

CROSS-INDUSTRY WORKFORCE DEVELOPMENT PRIORITIES

FOR THE ALASKA MINING, OIL & GAS,
CONSTRUCTION, MARITIME, AND
HEALTH CARE INDUSTRIES



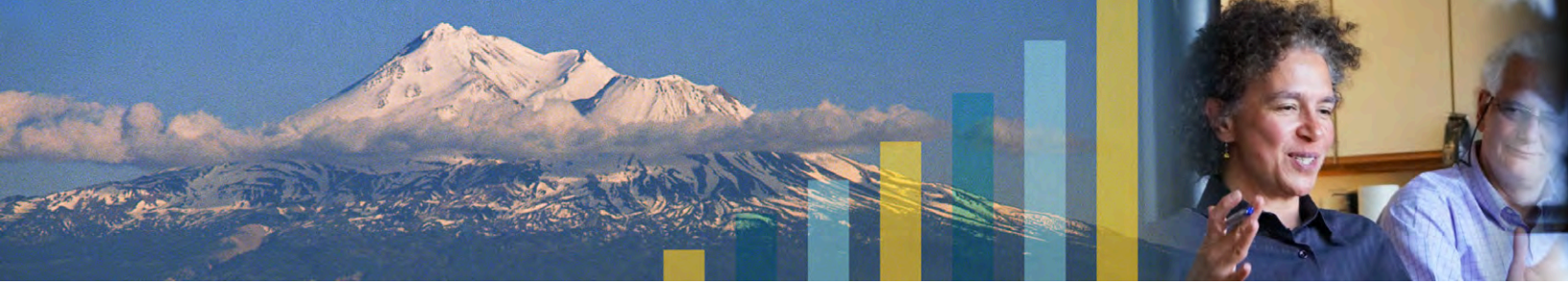
PREPARED FOR THE ALASKA PROCESS INDUSTRY CAREERS CONSORTIUM **APRIL 2016**



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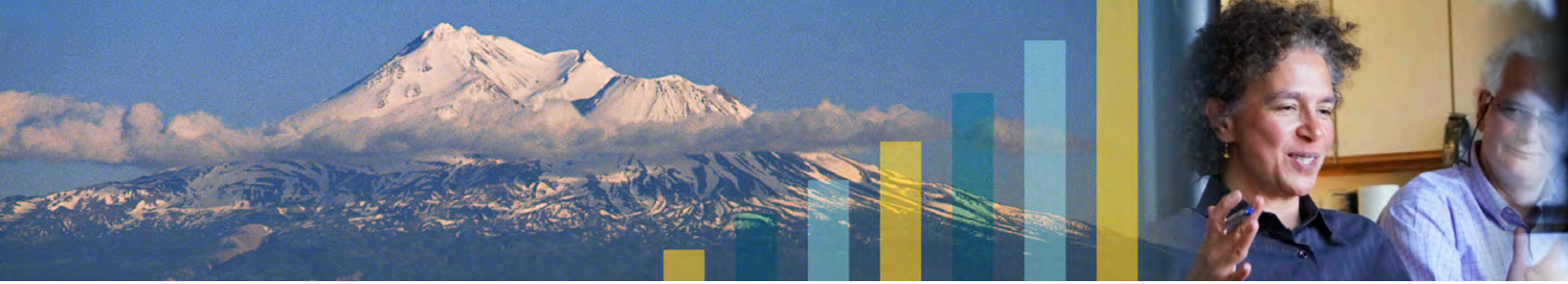
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INTRODUCTION

The Alaska Process Industry Careers Consortium (APICC) was founded in 1999 as a vehicle for industry collaboration in workforce development in Alaska, especially in the oil, gas, mining, and related industries. The organization's programs include a Teacher Industry Externship (Alaskan teachers experiencing industrial work first hand), scholarships for students attending process technology programs at the University of Alaska and other educational institutions in Alaska, career awareness outreach, and a variety of other workforce development efforts throughout the state.

