, Business and Financial	37,659	2,320	4,088	17%	9,730	26%
Professional and Related	32,963	3,277	3,592	21%	6,522	20%
Service	5,106	1,159	730	37%	1,162	23%
Sales and Related	7,045	192	980	17%	1,607	23%
Office & Administrative Support	19,350	1,671	2,961	24%	11,146	58%
Skilled Blue Collar	39,728	3,993	9,487	34%	1,817	5%
Semi-skilled Blue Collar	62,717	9,349	20,478	48%	9,390	15%
Unskilled Blue Collar	12,259	1,901	4,651	53%	2,385	19%
2030						
Total	217,316	24,705	51,038	35%	43,599	20%
Management, Business and Financial	37,631	2,425	4,626	19%	9,724	26%
Professional and Related	33,240	3,436	4,153	23%	6,552	20%
Service	5,287	1,221	867	39%	1,217	23%
Sales and Related	7,145	206	1,109	18%	1,639	23%
Office & Administrative Support	19,227	1,712	3,246	26%	10,908	57%
Skilled Blue Collar	39,932	4,178	10,219	36%	1,854	5%
Semi-skilled Blue Collar	62,823	9,594	22,050	50%	9,270	15%
Unskilled Blue Collar	12,031	1,933	4,768	56%	2,435	20%
2035						
Total	208,936	24,897	50,752	36%	42,124	20%
Management, Business and Financial	36,244	2,466	4,859	20%	9,392	26%
Professional and Related	32,229	3,514	4,422	25%	6,353	20%
Service	5,342	1,258	948	41%	1,234	23%
Sales and Related	7,024	217	1,185	20%	1,625	23%
Office & Administrative Support	18,427	1,707	3,319	27%	10,260	56%
Skilled Blue Collar	37,922	4,210	9,750	37%	1,833	5%
Semi-skilled Blue Collar	60,659	9,625	21,992	52%	8,988	15%
Unskilled Blue Collar	11,089	1,900	4,277	56%	2,439	22%

Table III.7

Projected Baseline Employment in Oil & Gas and Petrochemical Industry Operations and Investment

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015						
Total	1,390,414	93,602	283,470	27%	237,231	17%
Management, Business and Financial	246,184	12,495	22,601	14%	71,102	29%
Professional and Related	209,141	12,463	22,547	17%	43,301	21%
Service	16,549	3,344	3,023	38%	3,853	23%
Sales and Related	29,269	557	3,253	13%	5,289	18%
Office & Administrative Support	119,524	8,545	17,167	22%	79,768	67%
Skilled Blue Collar	403,487	23,923	93,800	29%	10,516	3%
Semi-skilled Blue Collar	296,226	25,981	92,918	40%	18,944	6%
Unskilled Blue Collar	70,034	6,294	28,161	49%	4,458	6%
2020						
Total	1,796,082	126,205	398,570	29%	306,215	17%
Management, Business and Financial	319,980	17,903	34,784	16%	94,555	30%
Professional and Related	276,021	17,562	35,072	19%	58,505	21%
Service	21,098	4,525	4,442	43%	4,765	23%
Sales and Related	35,790	820	4,926	16%	6,467	18%
Office & Administrative Support	153,806	11,311	25,001	24%	102,060	66%
Skilled Blue Collar	535,819	33,049	134,649	31%	13,781	3%
Semi-skilled Blue Collar	370,462	33,354	124,498	43%	21,022	6%
Unskilled Blue Collar	83,106	7,681	35,198	52%	5,060	6%
2025						
Total	1,911,787	138,783	463,368	31%	324,481	17%
Management, Business and Financial	337,313	19,699	42,294	18%	102,227	30%
Professional and Related	292,479	19,370	42,457	21%	63,395	22%
Service	22,663	4,894	5,261	45%	5,182	23%
Sales and Related	37,397	944	5,927	18%	6,815	18%
Office & Administrative Support	161,052	12,281	29,226	26%	105,380	65%
Skilled Blue Collar	578,450	36,969	156,194	33%	14,626	3%
Semi-skilled Blue Collar	393,716	36,195	142,161	45%	21,266	5%
Unskilled Blue Collar	88,717	8,431	39,848	54%	5,590	6%
2030						
Total	1,891,791	140,988	494,052	34%	318,865	17%
Management, Business and Financial	332,515	20,003	47,209	20%	101,110	30%
Professional and Related	290,056	19,772	47,398	23%	63,370	22%
Service	22,830	4,971	5,645	47%	5,289	23%
Sales and Related	37,152	981	6,600	20%	6,845	18%
Office & Administrative Support	157,401	12,298	31,367	28%	101,458	64%
Skilled Blue Collar	577,017	38,153	166,047	35%	14,583	3%
Semi-skilled Blue Collar	388,987	36,429	149,453	48%	20,593	5%
Unskilled Blue Collar	85,833	8,381	40,333	57%	5,617	7%
2035						
Total	1,879,424	145,988	535,428	36%	314,613	17%
Management, Business and Financial	330,414	20,857	52,775	22%	100,493	30%
Professional and Related	291,217	20,869	53,296	25%	63,605	22%
Service	22,848	5,031	6,117	49%	5,337	23%
Sales and Related	37,563	1,068	7,376	22%	6,964	19%
Office & Administrative Support	154,851	12,581	33,893	30%	98,250	63%
Skilled Blue Collar	571,996	39,880	179,333	38%	14,375	3%
Semi-skilled Blue Collar	385,326	37,211	160,274	51%	19,902	5%
Unskilled Blue Collar	85,209	8,491	42,364	60%	5,687	7%

At the level of detailed occupations, there will be strong growth in the core oilfield development and extraction occupations – derrick, rotary drill, and service unit operators and roustabouts (Table III.8). We project over 90 thousand net new jobs, 2015-2035, in those two occupations. We project 30 thousand new jobs for petroleum engineers. Projections of employment in all segments by detailed occupation in nine regions are in Appendix G.

Table III.8
Baseline Employment Growth in Oil & Gas and Petrochemical Industry Operations and Investment in Detailed Occupations, 2015-2035

	2015	2035	Change
Derrick, Rotary Drill, and Service Unit Operators	118,897	181,414	62,517
Roustabouts, Oil & Gas	64,727	96,631	31,904
Petroleum Engineers	30,604	60,430	29,826
Industrial Machinery Installation, Repair, and Maintenance Workers	29,699	54,468	24,769
Pumping Station Operators	30,198	47,562	17,364
First-Line Supervisors of Construction Trades and Extraction Workers	41,975	58,288	16,313
Driver/Sales Workers and Truck Drivers	41,481	57,177	15,696
Secretaries and Administrative Assistants	33,087	46,466	13,379
General and Operations and Investment Managers	30,440	41,490	11,050
Environmental Scientists and Geoscientists	15,643	24,793	9,150
Welding, Soldering, and Brazing Workers	24,483	33,414	8,931
Accountants and Auditors	17,343	25,258	7,915
Laborers and Freight, Stock, and Material Movers, Hand	18,725	26,539	7,814
Bookkeeping, Accounting, and Auditing Clerks	17,275	23,360	6,085
Maintenance and Repair Workers, General	16,849	22,435	5,586
Geological and Petroleum Technicians	10,071	15,258	5,187
Miscellaneous Production Workers	15,667	20,414	4,747
Office Clerks, General	21,699	26,262	4,563
Sales Representatives, Wholesale and Manufacturing	13,128	17,170	4,042
Operating Engineers and Other Construction Equipment Operators	28,093	31,918	3,825
Helpers, Extraction Workers	6,302	9,252	2,950
Civil Engineers	10,844	13,403	2,559
Electricians	10,978	13,368	2,390
Construction Laborers	45,588	47,720	2,132
Managers, All Other	4,519	6,237	1,718
Pipelayers, Plumbers, Pipefitters, and Steamfitters	17,125	18,240	1,115

Job Opportunities Due to Replacement Requirements

The baseline growth of employment in the oil and gas and petrochemical industries projected above will create 489 thousand new jobs. However, job opportunities also arise when workers leave their occupations and need to be replaced. The Occupational Projections unit of the Bureau of Labor Statistics (BLS) estimates the number of job openings that will result from workers retiring from or permanently leaving an occupation. For each detailed occupation in the U.S. economy, BLS has projected the share of employees who were at work in 2014 that will have to be replaced over the following 10 years, 2014-2024.

To develop estimates of the number of jobs that will be created in the oil and gas and petrochemical industries due to replacement, we start with BLS occupation-specific U.S.-average replacement rates. The need to replace workers due to retirement and other reasons will differ by region due to differences among regions in the share of the working age population that is approaching retirement. Therefore, we adjusted the BLS rates for age differences in the labor force by region to account for differences in the regional mix of employment in the oil and gas and petrochemical industries. We apply these replacement rates to our baseline estimates of employment in the oil and gas and petrochemical industries by occupation in 2015.

Table III.9 illustrates this calculation for the 26 detailed occupations used in our analysis. Column 2 of this table shows the percentage of 2015 employees that are projected to need to be replaced by 2025 in each occupation in the combined oil and gas and petrochemical industries (U.S.-average). This includes both industry operations and investment-related employment in these industries. Retirements and other replacement needs are projected to create job opportunities for about 46 thousand derrick, rotary drill and service unit operators, 16 thousand roustabouts and over 7 thousand petroleum engineers in the next 10 years.

Job openings due to replacement demand will likely be even greater in the following decade, 2025-2035. The next decade of Baby Boomers approaching retirement (those age 45-55 in 2015) is about 6 percent larger than the first wave (those 55-65 in 2015). To approximate job opportunities due to replacement demand in the period 2025-2035, we adjusted the replacement rates for 2015-2025 to reflect a correspondingly higher retirement rate. All occupation-specific replacement rates for 2025-2035 were assumed to be 6 percent higher than in 2015-2025.

Projections of replacement requirements in the oil & gas and petrochemical industries at the level of eight broad occupational categories are presented in Table III.10. Over 585 thousand jobs are projected to become available in these industries (including industry operations and the industries that support investment) over the period 2015-2035. This exceeds the number of new jobs that Wood Mackenzie projects would be created in the oil and gas industry by 2035 in their Regulatory Constraints scenario. Approximately 285 thousand of the replacement job opportunities in the oil and gas industry are projected to be skilled and semi-skilled blue collar

jobs. Over 185 thousand job openings are projected to become available in management and professional occupations.

Table III.9

**Job Opportunities Due to Replacement Requirements in Selected Occupations
in the Oil and Gas and Petrochemical Industries, 2015-2025**

	Replacement Rate	Replacement Employment 2015-2025
General and Operations Managers	18.0	5,479
Managers, All Other	21.1	955
Accountants and Auditors	28.4	4,930
Civil Engineers	23.3	2,531
Petroleum Engineers	24.3	7,449
Environmental Scientists and Geoscientists	28.1	4,403
Geological and Petroleum Technicians	34.4	3,461
Sales Representatives, Wholesale and Manufacturing	18.8	2,474
Bookkeeping, Accounting, and Auditing Clerks	8.8	1,526
Secretaries and Administrative Assistants	11.5	3,821
Office Clerks, General	20.2	4,394
First-Line Supervisors of Construction Trades and Extraction Workers	10.4	4,367
Construction Laborers	20.8	9,484
Operating Engineers and Other Construction Equipment Operators	21.5	6,046
Electricians	18.2	1,999
Pipelayers, Plumbers, Pipefitters, and Steamfitters	12.1	2,065
Derrick, Rotary Drill, and Service Unit Operators	38.7	45,985
Roustabouts, Oil & Gas	25.3	16,362
Helpers, Extraction Workers	13.6	857
Industrial Machinery Installation, Repair, and Maintenance Workers	23.7	7,050
Maintenance and Repair Workers, General	18.7	3,144
Welding, Soldering, and Brazing Workers	23.5	5,753
Miscellaneous Production Workers	19.4	3,041
Driver/Sales Workers and Truck Drivers	15.4	6,401
Laborers and Freight, Stock, and Material Movers, Hand	30.0	5,615
Pumping Station Operators	33.3	10,052

Table III.10
Projected Job Opportunities from Replacement in the Oil & Gas and Petrochemical Industries by Broad Occupation, 2015-2035

	2015-2025	2025-2035	2015-2035
Total	282,043	303,054	585,097
Management, Business and Financial	47,341	51,005	98,346
Professional and Related	41,813	45,141	86,954
Service	4,465	4,794	9,259
Sales and Related	8,413	9,044	17,457
Office & Administrative Support	24,970	26,902	51,872
Skilled Blue Collar	81,328	87,170	168,498
Semi-skilled Blue Collar	56,147	60,218	116,365
Unskilled Blue Collar	17,566	18,780	36,346

Our projections of the total job opportunities expected to be available to African Americans and Hispanics in the oil and gas and petrochemical industries include opportunities from replacement requirements as well as industry growth. Minority workers are increasing their shares of total employment over time in most industries, while the share of non-minority workers is declining. Therefore, part of the minority job growth that we report must represent minority workers replacing non-minority workers. We do not estimate this amount directly, although you can see these trends in the projected employment growth in industry operations and investment, where in some cases minority employment increases are projected to be larger than total employment increases. However, in order to project comprehensive estimates of job opportunities for minorities, there is a component of job opportunities from replacement that we must identify, which is minority workers replacing other minority workers who retire.

To estimate this component of minority job opportunities, we separately estimated the number of current (2015) African American and Hispanic workers who will likely retire from the industry between 2015 and 2035. The starting point for these estimates is the national occupation-specific replacement rates cited above. However, the population data presented in Appendix A show that the shares of African American and especially Hispanic workers who are nearing retirement age are lower than the national average. To capture this basic difference, we adjust the national replacement rates for the differences in the age distribution of the overall African American and Hispanic workforces in each of nine regions.⁹

⁹ For each minority group in each region, we adjusted the national replacement rates for 2015-2025 by the ratio of that group's share of the workforce age 55-64 in the region in 2015 divided by the corresponding national share. We adjusted the national replacement rates for 2025-2035 using ratios based on the share of the workforce age 45-54 in 2015. We applied these adjusted replacement rates for each minority group to employment by occupation for each group in 2015 to estimate the number of workers that would need to be replaced over the period 2015-2035.

Projections of replacement requirements in the eight broad occupations in the oil and gas and petrochemical industries by region, including these supplemental estimates for minorities, are presented in Appendix H.

Table III.11 shows projected replacement requirements over the full 20-year forecast period in detailed occupations in the oil and gas industry and in the petrochemical industry. Projections of replacement requirements in the oil & gas and petrochemical industries by detailed occupation for nine regions are presented in Appendix I.

Table III.11

Projected Job Opportunities from Replacement in Oil & Gas and Petrochemical Industries by Detailed Occupation, 2015-2035

	2015-2025	2025-2035	2015-2035
General and Operations Managers	5,479	4,748	10,227
Managers, All Other	955	828	1,783
Accountants and Auditors	4,930	4,252	9,182
Civil Engineers	2,531	2,191	4,722
Petroleum Engineers	7,449	6,377	13,826
Environmental Scientists and Geoscientists	4,403	3,772	8,175
Geological and Petroleum Technicians	3,461	2,967	6,428
Sales Representatives, Wholesale and Manufacturing	2,474	2,149	4,623
Bookkeeping, Accounting, and Auditing Clerks	1,526	1,316	2,842
Secretaries and Administrative Assistants	3,821	3,303	7,124
Office Clerks, General	4,394	3,813	8,207
First-Line Supervisors, Construction Trades & Extraction Workers	4,367	3,773	8,140
Construction Laborers	9,484	8,352	17,836
Operating Engineers and Other Construction Equipment Operators	6,046	5,300	11,346
Electricians	1,999	1,752	3,751
Pipelayers, Plumbers, Pipefitters, and Steamfitters	2,065	1,826	3,891
Derrick, Rotary Drill, and Service Unit Operators	45,985	39,324	85,309
Roustabouts, Oil & Gas	16,362	13,999	30,361
Helpers, Extraction Workers	857	731	1,588
Industrial Machinery Installation, Repair, and Maintenance Workers	7,050	6,143	13,193
Maintenance and Repair Workers, General	3,144	2,753	5,897
Welding, Soldering, and Brazing Workers	5,753	4,960	10,713
Miscellaneous Production Workers	3,041	2,646	5,687
Driver/Sales Workers and Truck Drivers	6,401	5,537	11,938
Laborers and Freight, Stock, and Material Movers, Hand	5,615	4,881	10,496
Pumping Station Operators	10,052	8,630	18,682

Employment Outlook Including Baseline Growth and Replacement Demand

Combining the increase in jobs due to projected baseline growth of the oil and gas industry with job opportunities that will be created by the need to replace retiring workers in the industry, we project a total of 747 thousand job opportunities over the period 2015-2025 (see Table

III.12). As reported above, 507 thousand of these job opportunities result from employment growth as projected in Wood Mackenzie’s Regulatory Constraints scenario. (This includes employment stimulated by investment in the industry as well as industry operations.) The additional 240 thousand jobs arise from replacement requirements. Of the total of 747 thousand, we project that 259 thousand, or 35%, will represent new job opportunities for Hispanic and African American workers.

Table III.12
Projected Job Opportunities from Baseline Employment Growth and Replacement Requirements in the Oil & Gas Industry

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	746,604	54,951	203,565	35%	124,091	17%
Management, Business and Financial	129,069	8,672	20,999	23%	42,186	33%
Professional and Related	116,083	8,071	21,460	25%	26,927	23%
Service	8,580	1,892	2,407	50%	1,883	22%
Sales and Related	14,063	448	2,860	24%	2,466	18%
Office & Administrative Support	61,467	4,862	13,406	30%	39,754	65%
Skilled Blue Collar	246,242	16,198	72,540	36%	5,718	2%
Semi-skilled Blue Collar	137,696	11,818	54,482	48%	3,778	3%
Unskilled Blue Collar	33,404	2,990	15,411	55%	1,379	4%
2025-2035						
Total	233,753	22,676	120,155	61%	34,746	15%
Management, Business and Financial	38,123	3,253	13,658	44%	11,459	30%
Professional and Related	38,049	3,431	14,198	46%	8,433	22%
Service	3,493	765	1,361	61%	929	27%
Sales and Related	7,196	230	2,013	31%	1,314	18%
Office & Administrative Support	17,473	1,904	7,556	54%	9,197	53%
Skilled Blue Collar	74,410	7,254	40,719	64%	1,650	2%
Semi-skilled Blue Collar	41,959	4,518	31,636	86%	1,064	3%
Unskilled Blue Collar	13,050	1,321	9,014	79%	700	5%
2015-2035						
Total	980,357	77,627	323,720	41%	158,837	16%
Management, Business and Financial	167,192	11,925	34,657	28%	53,645	32%
Professional and Related	154,132	11,502	35,658	31%	35,360	23%
Service	12,073	2,657	3,768	53%	2,812	23%
Sales and Related	21,259	678	4,873	26%	3,780	18%
Office & Administrative Support	78,940	6,766	20,962	35%	48,951	62%
Skilled Blue Collar	320,652	23,452	113,259	43%	7,368	2%
Semi-skilled Blue Collar	179,655	16,336	86,118	57%	4,842	3%
Unskilled Blue Collar	46,454	4,311	24,425	62%	2,079	4%

Over the period 2025 to 2035, Wood Mackenzie projects that employment growth in the oil and gas industry will slow and then gradually decline. As a result, as shown in Table II.2, employment in oil and gas industry operations is projected to be 5 thousand lower in 2035 than

in 2025, and employment stimulated by investment in the industry is projected to be 20 thousand lower. However, job opportunities due to replacement requirements will be even greater in this second decade of the forecast period, and total job opportunities from baseline growth and replacement between 2025 and 2035 are projected to be 234 thousand. Hispanic and African American workers are projected to account for 143 thousand, or 61%, of these job opportunities in the industry over the period 2025-2035 as growth of the non-minority portion of the U.S. labor force slows and Hispanic labor force growth in particular remains strong. Over the entire 20-year forecast period, we project a total of 980 thousand job opportunities in the oil and gas industry, with the two minority groups projected to account for just over 400 thousand, or 41% of the total.

Summary results for the Petrochemical industry are presented in Table III.13. A total of 57 thousand job opportunities are projected over the next 10 years – 15 thousand due to employment growth (including investment as well as industry operations) and 42 thousand from replacement requirements. The two minority groups are projected to account for 25 thousand of these job opportunities, or 43% of the total.

As in the oil and gas industry, employment growth is projected to decline in the petrochemical industry near the end of the 20-year forecast period, primarily due to a lower projected level of investment in the industry. Although employment in industry operations will be 10 thousand higher in 2035 than in 2025, employment stimulated by investment in the industry is projected to be 18 thousand lower. Replacement requirements will remain high, however, and a total of 37 thousand job opportunities from all sources are projected for the period 2025-2035, with the two minority groups continuing to account for 45% of the total.

Over the entire 20-year forecast period, we project a total of 94 thousand job opportunities in the petrochemical industry, and Hispanic and African American workers will account for 41 thousand of these.

Projected job opportunities under the Regulatory Constraints scenario (in operations and investment) plus replacement requirements in the oil & gas and petrochemical industries are shown in Table III.14. These sources total nearly 1.1 million job opportunities over the period 2015-2035. A little over half of the total is due to the need to replace retiring workers throughout the two decades. A little under half is due to employment growth projected under Wood Mackenzie's Regulatory Constraints scenario. We project that African Americans and Hispanics will account for 443 thousand of these job opportunities or 41% of the total.

Projections of total job opportunities from employment growth and replacement requirements in the combined oil & gas and petrochemical industries in broad occupational categories by region under the Regulatory Constraints scenario are presented in Appendix J.

Table III.13

**Projected Job Opportunities from Employment Growth and Replacement
Requirements in the Petrochemical Industry**

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	56,812	8,473	16,198	43%	11,579	20%
Management, Business and Financial	9,401	837	1,713	27%	2,605	28%
Professional and Related	9,068	1,232	1,589	31%	1,826	20%
Service	1,999	520	393	46%	485	24%
Sales and Related	2,478	91	461	22%	587	24%
Office & Administrative Support	5,031	586	1,143	34%	2,506	50%
Skilled Blue Collar	10,049	1,456	2,906	43%	517	5%
Semi-skilled Blue Collar	15,941	3,107	6,890	63%	2,167	14%
Unskilled Blue Collar	2,845	644	1,103	61%	886	31%
2025-2035						
Total	36,938	5,291	11,316	45%	7,493	20%
Management, Business and Financial	5,983	529	1,318	31%	1,529	26%
Professional and Related	5,830	795	1,312	36%	1,122	19%
Service	1,486	350	334	46%	341	23%
Sales and Related	2,014	69	398	23%	472	23%
Office & Administrative Support	3,228	347	818	36%	1,614	50%
Skilled Blue Collar	6,306	907	1,851	44%	374	6%
Semi-skilled Blue Collar	9,869	1,851	4,567	65%	1,443	15%
Unskilled Blue Collar	2,222	443	718	52%	598	27%
2015-2035						
Total	93,750	13,764	27,514	44%	19,072	20%
Management, Business and Financial	15,384	1,366	3,031	29%	4,134	27%
Professional and Related	14,898	2,027	2,901	33%	2,948	20%
Service	3,485	870	727	46%	826	24%
Sales and Related	4,492	160	859	23%	1,059	24%
Office & Administrative Support	8,259	933	1,961	35%	4,120	50%
Skilled Blue Collar	16,355	2,363	4,757	44%	891	5%
Semi-skilled Blue Collar	25,810	4,958	11,457	64%	3,610	14%
Unskilled Blue Collar	5,067	1,087	1,821	57%	1,484	29%

Table III.14

Projected Job Opportunities from Baseline Growth and Replacement Demand in the Oil & Gas and Petrochemical Industries

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	803,416	63,424	219,763	35%	135,670	17%
Management, Business and Financial	138,470	9,509	22,712	23%	44,791	32%
Professional and Related	125,151	9,303	23,049	26%	28,753	23%
Service	10,579	2,412	2,800	49%	2,368	22%
Sales and Related	16,541	539	3,321	23%	3,053	18%
Office & Administrative Support	66,498	5,448	14,549	30%	42,260	64%
Skilled Blue Collar	256,291	17,654	75,446	36%	6,235	2%
Semi-skilled Blue Collar	153,637	14,925	61,372	50%	5,945	4%
Unskilled Blue Collar	36,249	3,634	16,514	56%	2,265	6%
2025-2035						
Total	270,691	27,967	131,471	59%	42,239	16%
Management, Business and Financial	44,106	3,782	14,976	43%	12,988	29%
Professional and Related	43,879	4,226	15,510	45%	9,555	22%
Service	4,979	1,115	1,695	56%	1,270	26%
Sales and Related	9,210	299	2,411	29%	1,786	19%
Office & Administrative Support	20,701	2,251	8,374	51%	10,811	52%
Skilled Blue Collar	80,716	8,161	42,570	63%	2,024	3%
Semi-skilled Blue Collar	51,828	6,369	36,203	82%	2,507	5%
Unskilled Blue Collar	15,272	1,764	9,732	75%	1,298	8%
2015-2035						
Total	1,074,107	91,391	351,234	41%	177,909	17%
Management, Business and Financial	182,576	13,291	37,688	28%	57,779	32%
Professional and Related	169,030	13,529	38,559	31%	38,308	23%
Service	15,558	3,527	4,495	52%	3,638	23%
Sales and Related	25,751	838	5,732	26%	4,839	19%
Office & Administrative Support	87,199	7,699	22,923	35%	53,071	61%
Skilled Blue Collar	337,007	25,815	118,016	43%	8,259	2%
Semi-skilled Blue Collar	205,465	21,294	97,575	58%	8,452	4%
Unskilled Blue Collar	51,521	5,398	26,246	61%	3,563	7%

Pro-Development Scenario

The Wood Mackenzie Pro-Development scenario projects much stronger growth of employment in the oil and gas industry. Total oil and gas industry employment is projected to be 479 thousand higher in 2025 compared to the Regulatory Constraints scenario (Table III.15). Over the period 2025-2035 an additional 311 thousand jobs would be added compared to the Regulatory Constraints scenario. As a result, employment in 2035 under the Pro-Development scenario would be 790 thousand higher than under the Regulatory Constraints scenario. Most of this additional growth occurs in the upstream industry; Wood Mackenzie did not project growth for the downstream segment.

Table III.15

**Projected Employment in Oil and Gas Industry Operations and Investment,
2015-2035: Pro-Development Scenario
(thousands)**

	Employment		Additional Jobs Compared to Regulatory Constraints Scenario	
	2025	2035	2025	2035
Oil and Gas Industry				
Total Employment	2,174	2,460	479	790
Hispanic Employment	554	710	138	225
African American Employment	138	160	23	39
Female Employment	353	385	72	112
Upstream Oil and Gas Industry				
Total Employment	1,625	1,855	358	638
Hispanic Employment	401	515	96	170
African American Employment	92	107	14	26
Female Employment	272	298	55	92
Midstream Oil and Gas Industry				
Total Employment	478	534	121	153
Hispanic Employment	137	175	42	55
African American Employment	40	46	9	13
Female Employment	68	74	17	21
Downstream Oil and Gas Industry				
Total Employment	71	71	na	na
Hispanic Employment	17	19	na	na
African American Employment	7	7	na	na
Female Employment	13	13	na	na

Under this scenario, we project that an additional 225 thousand jobs would be created for Hispanic workers in the oil and gas industry by 2035, and an additional 39 thousand jobs will be

added for African Americans. National projections of oil and gas industry employment under the Pro-Development scenario by broad occupation are presented in Table III.16. Data in this format for the nine regions are in Appendix K.

Table III.16
Employment in Oil & Gas Industry Operations and Investment
Pro-Development Scenario

	Total	African American	Hispanic	Minority Share	Female	Female Share
2020						
Total	1,910,320	119,166	437,964	29%	312,289	16%
Management, Business and Financial	338,237	17,383	37,150	16%	98,324	29%
Professional and Related	295,431	16,318	38,359	19%	61,933	21%
Service	18,832	3,746	4,488	44%	4,129	22%
Sales and Related	36,172	772	4,810	15%	6,050	17%
Office & Administrative Support	160,107	10,843	26,262	23%	109,134	68%
Skilled Blue Collar	595,398	34,106	151,446	31%	14,377	2%
Semi-skilled Blue Collar	375,182	28,240	133,363	43%	14,724	4%
Unskilled Blue Collar	90,961	7,758	42,086	55%	3,618	4%
2025						
Total	2,173,790	138,382	554,041	32%	352,561	16%
Management, Business and Financial	382,217	20,104	48,712	18%	113,381	30%
Professional and Related	335,398	18,926	50,091	21%	71,869	21%
Service	22,078	4,426	5,681	46%	4,895	22%
Sales and Related	39,595	909	6,036	18%	6,727	17%
Office & Administrative Support	178,432	12,123	33,165	25%	120,062	67%
Skilled Blue Collar	688,644	40,272	192,352	34%	16,213	2%
Semi-skilled Blue Collar	423,309	31,846	166,137	47%	15,287	4%
Unskilled Blue Collar	104,117	9,776	51,867	59%	4,127	4%
2030						
Total	2,370,690	151,490	648,387	34%	376,382	16%
Management, Business and Financial	411,180	21,583	58,512	19%	121,430	30%
Professional and Related	364,097	20,617	60,187	22%	78,293	22%
Service	24,946	4,870	6,747	47%	5,580	22%
Sales and Related	41,767	989	6,929	19%	7,167	17%
Office & Administrative Support	189,473	12,830	38,345	27%	125,866	66%
Skilled Blue Collar	767,126	45,492	226,619	35%	17,844	2%
Semi-skilled Blue Collar	459,034	34,326	191,732	49%	15,733	3%
Unskilled Blue Collar	113,067	10,783	59,316	62%	4,469	4%
2035						
Total	2,460,290	160,212	709,888	35%	384,790	16%
Management, Business and Financial	423,674	22,789	65,402	21%	124,505	29%
Professional and Related	378,870	22,143	67,784	24%	81,320	21%
Service	26,165	5,009	7,449	48%	5,801	22%
Sales and Related	43,516	1,083	7,633	20%	7,437	17%
Office & Administrative Support	193,145	13,336	41,180	28%	126,774	66%
Skilled Blue Collar	802,782	49,116	248,988	37%	18,497	2%
Semi-skilled Blue Collar	474,629	35,833	207,872	51%	15,768	3%
Unskilled Blue Collar	117,509	10,903	63,580	63%	4,688	4%

The additional job opportunities that would be created under the Pro-Development scenario (above baseline growth) by broad occupation are shown in Table III.17. The increased pace of development of oil and natural gas resources would stimulate an additional 174 thousand blue collar jobs for minorities.

Projections of the additional job opportunities that would be created under the Pro-Development scenario by detailed occupation and region are shown in Table III.18.

Table III.17
Projected Additional Jobs from Pro-Development Policy in the Oil & Gas Industry by Broad Occupation, 2015-2035*

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	478,830	23,461	137,640	34%	71,839	15%
Management, Business and Financial	82,563	2,725	10,506	16%	20,884	25%
Professional and Related	75,882	2,833	11,226	19%	14,996	20%
Service	4,521	691	1,150	41%	875	19%
Sales and Related	9,243	157	1,089	13%	1,519	16%
Office & Administrative Support	36,730	1,513	6,900	23%	25,828	70%
Skilled Blue Collar	149,922	7,296	45,645	35%	3,404	2%
Semi-skilled Blue Collar	92,310	5,000	44,454	54%	3,411	4%
Unskilled Blue Collar	27,659	3,246	16,670	72%	922	3%
2015-2035						
Total	789,802	39,121	225,212	33%	112,301	14%
Management, Business and Financial	129,504	4,398	17,486	17%	33,404	26%
Professional and Related	119,882	4,788	18,910	20%	24,068	20%
Service	8,659	1,236	2,280	41%	1,698	20%
Sales and Related	12,977	232	1,442	13%	2,098	16%
Office & Administrative Support	56,721	2,462	10,606	23%	38,784	68%
Skilled Blue Collar	268,708	13,446	79,405	35%	5,955	2%
Semi-skilled Blue Collar	149,962	8,247	69,590	52%	4,854	3%
Unskilled Blue Collar	43,389	4,312	25,493	69%	1,440	3%

*incremental jobs in addition to baseline employment growth

Table III.18
Projected Additional Jobs from Pro-Development Policy in the Oil & Gas Industry
by Detailed Occupation and Region, 2015-2035*

	U.S.	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations Managers	18,307	-11	502	468	539	2,419	221	4,952	4,121	5,096
Managers, All Other	2,203	0	42	47	34	322	25	657	462	614
Accountants and Auditors	10,055	-3	160	203	189	1,814	121	2,154	2,045	3,372
Civil Engineers	9,306	-14	360	247	344	430	71	4,275	2,375	1,218
Petroleum Engineers	23,895	1	68	354	295	5,780	300	2,338	4,454	10,305
Environmental Scientists and Geoscientists	10,361	-2	72	164	151	2,283	121	1,464	2,005	4,103
Geological and Petroleum Technicians	6,371	2	43	105	156	1,133	98	1,190	1,339	2,305
Sales Representatives, Wholesale and Manufacturing	6,416	-5	196	130	159	667	60	2,469	1,403	1,337
Bookkeeping, Accounting, and Auditing Clerks	10,553	-6	277	256	307	1,498	125	2,633	2,360	3,103
Secretaries and Administrative Assistants	20,780	-11	505	505	582	3,003	252	5,194	4,608	6,142
Office Clerks, General	11,850	-9	394	334	350	1,416	133	3,446	2,737	3,049
First-Line Supervisors of Construction Trades and Extraction Workers	30,442	-21	1,078	949	1,223	3,827	411	6,581	7,349	9,045
Construction Laborers	33,598	-77	2,636	1,829	1,993	2,394	320	8,015	9,282	7,206
Operating Engineers and Other Construction Equipment Operators	20,380	-36	1,336	969	1,102	1,734	222	4,789	5,436	4,828
Electricians	5,893	-5	280	217	240	583	70	1,599	1,462	1,447
Pipelayers, Plumbers, Pipefitters, and Steamfitters	12,077	-28	963	680	706	814	117	3,092	3,305	2,428
Derrick, Rotary Drill, and Service Unit Operators	84,217	33	681	1,372	2,620	12,786	1,403	17,693	18,769	28,860
Roustabouts, Oil & Gas	45,042	13	435	774	1,406	6,892	735	9,298	10,043	15,446
Helpers, Extraction Workers	4,367	2	40	73	144	620	74	972	990	1,452
Industrial Machinery Installation, Repair, and Maintenance Workers	17,753	-4	331	418	435	2,141	264	6,067	3,731	4,370
Maintenance and Repair Workers, General	7,070	-6	209	183	203	848	86	2,136	1,589	1,822
Welding, Soldering, and Brazing Workers	17,976	-19	867	460	452	1,252	102	8,330	4,067	2,465
Miscellaneous Production Workers	7,440	-9	225	167	202	898	78	2,442	1,618	1,819
Driver/Sales Workers and Truck Drivers	24,904	-3	550	611	828	3,093	385	6,404	5,776	7,260
Laborers and Freight, Stock, and Material Movers, Hand	10,667	0	268	249	108	1,104	131	4,212	2,359	2,236
Pumping Station Operators	18,360	10	100	318	207	3,537	268	3,466	3,677	6,777

*incremental jobs in addition to baseline employment growth

IV. Opportunities for Asians and Native Americans in the Oil & Natural Gas and Petrochemical Industries

Due to the smaller size of the U.S. Asian and Native American populations, the sample size for these groups in Census Bureau surveys such as the Current Population Survey and the American Community Survey limits the ability to carry out the type of detailed analysis of employment by occupation within industries that is the basis of our estimates of the African American and Hispanic populations. In this section, we provide a brief summary of potential opportunities for the Asian and Native American populations in the oil and gas industry.

Opportunities for Asians in the Oil & Natural Gas and Petrochemical Industries

The Asian American¹⁰ population is extremely diverse and includes individuals from a wide set of countries, including Bangladesh, Cambodia, China, India, Malaysia, Nepal, the Philippines, Thailand, and Vietnam. Many of the Asian population in the U.S. are immigrants. The diversity within this population group extends to many other factors, including socioeconomic and geographic differences, offering both opportunities and challenges for the Asian American community and their experience with the oil and natural gas industry.

In 2014, Asians made up close to 6% of the total U.S. population, and are expected to rise to nearly 10% of the population in 2060. This puts the Asian population among the fastest growing groups in the country. Several areas in the U.S. with traditionally large Asian populations overlap with areas that have significant oil and gas resources, such as California and Texas. While the Asian communities in these areas continue to grow, there has also been growth in the Asian populations in new areas such as North Dakota that also have abundant oil and gas resources. The proximity of large Asian communities to areas of oil and gas activity means that there is significant opportunity for Asian workers to participate in meaningful careers in the industry, both in blue collar occupations for individuals with less education and in professional and technical occupations given their high incidence of college degrees. Continued communication and cultural training in terms of diversity and understanding of multiculturalism will help ensure a positive experience as more Asian Americans take advantage of the well-paying careers in the oil & gas and petrochemical industries.