APICC contracted with McDowell Group to identify priority occupations and workforce needs in common between the oil & gas, mining, construction, maritime, and health care industries. The scope of this work included the following tasks:

- Review available information on priority occupations in each industry, including published workforce development plans, lists developed by industry groups, and other sources. Identify occupations that are a priority for multiple industries, or are a priority due to a comparatively large number of jobs expected.
- Conduct executive interviews with key industry representatives, as well as workforce development training providers and other experts.
- Review and analyze career clusters and pathways as they relate to the priority occupations identified in the industry plans.

McDowell Group also analyzed Alaska Department of Labor & Workforce Development (DOLWD) and U.S. Department of Labor data, summarized studies reflecting the economic and employment impacts of key industries, and reviewed various other secondary information to provide context for this report.

Terminology

Following are concepts and terms commonly used in workforce development and in this report:

- **Occupation** The term describes the major activity of a job performed for payment. This report uses the occupation names that appear in each industry's workforce plan or are otherwise more widely understood, even when those names conflict with the government SOC system described below. Appendix B provides a crosswalk between SOC codes and the occupation names used in this report.
- **SOC Code** The Standard Occupational Classification (SOC) system is a United States government effort to

classify occupations and assign each occupation a number known as a SOC code (eg. 15-1130, "Software Developers and Programmers"). The most recent set of codes (developed in 2010) includes 840 occupations. The SOC system is the standard occupational classification system and a wide variety of public data are organized by SOC code, including worker counts, average wages, and projected openings, for example.

A limitation of the SOC system is that it may divide occupations in ways that do not accurately capture jobs as they are performed in Alaska industries.

- **Priority Occupation** While the term has multiple meanings, a "priority occupation" is generally considered one that provides a livable wage and is either difficult to fill with qualified Alaskans or in high demand as a result of projected growth or attrition/turnover. The priority occupation lists used in the report derive from industry-specific workforce development plans, additional available data and reports, and feedback from industry representatives when necessary to supplement or update published sources.

- **Career Clusters and Pathways** The National Career Clusters Framework identifies 16 Career Clusters and 79 Career Pathways. The framework organizes curriculum design and instruction and focuses attention on broader groupings than occupations. Within each cluster — for example "Manufacturing" — are multiple Career Pathways. For Manufacturing, the pathways identified are "Production," "Manufacturing Production Process Development," "Maintenance, Installation & Repair," "Quality Assurance," "Logistics & Inventory Control," and "Health, Safety & Environmental Assurance." For each pathway, a set of resources have been developed to identify the education, training, career counseling, and support skills needed for that type of work.

- **O*NET – Occupational Information Network** The O*NET program is a resource developed and regularly updated by the U.S. Department of Labor as the nation's primary source of occupational information. O*NET data is organized around the Standard Occupational Classification (SOC) system described above. For each occupation, a wide variety of information is provided, including a sample of reported job titles; a description of the occupation; the tasks, knowledge, skills, and abilities required of workers in each occupation; tools and technology used in the occupation; required education; and many other details. The database behind O*NET can be accessed online interactively at www.onetcenter.org, or downloaded for additional analysis, as was done for this study.

• **AWIB — Alaska Workforce Investment Board**

The Alaska Workforce Investment Board — a state board appointed by the governor and composed of industry, government, and other representatives — sets strategy and makes many of the key decision regarding workforce development efforts in Alaska.¹

The vision for the Alaska Workforce Investment Board is to “build connections that put Alaskans into good jobs.” This comprehensive vision keeps the board focused on developing a workforce system that is useful, accessible and understandable to all of the system’s customers, which include businesses looking for qualified workers, unemployed Alaskans looking for jobs, and incumbent workers wanting to upgrade their skills in a changing work environment.