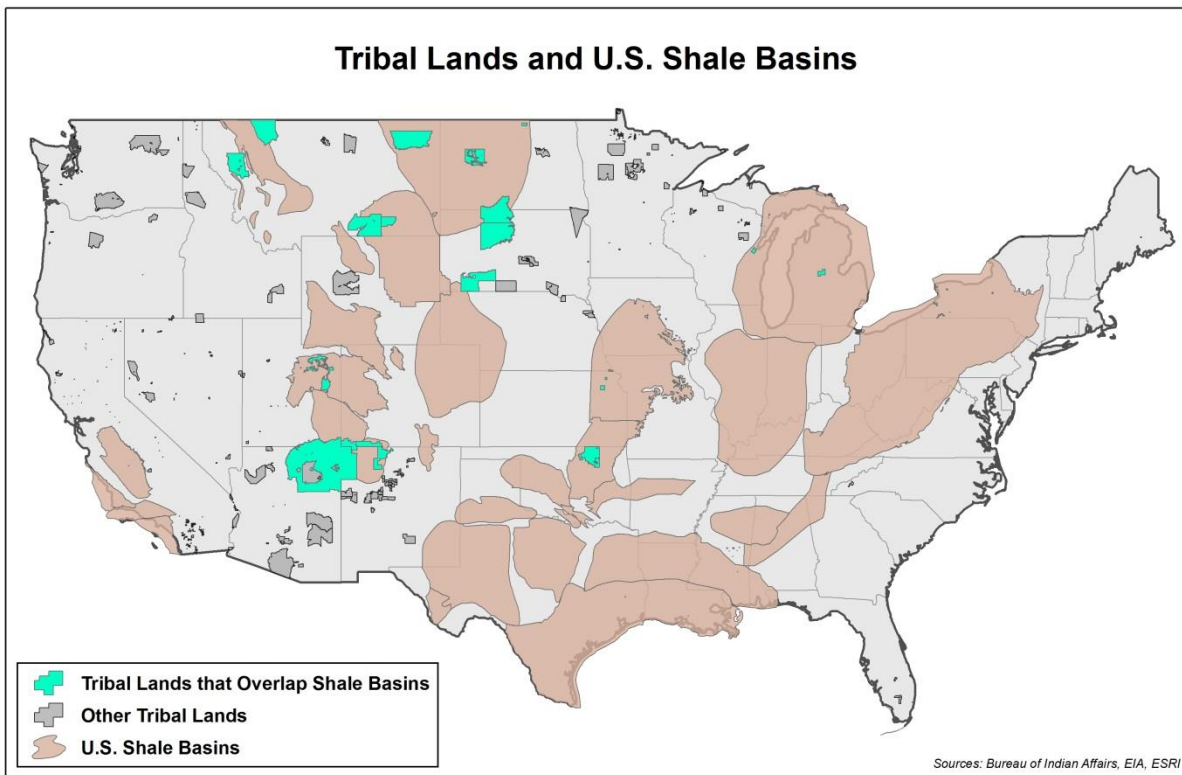
Opportunities for Native Americans in the Oil & Natural Gas and Petrochemical Industries

Growth in the oil and gas and related industries has been significant in regions where American Indians and other Native populations constitute a larger portion of the population, such as Alaska (20 percent of the population), Oklahoma (13 percent of the population), and the Dakotas (8 percent of the population). Further, in 2011 an estimated 20% of known U.S. oil and

¹⁰ The term "Asian Americans" used in this report refers to individuals identifying as Asian, Native Hawaiian, or Pacific Islander.

gas reserves were beneath tribal lands; according to the Department of the Interior (DOI), Indian lands could produce up to 5.35 billion barrels of oil and 37.7 trillion cubic feet of natural gas. Figure 1 shows the tribal lands that overlap with shale basins across the U.S. The oil and gas resources on tribal lands, along with coal, are estimated to be worth nearly \$1.5 trillion.

Figure 1.



Despite this abundance of energy resources and the associated potential wealth located on or near Indian country, many Native American individuals and communities face significant economic challenges. Native American reservations remain some of the poorest communities in the U.S., with a Harvard study finding that Native Americans “lag behind on almost every measure of economic and social wellbeing.” While some tribes are tapping into their significant energy resources to provide jobs and support education, infrastructure, and other public services, DOI estimates “that energy development is taking place on only 2.1 million acres of Indian lands while an additional 15 million acres with energy potential remain untapped. In other words, 88 percent of Indian lands with energy potential have yet to be developed.”

There are several challenges that face Native populations as they try to access their energy resources. One issue is cultural—based on an unfortunate history of past abuses and mismanagement by the government, many Native people are skeptical of energy development.

Even when those tense histories can be overcome, finding the right partners, both technical and financial, is a challenge. Intense regulatory barriers also inhibit the ability of tribes to access and develop the resources that exist on their own lands. For example, the Property and Environmental Research Center explains that “on Indian lands, companies must go through at least four federal agencies and 49 steps to acquire a permit for energy development, compared to as few as four steps off reservations. . . . Tribal energy development projects are subject to a number of regulations that do not apply on private lands.”

Despite these obstacles, Native people are moving forward to both tap into their own resources and participate in the growth that is happening close by. In Alaska, the Alaska Native Utilization Agreement between Alyeska and DOI, renewed in 2007, “provides Alaska Natives with recruitment, training, employment and promotional opportunities . . . [to ensure] Alaska’s indigenous people continue to benefit from the economic opportunities afforded by [Trans Alaska Pipeline System] operations.” More recently, the Navajo Nation Oil & Gas Company joined the American Petroleum Institute in late 2015 as a member company, further solidifying it as a part of the broader industry community and giving it access to all of the benefits of the national trade association. Legislation addressing permitting delays and leases on Indian lands, The Native American Energy Act, passed in the House in October 2015 “based on the principle that tribes, not the federal government or special interests, are the best stewards of their lands.” In addition, the industry has been collaborating directly with Indian country in an effort to better communicate the opportunities available in the industry and promote education and training efforts to prepare Native individuals to be qualified for those opportunities.

With such an abundance of resources there is significant opportunity both for tribes to develop the resources on their own lands, creating wealth and jobs to support their communities, and for Native people to find meaningful, well-paying careers in the oil and natural gas industry in areas close to home.

V. Conclusion: Job Opportunities from All Sources

This report has analyzed some of the U.S. demographic trends that will influence the changing make-up of the labor force in the oil and gas and petrochemical industries over the next 20 years. Despite a lull in the pace of Hispanic immigration in recent years, an above-average birth rate and an expected gradual return to higher levels of immigration will keep the Hispanic population growth rate well above average over the next two decades – an average of 2.0% per year, 2015-2035, compared to non-Hispanic population growth of 0.4%. And because the Hispanic population is younger, its role in labor force growth will be substantial. African American employment growth is also projected to be above average over this period due to population growth that is slightly higher than the national average and a narrowing of the African American unemployment gap as labor markets tighten in an environment of slower labor force growth.

Our estimates of the composition of employment in the oil and gas and petrochemical industries by race/ethnicity and gender within occupations based on Census Bureau survey data show that minority employment already plays a significant role in these industries, accounting for 27% of the total. The Hispanic share of employment in the industry is above its economy-wide share of employment, while the African American share of employment is below the African American share of employment in other industries. With industry growth and replacement of retiring workers over the next 20 years, we project the shares of both minority groups to rise, and the overall minority share of industry employment will increase to 36%.

Combining all types of job growth, we project a total of 1.3 million job opportunities from 2015 to 2025, with a total of 444 thousand minority job opportunities over the period. In the Wood Mackenzie Regulatory Constraints scenario for the oil and gas industry combined with IHS projections for the petrochemical industry, total employment in these industries will increase by 521 thousand between 2015 and 2025. When the 282 thousand job opportunities arising from replacement requirements in these industries are added to employment growth over this period, the result is over 800 thousand new job opportunities (see row 1 of Table V.1).

Implementation of the policies and practices analyzed in Wood Mackenzie's Pro-Development scenario would increase employment in these industries by an additional 479 thousand, to nearly 1.3 million total opportunities by 2025 (row 2 of Table V.1). Over the following 10-year period, 2025-2035, investment levels in the industry and overall employment growth are projected to decline slightly under Wood Mackenzie's Regulatory Constraints scenario, but replacement requirements will be even higher.

Table V.1
Projected Job Opportunities in the Oil & Gas and Petrochemical Industries*

	African American	Hispanic	Minority	Total Jobs	Of which, Female
<u>Increment from 2015 to 2025</u>					
Regulatory Constraints Scenario (Growth and Capital Expenditures) plus Replacement Requirements	63	220	283	803	136
Total Including Additional Employment from Pro-Development Policy	87	357	444	1,282	208
<u>Increment from 2015 to 2035</u>					
Regulatory Constraints Scenario (Growth and Capital Expenditures) plus Replacement Requirements	91	351	443	1,074	178
Total Including Additional Employment from Pro-Development Policy	131	576	707	1,864	290

*"Minority" is the sum of African American and Hispanic.

African American, Hispanic, Minority and Total columns include females.

When job opportunities associated with replacement requirements are added to the combined employment growth from the Regulatory Constraints and Pro-Development scenarios, the result is a total of nearly 1.9 million job opportunities created over the period 2015-2035. Of these opportunities, we project 707 thousand job opportunities (38%) for Hispanics and African Americans (row 4 of Table V.I).

We expect the employment of women in the oil and gas and petrochemical industries to grow roughly in line with total employment in these industries over the 20-year period. The already-low shares of women in the semi-skilled and unskilled blue-collar occupational groups are projected to decline further, and the share of women in the traditionally female-dominated 'Office and Administrative Support' (OAS) category will fall slightly, which will hold down the overall increase in female employment in the industry. However, women will share in the growth of more skilled white collar jobs in the industry, and the overall female share of employment in the industry will remain stable. Combining all growth types, this would translate into 290 thousand job opportunities for women over the period 2015-2035.

Projections of job opportunities from baseline employment growth and replacement combined with pro-development policy by broad occupation are presented in Table V.2. Data in this format for nine regions are in Appendix L.

Table V.2

**Projected Employment Opportunities in the Oil & Gas and Petrochemical Industries, 2015-2035
(Combining Pro-Development Policy with Baseline Growth and Replacement, Including Investment)**

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	1,282,246	86,885	357,403	35%	207,509	16%
Management, Business and Financial	221,033	12,234	33,218	21%	65,675	30%
Professional and Related	201,033	12,136	34,275	23%	43,749	22%
Service	15,100	3,103	3,950	47%	3,243	21%
Sales and Related	25,784	696	4,410	20%	4,572	18%
Office & Administrative Support	103,228	6,961	21,449	28%	68,088	66%
Skilled Blue Collar	406,213	24,950	121,091	36%	9,639	2%
Semi-skilled Blue Collar	245,947	19,925	105,826	51%	9,356	4%
Unskilled Blue Collar	63,908	6,880	33,184	63%	3,187	5%
2015-2035						
Total	1,863,909	130,512	576,446	38%	290,210	16%
Management, Business and Financial	312,080	17,689	55,174	23%	91,183	29%
Professional and Related	288,912	18,317	57,469	26%	62,376	22%
Service	24,217	4,763	6,775	48%	5,336	22%
Sales and Related	38,728	1,070	7,174	21%	6,937	18%
Office & Administrative Support	143,920	10,161	33,529	30%	91,855	64%
Skilled Blue Collar	605,715	39,261	197,421	39%	14,214	2%
Semi-skilled Blue Collar	355,427	29,541	167,165	55%	13,306	4%
Unskilled Blue Collar	94,910	9,710	51,739	65%	5,003	5%

Projections of job opportunities from baseline employment growth and replacement combined with pro-development policy by region are presented in Table V.3. The West South Central region, which accounted for 58% of total oil and gas and petrochemical employment in 2015, will see the largest growth in job opportunities – 840 thousand, or 45% of the total. However, under the Pro-Development scenario policies that boost total job opportunities to nearly 1.9 million, other regions will also see significant growth. The Pacific region will have 14% of total job opportunities and the Mountain region 12%.

Table V.3
Projected Employment Opportunities in the Oil & Gas and Petrochemical Industries,
2015-2035 (Combining Pro-Development Policy with Baseline Growth and
Replacement, Including Investment)

	African American	Hispanic	Minority	Total	Female
U.S.	130,512	576,446	706,958	1,863,909	290,210
New England	227	818	1,045	3,879	685
Middle Atlantic	6,642	22,407	29,049	131,648	18,386
East North Central	4,930	10,792	15,722	112,529	15,781
West North Central	4,295	16,418	20,713	117,678	15,189
South Atlantic	10,516	18,483	28,999	128,900	18,559
East South Central	6,192	3,261	9,453	38,293	4,534
West South Central	82,389	346,125	428,514	840,245	145,412
Mountain	4,871	62,563	67,434	221,381	31,478
Pacific	10,450	95,579	106,029	269,356	40,186

At the level of detailed occupations, when employment growth in the Pro-Development scenario is combined with expected replacement requirements for the industry over the period 2015-2035, we project 339 thousand new job opportunities in the core oil and gas occupations involved in oil field development and operations – Derrick, Rotary Drill, and Service Unit Operators and Roustabouts (see Table V.4). Over 67 thousand job opportunities are projected for Petroleum Engineers under this scenario.

This report does not address the issue of wages in the oil & gas and petrochemical industries, but it is clear that the employment opportunities projected here will include a substantial number of high wage jobs. The average hourly wage in 2014 of the occupation that will see the greatest number of job opportunities – derrick, rotary drill and service unit operators – was \$25.85, which is well above the economy-wide mean wage of \$22.71 even though the latter includes all managerial and professional occupations. Significant numbers of employment opportunities are also projected in high wage jobs such as petroleum engineers (\$70.92/hour in 2014), industrial machinery mechanics (\$23.66), supervisors of construction and extraction workers (\$31.32), and pumping station operators (\$23.51).

The nearly 1.9 million direct job opportunities presented in this report for the oil & gas and petrochemical industries through 2035 speak to the continuing importance of these industries in the U.S. economy as a whole and to individuals and families looking for well-paying career opportunities. As seen in this report, minority communities and women represent critically vital and available talent pools to help meet the industry’s future workforce demands.

Table V.4

**Projected Employment Opportunities in the Oil & Gas and Petrochemical Industries in Detailed Occupations, 2015-2035
(Combining Pro-Development Policy with Baseline Growth and Replacement, Including Investment)**

	U.S.	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations and Investment Managers	39,584	62	2,823	2,362	2,477	2,951	803	17,114	4,720	6,272
Managers, n.e.c.	5,704	13	375	373	307	427	123	2,676	577	833
Accountants and Auditors	27,152	40	1,686	1,561	1,252	2,294	522	12,741	2,689	4,367
Civil Engineers	16,587	21	1,074	783	1,126	555	251	8,461	2,695	1,621
Petroleum Engineers	67,547	12	3,650	3,352	2,126	6,686	1,100	31,899	6,085	12,637
Environmental Scientists and Geoscientists	27,686	6	1,533	1,388	947	2,646	449	13,084	2,607	5,026
Geological and Petroleum Technicians	17,986	9	1,066	869	1,012	1,375	349	8,449	1,904	2,953
Sales Representatives, Wholesale and Manufacturing	15,081	33	971	851	890	954	284	7,513	1,687	1,898
Bookkeeping, Accounting, and Auditing Clerks	19,480	6	1,366	1,100	1,133	1,656	354	7,910	2,399	3,556
Secretaries and Administrative Assistants	41,283	37	2,848	2,395	2,375	3,462	787	17,301	4,900	7,178
Office Clerks, General	24,620	40	1,873	1,548	1,612	1,743	506	10,386	3,111	3,801
First-Line Supervisors of Construction Trades and Extra	54,895	24	4,505	3,254	4,209	4,218	1,128	19,565	7,754	10,238
Construction Laborers	53,566	76	6,705	4,614	5,841	2,701	1,216	13,371	10,189	8,853
Operating Engineers and Other Construction Equipmei	35,551	45	3,921	2,708	3,534	2,004	785	10,581	6,093	5,880
Electricians	12,034	31	1,068	857	996	748	281	4,578	1,656	1,819
Pipelayers, Plumbers, Pipefitters, and Steamfitters	17,083	20	2,149	1,592	1,889	852	422	3,809	3,448	2,902
Derrick, Rotary Drill, and Service Unit Operators	232,043	100	14,057	9,489	16,130	15,604	4,344	109,157	27,428	35,734
Roustabouts, Oil & Gas	107,307	45	6,804	4,749	7,268	8,096	2,060	47,532	12,583	18,170
Helpers, Extraction Workers	8,905	3	589	403	640	706	180	3,695	1,069	1,620
Industrial Machinery Installation, Repair, and Mainten:	55,715	242	3,688	3,886	3,621	3,652	1,504	27,097	5,322	6,703
Maintenance and Repair Workers, General	18,553	80	1,330	1,283	1,236	1,294	455	8,522	1,920	2,433
Welding, Soldering, and Brazing Workers	37,620	38	2,620	1,861	2,230	1,628	503	19,765	5,022	3,953
Miscellaneous Production Workers	17,874	50	1,193	1,083	1,078	1,195	385	8,426	1,958	2,506
Driver/Sales Workers and Truck Drivers	52,538	66	3,964	3,035	3,931	3,844	1,155	21,452	6,512	8,579
Laborers and Freight, Stock, and Material Movers, Han	28,977	83	2,345	1,960	1,768	1,820	618	13,824	3,293	3,266
Pumping Station Operators	54,406	61	3,392	2,952	2,841	4,502	1,068	25,385	5,517	8,688

Appendix A. Population Projections by Age, Race and Gender

This section describes the long-term projections of U.S. population by age and gender – in total and separately for African Americans and Hispanics – that IHS produced as a first step in forecasting the potential employment opportunities for minorities and women in the oil & gas and petrochemical industries through 2035. To produce these population projections, IHS assembled the most current data from the Census Bureau and other sources on population by age, gender and race/ethnicity and on demographic relationships that underlie the projections, such as fertility rates and survival rates, nationally and in the nine Census regions.

Our population projections are produced using a cohort component method, similar to the approach used by the U.S. Census Bureau to produce its long-term population projections. The model produces estimates of the target populations at 5-year intervals, 2015 through 2035, starting with base year 2010 estimates of the population in 5-year age groups, 0-4 through 85+, as follows:

- In each 5-year period, age-specific survival rates are applied to the initial population in each 5-year age category to make preliminary estimates of the population in each higher 5-year age category in the forecast year.
- The population of age 0-4 in the forecast year is estimated by applying age-specific fertility rates to the female population in six 5-year age categories, 15-19 through 40-44.
- Estimates of net international migration – total and by 5-year age category are added to the preliminary estimates.
- For regional estimates, the final step is an adjustment for interregional migration – total and by 5-year age groups.

Below we present historical data on these inputs to the population projections and summarize the assumptions underlying the forecasts.

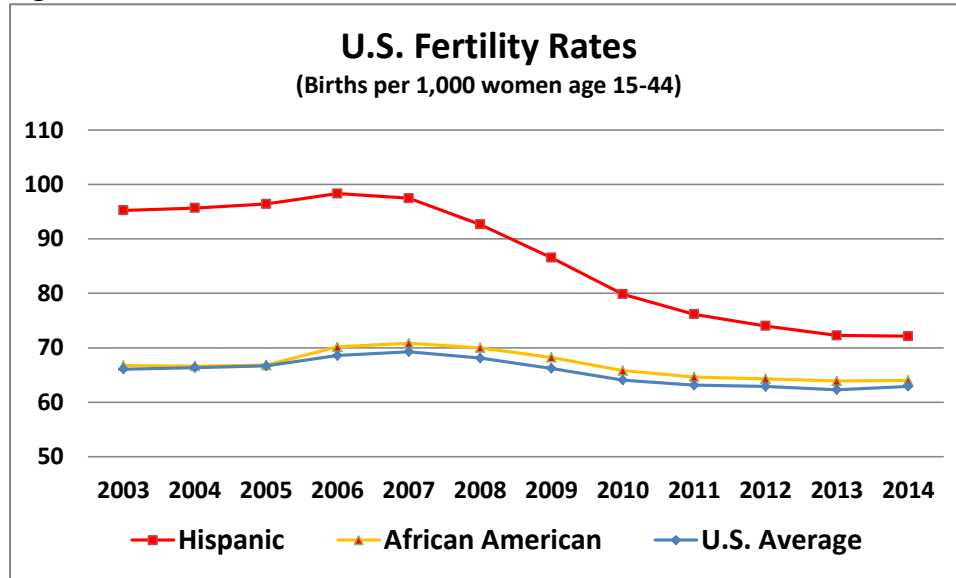
Race/ethnicity categories are defined as follows in this report. The Hispanic population includes persons of Hispanic origin of all races. The African American population includes persons not of Hispanic origin reporting African American as a single response to the Census Bureau's question regarding race.

Fertility Rates

As the experience of the last several years reconfirmed, birth rates are indeed sensitive to economic conditions. The fertility rate (births per 1,000 women age 15-44) differs for the two minority groups analyzed in this study, but the extent of the differences have narrowed in recent years due to a sharp drop in the Hispanic fertility rate since the onset of the 2008-09 recession. Prior to the recession, the Hispanic fertility rate was 40 percent or more higher than the U.S. average, but by 2014 the differential was only 15 percent. The African American

fertility rate was less affected by the recession. It declined from 70.8 births per 1,000 women in 2007 to 63.9 in 2013 and remains just above the U.S. average.

Figure A.1



The decline in the Hispanic fertility rate was sharpest among young women. Among Hispanic women age 15-19, the fertility rate in 2014 was half its level prior to the recession. In the 20-24 age group, there was a 36 percent decline. As fertility rates in these younger age groups have declined, the incidence of enrollment in education has risen among Hispanic women.

Table A.1
Hispanic Fertility Rates by Age
(Births per 1,000 women)

	2007	2014	change
Overall	97.4	72.1	-26%
15-19 years	75.3	38.0	-50%
20-24 years	164.6	104.5	-36%
25-29 years	149.5	118.7	-21%
30-34 years	108.5	96.5	-11%
35-39 years	55.0	53.6	-3%
40-44 years	13.1	13.5	3%

Fertility rates differ regionally, reflecting in part differences in regional shares of these minority populations. However, even within each of the two minority groups there are substantial interregional differences in fertility rates as shown in Table A.2. Our fertility rate forecasts generally preserve these regional differences.

Table A.2
Fertility Rates by Region: 2014
(Births per 1,000 women age 15-44)

	Total	Hispanic	African American
U.S.	62.9	72.1	64.0
New England	52.6	66.2	59.0
Middle Atlantic	59.3	68.2	58.9
East North Central	62.0	69.8	69.1
West North Central	67.9	82.0	80.3
South Atlantic	60.8	69.3	62.3
East South Central	63.5	92.7	64.0
West South Central	70.0	80.6	67.0
Mountain	66.9	72.1	69.7
Pacific	62.6	68.8	57.0
As Percent of U.S. Average			
U.S.	100%	100%	100%
New England	84%	92%	92%
Middle Atlantic	94%	95%	92%
East North Central	99%	97%	108%
West North Central	108%	114%	126%
South Atlantic	97%	96%	97%
East South Central	101%	129%	100%
West South Central	111%	112%	105%
Mountain	106%	100%	109%
Pacific	99%	95%	89%

After six years of decline, fertility rates for most demographic groups showed small increases in 2014. The overall fertility rate rose from 62.3 to 62.9 but remains 9 percent below its 2007 level. We expect fertility rates to increase slightly over the next 3-4 years, but following this cyclical recovery we assume that the overall fertility rates of all demographic groups will resume a gradual decline. However, within different age categories, the fertility rates among women in younger age categories will fall more, while those among the 30-34 and 35-39 year categories will continue to trend up slightly. The total births that we project over the 20-year forecast period are similar to the number of births projected in the Census Bureau's most recent (December 2014) population projections.

Survival Rates

The survival rates used in our projections are average probabilities of survival of persons in each 5-year category for a period of five years. These 5-year survival rates were derived from single-year survival rates from the Census Bureau's December 2014 population projections. Separate sets of survival rates were developed for each future five-year period, separately for

the African American and Hispanic populations as well as the overall U.S. population. Survival rates are not differentiated by region.

Net International Migration

In addition to affecting birth rates, the recent recession also had a significant impact on the pace of immigration into the U.S. In particular, numerous reports have documented a slowdown in the net flow of Hispanic immigrants to the U.S. as job prospects disappeared and border enforcement efforts increased. The most recent Census Bureau estimates show that Hispanic net immigration slowed to around 300 thousand over the last four years – less than one-third of the levels seen prior to the recession.

Our assumptions about the future levels of net international migration – in total and for the Hispanic and African American populations separately – are in line with the most recent Census Bureau long-term population projections. They show the amount of net international immigration gradually rising over the 20-year forecast period from about 1 million in recent years to 1.3 million per year in the final 5-year period of the forecast.

Assumptions about the distribution of immigrants by age, race/ethnicity and region were developed based on analysis of recent trends in immigration using the American Community Survey (ACS). Both the ACS and the Census Bureau’s Current Population Survey (CPS) provide data on migration. The ACS has a larger sample and, thus, provides better estimates of small demographic cells defined simultaneously by age, race/ethnicity and region.

The ACS asks all respondents whether they lived in the same house one year ago and, if not, where they lived one year ago. Response categories permit identifying movers within the U.S. as well as immigrants. We analyzed data on this question from the Public Use Microdata Sample (PUMS) from ACS surveys conducted during 2012-2014. The ACS provides data on the number and distribution of immigrants. Our population estimates and projections adjust these figures for the number of migrants out of the U.S. to yield net immigration. These adjustments were developed by simulating our cohort component model to project 2015 population from a base of 2010 and comparing the results with our independent estimate of actual 2015 population.

Domestic Migration

ACS data show that each year about one in six people were living in a different house one year prior to the date they were surveyed. However, a large percentage of these moves are within the same county or within the same state. With the country divided into the nine large regions analyzed in this study, the proportion of the population involved in interregional moves is small – about 1.6 percent per year. On a net basis, interregional moves have only a small effect on the populations of the nine regions. Table A.3 shows the net change in the population of each region due to moves into and out of each region (average during 2012 and 2013). The Middle

Atlantic region has experienced the largest population outflow on a percentage basis – 0.5 percent, or approximately 2.5 percent over five years.

Table A.3
Net Interregional Migration per Year, 2012-2013

Region	Net Population Change Due to Movement Between Regions	Percentage of the Region's Population
New England	-21,116	-0.1%
Middle Atlantic	-226,149	-0.5%
East North Central	-132,692	-0.3%
West North Central	17,565	0.1%
South Atlantic	193,175	0.3%
East South Central	39,383	0.2%
West South Central	122,080	0.3%
Mountain	97,830	0.4%
Pacific	-90,076	-0.2%

Data like those in Table A.3 were also tabulated separately for the Hispanic (Table A.4) and African American (Table A.5) populations. Data for the Hispanic population reflect net outflows from the Middle Atlantic and East South Central regions as well as from the Pacific. The primary beneficiaries of this flow were the West North Central, West South Central and South Atlantic regions. The Middle Atlantic and Pacific regions have also seen net interregional outflows for the African American population.

Table A.4
**Net Interregional Migration of the Hispanic Population
per Year, 2012-2013**

Region	Net Population Change Due to Movement Between Regions	Percentage of the Region's Population
New England	-486	0.0%
Middle Atlantic	-30,440	-0.5%
East North Central	-757	0.0%
West North Central	5,178	0.4%
South Atlantic	21,862	0.3%
East South Central	-3,557	-0.5%
West South Central	32,748	0.3%
Mountain	7,608	0.1%
Pacific	-32,155	-0.2%

Table A.5
Net Interregional Migration of the African American Population
per Year, 2012-2013

Region	Net Population Change Due to Movement Between Regions	Percentage of the Region's Population
New England	3,508	0.4%
Middle Atlantic	-41,892	-0.8%
East North Central	-17,268	-0.3%
West North Central	-1,111	-0.1%
South Atlantic	39,421	0.3%
East South Central	5,205	0.1%
West South Central	22,067	0.4%
Mountain	5,960	0.8%
Pacific	-15,890	-0.6%

The ACS also permitted analysis of the age distribution of interregional movers. Data were tabulated for each five-year age group defined in our cohort component model to provide a basis for developing assumptions about the age distribution of net population change due to interregional migration for use in projecting the population of regions.

Population by Gender

We project the population by gender as well as age for each of the minority groups. These projections are based on the Census Bureau's projected shares of the female population in each 5-year age group. Female life expectancy exceeds male life expectancy for the Hispanic and African American populations as it does for the overall population. So the female share of the population rises with age. However, the female share of the population is lower at all age levels for Hispanics than for African Americans (see Table A.6). Two factors are at work here – the high incidence of males among Hispanic immigrants in the younger age groups and higher mortality rates for African American males.

Table A.6
Female Share of the Population by Age: 2015

Age Group	Total	Hispanic	African American
Total	50.8%	49.4%	52.6%
0-4	48.9%	49.1%	49.3%
5-9	48.9%	49.0%	49.3%
10-14	49.0%	49.2%	49.3%
15-19	48.8%	48.9%	49.2%
20-24	48.7%	48.1%	50.4%
25-29	49.2%	47.2%	51.8%
30-34	49.8%	47.7%	52.6%
35-39	50.1%	48.5%	53.0%
40-44	50.4%	49.4%	52.9%
45-49	50.4%	49.0%	52.9%
50-54	50.9%	49.9%	53.2%
55-59	51.4%	51.0%	54.1%
60-64	52.2%	52.5%	55.1%
65-69	52.7%	53.7%	56.5%
70-74	53.9%	56.0%	58.4%
75-79	55.5%	57.7%	61.1%
80-84	58.3%	59.9%	65.2%
85+	65.4%	63.7%	71.6%

Projections

Historical estimates and projections of U.S. population by region are presented in Table A.7. U.S. population growth will average 0.7 percent over the 20-year forecast period, slowing gradually from 0.8 percent in 2016-2020 to 0.6 percent in 2031-2035. The fastest growth is expected in the Mountain region, at 1.4 percent per year, followed by the West South Central at 1.2 percent. Growth will be slowest in the Middle Atlantic region.

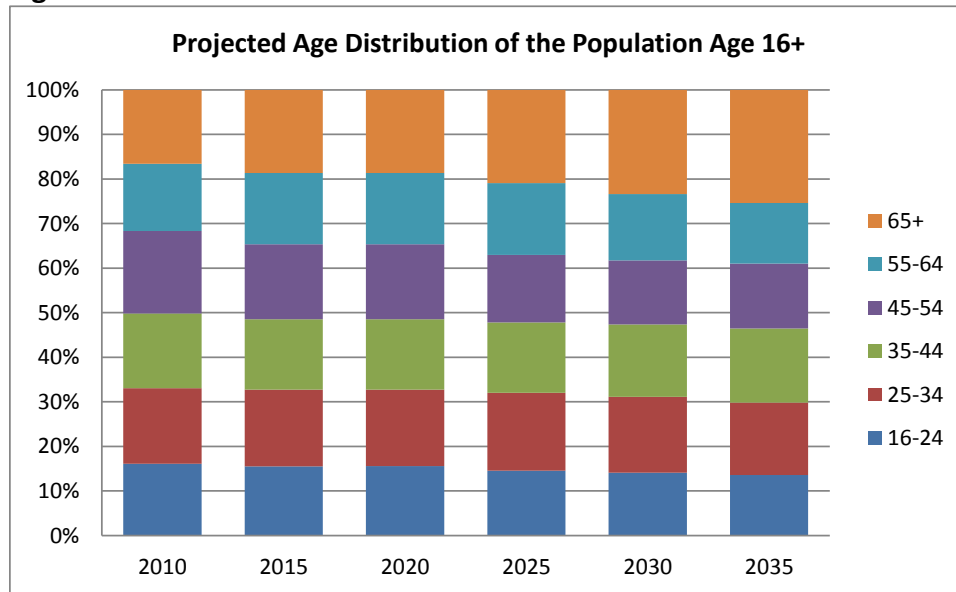
Projections of the Hispanic population by region are presented in Table A.8. With declining fertility and immigration after the onset of the 2008-2009 recession, Hispanic population growth slowed sharply from rates near 3.5 percent prior to the recession to 2.2 percent over the last five years. We expect growth to pick up slightly over the next five years as fertility rates rebound from cyclical lows and immigration responds to improving U.S. economic conditions. Over the following 15 years, Hispanic population growth will continue to significantly outpace overall U.S. growth, but there will not be a return to the pre-recession pace. We project Hispanic population growth to average 2.0 percent over the 20-year forecast period, which will raise the Hispanic share of the U.S. population from 17.6 percent in 2015 to 22.9 percent in 2035.

The South Atlantic and East South Central regions will lead Hispanic population growth at 2.8-2.9 percent average annual gains over the period 2015-2035, with the West North Central a close third at 2.6 percent. The Pacific region currently has the largest share of Hispanic population at 32.0%, but given the slower Hispanic population growth projected for the Pacific, in 2035 it will be surpassed as the region with the highest Hispanic share by the West South Central region at 37.6% (compared to the Pacific’s projected 36.0%).

Projections of the African American population by region are presented in Table A.9. Growth is expected to average 0.8 percent per year through 2035 – near the U.S. average rate. As a result, the African American share of the U.S. total population will show little change – 12.4 percent in 2015 and 12.7 percent in 2035. The fastest growth – spurred by continuing interregional migration – is projected for the Mountain region, which is the region that currently has the smallest African American share of total population, at 3.6 percent. The West North Central, New England and West South Central regions will also see above average growth of the African American population.

With the Baby Boomer generation entering retirement years, the aging of the U.S. population will play a major role in the evolution of the U.S. labor force over the next 20 years. The share of persons age 65 and over in the total population of age 16 and over will rise from 16.6 percent in 2015 to 25.4 percent in 2035 (see Figure A.2).

Figure A.2



The African American population will undergo a similar demographic shift. However, the Hispanic population will remain a much younger group with only 14 percent of the population age 16+ in the oldest age group in 2035 (Table A.10).

Table A.7
Projected Total Population by Region, 2010-2035
(x1,000; 5-year average annual growth rates in percent)

	2010	2015	2020	2025	2030	2035	Change 2015-2035
U.S.	309,347	321,620	334,481	347,309	359,606	370,758	49,138
		0.8%	0.8%	0.8%	0.7%	0.6%	
New England	14,466	14,752	14,985	15,225	15,423	15,535	783
		0.4%	0.3%	0.3%	0.3%	0.1%	
Middle Atlantic	40,916	41,639	42,005	42,321	42,480	42,420	781
		0.4%	0.2%	0.1%	0.1%	0.0%	
East North Central	46,436	46,861	47,620	48,332	48,922	49,282	2,421
		0.2%	0.3%	0.3%	0.2%	0.1%	
West North Central	20,536	21,145	21,735	22,315	22,851	23,319	2,174
		0.6%	0.6%	0.5%	0.5%	0.4%	
South Atlantic	59,935	63,249	66,872	70,497	74,045	77,402	14,153
		1.1%	1.1%	1.1%	1.0%	0.9%	
East South Central	18,463	18,909	19,453	19,971	20,436	20,829	1,920
		0.5%	0.6%	0.5%	0.5%	0.4%	
West South Central	36,473	38,996	41,517	44,075	46,652	49,172	10,176
		1.3%	1.3%	1.2%	1.1%	1.1%	
Mountain	22,129	23,505	25,274	27,098	28,963	30,812	7,307
		1.2%	1.5%	1.4%	1.3%	1.2%	
Pacific	49,993	52,564	55,020	57,475	59,834	61,988	9,424
		1.0%	0.9%	0.9%	0.8%	0.7%	

Table A.8
Projected Hispanic Population by Region, 2010-2035
(x1,000; 5-year average annual growth rates in percent)

	2010	2015	2020	2025	2030	2035	Change 2015-2035
U.S.	50,756	56,636	63,372	70,383	77,590	84,939	28,303
		2.2%	2.3%	2.1%	2.0%	1.8%	
New England	1,311	1,544	1,768	2,000	2,239	2,481	936
		3.3%	2.7%	2.5%	2.3%	2.1%	
Middle Atlantic	5,726	6,373	7,043	7,705	8,356	9,001	2,628
		2.2%	2.0%	1.8%	1.6%	1.5%	
East North Central	3,558	3,912	4,292	4,682	5,070	5,452	1,540
		1.9%	1.9%	1.8%	1.6%	1.5%	
West North Central	1,127	1,303	1,497	1,710	1,943	2,192	889
		3.0%	2.8%	2.7%	2.6%	2.4%	
South Atlantic	7,420	8,610	10,065	11,605	13,236	14,964	6,354
		3.0%	3.2%	2.9%	2.7%	2.5%	
East South Central	694	789	923	1,066	1,220	1,386	597
		2.6%	3.2%	2.9%	2.7%	2.6%	
West South Central	10,231	11,493	13,079	14,790	16,606	18,507	7,014
		2.4%	2.6%	2.5%	2.3%	2.2%	
Mountain	5,243	5,780	6,448	7,156	7,890	8,631	2,851
		2.0%	2.2%	2.1%	2.0%	1.8%	
Pacific	15,445	16,832	18,257	19,668	21,032	22,326	5,493
		1.7%	1.6%	1.5%	1.3%	1.2%	

Table A.9
Projected African American Population by Region, 2010-2035
(x1,000; 5-year average annual growth rates in percent)

	2010	2015	2020	2025	2030	2035	Change 2015-2035
U.S.	38,013	39,954	41,841	43,751	45,536	47,144	7,190
		1.0%	0.9%	0.9%	0.8%	0.7%	
New England	853	929	1,003	1,081	1,160	1,238	310
		1.7%	1.5%	1.5%	1.4%	1.3%	
Middle Atlantic	5,301	5,434	5,529	5,618	5,676	5,699	265
		0.5%	0.4%	0.3%	0.2%	0.1%	
East North Central	5,561	5,618	5,706	5,787	5,838	5,855	236
		0.2%	0.3%	0.3%	0.2%	0.1%	
West North Central	1,316	1,423	1,535	1,654	1,774	1,893	470
		1.6%	1.5%	1.5%	1.4%	1.3%	
South Atlantic	12,908	13,718	14,512	15,314	16,076	16,779	3,061
		1.2%	1.1%	1.1%	1.0%	0.9%	
East South Central	3,736	3,878	4,010	4,133	4,234	4,308	431
		0.7%	0.7%	0.6%	0.5%	0.3%	
West South Central	5,086	5,481	5,888	6,312	6,734	7,145	1,663
		1.5%	1.4%	1.4%	1.3%	1.2%	
Mountain	724	837	950	1,075	1,211	1,357	520
		2.9%	2.6%	2.5%	2.4%	2.3%	
Pacific	2,528	2,636	2,708	2,777	2,833	2,871	235
		0.8%	0.5%	0.5%	0.4%	0.3%	

Table A.10
Projected Age Distribution of the Population of Age 16 and Over: 2035

	U.S. Total	Hispanic	African American
Total	100%	100%	100%
16-24	14%	19%	15%
25-34	16%	20%	17%
35-44	17%	18%	19%
45-54	14%	16%	15%
55-64	14%	13%	13%
65+	25%	14%	21%

Appendix B. Minority and Female Labor Force and Employment

The population projections presented in the previous section provide the basis for forecasting the employment of African Americans and Hispanics, nationally and by region. We analyze trends in the labor force participation rates in different age groups of the minority populations in order to project the labor force for each group. Then, by projecting the unemployment rates of African Americans and Hispanics, we project total employment for each group. Finally, we analyze trends in employment by occupation in broad occupational categories and present long-term projections of employment by occupation for each minority group. In addition, we analyze trends in female employment within broad occupations – economy-wide and for each minority group – to provide a basis for the projections of female employment in the oil and gas industry done in Section III.