AWIB is the Governor of Alaska’s appointed, lead planning and coordinating entity for Alaska’s public workforce and development system. The Board provides policy oversight of state and federally funded job training and vocational education programs. Board members — who represent a variety of sectors in Alaska including business, industry, education, organized labor, and state government — examine employment trends and emerging occupations to ensure training efforts are aligned and that Alaskans are trained and ready for the jobs that pay well, and are in demand.

• **WIOA – Workforce Innovation and Opportunity Act**

This act was signed into law in July 2014. It reauthorizes and amends federal law and funding related to workforce development. WIOA directs states to take a regional approach to workforce development, continues a focus on one-stop job centers, and requires states to develop a state plan informed by economic development and other plans. Aligning efforts with emerging requirements under WIOA is a key task currently before workforce development entities in Alaska, especially the Alaska Workforce Investment Board. A draft state WIOA plan was circulated in early 2016, and a final plan was submitted to the U.S. Department of Labor in late March 2016.²

The U.S. Department of Labor’s website provides additional insight into WIOA.³

Under WIOA, workforce boards focus on strategy. As strategic leaders, State and local workforce boards, in partnership with governors and chief elected officials, facilitate public-private partnerships; support sector strategies and career pathways that advance opportunities for all workers and jobseekers, including low-skilled adults, youth, and individuals with disabilities; foster innovation; and ensure streamlined operations and service delivery excellence. (TEGL 19-14; Section 4.b)

State and local boards should be working with One-Stop Center operators and partners to increase coordination of programs and resources to support a comprehensive system that seamlessly provides integrated services that are accessible to all jobseekers, workers, and businesses. (TEGL 19-14; Section 4.d). Examples of key activities that should be underway include designation of local workforce development areas, identification of regions, the development of criteria for Local Board appointments, and launch of the State planning process.

Rationale for Identifying Common Priority Occupations

Alaska’s oil & gas, mining, construction, maritime, and health care industries provide significant and varied benefits to our economy and households. Despite many efforts and successes, however, too many jobs in these industries remain difficult to fill, due in part to a lack of qualified Alaskan workers. All the industries described in this report have significant challenges hiring in Alaska and must therefore recruit employees from outside the state. Workforce development efforts — including industry-specific initiatives as well as collaborations between industries — can help address these problems.

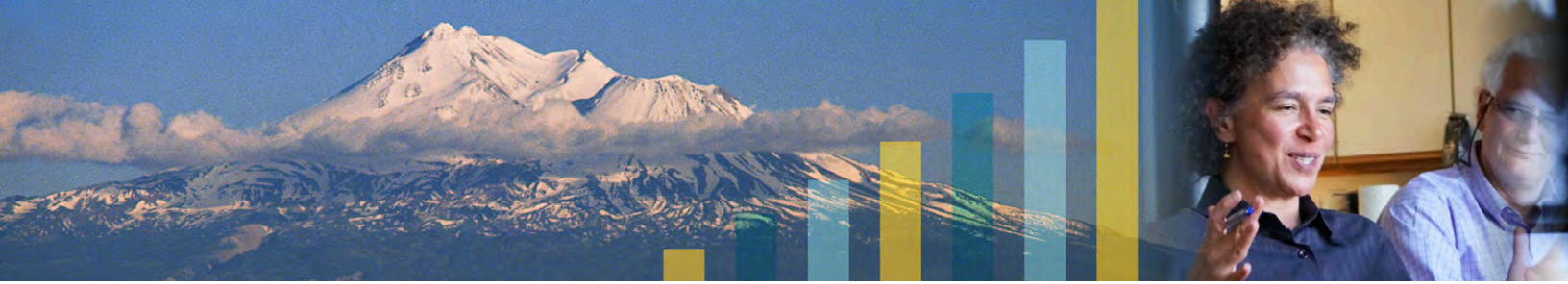
- An understanding of the areas of overlap between Alaska’s major industry employers will help business leaders identify areas in which collaboration will leverage their individual efforts.
- By preparing for and targeting priority occupations, Alaskans can more quickly find high paying and rewarding work, leading to more money circulating in Alaska’s economy.
- Collective impact — through which a cross-section of educational institutions, industry groups, community organizations, and businesses identify a common set of indicators around which to organize — can lead to more ambitious results than would be possible by isolated efforts. This is especially true when technical solutions fall short, complex problems underlie an issue, and a cultural shift is required to have a substantial impact.⁴
- Choosing strategic workforce development efforts, and maximizing industry involvement will increase the impact of limited public and private sector resources, especially in times of budget tightening.
- Educational outreach helps Alaskans understand the types of work that are in demand in their region. A wide variety of situations must be addressed by these efforts, from elementary school youth to adults looking for a new career.
- Hiring Alaskans — rather than out of state contractors and employees — not only adds to Alaska’s wage base, but also increases public support for, and the viability of, needed industrial development projects.