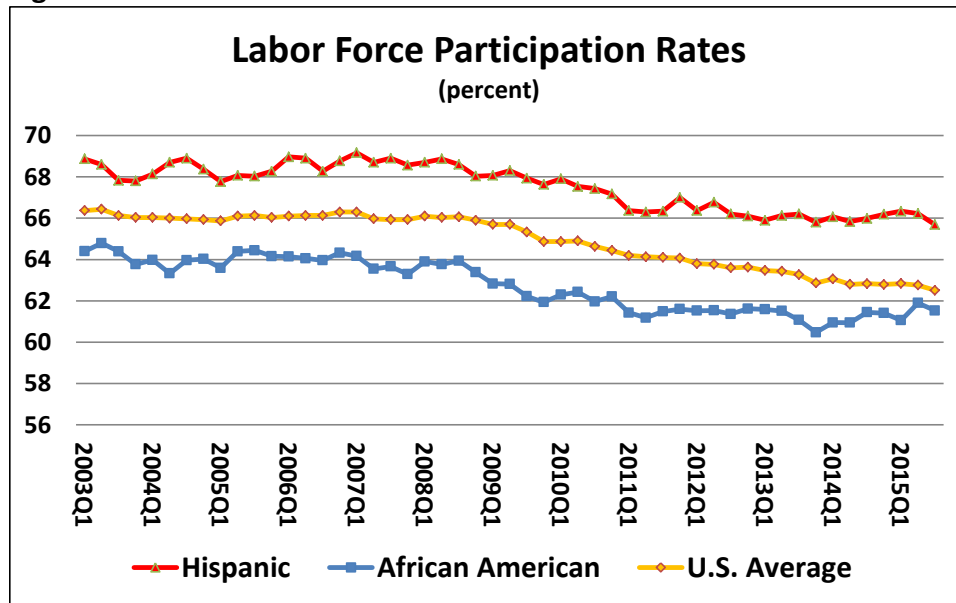
Labor Force Participation Rates

Although employment growth has accelerated in the last two years and the unemployment rate has fallen, the nation's labor force participation rate has continued a gradual decline, which is a continuing concern to economic policy makers. In the third quarter of 2015, the participation rate was at 62.5% – a level not seen since 1977.

The labor force participation rate has continued to fall in part because the severe recession of 2008-2009 created a large pool of long-term unemployed who have become discouraged workers and left the workforce. But most of the decline in the overall labor force participation rate is related to broader long-term demographic trends, including changes in the shares of different demographic groups that have quite different participation rates. Indeed, the labor force participation rate was already trending downward before the Great Recession. After decades of rising, the female labor force participation rate plateaued in the late 1990s, and the male rate continued its long-term decline. Other demographic trends that have contributed to the continuing decline in the overall labor force participation rate during the economic recovery are a rise in the incidence of school enrollment among young persons and the movement of the Baby Boomer generation into retirement.

The African American and Hispanic populations both experienced declines in labor force participation during the recession and subsequent recovery. However, the labor force participation rates of both groups appear to have stabilized and possibly turned upward again, even as the overall labor force participation rate continues to decline. Moreover, the levels of the participation rates for the Hispanic and African American populations are quite different, due in part to differences in the age structure of the two groups. The Hispanic labor force participation rate has held at about 66% over the past three years and is now over 3 percentage points above the U.S. average. The African American rate is below the national average, but the gap between the two has narrowed from over 2 percentage points for many years to about 1 percentage point currently (see Figure B.1).

Figure B.1



To gain more insight into these differences and develop a basis for projecting labor force participation rates for the African American and Hispanic populations nationally and by region, we compiled time series data on their labor force participation rates by age using public-use microdata files from the CPS. We divided the population into three broad age groups:

- 16-24 (ages when school enrollment is a major consideration in labor market decisions),
- 25-64 (core working ages), and
- 65+ (potential retirement years).

What this disaggregation shows is that the higher labor force participation rate of the Hispanic population is due largely to the very low share of the Hispanic population in the older age group, where labor force participation is much lower. Indeed, the Hispanic participation rate is lower than the national average in each of the three age categories listed above. Yet – as shown in Figure B.2 – the overall Hispanic rate is higher.

Labor force participation rates of the African American population are also lower than the national average in all three broad age categories, but the age distribution of the African American population is much closer to the national average; thus, the overall African American labor participation rate, as expected, lies below the national average.

Much of the difference in overall labor force participation rates across regions can be explained by differences in labor force composition with respect to age, race and ethnicity. Again using public-use microdata files from the CPS, we developed time series estimates of age-specific labor force participation rates by region, separately for the two minority groups. Data for overall labor force participation rates by region in 2014 are shown in Table B.1.

Table B.1
Labor Force Participation Rates by Region: 2014

	Total	Hispanic	African American
U.S.	63.1%	66.2%	61.5%
New England	66.0%	68.0%	62.5%
Middle Atlantic	62.0%	62.1%	60.6%
East North Central	63.8%	69.6%	59.3%
West North Central	68.7%	75.7%	67.3%
South Atlantic	61.9%	67.1%	62.8%
East South Central	58.0%	70.5%	57.6%
West South Central	63.8%	66.8%	63.2%
Mountain	63.9%	65.4%	63.9%
Pacific	62.7%	65.7%	59.0%

The IHS U.S. Economic Service forecasts national labor participation rates separately for the population of ages 16-64 and those 65 and over. The rate for the age 65+ category has risen in recent years (perhaps reflecting delayed retirements due to loss of wealth in the recession), and this rate is expected to continue a gradual increase through 2025 and stabilize thereafter. The rate for the population of core working ages is also forecast to rise slightly over the 20-year forecast period. However, due to the rising share of those over age 65 in the total working age population, the overall labor force participation rate will fall steadily from 2019 through 2035 after a small increase associated with stronger economic growth in the next three years.

We expect the existing gaps between the Hispanic and African American labor force participation rates and the economy-wide rates to narrow over time as the labor market becomes tighter and the labor force behavior of the minority groups becomes more similar over time. We projected trends in age-specific labor force participation rates by region for each minority group to mirror the national trends summarized above. By applying these assumptions about age-specific labor force participation rates to our projections of population by age, we produced forecasts of the Hispanic and African American labor force, nationally and by region, which are consistent with the U.S. labor force forecast in the current IHS long-term U.S. macroeconomic forecast.

The two minority groups analyzed here will account for a substantial share of U.S. labor force growth over the next 20 years. The Hispanic population, in particular, will play an increasingly significant role in future U.S. labor force growth, because the Hispanic population is a younger and faster growing segment of the population. We project that Hispanic labor force growth will average 2.5% per year over the next 20 years, compared with 0.7% for the overall labor force. As a result, the Hispanic population will account for nearly two-thirds of the increase in the labor force over this period. The African American labor force will also grow somewhat faster than the national average (1.0% over the 20-year period). Thus, the two minority groups combined will account for over 80% of the net increase in the labor force from 2015 to 2035.

The white non-Hispanic population will continue to have millions of new entrants to the labor force, but this inflow will be largely offset by the wave of retiring Baby Boomers over the next 20 years.

Table B.2
U.S. Labor Force Growth, 2015-2035
(thousands)

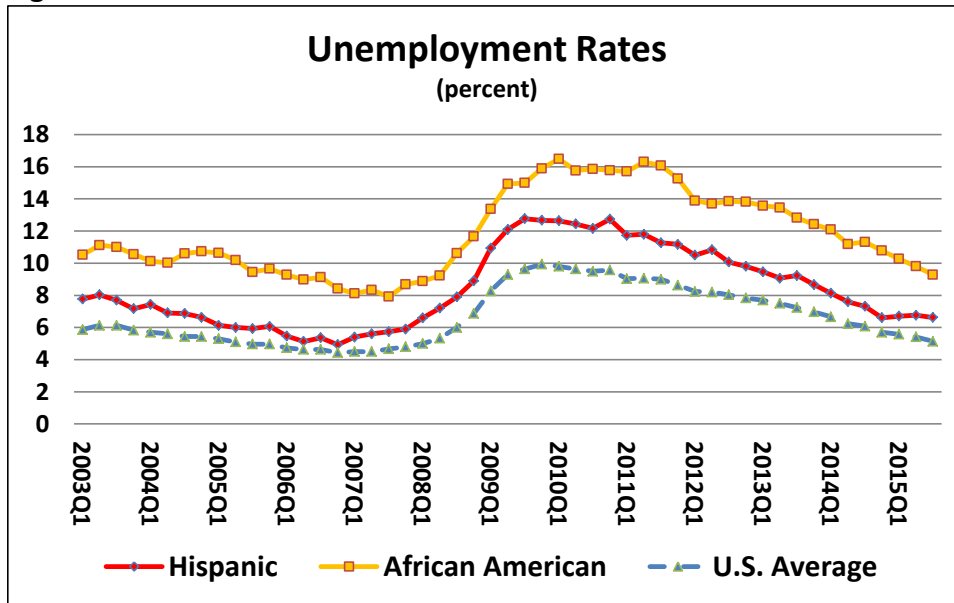
	2015	2020	2025	2030	2035	Change, 2015-35
Total	157,578	166,300	171,495	177,279	182,735	25,157
average annual growth		1.1%	0.6%	0.7%	0.6%	
Hispanic	26,091	30,480	34,476	38,635	42,392	16,300
average annual growth		3.2%	2.5%	2.3%	1.9%	
African American	18,092	19,328	20,293	21,213	22,133	4,041
average annual growth		1.3%	1.0%	0.9%	0.9%	

Unemployment Rates

The final step in forecasting total employment of the Hispanic and African American populations through 2035 was to compile historical data on and forecast the unemployment rate by region for each of these groups. Historically, the Hispanic unemployment rate has exceeded the overall U.S. rate – in the early 1990s by as much as 4 percentage points. During the period of strong economic growth following the 2001 recession, the gap between the Hispanic unemployment rate and the overall U.S. unemployment rate steadily narrowed from about 2 percentage points to less than 1 percentage point in 2006. During the 2008-2009 recession, the Hispanic unemployment rate rose to a high of 12.7% (fourth quarter of 2010), and the gap between the Hispanic and overall U.S. rates rose to around 3 percentage points. Over the past five years, however, the Hispanic unemployment rate has come down faster than the overall U.S. rate, and the gap has again been reduced to just over 1 percentage point (see Figure B.2).

The unemployment rate for African Americans exceeded the overall rate by 4-5 percentage points during the period 2003-2006, but this gap narrowed to less than 4 percentage points just prior to the 2008-2009 recession. African American workers suffered disproportionately during the recession, and the unemployment rate gap grew to over 7 percentage points. Over the last four years, however, the African American unemployment rate has come down faster than the overall U.S. rate, and the gap has again fallen to about 4 percentage points.

Figure B.2



Among regions, the overall unemployment rate varied from a low of 4.7% in the West North Central to a high of 7.2% in the Pacific in 2014 (see Table B.3). Unemployment rates for the two minority groups show wider geographical variation. The unemployment rates for both Hispanics and African Americans were lowest in the West South Central region – a key region for the oil and gas industry. The Hispanic rate in the West South Central, at 5.5%, nearly matched the economy-wide rate for the region. Hispanic unemployment rates remained higher in the northeast (New England and Middle Atlantic regions) and in the Pacific region. The Mountain region showed the second lowest African American unemployment rate – a region, as noted above, that has recently had significant net in-migration of the African American population.

We expect the gaps between the unemployment rates for the two minority groups and the economy-wide rate to narrow steadily over time as the labor force growth slows and the labor market tightens. We project the Hispanic unemployment rate to be only 1 percentage point above the overall rate by 2020 and 0.5 percentage points in 2035. The gap between the African American unemployment rate and the economy-wide rate is projected to narrow to 3 percentage points by 2025 and to continue a gradual decline thereafter.

Table B.3
Unemployment Rates by Region: 2014

	Total	Hispanic	African American
U.S.	6.2%	7.5%	11.5%
New England	5.9%	11.4%	11.6%
Middle Atlantic	6.3%	8.4%	11.3%
East North Central	6.4%	8.1%	14.4%
West North Central	4.7%	6.8%	12.9%
South Atlantic	6.4%	6.6%	10.6%
East South Central	6.9%	6.6%	11.9%
West South Central	5.3%	5.5%	9.7%
Mountain	5.9%	7.4%	9.8%
Pacific	7.2%	8.6%	14.0%

Employment Forecasts

Our forecast of total employment growth, nationally and by region, is shown in Table B.4. Employment estimates and forecasts for the Hispanic and African American populations are presented in Tables B.5 and B.6. Average annual growth rates for the 20-year forecast period are presented in Table B.7.

U.S. employment growth as measured by the household survey (CPS) has averaged 1.6% per year over the last four years and is expected to remain strong over the next 2-3 years. But the long-term outlook is for slower employment growth due to the labor force trends summarized above. Over the first five years of the forecast period, U.S. employment growth is projected to average 1.2% per year, but growth will average only 0.6% per year over the next 15 years. The Mountain region is projected to experience the fastest growth over the 20-year forecast period at 1.5% per year. Regions in the northeast, with their aging populations and net out-migration, will have the slowest employment growth.

In contrast to this economy-wide slow-growth pattern, Hispanic employment growth is projected to average 2.5% annually from 2015 to 2035. As a result, the Hispanic share of U.S. employment will rise from 16.3% in 2015 to 23.1% in 2035. The net increase in Hispanic employment from 2015 to 2035 of 15.8 million jobs will represent nearly two-thirds of the net increase in total U.S. employment over this period (24.8 million). Hispanic employment is projected to show strong gains in all regions of the country.

African American employment is also projected to grow faster than the U.S. average over the 20-year forecast period, at 1.1 percent per year. Growth rates will be highest in the Mountain and West North Central regions, two areas where migration has recently boosted growth of the African American population and is expected to continue to do so.

The two minority groups combined will have a net increase in employment of nearly 20 million between 2015 and 2035, which will represent 80% of the net increase in employment projected for the U.S. as a whole.

Table B.4
Projected Total Employment by Region, 2015-2035
(thousands)

	2015	2020	2025	2030	2035	Change 2015-2035
U.S.	149,091	157,906	163,008	168,862	173,914	24,823
New England	7,451	7,717	7,771	7,813	7,825	373
Middle Atlantic	19,433	20,221	19,924	19,924	19,826	392
East North Central	22,155	22,837	23,020	23,267	23,398	1,243
West North Central	10,761	11,226	11,458	11,720	11,991	1,230
South Atlantic	28,768	31,037	32,630	34,299	35,774	7,007
East South Central	7,990	8,428	8,649	8,885	9,061	1,072
West South Central	17,717	18,857	19,976	21,215	22,391	4,674
Mountain	10,809	11,912	12,805	13,757	14,652	3,843
Pacific	24,007	25,672	26,774	27,982	28,996	4,989

Table B.5
Projected Hispanic Employment by Region, 2015-2035
(thousands)

	2015	2020	2025	2030	2035	Change 2015-2035
U.S.	24,319	28,658	32,547	36,595	40,161	15,842
New England	595	720	836	957	1,080	485
Middle Atlantic	2,632	3,074	3,350	3,696	3,991	1,359
East North Central	1,589	1,850	2,092	2,319	2,488	898
West North Central	557	683	814	950	1,076	519
South Atlantic	3,718	4,502	5,265	6,081	6,881	3,163
East South Central	339	420	508	603	685	346
West South Central	5,264	6,301	7,297	8,366	9,345	4,081
Mountain	2,511	2,984	3,419	3,851	4,232	1,720
Pacific	7,114	8,123	8,964	9,772	10,385	3,271

Table B.6
Projected African American Employment by Region, 2015-2035
(thousands)

	2015	2020	2025	2030	2035	Change 2015-2035
U.S.	16,355	17,692	18,690	19,593	20,452	4,096
New England	378	421	458	493	533	155
Middle Atlantic	2,222	2,368	2,389	2,413	2,439	216
East North Central	2,170	2,268	2,327	2,390	2,396	226
West North Central	581	649	717	782	850	269
South Atlantic	5,837	6,355	6,775	7,128	7,476	1,639
East South Central	1,496	1,597	1,678	1,745	1,804	307
West South Central	2,277	2,518	2,732	2,935	3,147	870
Mountain	370	432	495	562	636	266
Pacific	1,023	1,083	1,120	1,144	1,171	148

Table B.7
Average Annual Growth Rates of Employment by Region:
2015-2035

	Total	Hispanic	African American
U.S.	0.8%	2.5%	1.1%
New England	0.2%	3.0%	1.7%
Middle Atlantic	0.1%	2.1%	0.5%
East North Central	0.3%	2.3%	0.5%
West North Central	0.5%	3.3%	1.9%
South Atlantic	1.1%	3.1%	1.2%
East South Central	0.6%	3.6%	0.9%
West South Central	1.2%	2.9%	1.6%
Mountain	1.5%	2.6%	2.7%
Pacific	0.9%	1.9%	0.7%

The employment shares of the two minority groups will rise in all regions over the forecast period (see Table B.8). By 2035 Hispanic workers will account for over 40% of total employment in the West South Central region and 36.0% in the Pacific region. The share of African American employment will remain highest in the South Atlantic region in 2035 at 20.9% followed by the East South Central region at 19.9%.

**Table B.8
Shares of Minority Employment within Each Region**

	2015	2020	2025	2030	2035
Hispanic Share of Employment in Region					
U.S.	16.3%	18.1%	20.0%	21.7%	23.1%
New England	8.0%	9.3%	10.8%	12.2%	13.8%
Mid Atlantic	13.5%	15.2%	16.8%	18.5%	20.1%
East North Central	7.2%	8.1%	9.1%	10.0%	10.6%
West North Central	5.2%	6.1%	7.1%	8.1%	9.0%
South Atlantic	12.9%	14.5%	16.1%	17.7%	19.2%
East South Central	4.2%	5.0%	5.9%	6.8%	7.6%
West South Central	29.7%	33.4%	36.5%	39.4%	41.7%
Mountain	23.2%	25.1%	26.7%	28.0%	28.9%
Pacific	29.6%	31.6%	33.5%	34.9%	35.8%
African American Share of Employment in Region					
U.S.	11.0%	11.2%	11.5%	11.6%	11.8%
New England	5.1%	5.5%	5.9%	6.3%	6.8%
Mid Atlantic	11.4%	11.7%	12.0%	12.1%	12.3%
East North Central	9.8%	9.9%	10.1%	10.3%	10.2%
West North Central	5.4%	5.8%	6.3%	6.7%	7.1%
South Atlantic	20.3%	20.5%	20.8%	20.8%	20.9%
East South Central	18.7%	19.0%	19.4%	19.6%	19.9%
West South Central	12.9%	13.4%	13.7%	13.8%	14.1%
Mountain	3.4%	3.6%	3.9%	4.1%	4.3%
Pacific	4.3%	4.2%	4.2%	4.1%	4.0%

Economy-wide Occupational Employment Trends

In order to project the growth of job opportunities for minorities and women in the oil and gas industry in Section IV, we compiled data on the demographic composition of employment by occupation in detailed industry categories within the broadly defined oil and gas industry. Changes in the share of minorities and women in oil and gas industry employment will occur within the context of broader trends in the occupational mix of employment, economy-wide and for the Hispanic and African American workforce. Therefore, we first examine recent trends in employment by occupation in order to project future employment of the two minority groups in broad occupational categories.

In our occupational analysis, in addition to identifying the most important occupations in the oil and gas industry on a detailed basis, we group all remaining detailed occupations into the following eight broad occupational categories:¹¹

- Management, business and financial
- Professional and related
- Service
- Sales and related
- Office & administrative support
- Skilled blue-collar
- Semi-skilled blue collar
- Unskilled blue collar

Table B.9 shows the distribution of employment by occupation in these categories as tabulated from the 2014 American Community Survey – economy-wide and separately for African Americans and Hispanics – as well as data on the change in the share of each occupation between 2004 and 2014.

This table shows some significant difference in the occupational mix of the two minority groups relative to the economy-wide average. It also shows that over the last 10 years the two minority groups have experienced general trends of change in occupational mix that are similar to those affecting the overall labor force – an increase in the shares of management, professional and service jobs and declines in the shares of jobs in office and administrative occupations and in skilled and semi-skilled blue collar jobs.

To develop base-year 2015 estimates of employment in these broad occupational categories in the nine Census regions we tabulated data from the public-use microdata files from the ACS for the past three years, 2012-2014, and projected recent trends in occupational mix forward, while maintaining consistency with our overall employment estimates reported above. Shares of employment by occupation in each region for African Americans and Hispanics are shown in Table B.10.

¹¹ The first five broad occupational categories are standard groupings of jobs used in the ACS and CPS. To provide a more direct distinction of the skill level of blue-collar jobs, the remaining broad occupational categories typically used in the American Community Survey were recast to distribute blue-collar jobs into categories of skilled, semi-skilled and unskilled jobs. Most jobs in the "Installation, maintenance and repair" group in the ACS are skilled jobs; most in the "Production" category are semi-skilled; and most "Material moving" jobs are unskilled. But there are exceptions in each of these categories. Therefore, the occupations in all of these categories, as well as those in agricultural, construction and transportation occupations were distributed into the three skill-based groupings. Assignments were based on average wages of the detailed occupations and their average skill rating as evaluated within the Department of Labor's O*NET (Occupational Information Network) database.

Table B.9
U.S. Employment by Major Occupation

	Employment Shares, 2014			Change in Shares, 2004-2014		
	Total	Hispanic	African American	Total	Hispanic	African American
Total	100.0%	100.0%	100.0%			
Management, Business & Financial	14.9%	8.5%	10.5%	+1.0%	+1.2%	+0.7%
Professional and Related	22.1%	11.8%	18.4%	+1.8%	+1.1%	+1.3%
Service	18.2%	26.0%	25.3%	+2.0%	+2.3%	+1.9%
Sales and Related	10.7%	10.0%	9.9%	-0.8%	+0.5%	+0.3%
Office & Admin Support	13.0%	12.0%	15.3%	-1.7%	-0.6%	-2.0%
Skilled Blue Collar	7.4%	8.3%	4.7%	-1.8%	-1.9%	-1.5%
Semi-skilled Blue Collar	9.2%	13.5%	10.8%	-0.9%	-2.6%	-1.1%
Unskilled Blue Collar	4.6%	9.9%	5.1%	+0.4%	0.0%	+0.3%

Source: IHS tabulations of American Community Survey data for 2004 and 2014.

Table B.10
Hispanic and African American Shares of Employment by Occupation in Regions: 2015

	U.S.	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
Hispanic Employment by Occupation										
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Management, Business and Financial	8.5%	8.3%	8.4%	7.7%	7.8%	10.3%	7.3%	8.4%	8.5%	8.0%
Professional and Related	11.8%	14.3%	13.0%	11.0%	11.5%	12.9%	10.7%	11.8%	11.4%	11.0%
Service	26.8%	32.7%	30.4%	26.2%	26.1%	25.8%	24.3%	24.9%	29.1%	26.3%
Sales and Related	10.0%	8.9%	9.7%	8.5%	8.0%	10.6%	7.3%	10.2%	9.9%	10.3%
Office & Administrative Support	12.0%	11.8%	12.1%	11.7%	9.9%	11.7%	7.6%	12.0%	12.7%	12.3%
Skilled Blue Collar	8.1%	5.4%	5.7%	6.8%	6.6%	8.3%	11.0%	11.0%	8.8%	7.1%
Semi-skilled Blue Collar	13.2%	12.1%	11.7%	18.6%	18.9%	11.5%	18.2%	14.1%	11.5%	12.8%
Unskilled Blue Collar	9.6%	6.4%	9.1%	9.5%	11.3%	8.9%	13.5%	7.6%	8.1%	12.3%
African American Employment by Occupation										
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Management, Business and Financial	10.5%	9.8%	10.4%	9.7%	8.9%	11.1%	8.3%	10.4%	11.9%	13.3%
Professional and Related	18.4%	20.9%	20.4%	17.0%	17.5%	18.2%	16.0%	18.4%	17.4%	21.4%
Service	25.9%	30.1%	29.6%	27.0%	27.7%	24.7%	24.9%	25.3%	25.5%	22.9%
Sales and Related	10.0%	9.1%	9.1%	9.8%	9.4%	10.4%	9.7%	10.0%	10.8%	10.0%
Office & Administrative Support	15.3%	13.5%	15.5%	15.4%	16.1%	15.3%	14.0%	14.9%	17.8%	16.6%
Skilled Blue Collar	4.5%	4.0%	3.8%	3.8%	3.5%	4.6%	5.3%	5.4%	4.1%	4.1%
Semi-skilled Blue Collar	10.5%	8.0%	7.0%	12.0%	11.4%	10.8%	15.7%	10.9%	7.9%	6.9%
Unskilled Blue Collar	5.0%	4.6%	4.2%	5.1%	5.6%	5.0%	6.3%	4.7%	4.6%	4.7%

An occupational group that is important for the labor supply for the oil and gas industry is the skilled blue collar category. For both minority groups, skilled blue-collar workers make up the highest share of employment in the West South Central and East South Central regions.

Our forecasts of employment by occupation rely in part on projections of employment by occupation produced by the Bureau of Labor Statistics – the BLS Occupational Outlook projections, which currently project employment by occupation to 2022 from a base of 2012.¹² The shares of occupations in the employment in any single industry are generally quite stable. However, BLS identifies certain long-term trends associated with expected technological change or change in the organization of work within individual industries. For example, the share of secretaries declines in almost all industries. Starting from a base of our own estimates of employment in the eight broad occupational categories identified above in 2015, we project changes in the shares of each occupation through 2025 based on the average annual change in share projected by BLS. For the last 10 years of the forecast period, we assume the occupational mix changes projected by BLS will continue, but at a slower pace.

At the level of the eight broad occupational categories used in our analysis, the economy will not see big changes in the mix of jobs over the next 20 years. Table B.11 shows our projections of the shares of U.S. employment in these eight categories through 2035. BLS projects the share of employment in the ‘Management, business and financial’ occupational group to stabilize near its current level over the next 10 years, and our projections reflect that trend. However, the shares of the ‘Professional and related’ and ‘Service’ groups will continue to increase.

Table B.11
Projected Shares of U.S. Employment by Occupation: 2015-2035

	2015	2020	2025	2030	2035
Total	100.0%	100.0%	100.0%	100.0%	100.0%
Management, Business and Financial	14.8%	14.8%	14.8%	14.7%	14.6%
Professional and Related	22.2%	22.2%	22.5%	22.9%	23.2%
Service	18.7%	18.7%	19.1%	19.4%	19.7%
Sales and Related	10.7%	10.7%	10.5%	10.3%	10.2%
Office & Administrative Support	13.0%	13.0%	12.7%	12.4%	12.1%
Skilled Blue Collar	7.1%	7.1%	7.2%	7.2%	7.3%
Semi-skilled Blue Collar	9.1%	9.1%	8.8%	8.6%	8.3%
Unskilled Blue Collar	4.5%	4.5%	4.5%	4.5%	4.5%

¹² <http://www.bls.gov/news.release/ecopro.toc.htm>

Within the blue-collar occupations, the share of skilled jobs will rise slightly as the share of semi-skilled jobs falls. The ‘Semi-skilled blue collar’ category is dominated by occupations involving assembly and other factory work, which will be in continuing decline.

To forecast employment by occupation of the African American and Hispanic populations in these broad occupational categories, we took into account their current occupational mix, their current U.S. employment in each of the eight occupations, their total employment growth in each period, and national employment growth in each occupation. Tables B.12 and B.13 presents summary results of this forecast of economy-wide employment by occupation for African American and Hispanic workers.

Table B.12
Projected Shares of Hispanic Employment by Occupation:
2015-2035

	2015	2020	2025	2030	2035
	Thousands				
Total	24,319	28,658	32,547	36,595	40,161
Management, Business and Financial	2,066	2,479	2,865	3,277	3,658
Professional and Related	2,873	3,562	4,244	4,996	5,731
Service	6,506	7,706	8,790	9,930	10,949
Sales and Related	2,430	2,816	3,144	3,474	3,747
Office & Administrative Support	2,911	3,349	3,711	4,069	4,353
Skilled Blue Collar	1,977	2,352	2,700	3,066	3,397
Semi-skilled Blue Collar	3,211	3,681	4,066	4,441	4,727
Unskilled Blue Collar	2,344	2,713	3,027	3,342	3,599
	share of total				
Total	100.0%	100.0%	100.0%	100.0%	100.0%
Management, Business and Financial	8.5%	8.6%	8.8%	9.0%	9.1%
Professional and Related	11.8%	12.4%	13.0%	13.7%	14.3%
Service	26.8%	26.9%	27.0%	27.1%	27.3%
Sales and Related	10.0%	9.8%	9.7%	9.5%	9.3%
Office & Administrative Support	12.0%	11.7%	11.4%	11.1%	10.8%
Skilled Blue Collar	8.1%	8.2%	8.3%	8.4%	8.5%
Semi-skilled Blue Collar	13.2%	12.8%	12.5%	12.1%	11.8%
Unskilled Blue Collar	9.6%	9.5%	9.3%	9.1%	9.0%

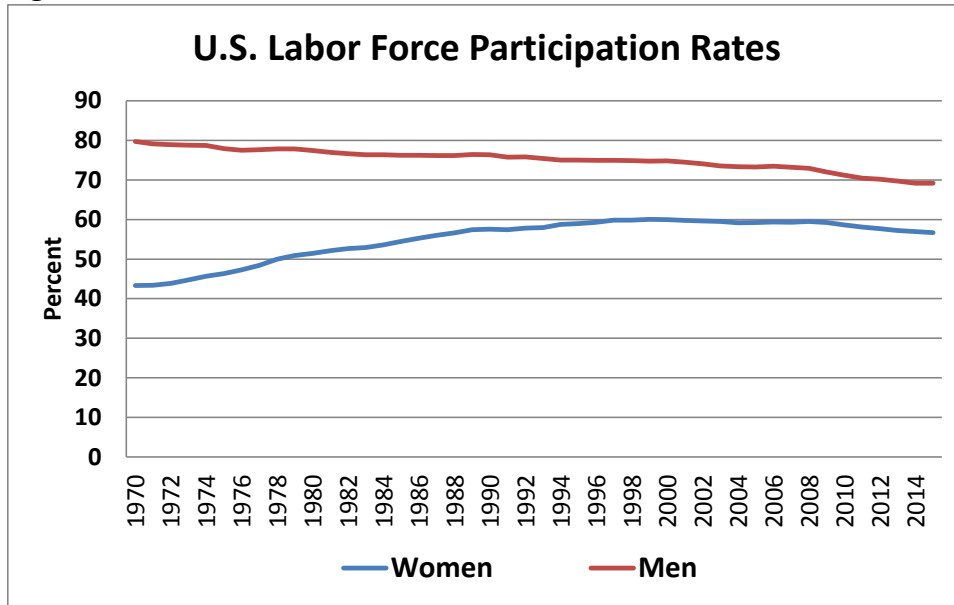
Table B.13
Projected Shares of African American Employment by Occupation:
2015-2035

	2015	2020	2025	2030	2035
	Thousands				
Total	16,355	17,692	18,690	19,593	20,452
Management, Business and Financial	1,716	1,869	1,987	2,096	2,202
Professional and Related	3,007	3,337	3,613	3,879	4,146
Service	4,234	4,599	4,876	5,131	5,377
Sales and Related	1,628	1,733	1,801	1,857	1,906
Office & Administrative Support	2,504	2,652	2,741	2,810	2,868
Skilled Blue Collar	731	814	886	955	1,025
Semi-skilled Blue Collar	1,724	1,813	1,864	1,899	1,924
Unskilled Blue Collar	811	875	922	964	1,004
	share of total				
Total	100.0%	100.0%	100.0%	100.0%	100.0%
Management, Business and Financial	10.5%	10.6%	10.6%	10.7%	10.8%
Professional and Related	18.4%	18.9%	19.3%	19.8%	20.3%
Service	25.9%	26.0%	26.1%	26.2%	26.3%
Sales and Related	10.0%	9.8%	9.6%	9.5%	9.3%
Office & Administrative Support	15.3%	15.0%	14.7%	14.3%	14.0%
Skilled Blue Collar	4.5%	4.6%	4.7%	4.9%	5.0%
Semi-skilled Blue Collar	10.5%	10.2%	10.0%	9.7%	9.4%
Unskilled Blue Collar	5.0%	4.9%	4.9%	4.9%	4.9%

Trends in Female Employment

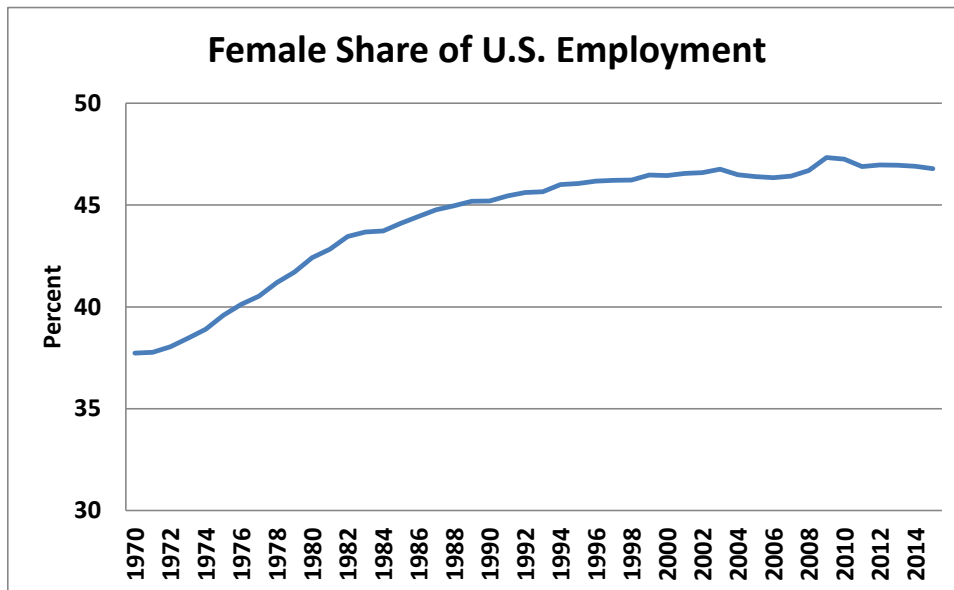
The female labor participation rate rose steadily from the early 1970s through the mid-1990s, but for the next 15 years it was quite stable at a level near 60 percent. Female labor force participation then began to decline at the time of the 2008-2009 recession and has continued to fall through 2015. At the same time, as noted above, the male labor force participation rate has continued a long-term downward trend since the recession, leading to an ongoing decline in the overall labor force participation rate.

Figure B.3



Given the opposing male and female trends of labor force participation through the mid-1990s, the share of women in total U.S. employment rose steadily from 38 percent in 1970 to 46 percent by 1994. The female share then rose more slowly to 46.8 percent in 2003. Male employment declined more sharply during the recession – boosting the female share of total employment to 47.3 percent in 2009. But the female share has since drifted down slightly to just under 47 percent.

Figure B.4



The dynamics of change in female labor force participation across different demographic dimensions such as changes in education levels and working mothers with children has been documented extensively.¹³ Of most interest for our purposes is identifying trends in the share of women within individual occupation groups. Changes in the Standard Occupational Classification – even at the broadest level – complicate the task of analyzing long-term changes. However, the relative stability of the overall female share of employment over the last 15 years suggests that an analysis focusing on this period should give good clues to possible future trends.

We compiled data on the female shares of employment at the level of 10 broad occupations over the period 2003-2014 using data from public-use microdata files of the Current Population Survey. Economy-wide, no occupational category showed an increase of the female share of employment of more than 2 percentage points over this period (see Table B.14). The ‘Management, business and financial’ occupational group showed the biggest gain. The female share of employment fell by 3 percentage points over this period in two occupational groups – ‘Office and administrative support’ and ‘Production’ occupations.

Table B.14
Change in the Female Share of Employment by Occupation
Between 2003 and 2014

Occupational Group	Economy- wide	Hispanic	African American
Total employment	0%	+2%	0%
Management, business and financial	+2%	+4%	0%
Professional and related	+1%	+3%	+1%
Service	0%	+3%	-1%
Sales and related	0%	+3%	-1%
Office & administrative support	-3%	-3%	-1%
Farming, fishing, and forestry	+2%	+5%	-2%
Construction & extraction	0%	0%	0%
Installation, maintenance & repair	-1%	-2%	-3%
Production	-3%	-2%	-7%
Transportation & material moving	+1%	0%	+1%

Among Hispanic workers, women posted big increases in the shares of jobs in the ‘Management, business and financial’ category (up from 44% to 48%) and in the ‘Professional and related’, ‘Service’ and ‘Sales and related’ groups. The female share of total Hispanic employment rose 2 percentage points over this period, from 40% to 42%.

¹³ BLS, *Women in the Labor Force: A Data Book*, BLS Report 1040, February 2013.

Women account for a higher share of the African American workforce (54%) than the 47% share of women economy-wide. While among all African American workers, women showed declines in two blue-collar categories, they showed small increases in 'Professional and related' and 'Transportation and material moving' occupations.

To project trends in female employment in the oil and gas industry – within each minority group and overall – we extrapolated the trends observed in CPS data for the past decade, while maintaining stable shares where little movement was seen over this period. These results are presented in Section III.

Appendix C. Occupation Descriptions

General and Operations Managers	Plan, direct, or coordinate the operations of public or private sector organizations. Duties and responsibilities include formulating policies, managing daily operations, and planning the use of materials and human resources, but are too diverse and general in nature to be classified in any one functional area of management or administration, such as personnel, purchasing, or administrative services.
Managers, All Other	All managers not listed separately in other management occupational categories.
Accountants and Auditors	Examine, analyze, and interpret accounting records to prepare financial statements, give advice, or audit and evaluate statements prepared by others. Install or advise on systems of recording costs or other financial and budgetary data.
Civil Engineers	Perform engineering duties in planning, designing, and overseeing construction and maintenance of building structures, and facilities, such as roads, railroads, airports, bridges, harbors, channels, dams, irrigation projects, pipelines, power plants, and water and sewage systems.
Petroleum Engineers	Devise methods to improve oil and gas extraction and production and determine the need for new or modified tool designs. Oversee drilling and offer technical advice.
Environmental Scientists and Geoscientists	<p>Conduct research or perform investigation for the purpose of identifying, abating, or eliminating sources of pollutants or hazards that affect either the environment or the health of the population. Using knowledge of various scientific disciplines, may collect, synthesize, study, report, and recommend action based on data derived from measurements or observations of air, food, soil, water, and other sources.</p> <p>Study the composition, structure, and other physical aspects of the Earth. May use geological, physics, and mathematics knowledge in exploration for oil, gas, minerals, or underground water; or in waste disposal, land reclamation, or other environmental problems. May study the Earth's internal composition, atmospheres, oceans, and its magnetic, electrical, and gravitational forces. Includes mineralogists, crystallographers, paleontologists, stratigraphers, geodesists, and seismologists.</p>
Geological and Petroleum Technicians	Assist scientists or engineers in the use of electronic, sonic, or nuclear measuring instruments in both laboratory and production activities to obtain data indicating potential resources such as metallic ore, minerals, gas, coal, or petroleum. Analyze mud and drill cuttings. Chart pressure, temperature, and other characteristics of wells or bore holes. Investigate and collect information leading to the possible discovery of new metallic ore, minerals, gas, coal, or petroleum deposits.
Sales Representatives, Wholesale and Manufacturing	Sell goods for wholesalers or manufacturers where technical or scientific knowledge is required in such areas as biology, engineering, chemistry, and electronics, normally obtained from at least 2 years of post-secondary education.
Bookkeeping, Accounting, and Auditing Clerks	Compute, classify, and record numerical data to keep financial records complete. Perform any combination of routine calculating, posting, and verifying duties to obtain primary financial data for use in maintaining accounting records. May also check the accuracy of figures, calculations, and postings pertaining to business transactions recorded by other workers.

Secretaries and Administrative Assistants	Provide high-level administrative support by conducting research, preparing statistical reports, handling information requests, and performing clerical functions such as preparing correspondence, receiving visitors, arranging conference calls, and scheduling meetings. May also train and supervise lower-level clerical staff. Perform routine clerical and administrative functions such as drafting correspondence, scheduling appointments, organizing and maintaining paper and electronic files, or providing information to callers.
Office Clerks, General	Perform duties too varied and diverse to be classified in any specific office clerical occupation, requiring knowledge of office systems and procedures. Clerical duties may be assigned in accordance with the office procedures of individual establishments and may include a combination of answering telephones, bookkeeping, word processing, stenography, office machine operation, and filing.
Skilled Blue Collar	
First-Line Supervisors of Construction Trades and Extraction Workers	Directly supervise and coordinate activities of construction or extraction workers.
Operating Engineers and Other Construction Equipment Operators	Operate one or several types of power construction equipment, such as motor graders, bulldozers, scrapers, compressors, pumps, derricks, shovels, tractors, or front-end loaders to excavate, move, and grade earth, erect structures, or pour concrete or other hard surface pavement. May repair and maintain equipment in addition to other duties.
Electricians	Install, maintain, and repair electrical wiring, equipment, and fixtures. Ensure that work is in accordance with relevant codes. May install or service street lights, intercom systems, or electrical control systems.
Pipelayers, Plumbers, Pipefitters, and Steamfitters	Assemble, install, alter, and repair pipelines or pipe systems that carry water, steam, air, or other liquids or gases. May install heating and cooling equipment and mechanical control systems. Includes sprinkler fitters.
Derrick, Rotary Drill, and Service Unit Operators	Rig derrick equipment and operate pumps to circulate mud through drill hole. Set up or operate a variety of drills to remove underground oil and gas, or remove core samples for testing during oil and gas exploration. Operate equipment to increase oil flow from producing wells or to remove stuck pipe, casing, tools, or other obstructions from drilling wells.
Industrial Machinery Installation, Maintenance and Repair Mechanics	Repair, install, adjust, or maintain industrial production and processing machinery or refinery and pipeline distribution systems.
Pumping Station Operators	Operate steam, gas, electric motor, or internal combustion engine driven compressors. Transmit, compress, or recover gases, such as butane, nitrogen, hydrogen, and natural gas. Tend, control, or operate power-driven, stationary, or portable pumps and manifold systems to transfer gases, oil, other liquids, slurries, or powdered materials to and from various vessels and processes. Operate power pumps and auxiliary equipment to produce flow of oil or gas from wells in oil field.
Semi-skilled Blue Collar	
Roustabouts, Oil and Gas	Assemble or repair oil field equipment using hand and power tools. Perform other tasks as needed.

Maintenance and Repair Workers, General	Perform work involving the skills of two or more maintenance or craft occupations to keep machines, mechanical equipment, or the structure of an establishment in repair. Duties may involve pipe fitting; boiler making; insulating; welding; machining; carpentry; repairing electrical or mechanical equipment; installing, aligning, and balancing new equipment; and repairing buildings, floors, or stairs.
Welding, Soldering, and Brazing Workers	Use hand-welding, flame-cutting, hand soldering, or brazing equipment to weld or join metal components or to fill holes, indentations, or seams of fabricated metal products. Set up, operate, or tend welding, soldering, or brazing machines or robots that weld, braze, solder, or heat treat metal products, components, or assemblies. Includes workers who operate laser cutters or laser-beam machines.
Miscellaneous Production Workers	All production workers not listed separately.
Driver/Sales Workers and Truck Drivers	Drive truck or other vehicle over established routes or within an established territory and sell or deliver goods, such as food products, including restaurant take-out items, or pick up or deliver items such as commercial laundry. May also take orders, collect payment, or stock merchandise at point of delivery. Includes newspaper delivery drivers. Drive a tractor-trailer combination or a truck with a capacity of at least 26,000 pounds Gross Vehicle Weight (GVW). May be required to unload truck. Requires commercial drivers' license. Drive a light vehicle, such as a truck or van, with a capacity of less than 26,000 pounds Gross Vehicle Weight (GVW), primarily to deliver or pick up merchandise or to deliver packages. May load and unload vehicle.
Unskilled Blue Collar	
Construction Laborers	Perform tasks involving physical labor at construction sites. May operate hand and power tools of all types: air hammers, earth tampers, cement mixers, small mechanical hoists, surveying and measuring equipment, and a variety of other equipment and instruments. May clean and prepare sites, dig trenches, set braces to support the sides of excavations, erect scaffolding, and clean up rubble, debris and other waste materials.
Helpers, Extraction Workers	Help extraction craft workers, such as earth drillers, blasters and explosives workers, derrick operators, and mining machine operators, by performing duties requiring less skill. Duties include supplying equipment or cleaning work area. All oil and natural gas extraction workers not listed separately.
Laborers and Freight, Stock, and Material Movers, Hand	Manually move freight, stock, or other materials or perform other general labor. Includes all manual laborers not elsewhere classified.

Source: Bureau of Labor Statistics, Occupational Employment Statistics

Appendix D. Benchmark Employment by Region

Table D-1
Wood Mackenzie Employment Projections: Regulatory Constraints Scenario

	2015	2020	2025	2030	2035
New England					
Total	2,950	3,534	3,692	3,804	3,668
Upstream Oil and Gas Industry	295	378	421	435	424
Industry Operations	0	0	0	0	0
Investment	295	378	421	435	424
Midstream Oil and Gas Industry	2,655	3,156	3,271	3,369	3,244
Industry Operations	716	837	937	1,003	1,027
Investment	1,939	2,319	2,334	2,366	2,217
Downstream Oil and Gas Industry	0	0	0	0	0
Middle Atlantic					
Total	73,288	141,352	169,495	153,113	141,012
Upstream Oil and Gas Industry	47,743	104,546	128,250	115,126	108,799
Industry Operations	22,457	65,033	85,294	82,851	72,003
Investment	25,286	39,513	42,956	32,275	36,796
Midstream Oil and Gas Industry	21,823	33,084	37,523	34,265	28,491
Industry Operations	10,914	16,685	18,922	19,951	18,639
Investment	10,909	16,399	18,601	14,314	9,852
Downstream Oil and Gas Industry	3,722	3,722	3,722	3,722	3,722
East North Central					
Total	51,444	89,277	111,198	117,127	106,228
Upstream Oil and Gas Industry	27,911	58,997	76,295	79,581	68,979
Industry Operations	10,838	37,624	52,175	55,731	45,404
Investment	17,073	21,373	24,120	23,850	23,575
Midstream Oil and Gas Industry	15,838	22,585	27,208	29,851	29,554
Industry Operations	9,078	14,371	16,594	18,359	18,551
Investment	6,760	8,214	10,614	11,492	11,003
Downstream Oil and Gas Industry	7,695	7,695	7,695	7,695	7,695
West North Central					
Total	75,469	111,625	124,288	130,961	131,808
Upstream Oil and Gas Industry	54,102	85,362	95,168	99,250	97,180
Industry Operations	33,737	57,680	63,194	64,614	62,303
Investment	20,365	27,682	31,974	34,636	34,877
Midstream Oil and Gas Industry	18,112	23,008	25,865	28,456	31,373
Industry Operations	12,619	15,619	17,605	18,523	18,443
Investment	5,493	7,389	8,260	9,933	12,930
Downstream Oil and Gas Industry	3,255	3,255	3,255	3,255	3,255

Table D-1 (continued)

	2015	2020	2025	2030	2035
South Atlantic					
Total	36,266	48,205	49,468	58,356	41,458
Upstream Oil and Gas Industry	15,518	24,348	22,751	34,829	23,896
Industry Operations	7,676	15,080	17,309	21,547	14,785
Investment	7,842	9,268	5,442	13,282	9,111
Midstream Oil and Gas Industry	19,911	23,020	25,880	22,690	16,725
Industry Operations	7,490	9,418	10,571	11,361	9,971
Investment	12,421	13,602	15,309	11,329	6,754
Downstream Oil and Gas Industry	837	837	837	837	837
East South Central					
Total	21,522	28,924	33,557	35,181	36,166
Upstream Oil and Gas Industry	9,483	14,757	18,068	19,145	19,053
Industry Operations	7,080	11,675	14,390	15,214	14,964
Investment	2,403	3,082	3,678	3,931	4,089
Midstream Oil and Gas Industry	8,547	10,675	11,997	12,544	13,621
Industry Operations	4,115	4,698	5,491	5,843	6,057
Investment	4,432	5,977	6,506	6,701	7,564
Downstream Oil and Gas Industry	3,492	3,492	3,492	3,492	3,492
West South Central					
Total	716,520	951,782	980,345	950,929	987,853
Upstream Oil and Gas Industry	495,777	757,538	767,225	734,845	753,308
Industry Operations	217,869	351,940	376,165	373,774	375,721
Investment	277,908	405,598	391,060	361,071	377,587
Midstream Oil and Gas Industry	187,358	160,556	179,432	182,396	200,857
Industry Operations	48,381	52,089	58,971	66,296	68,759
Investment	138,977	108,467	120,461	116,100	132,098
Downstream Oil and Gas Industry	33,385	33,688	33,688	33,688	33,688
Mountain					
Total	129,109	100,504	98,733	113,329	116,622
Upstream Oil and Gas Industry	99,480	74,182	73,375	86,384	86,834
Industry Operations	56,639	43,594	38,207	41,716	47,149
Investment	42,841	30,588	35,168	44,668	39,685
Midstream Oil and Gas Industry	25,143	21,836	20,872	22,459	25,302
Industry Operations	14,327	13,990	15,170	13,763	14,482
Investment	10,816	7,846	5,702	8,696	10,820
Downstream Oil and Gas Industry	4,486	4,486	4,486	4,486	4,486
Pacific					
Total	81,711	106,331	124,184	111,675	105,673
Upstream Oil and Gas Industry	46,865	67,226	84,906	67,310	58,842
Industry Operations	28,468	39,616	43,089	44,863	38,985
Investment	18,397	27,610	41,817	22,447	19,857
Midstream Oil and Gas Industry	20,166	24,425	24,598	29,685	32,151
Industry Operations	6,917	7,756	8,582	10,259	10,494
Investment	13,249	16,669	16,016	19,426	21,657
Downstream Oil and Gas Industry	14,680	14,680	14,680	14,680	14,680

Table D-2
Wood Mackenzie Employment Projections: Pro-development Scenario

	2015	2020	2025	2030	2035
New England					
Total	1,910	2,440	2,820	3,130	3,210
Upstream Oil and Gas Industry	310	470	550	650	640
Industry Operations	0	0	0	0	0
Investment	310	470	550	650	640
Midstream Oil and Gas Industry	1,600	1,970	2,270	2,480	2,570
Industry Operations	730	890	1,030	1,110	1,140
Investment	870	1,080	1,240	1,370	1,430
Downstream Oil and Gas Industry	0	0	0	0	0
Middle Atlantic					
Total	75,550	152,290	152,980	153,900	164,720
Upstream Oil and Gas Industry	48,830	115,940	114,810	114,500	125,500
Industry Operations	22,950	70,440	76,120	77,770	74,030
Investment	25,880	45,500	38,690	36,730	51,470
Midstream Oil and Gas Industry	23,030	32,660	34,480	35,710	35,530
Industry Operations	10,830	16,980	18,730	19,440	18,970
Investment	12,200	15,680	15,750	16,270	16,560
Downstream Oil and Gas Industry	3,690	3,690	3,690	3,690	3,690
East North Central					
Total	52,780	90,990	106,700	111,590	126,800
Upstream Oil and Gas Industry	28,350	57,780	69,300	71,600	85,110
Industry Operations	11,050	36,910	44,840	46,290	50,810
Investment	17,300	20,870	24,460	25,310	34,300
Midstream Oil and Gas Industry	16,780	25,560	29,750	32,340	34,040
Industry Operations	8,850	14,640	17,620	19,020	20,090
Investment	7,930	10,920	12,130	13,320	13,950
Downstream Oil and Gas Industry	7,650	7,650	7,650	7,650	7,650
West North Central					
Total	74,810	125,660	141,540	152,440	153,780
Upstream Oil and Gas Industry	53,690	95,210	111,240	120,730	119,460
Industry Operations	32,490	60,960	68,230	68,490	66,140
Investment	21,200	34,250	43,010	52,240	53,320
Midstream Oil and Gas Industry	17,870	27,200	27,050	28,460	31,070
Industry Operations	9,020	12,140	14,090	15,020	15,670
Investment	8,850	15,060	12,960	13,440	15,400
Downstream Oil and Gas Industry	3,250	3,250	3,250	3,250	3,250

Table D-2 (continued)

	2015	2020	2025	2030	2035
South Atlantic					
Total	42,070	52,110	59,470	114,160	138,810
Upstream Oil and Gas Industry	14,910	28,420	34,490	88,450	111,480
Industry Operations	6,880	17,090	24,590	71,580	85,550
Investment	8,030	11,330	9,900	16,870	25,930
Midstream Oil and Gas Industry	26,320	22,850	24,140	24,870	26,490
Industry Operations	7,510	10,210	11,540	11,740	13,110
Investment	18,810	12,640	12,600	13,130	13,380
Downstream Oil and Gas Industry	840	840	840	840	840
East South Central					
Total	21,640	31,040	38,300	44,380	45,410
Upstream Oil and Gas Industry	9,660	17,300	22,980	28,040	27,860
Industry Operations	7,130	13,170	16,940	19,180	19,450
Investment	2,530	4,130	6,040	8,860	8,410
Midstream Oil and Gas Industry	8,480	10,240	11,820	12,840	14,050
Industry Operations	4,190	5,030	5,980	6,520	6,800
Investment	4,290	5,210	5,840	6,320	7,250
Downstream Oil and Gas Industry	3,500	3,500	3,500	3,500	3,500
West South Central					
Total	763,350	1,116,370	1,189,970	1,195,700	1,218,440
Upstream Oil and Gas Industry	514,380	821,980	882,410	868,740	887,570
Industry Operations	213,180	369,190	414,880	397,880	378,720
Investment	301,200	452,790	467,530	470,860	508,850
Midstream Oil and Gas Industry	215,630	261,050	274,220	293,620	297,530
Industry Operations	53,230	69,950	84,430	101,720	95,700
Investment	162,400	191,100	189,790	191,900	201,830
Downstream Oil and Gas Industry	33,340	33,340	33,340	33,340	33,340
Mountain					
Total	145,670	223,170	253,830	280,650	296,060
Upstream Oil and Gas Industry	110,080	180,620	206,550	229,960	239,080
Industry Operations	62,700	95,160	105,930	112,560	114,530
Investment	47,380	85,460	100,620	117,400	124,550
Midstream Oil and Gas Industry	31,140	38,100	42,830	46,240	52,530
Industry Operations	13,690	15,450	17,820	19,430	21,520
Investment	17,450	22,650	25,010	26,810	31,010
Downstream Oil and Gas Industry	4,450	4,450	4,450	4,450	4,450
Pacific					
Total	83,890	116,250	228,180	314,740	313,060
Upstream Oil and Gas Industry	47,600	75,000	182,230	262,760	258,260
Industry Operations	28,560	40,790	75,450	136,470	164,570
Investment	19,040	34,210	106,780	126,290	93,690
Midstream Oil and Gas Industry	21,620	26,580	31,280	37,310	40,130
Industry Operations	7,200	8,550	10,020	13,110	13,960
Investment	14,420	18,030	21,260	24,200	26,170
Downstream Oil and Gas Industry	14,670	14,670	14,670	14,670	14,670

Table D-3
Employment Projections: Petrochemical Industry Operations

	2015	2020	2025	2030	2035
U.S.	161,576	187,220	196,983	203,425	206,837
New England	4,879	4,879	4,879	4,879	4,879
Mid-Atlantic	13,857	15,218	15,133	15,079	14,993
East North Central	29,207	29,207	29,847	30,082	30,020
West North Central	14,190	15,683	15,558	16,008	15,839
South Atlantic	24,271	24,271	24,271	24,271	24,271
East South Central	11,902	11,922	11,918	11,915	11,910
West South Central	52,031	74,081	83,464	89,309	93,091
Mountain	3,911	3,911	3,911	3,911	3,911
Pacific	7,328	8,048	8,002	7,971	7,923

Table D-4
Employment Projections: Petrochemical Industry Investment

	2015	2020	2025	2030	2035
U.S.	40,559	27,328	19,844	13,891	2,099
East North Central	0	0	2,590	0	0
West North Central	4,268	0	0	2,143	1,145
East South Central	402	0	0	0	0
West South Central	35,603	27,328	17,254	11,748	954
Pacific	286	0	0	0	0

Appendix E. Minority and Female Employment in Individual Segments of the Oil & Natural Gas and Petrochemical Industries by Detailed Occupation: 2015

Employment in Upstream Oil & Gas Industry Operations and Investment by Detailed Occupation: 2015

	Total	African American	Hispanic	Minority Share	Female	Female Share
General and Operations Managers	19,957	236	2,153	12%	721	4%
Managers, All Other	2,265	110	219	15%	425	19%
Accountants and Auditors	12,171	872	923	15%	7,769	64%
Civil Engineers	6,869	371	700	16%	863	13%
Petroleum Engineers	28,463	1,034	2,593	13%	3,587	13%
Environmental Scientists and Geoscientists	14,541	231	996	8%	2,826	19%
Geological and Petroleum Technicians	8,968	536	1,295	20%	2,204	25%
Sales Representatives, Wholesale and Manufacturing	5,173	95	487	11%	615	12%
Bookkeeping, Accounting, and Auditing Clerks	12,059	451	1,414	15%	11,062	92%
Secretaries and Administrative Assistants	23,511	417	2,508	12%	22,921	97%
Office Clerks, General	13,110	901	2,234	24%	11,269	86%
First-Line Supervisors of Construction Trades and Extraction	34,421	1,375	6,406	23%	914	3%
Construction Laborers	27,086	1,335	11,897	49%	636	2%
Operating Engineers and Other Construction Equipment	18,602	383	4,288	25%	121	1%
Electricians	5,835	227	1,109	23%	49	1%
Pipelayers, Plumbers, Pipefitters, and Steamfitters	8,868	896	2,909	43%	58	1%
Derrick, Rotary Drill, and Service Unit Operators	118,660	6,082	32,897	33%	2,665	2%
Roustabouts, Oil & Gas	64,092	3,270	17,739	33%	1,451	2%
Helpers, Extraction Workers	6,283	305	2,124	39%	139	2%
Industrial Machinery Installation, Repair, and Maintenance	12,759	607	3,266	30%	285	2%
Maintenance and Repair Workers, General	6,908	640	1,166	26%	25	0%
Welding, Soldering, and Brazing Workers	8,731	356	2,919	38%	173	2%
Miscellaneous Production Workers	6,855	359	2,119	36%	71	1%
Driver/Sales Workers and Truck Drivers	29,967	2,522	9,804	41%	654	2%
Laborers and Freight, Stock, and Material Movers, Hand	8,448	756	2,489	38%	201	2%
Pumping Station Operators	24,763	408	3,490	16%	818	3%

**Employment in Midstream Oil & Gas Industry Operations and Investment
by Detailed Occupation: 2015**

	Total	African American	Hispanic	Minority Share	Female	Female Share
General and Operations Managers	5,816	278	442	12%	799	14%
Managers, All Other	1,203	42	120	13%	213	18%
Accountants and Auditors	2,709	157	251	15%	1,464	54%
Civil Engineers	3,024	147	334	16%	274	9%
Petroleum Engineers	561	90	74	29%	29	5%
Environmental Scientists and Geoscientists	606	137	32	28%	280	46%
Geological and Petroleum Technicians	267	0	0	0%	0	0%
Sales Representatives, Wholesale and Manufacturing	3,541	88	314	11%	430	12%
Bookkeeping, Accounting, and Auditing Clerks	2,833	161	404	20%	2,473	87%
Secretaries and Administrative Assistants	5,192	215	748	19%	4,991	96%
Office Clerks, General	5,118	377	1,281	32%	4,035	79%
First-Line Supervisors of Construction Trades and Extraction	5,588	232	1,392	29%	134	2%
Construction Laborers	14,202	881	7,509	59%	414	3%
Operating Engineers and Other Construction Equipment	7,236	403	1,841	31%	108	1%
Electricians	2,466	196	655	35%	56	2%
Pipelayers, Plumbers, Pipefitters, and Steamfitters	6,103	290	2,129	40%	68	1%
Derrick, Rotary Drill, and Service Unit Operators	93	0	47	51%	0	0%
Roustabouts, Oil & Gas	503	0	252	50%	0	0%
Helpers, Extraction Workers	15	0	3	20%	0	0%
Industrial Machinery Installation, Repair, and Maintenance	7,148	368	908	18%	195	3%
Maintenance and Repair Workers, General	2,977	264	176	15%	148	5%
Welding, Soldering, and Brazing Workers	13,972	880	5,589	46%	232	2%
Miscellaneous Production Workers	3,689	328	1,143	40%	352	10%
Driver/Sales Workers and Truck Drivers	5,294	494	1,199	32%	272	5%
Laborers and Freight, Stock, and Material Movers, Hand	6,443	776	2,485	51%	463	7%
Pumping Station Operators	4,644	262	444	15%	0	0%

**Employment in Downstream Oil & Gas Industry Operations
by Detailed Occupation: 2015**

	Total	African American	Hispanic	Minority Share	Female	Female Share
General and Operations Managers	1,011	26	72	10%	110	11%
Managers, All Other	633	27	87	18%	95	15%
Accountants and Auditors	884	102	61	18%	402	45%
Civil Engineers	63	0	0	0%	0	0%
Petroleum Engineers	1,390	34	120	11%	269	19%
Environmental Scientists and Geoscientists	315	0	15	5%	134	43%
Geological and Petroleum Technicians	760	102	64	22%	194	26%
Sales Representatives, Wholesale and Manufacturing	947	57	97	16%	72	8%
Bookkeeping, Accounting, and Auditing Clerks	570	15	93	19%	427	75%
Secretaries and Administrative Assistants	947	121	140	28%	882	93%
Office Clerks, General	947	172	106	29%	873	92%
First-Line Supervisors of Construction Trades and Extraction	633	51	115	26%	0	0%
Construction Laborers	633	143	236	60%	19	3%
Operating Engineers and Other Construction Equipment	443	0	26	6%	174	39%
Electricians	633	28	38	10%	0	0%
Pipelayers, Plumbers, Pipefitters, and Steamfitters	570	93	166	45%	3	1%
Derrick, Rotary Drill, and Service Unit Operators	127	0	0	0%	0	0%
Roustabouts, Oil & Gas	0	0	0	0%	0	0%
Helpers, Extraction Workers	0	0	0	0%	0	0%
Industrial Machinery Installation, Repair, and Maintenance	3,033	176	679	28%	52	2%
Maintenance and Repair Workers, General	1,074	60	260	30%	25	2%
Welding, Soldering, and Brazing Workers	253	19	100	47%	2	1%
Miscellaneous Production Workers	1,579	155	403	35%	94	6%
Driver/Sales Workers and Truck Drivers	1,770	165	496	37%	25	1%
Laborers and Freight, Stock, and Material Movers, Hand	884	176	205	43%	35	4%
Pumping Station Operators	380	0	103	27%	0	0%

**Employment in All Oil & Gas Industry Operations and Investment
by Detailed Occupation: 2015**

		African Total American	Hispanic	Minority Share	Female	Female Share
General and Operations Managers	26,784	540	2,667	12%	1,630	6%
Managers, All Other	4,101	179	426	15%	733	18%
Accountants and Auditors	15,764	1,131	1,235	15%	9,635	61%
Civil Engineers	9,956	518	1,034	16%	1,137	11%
Petroleum Engineers	30,414	1,158	2,787	13%	3,885	13%
Environmental Scientists and Geoscientists	15,462	368	1,043	9%	3,240	21%
Geological and Petroleum Technicians	9,995	638	1,359	20%	2,398	24%
Sales Representatives, Wholesale and Manufacturing	9,661	240	898	12%	1,117	12%
Bookkeeping, Accounting, and Auditing Clerks	15,462	627	1,911	16%	13,962	90%
Secretaries and Administrative Assistants	29,650	753	3,396	14%	28,794	97%
Office Clerks, General	19,175	1,450	3,621	26%	16,177	84%
First-Line Supervisors of Construction Trades and Extraction	40,642	1,658	7,913	24%	1,048	3%
Construction Laborers	41,921	2,359	19,642	52%	1,069	3%
Operating Engineers and Other Construction Equipment	26,281	786	6,155	26%	403	2%
Electricians	8,934	451	1,802	25%	105	1%
Pipelayers, Plumbers, Pipefitters, and Steamfitters	15,541	1,279	5,204	42%	129	1%
Derrick, Rotary Drill, and Service Unit Operators	118,880	6,082	32,944	33%	2,665	2%
Roustabouts, Oil & Gas	64,595	3,270	17,991	33%	1,451	2%
Helpers, Extraction Workers	6,298	305	2,127	39%	139	2%
Industrial Machinery Installation, Repair, and Maintenance	22,940	1,151	4,853	26%	532	2%
Maintenance and Repair Workers, General	10,959	964	1,602	23%	198	2%
Welding, Soldering, and Brazing Workers	22,956	1,255	8,608	43%	407	2%
Miscellaneous Production Workers	12,123	842	3,665	37%	517	4%
Driver/Sales Workers and Truck Drivers	37,031	3,181	11,499	40%	951	3%
Laborers and Freight, Stock, and Material Movers, Hand	15,775	1,708	5,179	44%	699	4%
Pumping Station Operators	29,787	670	4,037	16%	818	3%

**Employment in Petrochemical Industry Operations and Investment
by Detailed Occupation: 2015**

		African Total	American Hispanic	Minority Share	Female	Female Share
General and Operations Managers	3,656	170	218	11%	382	10%
Managers, All Other	418	16	37	13%	74	18%
Accountants and Auditors	1,579	108	94	13%	922	58%
Civil Engineers	888	43	92	15%	108	12%
Petroleum Engineers	190	174	4	94%	3	2%
Environmental Scientists and Geoscientists	181	2	14	9%	43	24%
Geological and Petroleum Technicians	76	0	44	58%	0	0%
Sales Representatives, Wholesale and Manufacturing	3,467	83	297	11%	758	22%
Bookkeeping, Accounting, and Auditing Clerks	1,813	95	167	14%	1,637	90%
Secretaries and Administrative Assistants	3,437	101	375	14%	3,322	97%
Office Clerks, General	2,524	136	329	18%	2,086	83%
First-Line Supervisors of Construction Trades and Extraction	1,333	46	416	35%	32	2%
Construction Laborers	3,667	211	2,155	65%	116	3%
Operating Engineers and Other Construction Equipment	1,812	101	598	39%	27	1%
Electricians	2,044	136	301	21%	14	1%
Pipelayers, Plumbers, Pipefitters, and Steamfitters	1,584	100	560	42%	12	1%
Derrick, Rotary Drill, and Service Unit Operators	17	0	11	65%	0	0%
Roustabouts, Oil & Gas	132	0	88	67%	0	0%
Helpers, Extraction Workers	4	0	2	50%	0	0%
Industrial Machinery Installation, Repair, and Maintenance	6,759	564	1,233	27%	184	3%
Maintenance and Repair Workers, General	5,890	215	811	17%	144	2%
Welding, Soldering, and Brazing Workers	1,527	91	604	46%	25	2%
Miscellaneous Production Workers	3,544	555	882	41%	760	21%
Driver/Sales Workers and Truck Drivers	4,450	740	1,127	42%	89	2%
Laborers and Freight, Stock, and Material Movers, Hand	2,950	484	673	39%	478	16%
Pumping Station Operators	411	168	0	41%	0	0%

Appendix F. Projected Baseline Employment in the Oil & Natural Gas and Petrochemical Industries by Broad Occupation and Region

Projected Baseline Employment in Oil & Gas and Petrochemical Industry Operations and Investment

New England

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015						
Total	7,829	256	940	15%	1,549	20%
Management, Business and Financial	1,391	26	79	8%	355	26%
Professional and Related	1,049	30	57	8%	210	20%
Service	173	10	14	14%	32	18%
Sales and Related	261	2	18	8%	62	24%
Office & Administrative Support	731	22	68	12%	444	61%
Skilled Blue Collar	1,752	46	188	13%	61	3%
Semi-skilled Blue Collar	2,081	105	442	26%	340	16%
Unskilled Blue Collar	391	15	74	23%	45	12%
2020						
Total	8,413	298	1,106	17%	1,612	19%
Management, Business and Financial	1,464	30	93	8%	374	26%
Professional and Related	1,127	34	70	9%	224	20%
Service	185	13	18	17%	35	19%
Sales and Related	275	4	22	9%	64	23%
Office & Administrative Support	768	25	79	14%	461	60%
Skilled Blue Collar	1,985	58	231	15%	68	3%
Semi-skilled Blue Collar	2,170	115	501	28%	336	15%
Unskilled Blue Collar	439	19	92	25%	50	11%
2025						
Total	8,571	339	1,251	19%	1,631	19%
Management, Business and Financial	1,476	35	105	9%	387	26%
Professional and Related	1,156	40	84	11%	233	20%
Service	192	15	23	20%	38	20%
Sales and Related	284	5	27	11%	67	24%
Office & Administrative Support	775	28	90	15%	459	59%
Skilled Blue Collar	2,060	67	263	16%	71	3%
Semi-skilled Blue Collar	2,180	126	555	31%	325	15%
Unskilled Blue Collar	448	23	104	28%	51	11%
2030						
Total	8,683	375	1,398	20%	1,628	19%
Management, Business and Financial	1,484	41	120	11%	389	26%
Professional and Related	1,175	45	97	12%	235	20%
Service	197	15	28	22%	40	20%
Sales and Related	292	5	31	12%	70	24%
Office & Administrative Support	778	33	101	17%	453	58%
Skilled Blue Collar	2,119	75	295	17%	71	3%
Semi-skilled Blue Collar	2,184	135	608	34%	318	15%
Unskilled Blue Collar	454	26	118	32%	52	11%
2035						
Total	8,547	410	1,522	23%	1,593	19%
Management, Business and Financial	1,457	44	131	12%	382	26%
Professional and Related	1,160	50	109	14%	234	20%
Service	200	17	34	26%	41	21%
Sales and Related	294	7	36	15%	72	24%
Office & Administrative Support	761	36	111	19%	436	57%
Skilled Blue Collar	2,094	84	318	19%	69	3%
Semi-skilled Blue Collar	2,142	144	658	37%	309	14%
Unskilled Blue Collar	439	28	125	35%	50	11%

**Projected Baseline Employment in Oil & Gas and Petrochemical Industry Operations and Investment
Middle Atlantic**

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015						
Total	87,145	4,455	8,837	15%	13,584	16%
Management, Business and Financial	14,043	440	608	7%	3,755	27%
Professional and Related	10,964	411	507	8%	2,234	20%
Service	1,115	189	110	27%	282	25%
Sales and Related	1,532	24	75	6%	292	19%
Office & Administrative Support	6,924	414	511	13%	4,539	66%
Skilled Blue Collar	27,285	1,276	2,760	15%	691	3%
Semi-skilled Blue Collar	18,092	1,163	2,579	21%	1,402	8%
Unskilled Blue Collar	7,190	538	1,687	31%	389	5%
2020						
Total	156,570	7,123	16,166	15%	23,609	15%
Management, Business and Financial	24,769	732	1,170	8%	6,821	28%
Professional and Related	20,281	676	1,006	8%	4,280	21%
Service	1,637	276	193	29%	415	25%
Sales and Related	2,586	39	147	7%	463	18%
Office & Administrative Support	11,793	645	917	13%	7,851	67%
Skilled Blue Collar	52,492	2,191	5,243	14%	1,304	2%
Semi-skilled Blue Collar	31,762	1,722	4,580	20%	1,929	6%
Unskilled Blue Collar	11,250	842	2,910	33%	546	5%
2025						
Total	184,628	8,495	21,239	16%	27,778	15%
Management, Business and Financial	29,007	897	1,631	9%	8,267	29%
Professional and Related	24,270	834	1,424	9%	5,275	22%
Service	1,839	313	255	31%	471	26%
Sales and Related	3,009	49	210	9%	534	18%
Office & Administrative Support	13,614	758	1,208	14%	9,004	66%
Skilled Blue Collar	63,114	2,726	6,932	15%	1,557	2%
Semi-skilled Blue Collar	37,274	1,955	6,024	21%	2,052	6%
Unskilled Blue Collar	12,501	963	3,555	36%	618	5%
2030						
Total	168,192	8,049	21,452	18%	25,424	15%
Management, Business and Financial	26,401	850	1,763	10%	7,622	29%
Professional and Related	22,244	781	1,536	10%	4,923	22%
Service	1,751	307	272	33%	459	26%
Sales and Related	2,757	46	234	10%	498	18%
Office & Administrative Support	12,405	726	1,269	16%	8,059	65%
Skilled Blue Collar	57,939	2,675	6,952	17%	1,440	2%
Semi-skilled Blue Collar	34,302	1,819	6,226	23%	1,869	5%
Unskilled Blue Collar	10,393	845	3,200	39%	554	5%
2035						
Total	156,005	8,017	23,266	20%	23,276	15%
Management, Business and Financial	24,446	872	1,969	12%	7,032	29%
Professional and Related	20,640	806	1,723	12%	4,553	22%
Service	1,674	298	298	36%	443	26%
Sales and Related	2,511	49	254	12%	460	18%
Office & Administrative Support	11,346	702	1,353	18%	7,252	64%
Skilled Blue Collar	53,977	2,735	7,587	19%	1,328	2%
Semi-skilled Blue Collar	31,203	1,710	6,590	27%	1,671	5%
Unskilled Blue Collar	10,208	845	3,492	42%	537	5%