¹ <http://labor.alaska.gov/awib/board.htm>

² Alaska combined state WIOA plan is available on the Alaska Department of Labor’s website at <http://labor.state.ak.us/wioa/home.htm>

³ <http://www.doleta.gov/WIOA/FAQs.cfm>

⁴ Kania, John, and Mark Kramer. (2011). Collective impact. *Stanford Social Innovation Review*, Winter 2011: 36-41.



WORKFORCE DEVELOPMENT PLANS AND PRIORITIES

Overview of Workforce Planning

Many of Alaska’s industry sectors have created workforce development plans to document their workforce needs. Most of these plans, including those for the maritime, construction, oil & gas, and health care sectors, were the product of collaboration with state and university partners. The mining workforce development plan was led and completed primarily by an industry consortium.

A common element of these plans, with the exception of the construction industry plan, is the identification of priority occupations. The number of occupations identified ranges from 15 in the mining industry plan to 61 in the oil & gas industry plan. The content of the workforce development plans reviewed in this report are summarized in Table 1.

A complicating factor in this discussion, however, is that each plan defines “priority occupation” differently and uses different methods to determine which occupations to include. In addition, the construction workforce development plan did not determine priority occupations for the industry.

Summary of Individual Industry Workforce Priorities



Photo courtesy Kinross | Trevor Girdley photographer

Table 1 Existing Workforce Development Plans

SECTOR	DATE	PRIORITY OCCUPATIONS IDENTIFIED	ESTIMATED NUMBER OF JOBS IN INDUSTRY
Health Care	May 2010	26 occupations in 15 groups	33,800
Mining	Dec 2014	15 occupations in 5 groups	4,400
Oil & Gas	May 2014	61 occupations in 5 groups	20,249
Construction	April 2006	None identified	17,000
Maritime	May 2014	23 occupations in 4 groups	70,000

In order to standardize and update the priority occupation lists for each industry, this report combines published lists, Alaska Department of Labor data, and industry interviews and feedback to produce a priority occupations list for each industry. This effort was spearheaded by the Business Education Compact, an Anchorage-based collaborative of Alaska workforce leaders from all backgrounds.

We discuss each industry’s workforce development plan and priorities below.

Alaska’s mining industry provided approximately 4,400 direct jobs in 2014, including jobs for residents of more than 50 Alaska communities. As a result of spending by the mining industry and its employees, an additional 4,300 jobs were created in Alaska’s economy in 2014. The total payroll of these direct and indirect jobs is estimated at \$620 million.⁵

The Alaska Mining Workforce Development Plan was developed by the Alaska Miners Association’s Human Resources Committee, which is composed of human resources and administrative managers from various operating mines, exploratory mines, and major mine support businesses. Published in December 2014, the plan combined workforce data from the Department of Labor with a workforce assessment of the six mines operating in Alaska. The plan assumes that these six mines will continue to operate and two of the many exploration projects in Alaska will become producing mines in the near term.