**Projected Baseline Employment in Oil & Gas and Petrochemical Industry Operations and Investment
East North Central**

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015						
Total	80,651	4,231	6,178	13%	13,675	17%
Management, Business and Financial	12,411	390	431	7%	3,274	26%
Professional and Related	8,569	394	329	8%	1,770	21%
Service	1,520	187	95	19%	324	21%
Sales and Related	1,863	30	83	6%	397	21%
Office & Administrative Support	6,746	349	376	11%	4,285	64%
Skilled Blue Collar	22,741	975	1,542	11%	660	3%
Semi-skilled Blue Collar	19,803	1,355	2,355	19%	2,243	11%
Unskilled Blue Collar	6,998	551	967	22%	722	10%
2020						
Total	118,484	5,400	8,463	12%	18,919	16%
Management, Business and Financial	17,420	504	594	6%	4,733	27%
Professional and Related	11,643	486	452	8%	2,459	21%
Service	2,012	237	134	18%	434	22%
Sales and Related	2,261	38	108	6%	460	20%
Office & Administrative Support	10,007	449	515	10%	6,528	65%
Skilled Blue Collar	37,790	1,391	2,284	10%	1,030	3%
Semi-skilled Blue Collar	28,344	1,618	3,062	17%	2,475	9%
Unskilled Blue Collar	9,007	677	1,314	22%	800	9%
2025						
Total	143,635	6,425	11,201	12%	22,563	16%
Management, Business and Financial	20,877	616	803	7%	5,827	28%
Professional and Related	14,104	587	610	8%	3,015	21%
Service	2,334	265	179	19%	502	22%
Sales and Related	2,598	44	138	7%	515	20%
Office & Administrative Support	12,031	532	682	10%	7,845	65%
Skilled Blue Collar	47,299	1,746	3,120	10%	1,264	3%
Semi-skilled Blue Collar	33,918	1,853	3,985	17%	2,672	8%
Unskilled Blue Collar	10,474	782	1,684	24%	923	9%
2030						
Total	147,209	6,847	12,789	13%	22,778	15%
Management, Business and Financial	21,182	662	943	8%	5,960	28%
Professional and Related	14,291	623	715	9%	3,090	22%
Service	2,442	282	211	20%	531	22%
Sales and Related	2,627	48	159	8%	523	20%
Office & Administrative Support	12,229	565	777	11%	7,857	64%
Skilled Blue Collar	49,210	1,929	3,611	11%	1,310	3%
Semi-skilled Blue Collar	34,662	1,924	4,507	19%	2,573	7%
Unskilled Blue Collar	10,566	814	1,866	25%	934	9%
2035						
Total	136,248	6,682	13,319	15%	20,914	15%
Management, Business and Financial	19,587	645	1,003	8%	5,475	28%
Professional and Related	13,479	620	771	10%	2,899	22%
Service	2,359	275	225	21%	517	22%
Sales and Related	2,521	47	170	9%	510	20%
Office & Administrative Support	11,101	539	798	12%	6,973	63%
Skilled Blue Collar	45,118	1,921	3,740	13%	1,203	3%
Semi-skilled Blue Collar	31,902	1,842	4,671	20%	2,404	8%
Unskilled Blue Collar	10,181	793	1,941	27%	933	9%

**Projected Baseline Employment in Oil & Gas and Petrochemical Industry Operations and Investment
West North Central**

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015						
Total	93,927	2,268	6,640	9%	13,800	15%
Management, Business and Financial	13,874	241	420	5%	3,726	27%
Professional and Related	11,180	262	371	6%	2,312	21%
Service	944	66	40	11%	195	21%
Sales and Related	1,813	14	64	4%	342	19%
Office & Administrative Support	6,916	169	323	7%	4,686	68%
Skilled Blue Collar	31,256	618	2,428	10%	811	3%
Semi-skilled Blue Collar	22,145	679	2,304	13%	1,380	6%
Unskilled Blue Collar	5,799	219	690	16%	348	6%
2020						
Total	127,308	3,359	10,991	11%	18,155	14%
Management, Business and Financial	18,315	361	708	6%	5,041	28%
Professional and Related	14,508	373	616	7%	3,061	21%
Service	1,153	86	68	13%	237	21%
Sales and Related	2,393	27	113	6%	445	19%
Office & Administrative Support	9,217	255	526	8%	6,222	68%
Skilled Blue Collar	44,050	942	3,996	11%	1,126	3%
Semi-skilled Blue Collar	30,432	1,006	3,926	16%	1,615	5%
Unskilled Blue Collar	7,240	309	1,038	19%	408	6%
2025						
Total	139,846	4,222	13,765	13%	19,740	14%
Management, Business and Financial	19,884	451	897	7%	5,609	28%
Professional and Related	15,918	472	793	8%	3,414	21%
Service	1,250	101	90	15%	260	21%
Sales and Related	2,582	40	144	7%	479	19%
Office & Administrative Support	9,947	330	643	10%	6,632	67%
Skilled Blue Collar	49,030	1,195	4,899	12%	1,240	3%
Semi-skilled Blue Collar	33,259	1,255	4,970	19%	1,647	5%
Unskilled Blue Collar	7,976	378	1,329	21%	459	6%
2030						
Total	149,112	5,031	16,294	14%	20,770	14%
Management, Business and Financial	21,125	536	1,070	8%	5,930	28%
Professional and Related	17,181	574	969	9%	3,658	21%
Service	1,339	114	116	17%	283	21%
Sales and Related	2,746	53	171	8%	507	18%
Office & Administrative Support	10,453	400	739	11%	6,873	66%
Skilled Blue Collar	52,408	1,430	5,666	14%	1,323	3%
Semi-skilled Blue Collar	35,163	1,478	5,927	21%	1,700	5%
Unskilled Blue Collar	8,697	446	1,636	24%	496	6%
2035						
Total	148,792	5,575	17,694	16%	20,483	14%
Management, Business and Financial	21,032	595	1,183	8%	5,899	28%
Professional and Related	17,246	643	1,086	10%	3,660	21%
Service	1,352	121	130	19%	290	21%
Sales and Related	2,747	63	188	9%	509	19%
Office & Administrative Support	10,281	447	786	12%	6,652	65%
Skilled Blue Collar	52,495	1,593	6,057	15%	1,325	3%
Semi-skilled Blue Collar	34,819	1,621	6,454	23%	1,637	5%
Unskilled Blue Collar	8,820	492	1,810	26%	511	6%

**Projected Baseline Employment in Oil & Gas and Petrochemical Industry Operations and Investment
South Atlantic**

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015						
Total	60,537	7,931	6,556	24%	10,892	18%
Management, Business and Financial	10,714	849	514	13%	2,871	27%
Professional and Related	8,063	933	402	17%	1,685	21%
Service	1,068	296	89	36%	255	24%
Sales and Related	1,571	70	87	10%	345	22%
Office & Administrative Support	4,917	654	390	21%	3,077	63%
Skilled Blue Collar	16,156	1,722	1,781	22%	544	3%
Semi-skilled Blue Collar	14,167	2,666	2,404	36%	1,706	12%
Unskilled Blue Collar	3,881	741	889	42%	409	11%
2020						
Total	72,476	9,044	8,662	24%	12,469	17%
Management, Business and Financial	12,406	979	724	14%	3,376	27%
Professional and Related	9,445	1,037	559	17%	1,994	21%
Service	1,229	332	123	37%	288	23%
Sales and Related	1,764	79	121	11%	386	22%
Office & Administrative Support	5,708	742	512	22%	3,570	63%
Skilled Blue Collar	21,194	2,130	2,524	22%	674	3%
Semi-skilled Blue Collar	16,364	2,922	2,982	36%	1,743	11%
Unskilled Blue Collar	4,366	823	1,117	44%	438	10%
2025						
Total	73,739	9,615	9,953	27%	12,706	17%
Management, Business and Financial	12,508	1,041	885	15%	3,509	28%
Professional and Related	9,613	1,091	679	18%	2,080	22%
Service	1,253	343	144	39%	302	24%
Sales and Related	1,835	86	154	13%	403	22%
Office & Administrative Support	5,755	787	590	24%	3,542	62%
Skilled Blue Collar	21,741	2,330	2,898	24%	688	3%
Semi-skilled Blue Collar	16,704	3,074	3,361	39%	1,719	10%
Unskilled Blue Collar	4,330	863	1,242	49%	463	11%
2030						
Total	82,627	10,149	12,324	27%	13,731	17%
Management, Business and Financial	13,730	1,122	1,135	16%	3,871	28%
Professional and Related	10,651	1,158	874	19%	2,320	22%
Service	1,397	373	190	40%	329	24%
Sales and Related	1,915	89	185	14%	422	22%
Office & Administrative Support	6,273	801	716	24%	3,861	62%
Skilled Blue Collar	26,087	2,627	3,935	25%	784	3%
Semi-skilled Blue Collar	17,899	3,107	3,856	39%	1,671	9%
Unskilled Blue Collar	4,675	872	1,433	49%	473	10%
2035						
Total	65,729	8,820	10,718	30%	11,319	17%
Management, Business and Financial	11,113	976	1,058	18%	3,145	28%
Professional and Related	8,713	1,046	817	21%	1,924	22%
Service	1,201	331	179	42%	290	24%
Sales and Related	1,684	84	186	16%	387	23%
Office & Administrative Support	5,049	681	641	26%	3,019	60%
Skilled Blue Collar	19,771	2,206	3,291	28%	630	3%
Semi-skilled Blue Collar	14,538	2,761	3,371	42%	1,490	10%
Unskilled Blue Collar	3,660	735	1,175	52%	434	12%

**Projected Baseline Employment in Oil & Gas and Petrochemical Industry Operations and Investment
East South Central**

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015						
Total	33,826	4,856	1,042	17%	5,404	16%
Management, Business and Financial	4,186	371	54	10%	1,162	28%
Professional and Related	3,578	422	50	13%	787	22%
Service	723	252	13	37%	152	21%
Sales and Related	501	24	6	6%	105	21%
Office & Administrative Support	2,379	300	50	15%	1,483	62%
Skilled Blue Collar	10,484	1,255	317	15%	356	3%
Semi-skilled Blue Collar	9,519	1,762	378	22%	1,104	12%
Unskilled Blue Collar	2,456	470	174	26%	255	10%
2020						
Total	40,846	5,955	1,623	19%	6,189	15%
Management, Business and Financial	4,949	473	89	11%	1,404	28%
Professional and Related	4,198	509	79	14%	930	22%
Service	859	322	22	40%	169	20%
Sales and Related	615	29	12	7%	126	20%
Office & Administrative Support	2,736	353	70	15%	1,705	62%
Skilled Blue Collar	13,759	1,703	532	16%	458	3%
Semi-skilled Blue Collar	10,933	2,022	557	24%	1,117	10%
Unskilled Blue Collar	2,797	544	262	29%	280	10%
2025						
Total	45,475	6,817	2,301	20%	6,719	15%
Management, Business and Financial	5,421	550	130	13%	1,585	29%
Professional and Related	4,638	584	114	15%	1,047	23%
Service	952	370	36	43%	182	19%
Sales and Related	685	35	17	8%	138	20%
Office & Administrative Support	2,966	394	90	16%	1,830	62%
Skilled Blue Collar	15,914	2,044	791	18%	515	3%
Semi-skilled Blue Collar	11,852	2,237	760	25%	1,111	9%
Unskilled Blue Collar	3,047	603	363	32%	311	10%
2030						
Total	47,096	7,200	2,912	21%	6,843	15%
Management, Business and Financial	5,572	586	171	14%	1,637	29%
Professional and Related	4,822	626	148	16%	1,090	23%
Service	993	390	49	44%	187	19%
Sales and Related	708	37	21	8%	143	20%
Office & Administrative Support	3,024	407	105	17%	1,843	61%
Skilled Blue Collar	16,704	2,204	1,023	19%	536	3%
Semi-skilled Blue Collar	12,137	2,324	944	27%	1,085	9%
Unskilled Blue Collar	3,136	626	451	34%	322	10%
2035						
Total	48,076	7,475	3,493	23%	6,900	14%
Management, Business and Financial	5,683	612	209	14%	1,662	29%
Professional and Related	4,959	659	185	17%	1,117	23%
Service	1,015	395	58	45%	193	19%
Sales and Related	719	39	25	9%	146	20%
Office & Administrative Support	3,054	416	119	18%	1,832	60%
Skilled Blue Collar	17,097	2,315	1,238	21%	552	3%
Semi-skilled Blue Collar	12,288	2,385	1,114	28%	1,058	9%
Unskilled Blue Collar	3,261	654	545	37%	340	10%

**Projected Baseline Employment in Oil & Gas and Petrochemical Industry Operations and Investment
West South Central**

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015						
Total	804,154	63,723	200,481	33%	143,753	18%
Management, Business and Financial Professional and Related Service	151,016	9,401	16,227	17%	45,161	30%
Sales and Related Office & Administrative Support	134,694	9,266	16,934	19%	27,765	21%
Skilled Blue Collar	8,673	2,084	2,105	48%	2,049	24%
Semi-skilled Blue Collar	17,508	368	2,367	16%	3,014	17%
Unskilled Blue Collar	74,297	6,164	12,540	25%	50,016	67%
	219,266	16,262	65,796	37%	5,683	3%
	165,302	16,849	65,793	50%	8,302	5%
	33,398	3,329	18,719	66%	1,763	5%
2020						
Total	1,053,191	88,381	292,214	36%	191,491	18%
Management, Business and Financial Professional and Related Service	202,958	13,946	26,503	20%	62,174	31%
Sales and Related Office & Administrative Support	184,049	13,598	27,758	22%	39,048	21%
Skilled Blue Collar	11,394	2,951	3,189	54%	2,562	22%
Semi-skilled Blue Collar	22,019	574	3,792	20%	3,831	17%
Unskilled Blue Collar	97,418	8,318	19,119	28%	65,016	67%
	291,422	22,612	98,696	42%	7,465	3%
	206,461	22,420	90,551	55%	9,416	5%
	37,470	3,962	22,606	71%	1,979	5%
2025						
Total	1,081,063	95,231	333,492	40%	197,808	18%
Management, Business and Financial Professional and Related Service	208,627	15,110	32,087	23%	65,722	32%
Sales and Related Office & Administrative Support	189,788	14,778	33,312	25%	41,309	22%
Skilled Blue Collar	11,911	3,137	3,670	57%	2,723	23%
Semi-skilled Blue Collar	22,609	652	4,567	23%	3,994	18%
Unskilled Blue Collar	98,973	8,865	22,137	31%	64,951	66%
	299,683	24,479	112,017	46%	7,556	3%
	211,511	23,985	101,234	59%	9,404	4%
	37,961	4,225	24,468	76%	2,149	6%
2030						
Total	1,051,986	95,898	354,965	43%	191,784	18%
Management, Business and Financial Professional and Related Service	202,909	15,223	35,834	25%	64,184	32%
Sales and Related Office & Administrative Support	185,641	14,982	37,120	28%	40,767	22%
Skilled Blue Collar	11,853	3,162	3,952	60%	2,769	23%
Semi-skilled Blue Collar	21,884	666	5,024	26%	3,940	18%
Unskilled Blue Collar	95,325	8,785	23,770	34%	61,564	65%
	292,415	24,873	118,753	49%	7,352	3%
	205,323	23,986	105,610	63%	9,031	4%
	36,636	4,221	24,902	79%	2,177	6%
2035						
Total	1,081,898	101,535	392,573	46%	194,806	18%
Management, Business and Financial Professional and Related Service	207,399	16,118	40,815	27%	65,497	32%
Sales and Related Office & Administrative Support	191,326	16,047	42,419	31%	41,981	22%
Skilled Blue Collar	12,293	3,282	4,387	62%	2,888	23%
Semi-skilled Blue Collar	22,641	735	5,678	28%	4,097	18%
Unskilled Blue Collar	96,732	9,171	26,173	37%	61,530	64%
	302,298	26,645	131,120	52%	7,522	2%
	211,628	25,104	115,439	66%	9,021	4%
	37,581	4,433	26,542	82%	2,270	6%

**Projected Baseline Employment in Oil & Gas and Petrochemical Industry Operations and Investment
Mountain**

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015						
Total	133,020	1,783	26,314	21%	20,214	15%
Management, Business and Financial	23,113	264	2,140	10%	6,426	28%
Professional and Related	18,187	230	1,907	12%	3,793	21%
Service	767	32	156	25%	174	23%
Sales and Related	2,845	11	292	11%	466	16%
Office & Administrative Support	9,897	140	1,451	16%	6,858	69%
Skilled Blue Collar	46,503	577	10,286	23%	1,057	2%
Semi-skilled Blue Collar	27,208	441	8,223	32%	1,224	4%
Unskilled Blue Collar	4,500	88	1,859	43%	216	5%
2020						
Total	104,415	1,598	22,746	23%	15,765	15%
Management, Business and Financial	18,047	237	1,931	12%	5,060	28%
Professional and Related	14,122	205	1,695	13%	2,970	21%
Service	643	27	142	26%	146	23%
Sales and Related	2,192	14	263	13%	374	17%
Office & Administrative Support	7,736	132	1,288	18%	5,224	68%
Skilled Blue Collar	36,657	517	8,854	26%	821	2%
Semi-skilled Blue Collar	21,501	389	7,006	34%	982	5%
Unskilled Blue Collar	3,517	77	1,567	47%	188	5%
2025						
Total	102,644	1,785	24,696	26%	15,219	15%
Management, Business and Financial	17,242	263	2,091	14%	4,920	29%
Professional and Related	13,834	231	1,875	15%	2,924	21%
Service	659	30	163	29%	157	24%
Sales and Related	1,990	16	270	14%	348	17%
Office & Administrative Support	7,479	150	1,388	21%	4,963	66%
Skilled Blue Collar	36,548	581	9,665	28%	792	2%
Semi-skilled Blue Collar	21,263	426	7,520	37%	916	4%
Unskilled Blue Collar	3,629	88	1,724	50%	199	5%
2030						
Total	117,240	2,252	29,988	27%	17,053	15%
Management, Business and Financial	19,653	337	2,582	15%	5,548	28%
Professional and Related	16,068	301	2,369	17%	3,353	21%
Service	726	34	192	31%	171	24%
Sales and Related	2,444	25	354	16%	409	17%
Office & Administrative Support	8,325	190	1,626	22%	5,485	66%
Skilled Blue Collar	41,727	732	11,723	30%	902	2%
Semi-skilled Blue Collar	24,061	523	9,086	40%	970	4%
Unskilled Blue Collar	4,236	110	2,056	51%	215	5%
2035						
Total	120,533	2,590	31,634	28%	17,629	15%
Management, Business and Financial	20,456	400	2,856	16%	5,835	29%
Professional and Related	16,647	351	2,609	18%	3,531	21%
Service	738	38	195	32%	173	23%
Sales and Related	2,646	33	400	16%	445	17%
Office & Administrative Support	8,464	224	1,708	23%	5,514	65%
Skilled Blue Collar	42,861	837	12,333	31%	933	2%
Semi-skilled Blue Collar	24,563	587	9,485	41%	982	4%
Unskilled Blue Collar	4,158	120	2,048	52%	216	5%

**Projected Baseline Employment in Oil & Gas and Petrochemical Industry Operations and Investment
Pacific**

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015						
Total	89,325	4,099	26,482	34%	14,360	16%
Management, Business and Financial	15,436	513	2,128	17%	4,372	28%
Professional and Related	12,857	515	1,990	19%	2,745	21%
Service	1,566	228	401	40%	390	25%
Sales and Related	1,375	14	261	20%	266	19%
Office & Administrative Support	6,717	333	1,458	27%	4,380	65%
Skilled Blue Collar	28,044	1,192	8,702	35%	653	2%
Semi-skilled Blue Collar	17,909	961	8,440	52%	1,243	7%
Unskilled Blue Collar	5,421	343	3,102	64%	311	6%
2020						
Total	114,379	5,047	36,599	36%	18,006	16%
Management, Business and Financial	19,652	641	2,972	18%	5,572	28%
Professional and Related	16,648	644	2,837	21%	3,539	21%
Service	1,986	281	553	42%	479	24%
Sales and Related	1,685	16	348	22%	318	19%
Office & Administrative Support	8,423	392	1,975	28%	5,483	65%
Skilled Blue Collar	36,470	1,505	12,289	38%	835	2%
Semi-skilled Blue Collar	22,495	1,140	11,333	55%	1,409	6%
Unskilled Blue Collar	7,020	428	4,292	67%	371	5%
2025						
Total	132,186	5,854	45,470	39%	20,317	15%
Management, Business and Financial	22,271	736	3,665	20%	6,401	29%
Professional and Related	19,158	753	3,566	23%	4,098	21%
Service	2,273	320	701	45%	547	24%
Sales and Related	1,805	17	400	23%	337	19%
Office & Administrative Support	9,512	437	2,398	30%	6,154	65%
Skilled Blue Collar	43,061	1,801	15,609	40%	943	2%
Semi-skilled Blue Collar	25,755	1,284	13,752	58%	1,420	6%
Unskilled Blue Collar	8,351	506	5,379	70%	417	5%
2030						
Total	119,646	5,187	41,930	39%	18,854	16%
Management, Business and Financial	20,459	646	3,591	21%	5,969	29%
Professional and Related	17,983	682	3,570	24%	3,934	22%
Service	2,132	294	635	44%	520	24%
Sales and Related	1,779	12	421	24%	333	19%
Office & Administrative Support	8,589	391	2,264	31%	5,463	64%
Skilled Blue Collar	38,408	1,608	14,089	41%	865	2%
Semi-skilled Blue Collar	23,256	1,133	12,689	59%	1,376	6%
Unskilled Blue Collar	7,040	421	4,671	72%	394	6%
2035						
Total	113,596	4,884	41,209	41%	17,693	16%
Management, Business and Financial	19,241	595	3,551	22%	5,566	29%
Professional and Related	17,047	647	3,577	25%	3,706	22%
Service	2,016	274	611	44%	502	25%
Sales and Related	1,800	11	439	25%	338	19%
Office & Administrative Support	8,063	365	2,204	32%	5,042	63%
Skilled Blue Collar	36,285	1,544	13,649	42%	813	2%
Semi-skilled Blue Collar	22,243	1,057	12,492	61%	1,330	6%
Unskilled Blue Collar	6,901	391	4,686	74%	396	6%

Appendix G. Projected Minority and Female Baseline Employment in Individual Segments of the Oil & Natural Gas and Petrochemical Industries by Detailed Occupation and Region

Employment in Upstream Oil & Gas Industry Operations and Investment by Detailed Occupation and Region: 2015

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations Managers	19,957	7	1,139	667	1,287	382	238	12,577	2,477	1,183
Managers, All Other	2,265	0	102	60	113	40	27	1,508	275	140
Accountants and Auditors	12,171	2	539	326	551	219	148	8,123	1,478	785
Civil Engineers	6,869	1	486	277	441	120	35	4,581	687	241
Petroleum Engineers	28,463	3	1,047	644	1,067	495	361	19,448	3,471	1,927
Environmental Scientists and Geoscientists	14,541	1	554	342	519	252	176	9,994	1,738	965
Geological and Petroleum Technicians	8,968	3	357	201	520	156	118	5,928	1,136	549
Sales Representatives, Wholesale and Manufacturing	5,173	2	253	142	358	94	66	3,301	659	298
Bookkeeping, Accounting, and Auditing Clerks	12,059	4	671	395	744	229	144	7,648	1,495	729
Secretaries and Administrative Assistants	23,511	6	1,268	750	1,354	440	272	15,145	2,865	1,411
Office Clerks, General	13,110	5	847	500	891	261	149	8,079	1,615	763
First-Line Supervisors of Construction Trades and Extraction Workers	34,421	16	2,404	1,413	2,663	717	419	20,346	4,400	2,043
Construction Laborers	27,086	18	4,065	2,510	2,915	807	226	11,555	3,370	1,620
Operating Engineers and Other Construction Equipment Operators	18,602	11	2,229	1,359	1,825	491	184	9,055	2,348	1,100
Electricians	5,835	3	506	301	500	132	66	3,243	743	341
Pipelayers, Plumbers, Pipefitters, and Steamfitters	8,868	6	1,445	897	987	277	69	3,556	1,096	535
Derrick, Rotary Drill, and Service Unit Operators	118,660	51	4,870	2,625	8,333	2,085	1,627	76,732	15,443	6,894
Roustabouts, Oil & Gas	64,092	27	2,721	1,484	4,460	1,137	872	41,326	8,317	3,748
Helpers, Extraction Workers	6,283	3	263	141	463	111	87	4,033	823	359
Industrial Machinery Installation, Repair, and Maintenance Workers	12,759	5	587	326	889	232	170	8,153	1,648	749
Maintenance and Repair Workers, General	6,908	3	403	232	501	134	87	4,257	883	408
Welding, Soldering, and Brazing Workers	8,731	5	685	404	733	190	104	4,982	1,119	509
Miscellaneous Production Workers	6,855	3	361	207	471	129	88	4,311	876	409
Driver/Sales Workers and Truck Drivers	29,967	15	1,641	919	2,340	571	394	18,469	3,902	1,716
Laborers and Freight, Stock, and Material Movers, Hand	8,448	4	467	264	636	161	108	5,240	1,085	483
Pumping Station Operators	24,763	6	950	554	1,254	432	325	16,556	3,103	1,583

**Projected Employment in Upstream Oil & Gas Industry Operations and Investment
by Detailed Occupation and Region: 2025**

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations Managers	31,447	10	3,097	1,878	2,250	571	447	19,316	1,794	2,084
Managers, All Other	3,654	1	315	210	206	70	52	2,375	194	231
Accountants and Auditors	19,849	3	1,694	1,192	969	401	285	13,031	1,018	1,256
Civil Engineers	10,428	2	952	473	744	108	61	6,968	581	539
Petroleum Engineers	55,266	4	4,368	3,333	2,153	1,182	818	37,252	2,705	3,451
Environmental Scientists and Geoscientists	24,218	2	1,909	1,444	936	506	344	16,406	1,181	1,490
Geological and Petroleum Technicians	14,413	4	1,224	785	935	273	226	9,233	805	928
Sales Representatives, Wholesale and Manufacturing	8,163	3	760	446	633	144	125	5,033	481	538
Bookkeeping, Accounting, and Auditing Clerks	19,126	5	1,851	1,150	1,300	355	273	11,856	1,074	1,262
Secretaries and Administrative Assistants	37,698	9	3,552	2,245	2,408	699	523	23,746	2,075	2,441
Office Clerks, General	19,354	6	2,023	1,198	1,452	344	263	11,653	1,117	1,298
First-Line Supervisors of Construction Trades and Extraction Workers	55,297	23	6,233	3,543	4,767	986	807	31,678	3,354	3,906
Construction Laborers	39,942	25	7,495	3,947	4,710	687	388	16,615	2,645	3,430
Operating Engineers and Other Construction Equipment Operators	28,037	16	4,451	2,375	3,026	483	330	13,296	1,814	2,246
Electricians	8,790	4	1,133	618	844	152	119	4,720	551	649
Pipelayers, Plumbers, Pipefitters, and Steamfitters	12,874	8	2,586	1,359	1,568	222	113	5,020	859	1,139
Derrick, Rotary Drill, and Service Unit Operators	188,807	74	16,722	9,683	15,210	3,327	3,109	116,872	11,354	12,456
Roustabouts, Oil & Gas	100,892	38	9,033	5,273	8,018	1,792	1,646	62,390	6,032	6,670
Helpers, Extraction Workers	9,734	4	876	490	832	167	162	5,958	599	646
Industrial Machinery Installation, Repair, and Maintenance Workers	23,667	9	2,178	1,276	1,871	422	379	14,550	1,409	1,573
Maintenance and Repair Workers, General	10,992	4	1,124	651	894	196	166	6,550	656	751
Welding, Soldering, and Brazing Workers	13,556	6	1,640	901	1,272	235	193	7,481	846	982
Miscellaneous Production Workers	10,944	4	1,059	632	836	200	168	6,669	641	735
Driver/Sales Workers and Truck Drivers	46,486	21	4,693	2,594	4,143	798	736	27,430	2,882	3,189
Laborers and Freight, Stock, and Material Movers, Hand	13,215	6	1,323	743	1,130	227	203	7,882	805	896
Pumping Station Operators	40,529	8	3,360	2,295	2,270	805	629	26,402	2,169	2,591

**Projected Employment in Upstream Oil & Gas Industry Operations and Investment
by Detailed Occupation and Region: 2035**

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations Managers	30,056	10	2,611	1,681	2,286	585	468	18,840	2,114	1,461
Managers, All Other	3,510	1	265	184	210	66	55	2,321	232	176
Accountants and Auditors	19,075	3	1,417	1,042	966	368	294	12,766	1,217	1,002
Civil Engineers	10,300	2	835	466	819	161	67	6,975	681	294
Petroleum Engineers	57,703	4	3,934	3,117	2,241	1,112	910	39,684	3,520	3,181
Environmental Scientists and Geoscientists	23,410	2	1,598	1,251	932	445	356	16,143	1,426	1,257
Geological and Petroleum Technicians	13,822	4	1,026	686	928	259	235	9,032	957	695
Sales Representatives, Wholesale and Manufacturing	7,828	3	642	398	635	147	132	4,929	568	374
Bookkeeping, Accounting, and Auditing Clerks	18,300	5	1,558	1,025	1,315	357	285	11,581	1,269	905
Secretaries and Administrative Assistants	36,276	9	3,010	2,008	2,468	700	549	23,280	2,469	1,783
Office Clerks, General	17,970	6	1,662	1,053	1,443	356	268	11,048	1,275	859
First-Line Supervisors of Construction Trades and Extraction Workers	53,482	24	5,350	3,269	4,939	1,096	862	31,352	3,993	2,597
Construction Laborers	37,474	25	6,380	3,778	5,008	990	416	16,052	3,018	1,807
Operating Engineers and Other Construction Equipment Operators	26,501	16	3,787	2,244	3,175	637	351	12,925	2,093	1,273
Electricians	8,271	4	955	568	867	179	125	4,542	637	394
Pipelayers, Plumbers, Pipefitters, and Steamfitters	11,998	8	2,197	1,305	1,671	331	120	4,812	972	582
Derrick, Rotary Drill, and Service Unit Operators	181,264	74	14,144	8,559	15,260	3,345	3,279	114,453	13,474	8,676
Roustabouts, Oil & Gas	96,304	39	7,594	4,640	8,001	1,791	1,725	60,759	7,118	4,637
Helpers, Extraction Workers	9,245	4	734	430	830	170	170	5,771	702	434
Industrial Machinery Installation, Repair, and Maintenance Workers	24,529	10	1,987	1,223	2,031	462	432	15,395	1,804	1,185
Maintenance and Repair Workers, General	10,568	4	955	589	910	208	176	6,436	778	512
Welding, Soldering, and Brazing Workers	12,940	6	1,395	831	1,309	272	205	7,314	991	617
Miscellaneous Production Workers	10,518	4	897	566	843	204	177	6,551	760	516
Driver/Sales Workers and Truck Drivers	44,239	21	3,959	2,327	4,175	853	775	26,666	3,378	2,085
Laborers and Freight, Stock, and Material Movers, Hand	12,632	6	1,120	669	1,146	242	214	7,692	948	595
Pumping Station Operators	39,024	8	2,819	1,997	2,252	739	654	25,923	2,597	2,035

**Employment in Midstream Oil & Gas Industry Operations and Investment
by Detailed Occupation and Region: 2015**

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations Managers	5,816	59	364	290	284	386	178	3,503	367	385
Managers, All Other	1,203	8	90	74	93	70	38	636	121	73
Accountants and Auditors	2,709	23	170	150	143	160	89	1,595	204	175
Civil Engineers	3,024	38	181	162	153	243	106	1,814	100	227
Petroleum Engineers	561	5	34	41	33	33	27	307	42	39
Environmental Scientists and Geoscientists	606	7	34	33	27	42	21	371	29	42
Geological and Petroleum Technicians	267	4	17	21	17	18	14	139	17	20
Sales Representatives, Wholesale and Manufacturing	3,541	19	175	112	77	164	56	2,481	278	179
Bookkeeping, Accounting, and Auditing Clerks	2,833	27	170	125	119	184	76	1,777	171	184
Secretaries and Administrative Assistants	5,192	57	325	275	262	358	175	3,083	294	363
Office Clerks, General	5,118	48	353	257	299	346	144	2,972	369	330
First-Line Supervisors of Construction Trades and Extraction Workers	5,588	85	384	287	315	453	218	3,174	189	483
Construction Laborers	14,202	236	914	692	664	1,182	579	8,374	266	1,295
Operating Engineers and Other Construction Equipment Operators	7,236	118	476	359	359	598	293	4,217	163	653
Electricians	2,466	28	179	126	154	173	79	1,383	155	189
Pipelayers, Plumbers, Pipefitters, and Steamfitters	6,103	96	391	327	301	488	262	3,534	162	542
Derrick, Rotary Drill, and Service Unit Operators	93	1	5	4	3	6	3	60	4	7
Roustabouts, Oil & Gas	503	8	32	24	23	42	21	298	9	46
Helpers, Extraction Workers	15	0	1	1	1	1	1	9	0	1
Industrial Machinery Installation, Repair, and Maintenance Workers	7,148	65	423	433	340	390	275	4,200	530	492
Maintenance and Repair Workers, General	2,977	26	197	133	126	179	74	1,826	211	205
Welding, Soldering, and Brazing Workers	13,972	64	739	421	404	615	189	9,637	1,222	681
Miscellaneous Production Workers	3,689	29	198	114	89	209	63	2,531	244	212
Driver/Sales Workers and Truck Drivers	5,294	58	386	345	317	380	206	2,866	355	381
Laborers and Freight, Stock, and Material Movers, Hand	6,443	33	518	402	328	402	157	3,612	638	353
Pumping Station Operators	4,644	30	437	358	535	298	167	1,951	585	283

**Projected Employment in Midstream Oil & Gas Industry Operations and Investment
by Detailed Occupation and Region: 2025**

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations Managers	6,407	73	657	507	450	491	254	3,199	302	474
Managers, All Other	1,471	10	161	131	132	97	49	694	108	89
Accountants and Auditors	3,339	29	351	281	247	224	120	1,699	168	220
Civil Engineers	2,765	51	265	254	235	266	157	1,173	91	273
Petroleum Engineers	1,036	9	115	108	92	65	45	488	51	63
Environmental Scientists and Geoscientists	779	9	80	72	62	58	34	373	31	60
Geological and Petroleum Technicians	466	5	52	53	45	32	23	202	23	31
Sales Representatives, Wholesale and Manufacturing	4,306	23	432	230	168	248	73	2,714	161	257
Bookkeeping, Accounting, and Auditing Clerks	2,888	33	285	198	173	223	106	1,528	122	220
Secretaries and Administrative Assistants	5,712	72	579	481	427	454	255	2,747	254	443
Office Clerks, General	5,176	57	540	409	395	409	200	2,480	304	382
First-Line Supervisors of Construction Trades and Extraction Workers	4,464	104	377	341	337	502	328	1,830	152	493
Construction Laborers	10,667	282	838	776	696	1,277	874	4,475	164	1,285
Operating Engineers and Other Construction Equipment Operators	5,521	142	443	411	378	650	442	2,292	113	650
Electricians	2,421	34	236	188	192	209	118	1,106	133	205
Pipelayers, Plumbers, Pipefitters, and Steamfitters	5,435	117	479	455	398	565	391	2,329	137	564
Derrick, Rotary Drill, and Service Unit Operators	92	1	8	5	4	8	4	52	2	8
Roustabouts, Oil & Gas	368	10	28	26	24	45	31	154	5	45
Helpers, Extraction Workers	10	0	1	1	1	1	1	4	0	1
Industrial Machinery Installation, Repair, and Maintenance Workers	12,257	96	1,323	1,115	923	759	450	6,267	563	761
Maintenance and Repair Workers, General	3,451	33	375	255	215	247	109	1,807	168	242
Welding, Soldering, and Brazing Workers	17,648	82	1,723	874	721	1,002	273	11,163	771	1,039
Miscellaneous Production Workers	4,039	36	400	220	167	274	90	2,426	149	277
Driver/Sales Workers and Truck Drivers	6,258	70	745	615	520	503	287	2,725	352	441
Laborers and Freight, Stock, and Material Movers, Hand	8,818	42	1,269	823	612	618	215	4,176	601	462
Pumping Station Operators	6,741	42	783	708	820	463	240	2,573	723	389

**Projected Employment in Midstream Oil & Gas Industry Operations and Investment
by Detailed Occupation and Region: 2035**

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountai n	Pacific
General and Operations Managers	6,884	72	499	558	556	311	289	3,596	382	621
Managers, All Other	1,572	10	135	142	145	76	53	783	115	113
Accountants and Auditors	3,657	29	279	308	292	160	133	1,954	211	291
Civil Engineers	2,923	53	201	279	290	163	183	1,291	97	366
Petroleum Engineers	1,312	10	118	137	114	65	55	653	67	93
Environmental Scientists and Geoscientists	936	10	72	88	81	45	42	472	41	85
Geological and Petroleum Technicians	589	6	56	68	55	32	28	274	27	43
Sales Representatives, Wholesale and Manufacturing	4,786	22	261	245	251	134	88	3,132	290	363
Bookkeeping, Accounting, and Auditing Clerks	3,013	32	189	208	224	122	119	1,665	167	287
Secretaries and Administrative Assistants	6,165	72	456	535	525	294	291	3,097	313	582
Office Clerks, General	5,351	56	410	439	468	255	223	2,674	344	482
First-Line Supervisors of Construction Trades and Extraction Workers	4,039	100	228	342	436	228	361	1,586	150	608
Construction Laborers	9,437	268	436	776	971	517	956	3,744	186	1,583
Operating Engineers and Other Construction Equipment Operators	4,919	134	244	413	514	272	484	1,940	118	800
Electricians	2,476	33	175	204	237	121	133	1,162	148	263
Pipelayers, Plumbers, Pipefitters, and Steamfitters	5,280	112	332	487	519	285	431	2,250	158	706
Derrick, Rotary Drill, and Service Unit Operators	96	1	4	5	7	3	4	56	5	11
Roustabouts, Oil & Gas	320	9	14	26	33	18	34	126	5	55
Helpers, Extraction Workers	7	0	0	1	1	0	1	3	0	1
Industrial Machinery Installation, Repair, and Maintenance Workers	15,384	108	1,241	1,396	1,201	677	558	8,249	821	1,133
Maintenance and Repair Workers, General	3,822	33	284	287	283	159	130	2,084	232	330
Welding, Soldering, and Brazing Workers	19,944	82	1,040	952	1,096	535	344	13,074	1,320	1,501
Miscellaneous Production Workers	4,456	34	242	239	251	142	111	2,795	258	384
Driver/Sales Workers and Truck Drivers	6,680	70	655	683	599	364	315	3,046	389	559
Laborers and Freight, Stock, and Material Movers, Hand	9,847	44	1,129	935	729	495	246	4,913	736	620
Pumping Station Operators	7,638	48	813	824	910	459	276	3,087	729	492

**Employment in Downstream Oil & Gas Industry Operations
by Detailed Occupation and Region: 2015**

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations Managers	1,011	0	53	109	46	12	49	472	63	207
Managers, All Other	633	0	33	68	29	7	31	295	40	130
Accountants and Auditors	884	0	46	95	40	10	43	413	55	182
Civil Engineers	63	0	3	7	3	1	3	29	4	13
Petroleum Engineers	1,390	0	72	150	63	16	68	649	87	285
Environmental Scientists and Geoscientists	315	0	16	34	14	4	15	147	20	65
Geological and Petroleum Technicians	760	0	39	82	35	9	37	354	48	156
Sales Representatives, Wholesale and Manufacturing	947	0	49	102	43	11	46	442	59	195
Bookkeeping, Accounting, and Auditing Clerks	570	0	30	61	26	7	28	265	36	117
Secretaries and Administrative Assistants	947	0	49	102	43	11	46	442	59	195
Office Clerks, General	947	0	49	102	43	11	46	442	59	195
First-Line Supervisors of Construction Trades and Extraction Workers	633	0	33	68	29	7	31	295	40	130
Construction Laborers	633	0	33	68	29	7	31	295	40	130
Operating Engineers and Other Construction Equipment Operators	443	0	23	48	20	5	22	206	28	91
Electricians	633	0	33	68	29	7	31	295	40	130
Pipelayers, Plumbers, Pipefitters, and Steamfitters	570	0	30	61	26	7	28	265	36	117
Derrick, Rotary Drill, and Service Unit Operators	127	0	7	14	6	1	6	59	8	26
Roustabouts, Oil & Gas	0	0	0	0	0	0	0	0	0	0
Helpers, Extraction Workers	0	0	0	0	0	0	0	0	0	0
Industrial Machinery Installation, Repair, and Maintenance Workers	3,033	0	158	326	138	35	148	1,416	190	622
Maintenance and Repair Workers, General	1,074	0	56	116	49	13	52	501	67	220
Welding, Soldering, and Brazing Workers	253	0	13	27	12	3	12	118	16	52
Miscellaneous Production Workers	1,579	0	82	170	72	18	77	737	99	324
Driver/Sales Workers and Truck Drivers	1,770	0	92	190	81	21	86	826	111	363
Laborers and Freight, Stock, and Material Movers, Hand	884	0	46	95	40	10	43	413	55	182
Pumping Station Operators	380	0	20	41	17	4	19	177	24	78

**Projected Employment in Downstream Oil & Gas Industry Operations
by Detailed Occupation and Region - Regulatory Constraints Scenario: 2025**

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations Managers	1,045	0	54	112	47	12	51	490	65	214
Managers, All Other	625	0	32	67	28	7	30	294	39	128
Accountants and Auditors	907	0	47	97	41	11	44	425	57	185
Civil Engineers	69	0	4	7	3	1	3	33	4	14
Petroleum Engineers	1,325	0	69	142	60	15	64	621	83	271
Environmental Scientists and Geoscientists	348	0	18	37	16	4	17	163	22	71
Geological and Petroleum Technicians	767	0	40	82	35	9	37	359	48	157
Sales Representatives, Wholesale and Manufacturing	974	0	51	104	44	11	47	457	61	199
Bookkeeping, Accounting, and Auditing Clerks	557	0	29	60	25	6	27	261	35	114
Secretaries and Administrative Assistants	907	0	47	97	41	11	44	425	57	185
Office Clerks, General	907	0	47	97	41	11	44	425	57	185
First-Line Supervisors of Construction Trades and Extraction Workers	625	0	32	67	28	7	30	294	39	128
Construction Laborers	625	0	32	67	28	7	30	294	39	128
Operating Engineers and Other Construction Equipment Operators	418	0	22	45	19	5	20	196	26	85
Electricians	625	0	32	67	28	7	30	294	39	128
Pipelayers, Plumbers, Pipefitters, and Steamfitters	557	0	29	60	25	6	27	261	35	114
Derrick, Rotary Drill, and Service Unit Operators	69	0	4	7	3	1	3	33	4	14
Roustabouts, Oil & Gas	0	0	0	0	0	0	0	0	0	0
Helpers, Extraction Workers	0	0	0	0	0	0	0	0	0	0
Industrial Machinery Installation, Repair, and Maintenance Workers	3,623	0	188	388	164	42	176	1,699	226	740
Maintenance and Repair Workers, General	1,045	0	54	112	47	12	51	490	65	214
Welding, Soldering, and Brazing Workers	279	0	14	30	13	3	14	131	17	57
Miscellaneous Production Workers	1,604	0	83	172	73	19	78	752	100	327
Driver/Sales Workers and Truck Drivers	1,743	0	90	187	79	20	85	817	109	356
Laborers and Freight, Stock, and Material Movers, Hand	907	0	47	97	41	11	44	425	57	185
Pumping Station Operators	418	0	22	45	19	5	20	196	26	85

**Projected Employment in Downstream Oil & Gas Industry Operations
by Detailed Occupation and Region: 2035**

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations Managers	1,061	0	55	114	48	12	52	497	66	217
Managers, All Other	622	0	32	67	28	7	30	292	39	127
Accountants and Auditors	914	0	47	98	41	11	44	429	57	187
Civil Engineers	74	0	4	8	3	1	4	34	5	15
Petroleum Engineers	1,290	0	67	138	58	15	63	605	81	263
Environmental Scientists and Geoscientists	366	0	19	39	17	4	18	171	23	75
Geological and Petroleum Technicians	769	0	40	82	35	9	37	361	48	157
Sales Representatives, Wholesale and Manufacturing	989	0	51	106	45	12	48	463	62	202
Bookkeeping, Accounting, and Auditing Clerks	551	0	29	59	25	6	27	258	34	113
Secretaries and Administrative Assistants	884	0	46	95	40	10	43	414	55	181
Office Clerks, General	884	0	46	95	40	10	43	414	55	181
First-Line Supervisors of Construction Trades and Extraction Workers	622	0	32	67	28	7	30	292	39	127
Construction Laborers	622	0	32	67	28	7	30	292	39	127
Operating Engineers and Other Construction Equipment Operators	405	0	21	43	18	5	20	190	25	83
Electricians	622	0	32	67	28	7	30	292	39	127
Pipelayers, Plumbers, Pipefitters, and Steamfitters	551	0	29	59	25	6	27	258	34	113
Derrick, Rotary Drill, and Service Unit Operators	53	0	3	6	2	1	3	24	3	11
Roustabouts, Oil & Gas	0	0	0	0	0	0	0	0	0	0
Helpers, Extraction Workers	0	0	0	0	0	0	0	0	0	0
Industrial Machinery Installation, Repair, and Maintenance Workers	3,953	0	205	423	179	46	192	1,853	247	808
Maintenance and Repair Workers, General	1,028	0	53	110	47	12	50	482	64	210
Welding, Soldering, and Brazing Workers	291	0	15	31	13	3	14	137	18	60
Miscellaneous Production Workers	1,611	0	83	173	73	19	78	755	101	329
Driver/Sales Workers and Truck Drivers	1,725	0	89	185	78	20	84	809	108	352
Laborers and Freight, Stock, and Material Movers, Hand	914	0	47	98	41	11	44	429	57	187
Pumping Station Operators	438	0	23	47	20	5	21	205	27	90

**Employment in All Oil & Gas Industry Operations and Investment
by Detailed Occupation and Region: 2015**

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations Managers	26,784	66	1,556	1,066	1,617	780	465	16,552	2,907	1,775
Managers, All Other	4,101	8	225	202	235	117	96	2,439	436	343
Accountants and Auditors	15,764	25	755	571	734	389	280	10,131	1,737	1,142
Civil Engineers	9,956	39	670	446	597	364	144	6,424	791	481
Petroleum Engineers	30,414	8	1,153	835	1,163	544	456	20,404	3,600	2,251
Environmental Scientists and Geoscientists	15,462	8	604	409	560	298	212	10,512	1,787	1,072
Geological and Petroleum Technicians	9,995	7	413	304	572	183	169	6,421	1,201	725
Sales Representatives, Wholesale and Manufacturing	9,661	21	477	356	478	269	168	6,224	996	672
Bookkeeping, Accounting, and Auditing Clerks	15,462	31	871	581	889	420	248	9,690	1,702	1,030
Secretaries and Administrative Assistants	29,650	63	1,642	1,127	1,659	809	493	18,670	3,218	1,969
Office Clerks, General	19,175	53	1,249	859	1,233	618	339	11,493	2,043	1,288
First-Line Supervisors of Construction Trades and Extraction Workers	40,642	101	2,821	1,768	3,007	1,177	668	23,815	4,629	2,656
Construction Laborers	41,921	254	5,012	3,270	3,608	1,996	836	20,224	3,676	3,045
Operating Engineers and Other Construction Equipment Operators	26,281	129	2,728	1,766	2,204	1,094	499	13,478	2,539	1,844
Electricians	8,934	31	718	495	683	312	176	4,921	938	660
Pipelayers, Plumbers, Pipefitters, and Steamfitters	15,541	102	1,866	1,285	1,314	772	359	7,355	1,294	1,194
Derrick, Rotary Drill, and Service Unit Operators	118,880	52	4,882	2,643	8,342	2,092	1,636	76,851	15,455	6,927
Roustabouts, Oil & Gas	64,595	35	2,753	1,508	4,483	1,179	893	41,624	8,326	3,794
Helpers, Extraction Workers	6,298	3	264	142	464	112	88	4,042	823	360
Industrial Machinery Installation, Repair, and Maintenance Workers	22,940	70	1,168	1,085	1,367	657	593	13,769	2,368	1,863
Maintenance and Repair Workers, General	10,959	29	656	481	676	326	213	6,584	1,161	833
Welding, Soldering, and Brazing Workers	22,956	69	1,437	852	1,149	808	305	14,737	2,357	1,242
Miscellaneous Production Workers	12,123	32	641	491	632	356	228	7,579	1,219	945
Driver/Sales Workers and Truck Drivers	37,031	73	2,119	1,454	2,738	972	686	22,161	4,368	2,460
Laborers and Freight, Stock, and Material Movers, Hand	15,775	37	1,031	761	1,004	573	308	9,265	1,778	1,018
Pumping Station Operators	29,787	36	1,407	953	1,806	734	511	18,684	3,712	1,944

**Projected Employment in All Oil & Gas Industry Operations and Investment
by Detailed Occupation and Region: 2025**

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations Managers	38,899	83	3,808	2,497	2,747	1,074	752	23,005	2,161	2,772
Managers, All Other	5,750	11	508	408	366	174	131	3,363	341	448
Accountants and Auditors	24,095	32	2,092	1,570	1,257	636	449	15,155	1,243	1,661
Civil Engineers	13,262	53	1,221	734	982	375	221	8,174	676	826
Petroleum Engineers	57,627	13	4,552	3,583	2,305	1,262	927	38,361	2,839	3,785
Environmental Scientists and Geoscientists	25,345	11	2,007	1,553	1,014	568	395	16,942	1,234	1,621
Geological and Petroleum Technicians	15,646	9	1,316	920	1,015	314	286	9,794	876	1,116
Sales Representatives, Wholesale and Manufacturing	13,443	26	1,243	780	845	403	245	8,204	703	994
Bookkeeping, Accounting, and Auditing Clerks	22,571	38	2,165	1,408	1,498	584	406	13,645	1,231	1,596
Secretaries and Administrative Assistants	44,317	81	4,178	2,823	2,876	1,164	822	26,918	2,386	3,069
Office Clerks, General	25,437	63	2,610	1,704	1,888	764	507	14,558	1,478	1,865
First-Line Supervisors of Construction Trades and Extraction Workers	60,386	127	6,642	3,951	5,132	1,495	1,165	33,802	3,545	4,527
Construction Laborers	51,234	307	8,365	4,790	5,434	1,971	1,292	21,384	2,848	4,843
Operating Engineers and Other Construction Equipment Operators	33,976	158	4,916	2,831	3,423	1,138	792	15,784	1,953	2,981
Electricians	11,836	38	1,401	873	1,064	368	267	6,120	723	982
Pipelayers, Plumbers, Pipefitters, and Steamfitters	18,866	125	3,094	1,874	1,991	793	531	7,610	1,031	1,817
Derrick, Rotary Drill, and Service Unit Operators	188,968	75	16,734	9,695	15,217	3,336	3,116	116,957	11,360	12,478
Roustabouts, Oil & Gas	101,260	48	9,061	5,299	8,042	1,837	1,677	62,544	6,037	6,715
Helpers, Extraction Workers	9,744	4	877	491	833	168	163	5,962	599	647
Industrial Machinery Installation, Repair, and Maintenance Workers	39,547	105	3,689	2,779	2,958	1,223	1,005	22,516	2,198	3,074
Maintenance and Repair Workers, General	15,488	37	1,553	1,018	1,156	455	326	8,847	889	1,207
Welding, Soldering, and Brazing Workers	31,483	88	3,377	1,805	2,006	1,240	480	18,775	1,634	2,078
Miscellaneous Production Workers	16,587	40	1,542	1,024	1,076	493	336	9,847	890	1,339
Driver/Sales Workers and Truck Drivers	54,487	91	5,528	3,396	4,742	1,321	1,108	30,972	3,343	3,986
Laborers and Freight, Stock, and Material Movers, Hand	22,940	48	2,639	1,663	1,783	856	462	12,483	1,463	1,543
Pumping Station Operators	47,688	50	4,165	3,048	3,109	1,273	889	29,171	2,918	3,065

**Projected Employment in All Oil & Gas Industry Operations and Investment
by Detailed Occupation and Region: 2035**

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations Managers	38,001	82	3,165	2,353	2,890	908	809	22,933	2,562	2,299
Managers, All Other	5,704	11	432	393	383	149	138	3,396	386	416
Accountants and Auditors	23,646	32	1,743	1,448	1,299	539	471	15,149	1,485	1,480
Civil Engineers	13,297	55	1,040	753	1,112	325	254	8,300	783	675
Petroleum Engineers	60,305	14	4,119	3,392	2,413	1,192	1,028	40,942	3,668	3,537
Environmental Scientists and Geoscientists	24,712	12	1,689	1,378	1,030	494	416	16,786	1,490	1,417
Geological and Petroleum Technicians	15,180	10	1,122	836	1,018	300	300	9,667	1,032	895
Sales Representatives, Wholesale and Manufacturing	13,603	25	954	749	931	293	268	8,524	920	939
Bookkeeping, Accounting, and Auditing Clerks	21,864	37	1,776	1,292	1,564	485	431	13,504	1,470	1,305
Secretaries and Administrative Assistants	43,325	81	3,512	2,638	3,033	1,004	883	26,791	2,837	2,546
Office Clerks, General	24,205	62	2,118	1,587	1,951	621	534	14,136	1,674	1,522
First-Line Supervisors of Construction Trades and Extraction Workers	58,143	124	5,610	3,678	5,403	1,331	1,253	33,230	4,182	3,332
Construction Laborers	47,533	293	6,848	4,621	6,007	1,514	1,402	20,088	3,243	3,517
Operating Engineers and Other Construction Equipment Operators	31,825	150	4,052	2,700	3,707	914	855	15,055	2,236	2,156
Electricians	11,369	37	1,162	839	1,132	307	288	5,996	824	784
Pipelayers, Plumbers, Pipefitters, and Steamfitters	17,829	120	2,558	1,851	2,215	622	578	7,320	1,164	1,401
Derrick, Rotary Drill, and Service Unit Operators	181,413	75	14,151	8,570	15,269	3,349	3,286	114,533	13,482	8,698
Roustabouts, Oil & Gas	96,624	48	7,608	4,666	8,034	1,809	1,759	60,885	7,123	4,692
Helpers, Extraction Workers	9,252	4	734	431	831	170	171	5,774	702	435
Industrial Machinery Installation, Repair, and Maintenance Workers	43,866	118	3,433	3,042	3,411	1,185	1,182	25,497	2,872	3,126
Maintenance and Repair Workers, General	15,418	37	1,292	986	1,240	379	356	9,002	1,074	1,052
Welding, Soldering, and Brazing Workers	33,175	88	2,450	1,814	2,418	810	563	20,525	2,329	2,178
Miscellaneous Production Workers	16,585	38	1,222	978	1,167	365	366	10,101	1,119	1,229
Driver/Sales Workers and Truck Drivers	52,644	91	4,703	3,195	4,852	1,237	1,174	30,521	3,875	2,996
Laborers and Freight, Stock, and Material Movers, Hand	23,393	50	2,296	1,702	1,916	748	504	13,034	1,741	1,402
Pumping Station Operators	47,100	56	3,655	2,868	3,182	1,203	951	29,215	3,353	2,617

**Employment in Petrochemical Industry Operations and Investment
by Detailed Occupation and Region: 2015**

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations Managers	3,656	78	231	483	341	430	204	1,680	74	135
Managers, All Other	418	11	32	63	40	42	27	185	5	13
Accountants and Auditors	1,579	36	112	225	151	191	93	680	32	59
Civil Engineers	888	1	5	8	103	6	10	746	1	8
Petroleum Engineers	190	3	16	24	24	17	9	89	3	5
Environmental Scientists and Geoscientists	181	1	5	8	21	6	4	132	1	3
Geological and Petroleum Technicians	76	1	5	8	9	6	3	41	1	2
Sales Representatives, Wholesale and Manufacturing	3,467	76	239	505	314	531	205	1,331	104	162
Bookkeeping, Accounting, and Auditing Clerks	1,813	33	108	219	176	216	92	860	41	68
Secretaries and Administrative Assistants	3,437	70	216	442	332	391	186	1,609	68	123
Office Clerks, General	2,524	47	141	300	238	296	128	1,224	55	95
First-Line Supervisors of Construction Trades and Extraction Workers	1,333	1	5	8	153	6	15	1,134	1	10
Construction Laborers	3,667	0	0	0	422	0	36	3,186	0	23
Operating Engineers and Other Construction Equipment Operators	1,812	0	0	0	209	0	18	1,574	0	11
Electricians	2,044	47	144	288	199	233	120	902	38	73
Pipelayers, Plumbers, Pipefitters, and Steamfitters	1,584	6	21	40	179	27	29	1,262	4	16
Derrick, Rotary Drill, and Service Unit Operators	17	0	0	0	2	0	0	15	0	0
Roustabouts, Oil & Gas	132	0	0	0	15	0	1	115	0	1
Helpers, Extraction Workers	4	0	0	0	0	0	0	4	0	0
Industrial Machinery Installation, Repair, and Maintenance Workers	6,759	200	554	1,177	588	949	486	2,367	148	290
Maintenance and Repair Workers, General	5,890	173	477	1,016	513	816	420	2,099	126	250
Welding, Soldering, and Brazing Workers	1,527	2	11	16	151	12	21	1,298	2	14
Miscellaneous Production Workers	3,544	102	257	576	290	453	245	1,412	66	143
Driver/Sales Workers and Truck Drivers	4,450	68	319	552	494	586	216	1,917	124	174
Laborers and Freight, Stock, and Material Movers, Hand	2,950	77	209	459	254	410	192	1,152	70	127
Pumping Station Operators	411	12	38	71	41	48	29	152	6	14

**Projected Employment in Petrochemical Industry Operations and Investment
by Detailed Occupation and Region: 2025**

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations Managers	3,736	79	250	552	263	421	196	1,766	71	138
Managers, All Other	507	12	39	76	41	47	29	241	6	16
Accountants and Auditors	1,661	34	118	242	130	198	88	752	35	64
Civil Engineers	501	1	6	66	8	7	3	407	1	2
Petroleum Engineers	145	2	12	19	17	13	7	69	2	4
Environmental Scientists and Geoscientists	128	1	6	17	8	7	3	83	1	2
Geological and Petroleum Technicians	77	1	6	10	8	7	3	39	1	2
Sales Representatives, Wholesale and Manufacturing	3,661	72	251	526	285	513	192	1,558	101	163
Bookkeeping, Accounting, and Auditing Clerks	1,690	30	109	240	125	206	81	794	40	65
Secretaries and Administrative Assistants	3,416	67	229	495	251	390	173	1,617	69	125
Office Clerks, General	2,341	45	147	340	159	275	115	1,121	50	89
First-Line Supervisors of Construction Trades and Extraction Workers	704	1	6	90	8	7	3	586	1	2
Construction Laborers	1,774	0	0	226	0	0	0	1,548	0	0
Operating Engineers and Other Construction Equipment Operators	875	0	0	111	0	0	0	764	0	0
Electricians	2,098	45	152	309	164	220	113	988	35	72
Pipelayers, Plumbers, Pipefitters, and Steamfitters	960	7	26	128	29	30	18	708	4	10
Derrick, Rotary Drill, and Service Unit Operators	8	0	0	1	0	0	0	7	0	0
Roustabouts, Oil & Gas	63	0	0	8	0	0	0	55	0	0
Helpers, Extraction Workers	1	0	0	0	0	0	0	1	0	0
Industrial Machinery Installation, Repair, and Maintenance Workers	9,472	237	715	1,446	718	1,112	570	4,133	171	370
Maintenance and Repair Workers, General	6,887	170	516	1,049	520	809	411	3,017	126	269
Welding, Soldering, and Brazing Workers	857	2	12	113	17	13	7	687	2	4
Miscellaneous Production Workers	3,942	99	277	609	262	445	232	1,802	66	150
Driver/Sales Workers and Truck Drivers	4,547	69	336	607	439	603	213	1,970	128	182
Laborers and Freight, Stock, and Material Movers, Hand	3,230	74	226	486	230	395	182	1,440	67	130
Pumping Station Operators	442	9	38	63	45	43	25	199	6	14

**Projected US Employment in Petrochemical Industry Operations and Investment
by Detailed Occupation and Region: 2035**

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations Managers	3,489	79	248	496	292	417	196	1,556	70	135
Managers, All Other	533	13	41	77	46	50	31	253	6	16
Accountants and Auditors	1,612	34	116	223	139	203	87	708	37	65
Civil Engineers	106	1	7	10	38	7	4	36	1	2
Petroleum Engineers	125	2	11	16	15	11	6	59	2	3
Environmental Scientists and Geoscientists	81	1	7	10	13	7	4	36	1	2
Geological and Petroleum Technicians	78	1	7	10	10	7	4	36	1	2
Sales Representatives, Wholesale and Manufacturing	3,567	70	246	488	290	505	188	1,521	100	159
Bookkeeping, Accounting, and Auditing Clerks	1,496	29	105	202	137	201	78	642	39	63
Secretaries and Administrative Assistants	3,141	66	225	435	284	389	170	1,378	70	124
Office Clerks, General	2,057	44	143	286	180	265	112	894	48	85
First-Line Supervisors of Construction Trades and Extraction Workers	145	1	7	10	76	7	4	37	1	2
Construction Laborers	187	0	0	0	187	0	0	0	0	0
Operating Engineers and Other Construction Equipment Operators	93	0	0	0	93	0	0	0	0	0
Electricians	1,999	45	150	282	182	215	111	910	34	70
Pipelayers, Plumbers, Pipefitters, and Steamfitters	411	8	27	48	100	32	19	163	4	10
Derrick, Rotary Drill, and Service Unit Operators	1	0	0	0	1	0	0	0	0	0
Roustabouts, Oil & Gas	7	0	0	0	7	0	0	0	0	0
Helpers, Extraction Workers	0	0	0	0	0	0	0	0	0	0
Industrial Machinery Installation, Repair, and Maintenance Workers	10,602	258	768	1,552	797	1,204	619	4,822	185	397
Maintenance and Repair Workers, General	7,017	169	508	1,023	535	805	407	3,180	126	264
Welding, Soldering, and Brazing Workers	239	2	13	19	39	14	7	139	2	4
Miscellaneous Production Workers	3,829	97	269	567	270	441	228	1,744	66	147
Driver/Sales Workers and Truck Drivers	4,533	70	338	577	474	612	215	1,931	130	186
Laborers and Freight, Stock, and Material Movers, Hand	3,146	73	221	453	240	387	180	1,401	65	126
Pumping Station Operators	462	9	38	62	48	43	24	218	7	13

**Employment in Oil & Gas and Petrochemical Industry Operations and Investment
by Detailed Occupation and Region: 2015**

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations and Investment Managers	30,440	144	1,787	1,549	1,958	1,210	669	18,232	2,981	1,910
Managers, All Other	4,519	19	257	265	275	159	123	2,624	441	356
Accountants and Auditors	17,343	61	867	796	885	580	373	10,811	1,769	1,201
Civil Engineers	10,844	40	675	454	700	370	154	7,170	792	489
Petroleum Engineers	30,604	11	1,169	859	1,187	561	465	20,493	3,603	2,256
Environmental Scientists and Geoscientists	15,643	9	609	417	581	304	216	10,644	1,788	1,075
Geological and Petroleum Technicians	10,071	8	418	312	581	189	172	6,462	1,202	727
Sales Representatives, Wholesale and Manufacturing	13,128	97	716	861	792	800	373	7,555	1,100	834
Bookkeeping, Accounting, and Auditing Clerks	17,275	64	979	800	1,065	636	340	10,550	1,743	1,098
Secretaries and Administrative Assistants	33,087	133	1,858	1,569	1,991	1,200	679	20,279	3,286	2,092
Office Clerks, General	21,699	100	1,390	1,159	1,471	914	467	12,717	2,098	1,383
First-Line Supervisors of Construction Trades and Extraction Workers	41,975	102	2,826	1,776	3,160	1,183	683	24,949	4,630	2,666
Construction Laborers	45,588	254	5,012	3,270	4,030	1,996	872	23,410	3,676	3,068
Operating Engineers and Other Construction Equipment Operators	28,093	129	2,728	1,766	2,413	1,094	517	15,052	2,539	1,855
Electricians	10,978	78	862	783	882	545	296	5,823	976	733
Pipelayers, Plumbers, Pipefitters, and Steamfitters	17,125	108	1,887	1,325	1,493	799	388	8,617	1,298	1,210
Derrick, Rotary Drill, and Service Unit Operators	118,897	52	4,882	2,643	8,344	2,092	1,636	76,866	15,455	6,927
Roustabouts, Oil & Gas	64,727	35	2,753	1,508	4,498	1,179	894	41,739	8,326	3,795
Helpers, Extraction Workers	6,302	3	264	142	464	112	88	4,046	823	360
Industrial Machinery Installation, Repair, and Maintenance Workers	29,699	270	1,722	2,262	1,955	1,606	1,079	16,136	2,516	2,153
Maintenance and Repair Workers, General	16,849	202	1,133	1,497	1,189	1,142	633	8,683	1,287	1,083
Welding, Soldering, and Brazing Workers	24,483	71	1,448	868	1,300	820	326	16,035	2,359	1,256
Miscellaneous Production Workers	15,667	134	898	1,067	922	809	473	8,991	1,285	1,088
Driver/Sales Workers and Truck Drivers	41,481	141	2,438	2,006	3,232	1,558	902	24,078	4,492	2,634
Laborers and Freight, Stock, and Material Movers, Hand	18,725	114	1,240	1,220	1,258	983	500	10,417	1,848	1,145
Pumping Station Operators	30,198	48	1,445	1,024	1,847	782	540	18,836	3,718	1,958

**Projected Employment in Oil & Gas and Petrochemical Industry Operations and Investment
by Detailed Occupation and Region: 2025**

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations and Investment Managers	42,635	162	4,058	3,049	3,010	1,495	948	24,771	2,232	2,910
Managers, All Other	6,257	23	547	484	407	221	160	3,604	347	464
Accountants and Auditors	25,756	66	2,210	1,812	1,387	834	537	15,907	1,278	1,725
Civil Engineers	13,763	54	1,227	800	990	382	224	8,581	677	828
Petroleum Engineers	57,772	15	4,564	3,602	2,322	1,275	934	38,430	2,841	3,789
Environmental Scientists and Geoscientists	25,473	12	2,013	1,570	1,022	575	398	17,025	1,235	1,623
Geological and Petroleum Technicians	15,723	10	1,322	930	1,023	321	289	9,833	877	1,118
Sales Representatives, Wholesale and Manufacturing	17,104	98	1,494	1,306	1,130	916	437	9,762	804	1,157
Bookkeeping, Accounting, and Auditing Clerks	24,261	68	2,274	1,648	1,623	790	487	14,439	1,271	1,661
Secretaries and Administrative Assistants	47,733	148	4,407	3,318	3,127	1,554	995	28,535	2,455	3,194
Office Clerks, General	27,778	108	2,757	2,044	2,047	1,039	622	15,679	1,528	1,954
First-Line Supervisors of Construction Trades and Extraction Workers	61,090	128	6,648	4,041	5,140	1,502	1,168	34,388	3,546	4,529
Construction Laborers	53,008	307	8,365	5,016	5,434	1,971	1,292	22,932	2,848	4,843
Operating Engineers and Other Construction Equipment Operators	34,851	158	4,916	2,942	3,423	1,138	792	16,548	1,953	2,981
Electricians	13,934	83	1,553	1,182	1,228	588	380	7,108	758	1,054
Pipelayers, Plumbers, Pipefitters, and Steamfitters	19,826	132	3,120	2,002	2,020	823	549	8,318	1,035	1,827
Derrick, Rotary Drill, and Service Unit Operators	188,976	75	16,734	9,696	15,217	3,336	3,116	116,964	11,360	12,478
Roustabouts, Oil & Gas	101,323	48	9,061	5,307	8,042	1,837	1,677	62,599	6,037	6,715
Helpers, Extraction Workers	9,745	4	877	491	833	168	163	5,963	599	647
Industrial Machinery Installation, Repair, and Maintenance Workers	49,019	342	4,404	4,225	3,676	2,335	1,575	26,649	2,369	3,444
Maintenance and Repair Workers, General	22,375	207	2,069	2,067	1,676	1,264	737	11,864	1,015	1,476
Welding, Soldering, and Brazing Workers	32,340	90	3,389	1,918	2,023	1,253	487	19,462	1,636	2,082
Miscellaneous Production Workers	20,529	139	1,819	1,633	1,338	938	568	11,649	956	1,489
Driver/Sales Workers and Truck Drivers	59,034	160	5,864	4,003	5,181	1,924	1,321	32,942	3,471	4,168
Laborers and Freight, Stock, and Material Movers, Hand	26,170	122	2,865	2,149	2,013	1,251	644	13,923	1,530	1,673
Pumping Station Operators	48,130	59	4,203	3,111	3,154	1,316	914	29,370	2,924	3,079

**Projected Employment in Oil & Gas and Petrochemical Industry Operations and Investment
by Detailed Occupation and Region: 2035**

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations and Investment Managers	41,490	161	3,413	2,849	3,182	1,325	1,005	24,489	2,632	2,434
Managers, All Other	6,237	24	473	470	429	199	169	3,649	392	432
Accountants and Auditors	25,258	66	1,859	1,671	1,438	742	558	15,857	1,522	1,545
Civil Engineers	13,403	56	1,047	763	1,150	332	258	8,336	784	677
Petroleum Engineers	60,430	16	4,130	3,408	2,428	1,203	1,034	41,001	3,670	3,540
Environmental Scientists and Geoscientists	24,793	13	1,696	1,388	1,043	501	420	16,822	1,491	1,419
Geological and Petroleum Technicians	15,258	11	1,129	846	1,028	307	304	9,703	1,033	897
Sales Representatives, Wholesale and Manufacturing	17,170	95	1,200	1,237	1,221	798	456	10,045	1,020	1,098
Bookkeeping, Accounting, and Auditing Clerks	23,360	66	1,881	1,494	1,701	686	509	14,146	1,509	1,368
Secretaries and Administrative Assistants	46,466	147	3,737	3,073	3,317	1,393	1,053	28,169	2,907	2,670
Office Clerks, General	26,262	106	2,261	1,873	2,131	886	646	15,030	1,722	1,607
First-Line Supervisors of Construction Trades and Extraction Workers	58,288	125	5,617	3,688	5,479	1,338	1,257	33,267	4,183	3,334
Construction Laborers	47,720	293	6,848	4,621	6,194	1,514	1,402	20,088	3,243	3,517
Operating Engineers and Other Construction Equipment Operators	31,918	150	4,052	2,700	3,800	914	855	15,055	2,236	2,156
Electricians	13,368	82	1,312	1,121	1,314	522	399	6,906	858	854
Pipelayers, Plumbers, Pipefitters, and Steamfitters	18,240	128	2,585	1,899	2,315	654	597	7,483	1,168	1,411
Derrick, Rotary Drill, and Service Unit Operators	181,414	75	14,151	8,570	15,270	3,349	3,286	114,533	13,482	8,698
Roustabouts, Oil & Gas	96,631	48	7,608	4,666	8,041	1,809	1,759	60,885	7,123	4,692
Helpers, Extraction Workers	9,252	4	734	431	831	170	171	5,774	702	435
Industrial Machinery Installation, Repair, and Maintenance Workers	54,468	376	4,201	4,594	4,208	2,389	1,801	30,319	3,057	3,523
Maintenance and Repair Workers, General	22,435	206	1,800	2,009	1,775	1,184	763	12,182	1,200	1,316
Welding, Soldering, and Brazing Workers	33,414	90	2,463	1,833	2,457	824	570	20,664	2,331	2,182
Miscellaneous Production Workers	20,414	135	1,491	1,545	1,437	806	594	11,845	1,185	1,376
Driver/Sales Workers and Truck Drivers	57,177	161	5,041	3,772	5,326	1,849	1,389	32,452	4,005	3,182
Laborers and Freight, Stock, and Material Movers, Hand	26,539	123	2,517	2,155	2,156	1,135	684	14,435	1,806	1,528
Pumping Station Operators	47,562	65	3,693	2,930	3,230	1,246	975	29,433	3,360	2,630

Appendix H. Projected Job Opportunities from Replacement in the Oil & Natural Gas and Petrochemical Industries by Broad Occupation

Projected Job Opportunities from Replacement in the Oil & Gas and Petrochemical Industries: United States

	Total	African American	Hispanic	Female
2015-2025				
Total	282,043	18,243	39,865	48,420
Management, Business and Financial	47,341	2,305	3,019	13,666
Professional and Related	41,813	2,396	3,139	8,659
Service	4,465	862	562	1,039
Sales and Related	8,413	152	647	1,527
Office & Administrative Support	24,970	1,712	2,490	16,648
Skilled Blue Collar	81,328	4,608	13,052	2,125
Semi-skilled Blue Collar	56,147	4,711	12,129	3,623
Unskilled Blue Collar	17,566	1,497	4,827	1,133
2025-2035				
Total	303,054	20,762	59,411	52,107
Management, Business and Financial	51,005	2,624	4,495	14,722
Professional and Related	45,141	2,727	4,671	9,345
Service	4,794	978	839	1,115
Sales and Related	9,044	175	962	1,637
Office & Administrative Support	26,902	1,951	3,707	17,941
Skilled Blue Collar	87,170	5,250	19,431	2,275
Semi-skilled Blue Collar	60,218	5,353	18,090	3,871
Unskilled Blue Collar	18,780	1,704	7,216	1,201
2015-2035				
Total	585,097	39,005	99,276	100,527
Management, Business and Financial	98,346	4,929	7,514	28,388
Professional and Related	86,954	5,123	7,810	18,004
Service	9,259	1,840	1,401	2,154
Sales and Related	17,457	327	1,609	3,164
Office & Administrative Support	51,872	3,663	6,197	34,589
Skilled Blue Collar	168,498	9,858	32,483	4,400
Semi-skilled Blue Collar	116,365	10,064	30,219	7,494
Unskilled Blue Collar	36,346	3,201	12,043	2,334

**Projected Job Opportunities from Replacement in the Oil & Gas
and Petrochemical Industries: New England**

	Total	African American	Hispanic	Female
	2015-2025			
Total	1,762	46	119	344
Management, Business and Financial	297	5	9	77
Professional and Related	233	6	7	47
Service	51	2	2	13
Sales and Related	82	1	3	19
Office & Administrative Support	169	5	9	100
Skilled Blue Collar	389	7	24	13
Semi-skilled Blue Collar	434	17	52	63
Unskilled Blue Collar	107	3	13	12
	2025-2035			
Total	1,857	60	194	361
Management, Business and Financial	312	6	15	81
Professional and Related	245	7	13	48
Service	54	3	4	13
Sales and Related	87	1	5	20
Office & Administrative Support	178	6	15	105
Skilled Blue Collar	410	11	38	15
Semi-skilled Blue Collar	458	22	86	66
Unskilled Blue Collar	113	4	18	13
	2015-2035			
Total	3,619	106	313	705
Management, Business and Financial	609	11	24	158
Professional and Related	478	13	20	95
Service	105	5	6	26
Sales and Related	169	2	8	39
Office & Administrative Support	347	11	24	205
Skilled Blue Collar	799	18	62	28
Semi-skilled Blue Collar	892	39	138	129
Unskilled Blue Collar	220	7	31	25

**Projected Job Opportunities from Replacement in the Oil & Gas
and Petrochemical Industries: Middle Atlantic**

	Total	African American	Hispanic	Female
	2015-2025			
Total	18,923	893	1,356	2,985
Management, Business and Financial	2,881	83	86	819
Professional and Related	2,344	79	75	483
Service	319	50	22	87
Sales and Related	469	6	16	91
Office & Administrative Support	1,543	84	78	999
Skilled Blue Collar	5,836	249	411	148
Semi-skilled Blue Collar	3,636	213	359	257
Unskilled Blue Collar	1,895	129	309	101
	2025-2035			
Total	20,157	1,065	2,006	3,180
Management, Business and Financial	3,069	98	128	872
Professional and Related	2,497	95	112	515
Service	338	58	32	92
Sales and Related	498	8	24	96
Office & Administrative Support	1,643	100	116	1,064
Skilled Blue Collar	6,218	297	606	159
Semi-skilled Blue Collar	3,873	255	531	275
Unskilled Blue Collar	2,021	154	457	107
	2015-2035			
Total	39,080	1,958	3,362	6,165
Management, Business and Financial	5,950	181	214	1,691
Professional and Related	4,841	174	187	998
Service	657	108	54	179
Sales and Related	967	14	40	187
Office & Administrative Support	3,186	184	194	2,063
Skilled Blue Collar	12,054	546	1,017	307
Semi-skilled Blue Collar	7,509	468	890	532
Unskilled Blue Collar	3,916	283	766	208

**Projected Job Opportunities from Replacement in the Oil & Gas
and Petrochemical Industries: East North Central**

	Total	African American	Hispanic	Female
	2015-2025			
Total	18,050	860	802	3,056
Management, Business and Financial	2,615	75	53	718
Professional and Related	1,881	78	42	382
Service	445	50	16	112
Sales and Related	585	8	15	122
Office & Administrative Support	1,544	72	50	971
Skilled Blue Collar	4,996	192	195	143
Semi-skilled Blue Collar	4,089	252	280	420
Unskilled Blue Collar	1,895	133	151	188
	2025-2035			
Total	18,310	928	1,267	3,099
Management, Business and Financial	2,654	79	82	729
Professional and Related	1,909	84	66	389
Service	451	53	25	114
Sales and Related	593	9	23	123
Office & Administrative Support	1,565	77	78	983
Skilled Blue Collar	5,068	210	310	144
Semi-skilled Blue Collar	4,147	272	443	428
Unskilled Blue Collar	1,923	144	240	189
	2015-2035			
Total	36,360	1,788	2,069	6,155
Management, Business and Financial	5,269	154	135	1,447
Professional and Related	3,790	162	108	771
Service	896	103	41	226
Sales and Related	1,178	17	38	245
Office & Administrative Support	3,109	149	128	1,954
Skilled Blue Collar	10,064	402	505	287
Semi-skilled Blue Collar	8,236	524	723	848
Unskilled Blue Collar	3,818	277	391	377

**Projected Job Opportunities from Replacement in the Oil & Gas
and Petrochemical Industries: West North Central**

	Total	African American	Hispanic	Female
	2015-2025			
Total	20,495	393	730	3,104
Management, Business and Financial	2,878	40	45	832
Professional and Related	2,418	44	40	509
Service	273	15	6	69
Sales and Related	561	2	10	113
Office & Administrative Support	1,557	29	38	1,037
Skilled Blue Collar	6,761	106	263	178
Semi-skilled Blue Collar	4,501	111	235	269
Unskilled Blue Collar	1,546	46	93	97
	2025-2035			
Total	20,346	484	1,267	3,080
Management, Business and Financial	2,857	49	76	825
Professional and Related	2,401	55	69	507
Service	270	18	11	69
Sales and Related	557	5	18	112
Office & Administrative Support	1,546	37	63	1,029
Skilled Blue Collar	6,712	130	460	176
Semi-skilled Blue Collar	4,468	133	410	266
Unskilled Blue Collar	1,535	57	160	96
	2015-2035			
Total	40,841	877	1,997	6,184
Management, Business and Financial	5,735	89	121	1,657
Professional and Related	4,819	99	109	1,016
Service	543	33	17	138
Sales and Related	1,118	7	28	225
Office & Administrative Support	3,103	66	101	2,066
Skilled Blue Collar	13,473	236	723	354
Semi-skilled Blue Collar	8,969	244	645	535
Unskilled Blue Collar	3,081	103	253	193

Projected Job Opportunities from Replacement in the Oil & Gas and Petrochemical Industries: South Atlantic

	Total	African American	Hispanic	Female
	2015-2025			
Total	12,697	1,588	934	2,234
Management, Business and Financial	2,127	160	69	575
Professional and Related	1,667	182	55	333
Service	293	79	17	68
Sales and Related	466	20	18	104
Office & Administrative Support	1,058	134	58	657
Skilled Blue Collar	3,343	340	249	102
Semi-skilled Blue Collar	2,753	493	316	293
Unskilled Blue Collar	990	180	152	102
	2025-2035			
Total	13,659	1,831	1,487	2,402
Management, Business and Financial	2,286	185	110	616
Professional and Related	1,793	211	89	359
Service	318	89	27	74
Sales and Related	500	23	28	112
Office & Administrative Support	1,139	154	90	707
Skilled Blue Collar	3,596	392	397	109
Semi-skilled Blue Collar	2,962	570	503	316
Unskilled Blue Collar	1,065	207	243	109
	2015-2035			
Total	26,356	3,419	2,421	4,636
Management, Business and Financial	4,413	345	179	1,191
Professional and Related	3,460	393	144	692
Service	611	168	44	142
Sales and Related	966	43	46	216
Office & Administrative Support	2,197	288	148	1,364
Skilled Blue Collar	6,939	732	646	211
Semi-skilled Blue Collar	5,715	1,063	819	609
Unskilled Blue Collar	2,055	387	395	211

**Projected Job Opportunities from Replacement in the Oil & Gas
and Petrochemical Industries: East South Central**

	Total	African American	Hispanic	Female
	2015-2025			
Total	7,289	1,001	103	1,153
Management, Business and Financial	856	71	4	240
Professional and Related	762	85	4	163
Service	206	67	1	49
Sales and Related	152	6	0	31
Office & Administrative Support	528	64	4	328
Skilled Blue Collar	2,234	255	33	69
Semi-skilled Blue Collar	1,907	336	36	207
Unskilled Blue Collar	644	117	21	66
	2025-2035			
Total	7,510	1,053	199	1,184
Management, Business and Financial	880	75	10	247
Professional and Related	786	90	10	168
Service	211	71	2	49
Sales and Related	158	7	2	32
Office & Administrative Support	544	66	11	337
Skilled Blue Collar	2,303	268	60	70
Semi-skilled Blue Collar	1,964	353	65	212
Unskilled Blue Collar	664	123	39	69
	2015-2035			
Total	14,799	2,054	302	2,337
Management, Business and Financial	1,736	146	14	487
Professional and Related	1,548	175	14	331
Service	417	138	3	98
Sales and Related	310	13	2	63
Office & Administrative Support	1,072	130	15	665
Skilled Blue Collar	4,537	523	93	139
Semi-skilled Blue Collar	3,871	689	101	419
Unskilled Blue Collar	1,308	240	60	135

Projected Job Opportunities from Replacement in the Oil & Gas and Petrochemical Industries: West South Central

	Total	African American	Hispanic	Female
2015-2025				
Total	157,886	12,309	28,415	28,292
Management, Business and Financial	28,258	1,728	2,184	8,165
Professional and Related	26,272	1,777	2,375	5,375
Service	2,254	532	394	498
Sales and Related	4,885	101	474	833
Office & Administrative Support	15,093	1,231	1,833	10,199
Skilled Blue Collar	42,783	3,119	9,237	1,094
Semi-skilled Blue Collar	30,305	3,035	8,678	1,685
Unskilled Blue Collar	8,036	786	3,240	443
2025-2035				
Total	174,028	13,980	41,903	31,183
Management, Business and Financial	31,148	1,962	3,222	9,001
Professional and Related	28,957	2,017	3,504	5,922
Service	2,486	606	580	550
Sales and Related	5,385	114	699	918
Office & Administrative Support	16,636	1,397	2,704	11,243
Skilled Blue Collar	47,157	3,541	13,620	1,205
Semi-skilled Blue Collar	33,403	3,449	12,797	1,856
Unskilled Blue Collar	8,856	894	4,777	488
2015-2035				
Total	331,914	26,289	70,318	59,475
Management, Business and Financial	59,406	3,690	5,406	17,166
Professional and Related	55,229	3,794	5,879	11,297
Service	4,740	1,138	974	1,048
Sales and Related	10,270	215	1,173	1,751
Office & Administrative Support	31,729	2,628	4,537	21,442
Skilled Blue Collar	89,940	6,660	22,857	2,299
Semi-skilled Blue Collar	63,708	6,484	21,475	3,541
Unskilled Blue Collar	16,892	1,680	8,017	931

**Projected Job Opportunities from Replacement in the Oil & Gas
and Petrochemical Industries: Mountain**

	Total	African American	Hispanic	Female
	2015-2025			
Total	26,939	318	3,683	4,295
Management, Business and Financial	4,477	45	287	1,355
Professional and Related	3,673	42	266	805
Service	208	7	29	49
Sales and Related	821	4	60	140
Office & Administrative Support	2,082	25	210	1,433
Skilled Blue Collar	9,392	103	1,435	233
Semi-skilled Blue Collar	5,165	73	1,077	226
Unskilled Blue Collar	1,121	19	319	54
	2025-2035			
Total	27,491	389	5,363	4,381
Management, Business and Financial	4,569	55	417	1,384
Professional and Related	3,748	49	386	822
Service	211	9	44	49
Sales and Related	838	4	85	143
Office & Administrative Support	2,124	33	308	1,463
Skilled Blue Collar	9,587	125	2,088	237
Semi-skilled Blue Collar	5,270	90	1,568	229
Unskilled Blue Collar	1,144	24	467	54
	2015-2035			
Total	54,430	707	9,046	8,676
Management, Business and Financial	9,046	100	704	2,739
Professional and Related	7,421	91	652	1,627
Service	419	16	73	98
Sales and Related	1,659	8	145	283
Office & Administrative Support	4,206	58	518	2,896
Skilled Blue Collar	18,979	228	3,523	470
Semi-skilled Blue Collar	10,435	163	2,645	455
Unskilled Blue Collar	2,265	43	786	108

**Projected Job Opportunities from Replacement in the Oil & Gas
and Petrochemical Industries: Pacific**

	Total	African American	Hispanic	Female
	2015-2025			
Total	18,002	835	3,723	2,957
Management, Business and Financial	2,952	98	282	885
Professional and Related	2,563	103	275	562
Service	416	60	75	94
Sales and Related	392	4	51	74
Office & Administrative Support	1,396	68	210	924
Skilled Blue Collar	5,594	237	1,205	145
Semi-skilled Blue Collar	3,357	181	1,096	203
Unskilled Blue Collar	1,332	84	529	70
	2025-2035			
Total	19,696	972	5,725	3,237
Management, Business and Financial	3,230	115	435	967
Professional and Related	2,805	119	422	615
Service	455	71	114	105
Sales and Related	428	4	78	81
Office & Administrative Support	1,527	81	322	1,010
Skilled Blue Collar	6,119	276	1,852	160
Semi-skilled Blue Collar	3,673	209	1,687	223
Unskilled Blue Collar	1,459	97	815	76
	2015-2035			
Total	37,698	1,807	9,448	6,194
Management, Business and Financial	6,182	213	717	1,852
Professional and Related	5,368	222	697	1,177
Service	871	131	189	199
Sales and Related	820	8	129	155
Office & Administrative Support	2,923	149	532	1,934
Skilled Blue Collar	11,713	513	3,057	305
Semi-skilled Blue Collar	7,030	390	2,783	426
Unskilled Blue Collar	2,791	181	1,344	146

Appendix I. Projected Job Opportunities from Replacement in the Oil & Natural Gas and Petrochemical Industries by Detailed Occupation and Region

Projected Job Opportunities from Replacement in the Oil & Gas and Petrochemical Industries
by Detailed Occupation and Region, 2015-2025

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations Managers	5,479	29	342	305	379	223	128	3,192	539	342
Managers, All Other	955	4	57	63	64	35	27	537	93	75
Accountants and Auditors	4,930	19	264	249	271	172	113	2,994	507	341
Civil Engineers	2,531	10	168	117	176	88	40	1,632	187	113
Petroleum Engineers	7,449	3	306	230	315	142	121	4,892	890	550
Environmental Scientists and Geoscientists	4,403	2	185	130	177	88	65	2,940	512	304
Geological and Petroleum Technicians	3,461	2	154	118	218	66	63	2,171	418	251
Sales Representatives, Wholesale and Manufacturing	2,474	20	144	177	160	156	74	1,380	208	155
Bookkeeping, Accounting, and Auditing Clerks	1,526	5	92	77	101	58	32	909	156	96
Secretaries and Administrative Assistants	3,821	17	229	199	247	143	85	2,279	382	240
Office Clerks, General	4,394	22	300	257	320	190	101	2,500	427	277
First-Line Supervisors of Construction Trades and Extraction Workers	4,367	11	313	202	355	127	75	2,523	485	276
Construction Laborers	9,484	57	1,101	737	894	423	191	4,689	762	630
Operating Engineers and Other Construction Equipment Operators	6,046	30	622	413	556	241	116	3,128	546	394
Electricians	1,999	16	166	155	172	101	56	1,024	177	132
Pipelayers, Plumbers, Pipefitters, and Derrick, Rotary Drill, and Service Unit Operators	2,065	14	241	173	191	98	51	999	155	143
Roustabouts, the Oil & Gas	45,985	22	2,024	1,126	3,500	838	675	29,071	6,050	2,679
Helpers, Extraction Workers	16,362	10	746	420	1,232	309	241	10,315	2,130	959
Industrial Machinery Installation, Repair, and Maintenance Workers	857	0	39	21	69	15	12	538	114	49
Maintenance and Repair Workers, General	7,050	70	433	584	496	392	271	3,701	597	506
Welding, Soldering, and Brazing Workers	3,144	41	224	303	237	217	126	1,560	238	198
Miscellaneous Production Workers	5,753	19	364	223	331	200	83	3,678	560	295
Driver/Sales Workers and Truck Drivers	3,041	29	185	226	192	161	97	1,691	250	210
Laborers and Freight, Stock, and Material Movers, Hand	6,401	25	399	338	536	247	148	3,607	696	405
Pumping Station Operators	5,615	37	394	399	406	302	159	3,024	555	339
	10,052	17	515	374	665	270	191	6,118	1,251	651

**Projected Job Opportunities from Replacement in the Oil & Gas and Petrochemical Industries
by Detailed Occupation and Region, 2025-2035**

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations Managers	4,748	27	353	289	335	194	118	2,713	409	310
Managers, All Other	828	4	60	58	55	30	25	457	71	68
Accountants and Auditors	4,252	19	270	234	239	146	103	2,547	384	310
Civil Engineers	2,191	9	174	110	156	75	36	1,388	141	102
Petroleum Engineers	6,377	3	315	219	275	122	110	4,161	674	498
Environmental Scientists and Geoscientists	3,772	2	189	123	157	78	59	2,502	387	275
Geological and Petroleum Technicians	2,967	2	158	112	191	58	56	1,847	316	227
Sales Representatives, Wholesale and Manufacturing	2,149	20	147	168	142	133	67	1,174	156	142
Bookkeeping, Accounting, and Auditing Clerks	1,316	5	95	73	89	50	28	772	117	87
Secretaries and Administrative Assistants	3,303	17	235	187	220	123	76	1,938	289	218
Office Clerks, General	3,813	21	308	243	282	165	93	2,127	323	251
First-Line Supervisors of Construction Trades and Extraction Workers	3,773	11	323	191	312	109	68	2,143	367	249
Construction Laborers	8,352	57	1,132	697	790	366	175	3,989	578	568
Operating Engineers and Other Construction Equipment Operators	5,300	30	639	392	489	209	109	2,661	414	357
Electricians	1,752	16	172	147	152	87	52	872	135	119
Pipelayers, Plumbers, Pipefitters, and Derrick, Rotary Drill, and Service Unit Operators	1,826	14	247	165	170	85	45	852	118	130
Roustabouts, the Oil & Gas	39,324	22	2,083	1,064	3,084	723	616	24,726	4,582	2,424
Helpers, Extraction Workers	13,999	9	768	397	1,087	265	219	8,773	1,613	868
Industrial Machinery Installation, Repair, and Maintenance Workers	731	0	40	20	60	13	11	457	86	44
Maintenance and Repair Workers, General	6,143	70	445	552	437	336	247	3,146	453	457
Welding, Soldering, and Brazing Workers	2,753	41	230	285	210	187	113	1,327	180	180
Miscellaneous Production Workers	4,960	19	374	213	290	172	74	3,128	423	267
Driver/Sales Workers and Truck Drivers	2,646	29	190	212	169	139	89	1,439	190	189
Laborers and Freight, Stock, and Material Movers, Hand	5,537	24	412	320	473	213	135	3,067	527	366
Pumping Station Operators	4,881	37	406	377	356	262	144	2,570	421	308
	8,630	17	529	354	586	231	174	5,204	947	588

**Projected Job Opportunities from Replacement in the Oil & Gas and Petrochemical Industries
by Detailed Occupation and Region, 2015-2035**

	US	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific
General and Operations Managers	10,227	56	695	594	714	417	246	5,905	948	652
Managers, All Other	1,783	8	117	121	119	65	52	994	164	143
Accountants and Auditors	9,182	38	534	483	510	318	216	5,541	891	651
Civil Engineers	4,722	19	342	227	332	163	76	3,020	328	215
Petroleum Engineers	13,826	6	621	449	590	264	231	9,053	1,564	1,048
Environmental Scientists and Geoscientists	8,175	4	374	253	334	166	124	5,442	899	579
Geological and Petroleum Technicians	6,428	4	312	230	409	124	119	4,018	734	478
Sales Representatives, Wholesale and Manufacturing	4,623	40	291	345	302	289	141	2,554	364	297
Bookkeeping, Accounting, and Auditing Clerks	2,842	10	187	150	190	108	60	1,681	273	183
Secretaries and Administrative Assistants	7,124	34	464	386	467	266	161	4,217	671	458
Office Clerks, General	8,207	43	608	500	602	355	194	4,627	750	528
First-Line Supervisors of Construction Trades and Extraction Workers	8,140	22	636	393	667	236	143	4,666	852	525
Construction Laborers	17,836	114	2,233	1,434	1,684	789	366	8,678	1,340	1,198
Operating Engineers and Other Construction Equipment Operators	11,346	60	1,261	805	1,045	450	225	5,789	960	751
Electricians	3,751	32	338	302	324	188	108	1,896	312	251
Pipelayers, Plumbers, Pipefitters, and Derrick, Rotary Drill, and Service Unit Operators	3,891	28	488	338	361	183	96	1,851	273	273
Roustabouts, the Oil & Gas	85,309	44	4,107	2,190	6,584	1,561	1,291	53,797	10,632	5,103
Helpers, Extraction Workers	30,361	19	1,514	817	2,319	574	460	19,088	3,743	1,827
Industrial Machinery Installation, Repair, and Maintenance Workers	1,588	0	79	41	129	28	23	995	200	93
Maintenance and Repair Workers, General	13,193	140	878	1,136	933	728	518	6,847	1,050	963
Welding, Soldering, and Brazing Workers	5,897	82	454	588	447	404	239	2,887	418	378
Miscellaneous Production Workers	10,713	38	738	436	621	372	157	6,806	983	562
Driver/Sales Workers and Truck Drivers	5,687	58	375	438	361	300	186	3,130	440	399
Laborers and Freight, Stock, and Material Movers, Hand	11,938	49	811	658	1,009	460	283	6,674	1,223	771
Pumping Station Operators	10,496	74	800	776	762	564	303	5,594	976	647
	18,682	34	1,044	728	1,251	501	365	11,322	2,198	1,239

Appendix J. Projected Job Opportunities from Baseline Growth and Replacement in the Oil & Natural Gas and Petrochemical Industries by Broad Occupation and Region

Projected Job Opportunities from Baseline Growth and Replacement Demand in the Oil & Gas and Petrochemical Industries

New England

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	2,504	129	430	22%	426	17%
Management, Business and Financial	382	14	35	13%	109	29%
Professional and Related	340	16	34	15%	70	21%
Service	70	7	11	26%	19	27%
Sales and Related	105	4	12	15%	24	23%
Office & Administrative Support	213	11	31	20%	115	54%
Skilled Blue Collar	697	28	99	18%	23	3%
Semi-skilled Blue Collar	533	38	165	38%	48	9%
Unskilled Blue Collar	164	11	43	33%	18	11%
2025-2035						
Total	1,833	131	465	33%	323	18%
Management, Business and Financial	293	15	41	19%	76	26%
Professional and Related	249	17	38	22%	49	20%
Service	62	5	15	32%	16	26%
Sales and Related	97	3	14	18%	25	26%
Office & Administrative Support	164	14	36	30%	82	50%
Skilled Blue Collar	444	28	93	27%	13	3%
Semi-skilled Blue Collar	420	40	189	55%	50	12%
Unskilled Blue Collar	104	9	39	46%	12	12%
2015-2035						
Total	4,337	260	895	27%	749	17%
Management, Business and Financial	675	29	76	16%	185	27%
Professional and Related	589	33	72	18%	119	20%
Service	132	12	26	29%	35	27%
Sales and Related	202	7	26	16%	49	24%
Office & Administrative Support	377	25	67	24%	197	52%
Skilled Blue Collar	1,141	56	192	22%	36	3%
Semi-skilled Blue Collar	953	78	354	45%	98	10%
Unskilled Blue Collar	268	20	82	38%	30	11%

**Projected Job Opportunities from Baseline Growth and Replacement Demand in the
Oil & Gas and Petrochemical Industries**

Middle Atlantic

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	116,406	4,933	13,758	16%	17,179	15%
Management, Business and Financial	17,845	540	1,109	9%	5,331	30%
Professional and Related	15,650	502	992	10%	3,524	23%
Service	1,043	174	167	33%	276	26%
Sales and Related	1,946	31	151	9%	333	17%
Office & Administrative Support	8,233	428	775	15%	5,464	66%
Skilled Blue Collar	41,665	1,699	4,583	15%	1,014	2%
Semi-skilled Blue Collar	22,818	1,005	3,804	21%	907	4%
Unskilled Blue Collar	7,206	554	2,177	38%	330	5%
2025-2035						
Total	-8,466	587	4,033	-55%	-1,322	16%
Management, Business and Financial	-1,492	73	466	-36%	-363	24%
Professional and Related	-1,133	67	411	-42%	-207	18%
Service	173	43	75	68%	64	37%
Sales and Related	0	8	68	0%	22	0%
Office & Administrative Support	-625	44	261	-49%	-688	110%
Skilled Blue Collar	-2,919	306	1,261	-54%	-70	2%
Semi-skilled Blue Collar	-2,198	10	1,097	-50%	-106	5%
Unskilled Blue Collar	-272	36	394	-158%	26	-10%
2015-2035						
Total	107,940	5,520	17,791	22%	15,857	15%
Management, Business and Financial	16,353	613	1,575	13%	4,968	30%
Professional and Related	14,517	569	1,403	14%	3,317	23%
Service	1,216	217	242	38%	340	28%
Sales and Related	1,946	39	219	13%	355	18%
Office & Administrative Support	7,608	472	1,036	20%	4,776	63%
Skilled Blue Collar	38,746	2,005	5,844	20%	944	2%
Semi-skilled Blue Collar	20,620	1,015	4,901	29%	801	4%
Unskilled Blue Collar	6,934	590	2,571	46%	356	5%

**Projected Job Opportunities from Baseline Growth and Replacement Demand in the
Oil & Gas and Petrochemical Industries**

East North Central

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	81,034	3,054	5,825	11%	11,944	15%
Management, Business and Financial	11,081	301	425	7%	3,271	30%
Professional and Related	7,416	271	323	8%	1,627	22%
Service	1,259	128	100	18%	290	23%
Sales and Related	1,320	22	70	7%	240	18%
Office & Administrative Support	6,829	255	356	9%	4,531	66%
Skilled Blue Collar	29,554	963	1,773	9%	747	3%
Semi-skilled Blue Collar	18,204	750	1,910	15%	849	5%
Unskilled Blue Collar	5,371	364	868	23%	389	7%
2025-2035						
Total	10,923	1,185	3,385	42%	1,450	13%
Management, Business and Financial	1,364	108	282	29%	377	28%
Professional and Related	1,284	117	227	27%	273	21%
Service	476	63	71	28%	129	27%
Sales and Related	516	12	55	13%	118	23%
Office & Administrative Support	635	84	194	44%	111	17%
Skilled Blue Collar	2,887	385	930	46%	83	3%
Semi-skilled Blue Collar	2,131	261	1,129	65%	160	8%
Unskilled Blue Collar	1,630	155	497	40%	199	12%
2015-2035						
Total	91,957	4,239	9,210	15%	13,394	15%
Management, Business and Financial	12,445	409	707	9%	3,648	29%
Professional and Related	8,700	388	550	11%	1,900	22%
Service	1,735	191	171	21%	419	24%
Sales and Related	1,836	34	125	9%	358	19%
Office & Administrative Support	7,464	339	550	12%	4,642	62%
Skilled Blue Collar	32,441	1,348	2,703	12%	830	3%
Semi-skilled Blue Collar	20,335	1,011	3,039	20%	1,009	5%
Unskilled Blue Collar	7,001	519	1,365	27%	588	8%

**Projected Job Opportunities from Baseline Growth and Replacement Demand in the
Oil & Gas and Petrochemical Industries**

West North Central

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	66,414	2,347	7,855	15%	9,044	14%
Management, Business and Financial	8,888	250	522	9%	2,715	31%
Professional and Related	7,156	254	462	10%	1,611	23%
Service	579	50	56	18%	134	23%
Sales and Related	1,330	28	90	9%	250	19%
Office & Administrative Support	4,588	190	358	12%	2,983	65%
Skilled Blue Collar	24,535	683	2,734	14%	607	2%
Semi-skilled Blue Collar	15,615	687	2,901	23%	536	3%
Unskilled Blue Collar	3,723	205	732	25%	208	6%
2025-2035						
Total	29,292	1,837	5,196	24%	3,823	13%
Management, Business and Financial	4,005	193	362	14%	1,115	28%
Professional and Related	3,729	226	362	16%	753	20%
Service	372	38	51	24%	99	27%
Sales and Related	722	28	62	12%	142	20%
Office & Administrative Support	1,880	154	206	19%	1,049	56%
Skilled Blue Collar	10,177	528	1,618	21%	261	3%
Semi-skilled Blue Collar	6,028	499	1,894	40%	256	4%
Unskilled Blue Collar	2,379	171	641	34%	148	6%
2015-2035						
Total	95,706	4,184	13,051	18%	12,867	13%
Management, Business and Financial	12,893	443	884	10%	3,830	30%
Professional and Related	10,885	480	824	12%	2,364	22%
Service	951	88	107	21%	233	25%
Sales and Related	2,052	56	152	10%	392	19%
Office & Administrative Support	6,468	344	564	14%	4,032	62%
Skilled Blue Collar	34,712	1,211	4,352	16%	868	3%
Semi-skilled Blue Collar	21,643	1,186	4,795	28%	792	4%
Unskilled Blue Collar	6,102	376	1,373	29%	356	6%

**Projected Job Opportunities from Baseline Growth and Replacement Demand in the
Oil & Gas and Petrochemical Industries**

South Atlantic

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	25,899	3,272	4,331	29%	4,048	16%
Management, Business and Financial	3,921	352	440	20%	1,213	31%
Professional and Related	3,217	340	332	21%	728	23%
Service	478	126	72	41%	115	24%
Sales and Related	730	36	85	17%	162	22%
Office & Administrative Support	1,896	267	258	28%	1,122	59%
Skilled Blue Collar	8,928	948	1,366	26%	246	3%
Semi-skilled Blue Collar	5,290	901	1,273	41%	306	6%
Unskilled Blue Collar	1,439	302	505	56%	156	11%
2025-2035						
Total	5,649	1,036	2,252	58%	1,015	18%
Management, Business and Financial	891	120	283	45%	252	28%
Professional and Related	893	166	227	44%	203	23%
Service	266	77	62	52%	62	23%
Sales and Related	349	21	60	23%	96	28%
Office & Administrative Support	433	48	141	44%	184	42%
Skilled Blue Collar	1,626	268	790	65%	51	3%
Semi-skilled Blue Collar	796	257	513	97%	87	11%
Unskilled Blue Collar	395	79	176	65%	80	20%
2015-2035						
Total	31,548	4,308	6,583	35%	5,063	16%
Management, Business and Financial	4,812	472	723	25%	1,465	30%
Professional and Related	4,110	506	559	26%	931	23%
Service	744	203	134	45%	177	24%
Sales and Related	1,079	57	145	19%	258	24%
Office & Administrative Support	2,329	315	399	31%	1,306	56%
Skilled Blue Collar	10,554	1,216	2,156	32%	297	3%
Semi-skilled Blue Collar	6,086	1,158	1,786	48%	393	6%
Unskilled Blue Collar	1,834	381	681	58%	236	13%

**Projected Job Opportunities from Baseline Growth and Replacement Demand in the
Oil & Gas and Petrochemical Industries**

East South Central

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	18,938	2,962	1,362	23%	2,468	13%
Management, Business and Financial	2,091	250	80	16%	663	32%
Professional and Related	1,822	247	68	17%	423	23%
Service	435	185	24	48%	79	18%
Sales and Related	336	17	11	8%	64	19%
Office & Administrative Support	1,115	158	44	18%	675	61%
Skilled Blue Collar	7,664	1,044	507	20%	228	3%
Semi-skilled Blue Collar	4,240	811	418	29%	214	5%
Unskilled Blue Collar	1,235	250	210	37%	122	10%
2025-2035						
Total	10,111	1,711	1,391	31%	1,365	14%
Management, Business and Financial	1,142	137	89	20%	324	28%
Professional and Related	1,107	165	81	22%	238	21%
Service	274	96	24	44%	60	22%
Sales and Related	192	11	10	11%	40	21%
Office & Administrative Support	632	88	40	20%	339	54%
Skilled Blue Collar	3,486	539	507	30%	107	3%
Semi-skilled Blue Collar	2,400	501	419	38%	159	7%
Unskilled Blue Collar	878	174	221	45%	98	11%
2015-2035						
Total	29,049	4,673	2,753	26%	3,833	13%
Management, Business and Financial	3,233	387	169	17%	987	31%
Professional and Related	2,929	412	149	19%	661	23%
Service	709	281	48	46%	139	20%
Sales and Related	528	28	21	9%	104	20%
Office & Administrative Support	1,747	246	84	19%	1,014	58%
Skilled Blue Collar	11,150	1,583	1,014	23%	335	3%
Semi-skilled Blue Collar	6,640	1,312	837	32%	373	6%
Unskilled Blue Collar	2,113	424	431	40%	220	10%

**Projected Job Opportunities from Baseline Growth and Replacement Demand in the
Oil & Gas and Petrochemical Industries**

West South Central

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	434,795	43,817	161,426	47%	82,347	19%
Management, Business and Financial	85,869	7,437	18,044	30%	28,726	33%
Professional and Related	81,366	7,289	18,753	32%	18,919	23%
Service	5,492	1,585	1,959	65%	1,172	21%
Sales and Related	9,986	385	2,674	31%	1,813	18%
Office & Administrative Support	39,769	3,932	11,430	39%	25,134	63%
Skilled Blue Collar	123,200	11,336	55,458	54%	2,967	2%
Semi-skilled Blue Collar	76,514	10,171	44,119	71%	2,787	4%
Unskilled Blue Collar	12,599	1,682	8,989	85%	829	7%
2025-2035						
Total	174,863	20,284	100,984	69%	28,181	16%
Management, Business and Financial	29,920	2,970	11,950	50%	8,776	29%
Professional and Related	30,495	3,286	12,611	52%	6,594	22%
Service	2,868	751	1,297	71%	715	25%
Sales and Related	5,417	197	1,810	37%	1,021	19%
Office & Administrative Support	14,395	1,703	6,740	59%	7,822	54%
Skilled Blue Collar	49,772	5,707	32,723	77%	1,171	2%
Semi-skilled Blue Collar	33,520	4,568	27,002	94%	1,473	4%
Unskilled Blue Collar	8,476	1,102	6,851	94%	609	7%
2015-2035						
Total	609,658	64,101	262,410	54%	110,528	18%
Management, Business and Financial	115,789	10,407	29,994	35%	37,502	32%
Professional and Related	111,861	10,575	31,364	37%	25,513	23%
Service	8,360	2,336	3,256	67%	1,887	23%
Sales and Related	15,403	582	4,484	33%	2,834	18%
Office & Administrative Support	54,164	5,635	18,170	44%	32,956	61%
Skilled Blue Collar	172,972	17,043	88,181	61%	4,138	2%
Semi-skilled Blue Collar	110,034	14,739	71,121	78%	4,260	4%
Unskilled Blue Collar	21,075	2,784	15,840	88%	1,438	7%

**Projected Job Opportunities from Baseline Growth and Replacement Demand in the
Oil & Gas and Petrochemical Industries**

Mountain

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	-3,437	320	2,065	-69%	-700	20%
Management, Business and Financial	-1,394	44	238	-20%	-151	11%
Professional and Related	-680	43	234	-41%	-64	9%
Service	100	5	36	41%	32	32%
Sales and Related	-34	9	38	-138%	22	-65%
Office & Administrative Support	-336	35	147	-54%	-462	138%
Skilled Blue Collar	-563	107	814	-164%	-32	6%
Semi-skilled Blue Collar	-780	58	374	-55%	-82	11%
Unskilled Blue Collar	250	19	184	81%	37	15%
2025-2035						
Total	45,380	1,194	12,301	30%	6,791	15%
Management, Business and Financial	7,783	192	1,182	18%	2,299	30%
Professional and Related	6,561	169	1,120	20%	1,429	22%
Service	290	17	76	32%	65	22%
Sales and Related	1,494	21	215	16%	240	16%
Office & Administrative Support	3,109	107	628	24%	2,014	65%
Skilled Blue Collar	15,900	381	4,756	32%	378	2%
Semi-skilled Blue Collar	8,570	251	3,533	44%	295	3%
Unskilled Blue Collar	1,673	56	791	51%	71	4%
2015-2035						
Total	41,943	1,514	14,366	38%	6,091	15%
Management, Business and Financial	6,389	236	1,420	26%	2,148	34%
Professional and Related	5,881	212	1,354	27%	1,365	23%
Service	390	22	112	34%	97	25%
Sales and Related	1,460	30	253	19%	262	18%
Office & Administrative Support	2,773	142	775	33%	1,552	56%
Skilled Blue Collar	15,337	488	5,570	39%	346	2%
Semi-skilled Blue Collar	7,790	309	3,907	54%	213	3%
Unskilled Blue Collar	1,923	75	975	55%	108	6%

**Projected Job Opportunities from Baseline Growth and Replacement Demand in the
Oil & Gas and Petrochemical Industries**

Pacific

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	60,863	2,590	22,711	42%	8,914	15%
Management, Business and Financial	9,787	321	1,819	22%	2,914	30%
Professional and Related	8,864	341	1,851	25%	1,915	22%
Service	1,123	152	375	47%	251	22%
Sales and Related	822	7	190	24%	145	18%
Office & Administrative Support	4,191	172	1,150	32%	2,698	64%
Skilled Blue Collar	20,611	846	8,112	43%	435	2%
Semi-skilled Blue Collar	11,203	504	6,408	62%	380	3%
Unskilled Blue Collar	4,262	247	2,806	72%	176	4%
2025-2035						
Total	1,106	2	1,464	133%	613	55%
Management, Business and Financial	200	-26	321	148%	132	66%
Professional and Related	694	13	433	64%	223	32%
Service	198	25	24	25%	60	30%
Sales and Related	423	-2	117	27%	82	19%
Office & Administrative Support	78	9	128	176%	-102	-131%
Skilled Blue Collar	-657	19	-108	14%	30	-5%
Semi-skilled Blue Collar	161	-18	427	254%	133	83%
Unskilled Blue Collar	9	-18	122	1156%	55	611%
2015-2035						
Total	61,969	2,592	24,175	43%	9,527	15%
Management, Business and Financial	9,987	295	2,140	24%	3,046	30%
Professional and Related	9,558	354	2,284	28%	2,138	22%
Service	1,321	177	399	44%	311	24%
Sales and Related	1,245	5	307	25%	227	18%
Office & Administrative Support	4,269	181	1,278	34%	2,596	61%
Skilled Blue Collar	19,954	865	8,004	44%	465	2%
Semi-skilled Blue Collar	11,364	486	6,835	64%	513	5%
Unskilled Blue Collar	4,271	229	2,928	74%	231	5%

Appendix K. Projected Employment in Oil & Natural Gas Industry Operations and Investment: Pro-Development Scenario

Employment in Oil & Gas Industry Operations and Investment Pro-Development Scenario: New England

	Total	African American	Hispanic	Minority Share	Female	Female Share
2020						
Total	2,440	52	219	11%	333	14%
Management, Business and Financial	291	3	9	4%	60	21%
Professional and Related	344	6	19	7%	50	15%
Service	58	3	4	12%	14	24%
Sales and Related	60	1	3	7%	18	30%
Office & Administrative Support	203	6	13	9%	133	66%
Skilled Blue Collar	929	20	67	9%	28	3%
Semi-skilled Blue Collar	370	9	44	14%	22	6%
Unskilled Blue Collar	185	4	60	35%	8	4%
2025						
Total	2,820	70	292	13%	387	14%
Management, Business and Financial	334	5	13	5%	73	22%
Professional and Related	398	8	26	9%	60	15%
Service	67	4	6	15%	17	25%
Sales and Related	70	1	4	7%	21	30%
Office & Administrative Support	233	8	16	10%	149	64%
Skilled Blue Collar	1,079	26	88	11%	33	3%
Semi-skilled Blue Collar	426	12	61	17%	25	6%
Unskilled Blue Collar	213	6	78	39%	9	4%
2030						
Total	3,130	84	373	15%	425	14%
Management, Business and Financial	373	6	17	6%	81	22%
Professional and Related	442	10	36	10%	65	15%
Service	72	5	9	19%	18	25%
Sales and Related	76	1	5	8%	23	30%
Office & Administrative Support	254	8	20	11%	163	64%
Skilled Blue Collar	1,204	33	110	12%	38	3%
Semi-skilled Blue Collar	473	14	77	19%	28	6%
Unskilled Blue Collar	236	7	99	45%	9	4%
2035						
Total	3,210	103	431	17%	433	13%
Management, Business and Financial	383	7	20	7%	82	21%
Professional and Related	450	12	42	12%	68	15%
Service	75	6	11	23%	20	27%
Sales and Related	79	2	7	11%	24	30%
Office & Administrative Support	257	10	24	13%	163	63%
Skilled Blue Collar	1,239	39	127	13%	40	3%
Semi-skilled Blue Collar	486	17	90	22%	26	5%
Unskilled Blue Collar	241	10	110	50%	10	4%

**Employment in Oil & Gas Industry Operations and Investment
Pro-Development Scenario: Middle Atlantic**

	Total	African American	Hispanic	Minority Share	Female	Female Share
2020						
Total	152,290	6,608	15,013	14%	21,145	14%
Management, Business and Financial	22,985	591	1,067	7%	5,924	26%
Professional and Related	19,296	524	751	7%	4,118	21%
Service	1,440	255	210	32%	357	25%
Sales and Related	2,160	39	98	6%	364	17%
Office & Administrative Support	10,907	549	695	11%	7,612	70%
Skilled Blue Collar	54,625	2,303	4,677	13%	1,196	2%
Semi-skilled Blue Collar	29,153	1,371	3,906	18%	1,197	4%
Unskilled Blue Collar	11,724	976	3,609	39%	377	3%
2025						
Total	152,980	6,969	16,846	16%	21,519	14%
Management, Business and Financial	22,999	636	1,263	8%	6,215	27%
Professional and Related	19,545	564	943	8%	4,298	22%
Service	1,474	271	234	34%	378	26%
Sales and Related	2,188	42	126	8%	368	17%
Office & Administrative Support	10,911	591	826	13%	7,472	68%
Skilled Blue Collar	55,326	2,492	5,353	14%	1,234	2%
Semi-skilled Blue Collar	29,669	1,435	4,512	20%	1,170	4%
Unskilled Blue Collar	10,868	938	3,589	42%	384	4%
2030						
Total	153,900	7,239	19,563	17%	21,511	14%
Management, Business and Financial	23,027	669	1,529	10%	6,273	27%
Professional and Related	19,806	597	1,186	9%	4,371	22%
Service	1,504	277	270	36%	388	26%
Sales and Related	2,206	43	159	9%	374	17%
Office & Administrative Support	10,864	609	978	15%	7,327	67%
Skilled Blue Collar	55,947	2,663	6,277	16%	1,253	2%
Semi-skilled Blue Collar	29,897	1,449	5,318	23%	1,139	4%
Unskilled Blue Collar	10,649	932	3,846	45%	386	4%
2035						
Total	164,720	8,221	25,183	20%	22,328	14%
Management, Business and Financial	24,529	772	2,008	11%	6,467	26%
Professional and Related	21,172	709	1,524	11%	4,604	22%
Service	1,601	289	345	40%	404	25%
Sales and Related	2,294	52	195	11%	395	17%
Office & Administrative Support	11,345	645	1,177	16%	7,596	67%
Skilled Blue Collar	59,998	3,106	8,019	19%	1,296	2%
Semi-skilled Blue Collar	31,012	1,517	6,688	26%	1,136	4%
Unskilled Blue Collar	12,769	1,131	5,227	50%	430	3%

**Employment in Oil & Gas Industry Operations and Investment
Pro-Development Scenario: East North Central**

	Total	African American	Hispanic	Minority Share	Female	Female Share
2020						
Total	90,990	3,698	5,253	10%	12,494	14%
Management, Business and Financial	12,525	332	349	5%	3,251	26%
Professional and Related	8,390	293	269	7%	1,697	20%
Service	1,258	157	76	19%	284	23%
Sales and Related	1,043	14	25	4%	146	14%
Office & Administrative Support	7,412	333	310	9%	5,153	70%
Skilled Blue Collar	34,080	1,215	1,737	9%	829	2%
Semi-skilled Blue Collar	19,296	838	1,489	12%	832	4%
Unskilled Blue Collar	6,986	516	998	22%	302	4%
2025						
Total	106,700	4,433	7,151	11%	14,583	14%
Management, Business and Financial	14,572	402	487	6%	3,885	27%
Professional and Related	9,783	351	367	7%	2,029	21%
Service	1,480	183	103	19%	335	23%
Sales and Related	1,206	18	35	4%	172	14%
Office & Administrative Support	8,598	391	424	9%	5,901	69%
Skilled Blue Collar	40,385	1,503	2,374	10%	970	2%
Semi-skilled Blue Collar	22,608	987	2,067	14%	922	4%
Unskilled Blue Collar	8,068	598	1,294	23%	369	5%
2030						
Total	111,590	4,848	8,563	12%	15,062	13%
Management, Business and Financial	15,167	442	598	7%	4,048	27%
Professional and Related	10,304	391	451	8%	2,137	21%
Service	1,569	194	126	20%	358	23%
Sales and Related	1,256	19	44	5%	181	14%
Office & Administrative Support	8,873	420	503	10%	5,996	68%
Skilled Blue Collar	42,439	1,682	2,847	11%	1,019	2%
Semi-skilled Blue Collar	23,545	1,062	2,504	15%	930	4%
Unskilled Blue Collar	8,437	638	1,490	25%	393	5%
2035						
Total	126,800	5,426	10,679	13%	16,717	13%
Management, Business and Financial	17,229	502	760	7%	4,523	26%
Professional and Related	11,748	440	565	9%	2,420	21%
Service	1,737	205	151	20%	391	23%
Sales and Related	1,446	20	54	5%	207	14%
Office & Administrative Support	9,810	448	607	11%	6,591	67%
Skilled Blue Collar	48,685	1,951	3,571	11%	1,151	2%
Semi-skilled Blue Collar	26,392	1,143	3,134	16%	988	4%
Unskilled Blue Collar	9,753	717	1,837	26%	446	5%

**Employment in Oil & Gas Industry Operations and Investment
Pro-Development Scenario: West North Central**

	Total	African American	Hispanic	Minority Share	Female	Female Share
2020						
Total	125,660	2,673	11,601	11%	16,238	13%
Management, Business and Financial	17,123	256	661	5%	4,351	25%
Professional and Related	13,532	254	528	6%	2,725	20%
Service	829	47	48	11%	186	22%
Sales and Related	1,955	12	87	5%	311	16%
Office & Administrative Support	8,602	191	544	9%	6,249	73%
Skilled Blue Collar	46,398	846	4,048	11%	1,046	2%
Semi-skilled Blue Collar	29,661	804	4,535	18%	1,138	4%
Unskilled Blue Collar	7,560	263	1,150	19%	232	3%
2025						
Total	141,540	3,481	14,954	13%	18,153	13%
Management, Business and Financial	19,134	330	848	6%	4,935	26%
Professional and Related	15,342	341	684	7%	3,156	21%
Service	929	58	64	13%	209	22%
Sales and Related	2,187	20	107	6%	351	16%
Office & Administrative Support	9,566	255	689	10%	6,903	72%
Skilled Blue Collar	52,785	1,101	5,118	12%	1,168	2%
Semi-skilled Blue Collar	33,172	1,052	5,949	21%	1,174	4%
Unskilled Blue Collar	8,425	324	1,495	22%	257	3%
2030						
Total	152,440	4,177	18,027	15%	19,169	13%
Management, Business and Financial	20,537	392	1,014	7%	5,190	25%
Professional and Related	16,738	422	824	7%	3,412	20%
Service	1,006	66	81	15%	230	23%
Sales and Related	2,344	27	120	6%	374	16%
Office & Administrative Support	10,142	307	813	11%	7,263	72%
Skilled Blue Collar	57,142	1,330	6,042	13%	1,238	2%
Semi-skilled Blue Collar	35,169	1,253	7,253	24%	1,181	3%
Unskilled Blue Collar	9,362	380	1,880	24%	281	3%
2035						
Total	153,780	4,676	19,807	16%	19,080	12%
Management, Business and Financial	20,673	439	1,122	8%	5,192	25%
Professional and Related	17,008	481	925	8%	3,455	20%
Service	1,034	70	92	16%	236	23%
Sales and Related	2,362	32	130	7%	379	16%
Office & Administrative Support	10,083	344	874	12%	7,125	71%
Skilled Blue Collar	57,828	1,500	6,565	14%	1,252	2%
Semi-skilled Blue Collar	35,212	1,391	7,999	27%	1,146	3%
Unskilled Blue Collar	9,580	419	2,100	26%	295	3%

**Employment in Oil & Gas Industry Operations and Investment
Pro-Development Scenario: South Atlantic**

	Total	African American	Hispanic	Minority Share	Female	Female Share
2020						
Total	52,110	5,064	5,927	21%	7,377	14%
Management, Business and Financial	8,029	520	513	13%	2,185	27%
Professional and Related	5,660	415	306	13%	1,188	21%
Service	676	149	62	31%	140	21%
Sales and Related	833	38	51	11%	171	21%
Office & Administrative Support	3,814	477	283	20%	2,520	66%
Skilled Blue Collar	19,529	1,692	2,016	19%	463	2%
Semi-skilled Blue Collar	10,437	1,274	1,754	29%	542	5%
Unskilled Blue Collar	3,132	499	942	46%	168	5%
2025						
Total	59,470	5,795	7,231	22%	8,447	14%
Management, Business and Financial	8,964	600	633	14%	2,558	29%
Professional and Related	6,612	479	405	13%	1,448	22%
Service	762	175	78	33%	164	22%
Sales and Related	957	45	70	12%	196	20%
Office & Administrative Support	4,257	529	352	21%	2,785	65%
Skilled Blue Collar	22,959	1,989	2,595	20%	554	2%
Semi-skilled Blue Collar	11,739	1,444	2,079	30%	560	5%
Unskilled Blue Collar	3,220	534	1,019	48%	182	6%
2030						
Total	114,160	8,793	13,669	20%	16,030	14%
Management, Business and Financial	16,359	947	1,240	13%	4,855	30%
Professional and Related	13,915	843	904	13%	3,209	23%
Service	1,390	271	144	30%	261	19%
Sales and Related	1,696	58	134	11%	313	18%
Office & Administrative Support	7,648	699	622	17%	5,148	67%
Skilled Blue Collar	47,442	3,261	5,527	19%	1,191	3%
Semi-skilled Blue Collar	21,231	2,016	3,633	27%	835	4%
Unskilled Blue Collar	4,479	698	1,465	48%	218	5%
2035						
Total	138,810	10,672	18,749	21%	19,260	14%
Management, Business and Financial	19,815	1,151	1,786	15%	5,872	30%
Professional and Related	17,046	1,062	1,283	14%	3,944	23%
Service	1,716	316	199	30%	310	18%
Sales and Related	1,999	71	179	13%	365	18%
Office & Administrative Support	9,156	814	817	18%	6,115	67%
Skilled Blue Collar	58,185	4,083	7,707	20%	1,439	2%
Semi-skilled Blue Collar	25,475	2,350	4,820	28%	954	4%
Unskilled Blue Collar	5,418	825	1,958	51%	261	5%

**Employment in Oil & Gas Industry Operations and Investment
Pro-Development Scenario: East South Central**

	Total	African American	Hispanic	Minority Share	Female	Female Share
2020						
Total	31,040	4,312	1,273	18%	3,679	12%
Management, Business and Financial	3,462	320	63	11%	966	28%
Professional and Related	3,061	343	60	13%	630	21%
Service	566	257	15	48%	92	16%
Sales and Related	462	22	8	6%	73	16%
Office & Administrative Support	1,822	229	45	15%	1,157	64%
Skilled Blue Collar	12,905	1,694	465	17%	366	3%
Semi-skilled Blue Collar	6,644	1,072	349	21%	277	4%
Unskilled Blue Collar	2,118	375	268	30%	118	6%
2025						
Total	38,300	5,532	1,952	20%	4,452	12%
Management, Business and Financial	4,222	403	98	12%	1,202	28%
Professional and Related	3,732	438	92	14%	780	21%
Service	690	320	25	50%	110	16%
Sales and Related	563	25	13	7%	87	15%
Office & Administrative Support	2,203	274	61	15%	1,376	62%
Skilled Blue Collar	16,263	2,258	743	18%	444	3%
Semi-skilled Blue Collar	8,132	1,362	521	23%	310	4%
Unskilled Blue Collar	2,495	452	399	34%	143	6%
2030						
Total	44,380	6,599	2,731	21%	5,005	11%
Management, Business and Financial	4,858	463	140	12%	1,363	28%
Professional and Related	4,305	520	131	15%	888	21%
Service	779	361	36	51%	124	16%
Sales and Related	635	28	16	7%	99	16%
Office & Administrative Support	2,507	305	74	15%	1,538	61%
Skilled Blue Collar	19,130	2,809	1,062	20%	505	3%
Semi-skilled Blue Collar	9,357	1,602	716	25%	323	3%
Unskilled Blue Collar	2,809	511	556	38%	165	6%
2035						
Total	45,410	6,873	3,261	22%	5,103	11%
Management, Business and Financial	4,977	488	173	13%	1,399	28%
Professional and Related	4,440	549	161	16%	919	21%
Service	806	373	44	52%	128	16%
Sales and Related	651	31	21	8%	100	15%
Office & Administrative Support	2,541	316	85	16%	1,538	61%
Skilled Blue Collar	19,540	2,922	1,283	22%	519	3%
Semi-skilled Blue Collar	9,537	1,659	851	26%	325	3%
Unskilled Blue Collar	2,918	535	643	40%	175	6%

**Employment in Oil & Gas Industry Operations and Investment
Pro-Development Scenario: West South Central**

	Total	African American	Hispanic	Minority Share	Female	Female Share
2020						
Total	1,116,370	88,197	313,775	36%	201,163	18%
Management, Business and Financial	215,373	14,307	27,391	19%	66,048	31%
Professional and Related	195,876	13,401	29,821	22%	41,410	21%
Service	10,861	2,511	3,330	54%	2,352	22%
Sales and Related	23,625	612	3,807	19%	4,072	17%
Office & Administrative Support	103,393	8,490	20,086	28%	69,489	67%
Skilled Blue Collar	310,618	23,694	106,836	42%	7,692	2%
Semi-skilled Blue Collar	214,373	21,156	96,253	55%	8,312	4%
Unskilled Blue Collar	42,251	4,026	26,251	72%	1,788	4%
2025						
Total	1,189,970	98,160	368,222	39%	216,043	18%
Management, Business and Financial	230,543	16,110	33,896	22%	72,751	32%
Professional and Related	210,333	15,067	36,746	25%	45,784	22%
Service	11,653	2,767	3,910	57%	2,567	22%
Sales and Related	24,895	700	4,596	21%	4,370	18%
Office & Administrative Support	109,268	9,304	23,808	30%	72,371	66%
Skilled Blue Collar	333,161	26,678	125,814	46%	8,047	2%
Semi-skilled Blue Collar	226,040	23,190	110,168	59%	8,222	4%
Unskilled Blue Collar	44,077	4,344	29,284	76%	1,931	4%
2030						
Total	1,195,700	101,755	405,468	42%	213,603	18%
Management, Business and Financial	229,711	16,491	38,367	24%	72,209	31%
Professional and Related	210,304	15,600	41,521	27%	45,804	22%
Service	11,818	2,809	4,322	60%	2,699	23%
Sales and Related	24,916	739	5,094	23%	4,457	18%
Office & Administrative Support	108,415	9,490	26,223	33%	70,510	65%
Skilled Blue Collar	337,167	28,180	138,463	49%	7,948	2%
Semi-skilled Blue Collar	228,219	23,914	119,692	63%	7,951	3%
Unskilled Blue Collar	45,150	4,532	31,786	80%	2,025	4%
2035						
Total	1,218,440	105,761	444,542	45%	213,320	18%
Management, Business and Financial	231,576	17,067	42,636	26%	72,178	31%
Professional and Related	214,576	16,477	46,540	29%	46,312	22%
Service	12,030	2,838	4,726	63%	2,736	23%
Sales and Related	25,583	791	5,588	25%	4,571	18%
Office & Administrative Support	108,761	9,676	28,260	35%	69,703	64%
Skilled Blue Collar	345,812	29,695	152,008	53%	7,992	2%
Semi-skilled Blue Collar	233,717	24,523	130,681	66%	7,767	3%
Unskilled Blue Collar	46,385	4,694	34,103	84%	2,061	4%

**Employment in Oil & Gas Industry Operations and Investment
Pro-Development Scenario: Mountain**

	Total	African American	Hispanic	Minority Share	Female	Female Share
2020						
Total	223,170	3,317	49,512	24%	32,835	15%
Management, Business and Financial	38,466	460	4,098	12%	10,117	26%
Professional and Related	32,520	485	3,809	13%	6,653	20%
Service	1,199	53	284	28%	295	25%
Sales and Related	4,837	20	506	11%	693	14%
Office & Administrative Support	15,718	238	2,377	17%	11,272	72%
Skilled Blue Collar	77,564	1,133	19,428	27%	1,805	2%
Semi-skilled Blue Collar	43,456	760	14,478	35%	1,604	4%
Unskilled Blue Collar	9,410	168	4,532	50%	396	4%
2025						
Total	253,830	4,201	61,042	26%	37,194	15%
Management, Business and Financial	43,419	588	5,146	13%	11,646	27%
Professional and Related	37,198	625	4,848	15%	7,709	21%
Service	1,373	62	352	30%	342	25%
Sales and Related	5,420	31	628	12%	780	14%
Office & Administrative Support	17,632	306	2,901	18%	12,495	71%
Skilled Blue Collar	88,688	1,443	23,991	29%	2,025	2%
Semi-skilled Blue Collar	49,278	940	17,674	38%	1,724	3%
Unskilled Blue Collar	10,822	206	5,502	53%	473	4%
2030						
Total	280,650	5,083	71,813	27%	40,486	14%
Management, Business and Financial	47,601	713	6,131	14%	12,677	27%
Professional and Related	41,379	767	5,871	16%	8,526	21%
Service	1,531	72	414	32%	387	25%
Sales and Related	5,906	44	731	13%	856	14%
Office & Administrative Support	19,206	370	3,352	19%	13,469	70%
Skilled Blue Collar	98,523	1,763	28,267	30%	2,227	2%
Semi-skilled Blue Collar	54,278	1,110	20,598	40%	1,816	3%
Unskilled Blue Collar	12,226	244	6,449	55%	528	4%
2035						
Total	296,060	5,882	78,861	29%	42,090	14%
Management, Business and Financial	49,968	830	6,841	15%	13,251	27%
Professional and Related	43,547	890	6,595	17%	8,946	21%
Service	1,620	79	452	33%	412	25%
Sales and Related	6,413	58	830	14%	931	15%
Office & Administrative Support	19,895	429	3,618	20%	13,774	69%
Skilled Blue Collar	104,238	2,054	31,012	32%	2,337	2%
Semi-skilled Blue Collar	57,334	1,263	22,517	41%	1,875	3%
Unskilled Blue Collar	13,045	279	6,996	56%	564	4%

**Employment in Oil & Gas Industry Operations and Investment
Pro-Development Scenario: Pacific**

	Total	African American	Hispanic	Minority Share	Female	Female Share
2020						
Total	116,250	5,245	35,391	35%	17,025	15%
Management, Business and Financial	19,983	594	2,999	18%	5,422	27%
Professional and Related	16,752	597	2,796	20%	3,462	21%
Service	1,945	314	459	40%	409	21%
Sales and Related	1,197	14	225	20%	202	17%
Office & Administrative Support	8,236	330	1,909	27%	5,549	67%
Skilled Blue Collar	38,750	1,509	12,172	35%	952	2%
Semi-skilled Blue Collar	21,792	956	10,555	53%	800	4%
Unskilled Blue Collar	7,595	931	4,276	69%	229	3%
2025						
Total	228,180	9,741	76,351	38%	31,783	14%
Management, Business and Financial	38,030	1,030	6,328	19%	10,116	27%
Professional and Related	32,455	1,053	5,980	22%	6,605	20%
Service	3,650	586	909	41%	773	21%
Sales and Related	2,109	27	457	23%	382	18%
Office & Administrative Support	15,764	465	4,088	29%	10,610	67%
Skilled Blue Collar	77,998	2,782	26,276	37%	1,738	2%
Semi-skilled Blue Collar	42,245	1,424	23,106	58%	1,180	3%
Unskilled Blue Collar	15,929	2,374	9,207	73%	379	2%
2030						
Total	314,740	12,912	108,180	38%	45,091	14%
Management, Business and Financial	53,547	1,460	9,476	20%	14,734	28%
Professional and Related	46,904	1,467	9,263	23%	9,881	21%
Service	5,277	815	1,345	41%	1,115	21%
Sales and Related	2,732	30	626	24%	490	18%
Office & Administrative Support	21,564	622	5,760	30%	14,452	67%
Skilled Blue Collar	108,132	3,771	38,024	39%	2,425	2%
Semi-skilled Blue Collar	56,865	1,906	31,941	60%	1,530	3%
Unskilled Blue Collar	19,719	2,841	11,745	74%	464	2%
2035						
Total	313,060	12,598	108,375	39%	46,459	15%
Management, Business and Financial	54,524	1,533	10,056	21%	15,541	29%
Professional and Related	48,883	1,523	10,149	24%	10,652	22%
Service	5,546	833	1,429	41%	1,164	21%
Sales and Related	2,689	26	629	24%	465	17%
Office & Administrative Support	21,297	654	5,718	30%	14,169	67%
Skilled Blue Collar	107,257	3,766	38,696	40%	2,471	2%
Semi-skilled Blue Collar	55,464	1,970	31,092	60%	1,551	3%
Unskilled Blue Collar	17,400	2,293	10,606	74%	446	3%

Appendix L. Projected Employment Opportunities in the Oil & Natural Gas and Petrochemical Industries (Combining Pro-Development Policy with Baseline Growth and Replacement, Including Investment)

Projected Employment Opportunities in the Oil & Gas and Petrochemical Industries, 2015-2035 (Combining Pro-Development Policy with Baseline Growth and Replacement, Including Investment)

New England

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	1,632	94	322	25%	301	18%
Management, Business and Financial	232	11	24	15%	62	27%
Professional and Related	240	12	31	18%	40	17%
Service	67	6	10	24%	18	27%
Sales and Related	97	4	11	15%	25	26%
Office & Administrative Support	161	10	23	20%	88	55%
Skilled Blue Collar	430	18	44	14%	24	6%
Semi-skilled Blue Collar	330	28	119	45%	34	10%
Unskilled Blue Collar	75	5	60	87%	10	13%
2015-2035						
Total	3,879	227	818	27%	685	18%
Management, Business and Financial	586	25	64	15%	150	26%
Professional and Related	543	29	75	19%	97	18%
Service	133	12	26	29%	35	26%
Sales and Related	199	7	25	16%	49	25%
Office & Administrative Support	354	22	59	23%	193	55%
Skilled Blue Collar	1,016	48	142	19%	46	5%
Semi-skilled Blue Collar	831	69	309	45%	90	11%
Unskilled Blue Collar	217	15	118	61%	25	12%

**Projected Employment Opportunities in the Oil & Gas and Petrochemical Industries, 2015-2035
(Combining Pro-Development Policy with Baseline Growth and Replacement, Including Investment)**

Middle Atlantic

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	99,891	4,289	11,560	16%	14,503	15%
Management, Business and Financial	15,274	397	996	9%	4,207	28%
Professional and Related	13,319	361	690	8%	3,072	23%
Service	945	158	177	35%	228	24%
Sales and Related	1,682	34	120	9%	294	17%
Office & Administrative Support	7,118	336	578	13%	4,848	68%
Skilled Blue Collar	35,810	1,574	3,286	14%	799	2%
Semi-skilled Blue Collar	19,544	842	3,342	21%	811	4%
Unskilled Blue Collar	6,199	587	2,371	48%	244	4%
2015-2035						
Total	131,648	6,642	22,407	22%	18,386	14%
Management, Business and Financial	19,819	643	1,946	13%	5,315	27%
Professional and Related	17,443	612	1,443	12%	3,891	22%
Service	1,416	234	332	40%	348	25%
Sales and Related	2,298	54	231	12%	419	18%
Office & Administrative Support	9,152	494	1,085	17%	5,987	65%
Skilled Blue Collar	46,727	2,497	6,623	20%	1,020	2%
Semi-skilled Blue Collar	24,673	1,172	6,245	30%	1,009	4%
Unskilled Blue Collar	10,120	936	4,502	54%	397	4%

**Projected Employment Opportunities in the Oil & Gas and Petrochemical Industries, 2015-2035
(Combining Pro-Development Policy with Baseline Growth and Replacement, Including Investment)**

East North Central

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	76,536	3,056	5,646	11%	11,088	14%
Management, Business and Financial	10,473	278	415	7%	2,846	27%
Professional and Related	7,166	249	297	8%	1,511	21%
Service	1,230	125	93	18%	258	21%
Sales and Related	1,279	19	58	6%	196	15%
Office & Administrative Support	6,329	249	354	10%	4,309	68%
Skilled Blue Collar	27,572	983	1,558	9%	711	3%
Semi-skilled Blue Collar	16,931	734	1,892	16%	856	5%
Unskilled Blue Collar	5,556	419	979	25%	401	7%
2015-2035						
Total	112,529	4,930	10,792	14%	15,781	14%
Management, Business and Financial	15,357	458	818	8%	4,116	27%
Professional and Related	10,661	419	597	10%	2,233	21%
Service	1,944	201	181	20%	430	22%
Sales and Related	2,108	33	119	7%	358	17%
Office & Administrative Support	8,867	377	633	11%	5,780	65%
Skilled Blue Collar	40,367	1,637	3,091	12%	1,023	3%
Semi-skilled Blue Collar	24,270	1,132	3,556	19%	1,184	5%
Unskilled Blue Collar	8,955	673	1,797	28%	657	7%

**Projected Employment Opportunities in the Oil & Gas and Petrochemical Industries, 2015-2035
(Combining Pro-Development Policy with Baseline Growth and Replacement, Including Investment)**

West North Central

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	83,666	2,450	9,849	15%	11,021	13%
Management, Business and Financial	11,474	234	562	7%	2,940	26%
Professional and Related	9,408	266	432	7%	1,981	21%
Service	605	39	46	14%	137	23%
Sales and Related	1,668	23	78	6%	285	17%
Office & Administrative Support	5,736	186	463	11%	4,146	72%
Skilled Blue Collar	30,696	708	3,075	12%	671	2%
Semi-skilled Blue Collar	18,970	761	4,202	26%	644	3%
Unskilled Blue Collar	5,109	233	991	24%	217	4%
2015-2035						
Total	117,678	4,295	16,418	18%	15,189	13%
Management, Business and Financial	16,071	415	957	9%	4,067	25%
Professional and Related	13,724	492	791	9%	2,834	21%
Service	1,004	74	94	17%	240	24%
Sales and Related	2,453	47	131	7%	436	18%
Office & Administrative Support	7,874	330	733	14%	5,425	69%
Skilled Blue Collar	42,873	1,264	5,058	15%	947	2%
Semi-skilled Blue Collar	25,749	1,273	6,834	31%	878	3%
Unskilled Blue Collar	7,930	400	1,820	28%	362	5%

**Projected Employment Opportunities in the Oil & Gas and Petrochemical Industries, 2015-2035
(Combining Pro-Development Policy with Baseline Growth and Replacement, Including Investment)**

South Atlantic

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	35,901	3,728	4,669	23%	5,443	15%
Management, Business and Financial	5,247	384	521	17%	1,604	31%
Professional and Related	4,460	394	341	16%	1,064	24%
Service	602	137	66	34%	113	19%
Sales and Related	854	44	85	15%	182	21%
Office & Administrative Support	2,540	295	235	21%	1,603	63%
Skilled Blue Collar	13,704	1,186	1,537	20%	342	2%
Semi-skilled Blue Collar	6,889	958	1,318	33%	369	5%
Unskilled Blue Collar	1,605	330	566	56%	166	10%
2015-2035						
Total	128,900	10,516	18,483	22%	18,559	14%
Management, Business and Financial	18,343	1,135	1,908	17%	5,522	30%
Professional and Related	16,719	1,212	1,418	16%	3,923	23%
Service	1,891	369	238	32%	337	18%
Sales and Related	2,425	95	254	14%	471	19%
Office & Administrative Support	8,535	731	842	18%	5,581	65%
Skilled Blue Collar	52,603	3,708	7,190	21%	1,341	3%
Semi-skilled Blue Collar	23,510	2,434	4,812	31%	1,019	4%
Unskilled Blue Collar	4,874	832	1,821	54%	365	7%

**Projected Employment Opportunities in the Oil & Gas and Petrochemical Industries, 2015-2035
(Combining Pro-Development Policy with Baseline Growth and Replacement, Including Investment)**

East South Central

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	23,681	3,721	1,506	22%	2,768	12%
Management, Business and Financial	2,565	246	81	13%	740	29%
Professional and Related	2,241	283	71	16%	461	21%
Service	509	220	24	48%	75	15%
Sales and Related	396	15	11	7%	53	13%
Office & Administrative Support	1,369	156	38	14%	815	60%
Skilled Blue Collar	9,954	1,532	536	21%	282	3%
Semi-skilled Blue Collar	5,222	989	442	27%	224	4%
Unskilled Blue Collar	1,425	280	303	41%	118	8%
2015-2035						
Total	38,293	6,192	3,261	25%	4,534	12%
Management, Business and Financial	4,188	416	186	14%	1,180	28%
Professional and Related	3,747	496	167	18%	770	21%
Service	846	346	52	47%	143	17%
Sales and Related	647	29	23	8%	100	15%
Office & Administrative Support	2,232	266	81	16%	1,286	58%
Skilled Blue Collar	15,578	2,485	1,181	24%	431	3%
Semi-skilled Blue Collar	8,539	1,661	951	31%	398	5%
Unskilled Blue Collar	2,516	493	620	44%	226	9%

**Projected Employment Opportunities in the Oil & Gas and Petrochemical Industries, 2015-2035
(Combining Pro-Development Policy with Baseline Growth and Replacement, Including Investment)**

West South Central

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	644,420	60,132	226,913	45%	117,837	18%
Management, Business and Financial	123,425	9,681	22,478	26%	39,532	32%
Professional and Related	117,816	9,469	24,627	29%	26,156	22%
Service	7,572	1,956	2,659	61%	1,677	22%
Sales and Related	14,512	512	3,205	26%	2,712	19%
Office & Administrative Support	58,316	5,320	14,838	35%	37,267	64%
Skilled Blue Collar	179,206	16,126	76,459	52%	4,294	2%
Semi-skilled Blue Collar	119,505	14,310	65,735	67%	4,771	4%
Unskilled Blue Collar	24,068	2,758	16,912	82%	1,428	6%
2015-2035						
Total	840,245	82,389	346,125	51%	145,412	17%
Management, Business and Financial	154,559	12,676	34,844	31%	47,719	31%
Professional and Related	150,362	13,051	38,431	34%	32,445	22%
Service	10,599	2,721	4,192	65%	2,449	23%
Sales and Related	20,447	726	4,991	28%	3,816	19%
Office & Administrative Support	73,836	7,103	22,181	40%	45,316	61%
Skilled Blue Collar	237,168	22,800	116,105	59%	5,449	2%
Semi-skilled Blue Collar	159,143	19,332	99,514	75%	6,136	4%
Unskilled Blue Collar	34,131	3,980	25,867	87%	2,082	6%

**Projected Employment Opportunities in the Oil & Gas and Petrochemical Industries, 2015-2035
(Combining Pro-Development Policy with Baseline Growth and Replacement, Including Investment)**

Mountain

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	151,660	2,782	39,286	28%	22,221	15%
Management, Business and Financial	25,629	376	3,388	15%	6,802	27%
Professional and Related	23,056	441	3,249	16%	4,801	21%
Service	905	39	239	31%	231	26%
Sales and Related	3,568	25	420	12%	493	14%
Office & Administrative Support	10,359	197	1,755	19%	7,380	71%
Skilled Blue Collar	52,227	976	15,289	31%	1,234	2%
Semi-skilled Blue Collar	28,289	588	10,915	41%	924	3%
Unskilled Blue Collar	7,627	140	4,031	55%	356	5%
2015-2035						
Total	221,381	4,871	62,563	30%	31,478	14%
Management, Business and Financial	36,741	677	5,516	17%	9,788	27%
Professional and Related	33,156	757	5,391	19%	6,860	21%
Service	1,365	65	386	33%	351	26%
Sales and Related	5,404	57	711	14%	789	15%
Office & Administrative Support	14,736	357	2,789	21%	10,110	69%
Skilled Blue Collar	77,379	1,715	24,418	34%	1,783	2%
Semi-skilled Blue Collar	41,605	1,005	17,356	44%	1,296	3%
Unskilled Blue Collar	10,995	238	5,996	57%	501	5%

**Projected Employment Opportunities in the Oil & Gas and Petrochemical Industries, 2015-2035
(Combining Pro-Development Policy with Baseline Growth and Replacement, Including Investment)**

Pacific

	Total	African American	Hispanic	Minority Share	Female	Female Share
2015-2025						
Total	164,859	6,633	57,652	39%	22,327	14%
Management, Business and Financial	26,714	627	4,753	20%	6,942	26%
Professional and Related	23,327	661	4,537	22%	4,663	20%
Service	2,665	423	636	40%	506	19%
Sales and Related	1,728	20	422	26%	332	19%
Office & Administrative Support	11,300	212	3,165	30%	7,632	68%
Skilled Blue Collar	56,614	1,847	19,307	37%	1,282	2%
Semi-skilled Blue Collar	30,267	715	17,861	61%	723	2%
Unskilled Blue Collar	12,244	2,128	6,971	74%	247	2%
2015-2035						
Total	269,356	10,450	95,579	39%	40,186	15%
Management, Business and Financial	46,416	1,244	8,935	22%	13,326	29%
Professional and Related	42,557	1,249	9,156	24%	9,323	22%
Service	5,019	741	1,274	40%	1,003	20%
Sales and Related	2,747	22	689	26%	499	18%
Office & Administrative Support	18,334	481	5,126	31%	12,177	66%
Skilled Blue Collar	92,004	3,107	33,613	40%	2,174	2%
Semi-skilled Blue Collar	47,107	1,463	27,588	62%	1,296	3%
Unskilled Blue Collar	15,172	2,143	9,198	75%	388	3%



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