⁵ McDowell Group. (2014). *The Economic Benefits of the Alaska’s Mining Industry*. Prepared for the Alaska Miners Association.

Findings in the plan include the following:

WORKFORCE COMPOSITION

- Roughly 62 percent of the mining workforce is composed of Alaskans.
- Technicians make up roughly 85 percent of the mining workforce, with the remainder in professional, administrative, or managerial positions.

KEY TRENDS AND STRATEGIES

- Aging of the mining workforce is expected to result in a significant number of vacancies. Forty-seven percent of mechanics, 51 percent of mining materials engineers, and 65 percent of mining machine operators are 45 years of age or older.
- While current mine training offerings in Alaska are generally of the right type, additional graduates are needed and the system would benefit from trainings in more regions of the state so workers do not have to travel as far from home.
- The plan prioritizes six workforce development strategies, including increasing career awareness, improving data on mining labor demands, developing career pathways, improving the training system, and increasing retention and employee development.

PRIORITY OCCUPATIONS

- The priority occupations identified in the mining sector report are listed in Table 2.



Photo courtesy ConocoPhillips

McDowell Group has calculated that oil & gas industry spending in Alaska accounted for 51,000 jobs and \$3.45 billion in total wages in Alaska's private sector in 2013, including all direct, indirect, and induced employment and wages. Government spending of oil revenue accounted for an additional 60,000 jobs and \$3 billion in wages in 2013.⁶

The oil & gas industry's workforce is large and complex. In 2014, the Alaska Oil and Gas Workforce Development Plan 2014-2018 was created by DOLWD with input from a steering committee of industry representatives. The plan was designed to encompass all aspects of the industry, from exploration through primary distribution and included a description of progress made since the last workforce plan was developed in 2008. Findings presented in the oil & gas industry's workforce development plan include the following:

WORKFORCE COMPOSITION

- Seven of ten (71 percent) of Alaska's oil & gas workers in 2011 were Alaska residents.
- The oil & gas occupation with the highest number of workers in 2011 was Roustabout at 1,504 workers, followed by Operating Engineers and Construction Equipment Operators at 1,252 workers, Service Unit Operators at 1,009, Other Production Workers at 855 workers, and Electricians at 794 workers.
- The age composition of Alaska's oil & gas industry workers is skewed toward older employees. In total, the report estimates that 6,566 resident workers in the oil & gas industry are likely to reach retirement age in the next five to ten years.

KEY TRENDS AND STRATEGIES

- The oil & gas workforce in Alaska grew by 3,059 workers from 2006 to 2011 to a total of 20,249 workers, with

Table 2 Priority Occupations Identified by Alaska's Mining Industry

OCCUPATION	GROUPINGS
Metallurgy/Chemical/Geological/ Environmental Lab Tech	STEM/Engineering
Underground Miner	Heavy Equipment Operations
Drillers and Blasters	Heavy Equipment Operations
Permitting Specialist	Other
Health and Safety Specialist	Other
Mill Operators	Process Technology
Millwright	Maintenance Technicians
Electrical and Instrumentation	Maintenance Technicians
Mechanical Engineer	STEM/Engineering
Mining Engineer	STEM/Engineering
Metallurgist	STEM/Engineering
Geologist	STEM/Engineering
Haul Truck Drivers	Heavy Equipment Operations
Equipment Operators	Heavy Equipment Operations
Diesel Mechanic	Maintenance Technicians

Source: Alaska Miners Association. (2014). *Alaska Mining Workforce Development Plan*

⁶ McDowell Group. (2014). *The Role of the Oil and Gas Industry in Alaska's Economy. Prepared for the Alaska Oil and Gas Association.*

earnings of more than \$1.9 billion. This increase occurred despite a decline in production over this time period.

- A recent pipeline-worker program provided training to 1,646 individuals, 80 percent of whom were still on Alaska payrolls three years later. Wages for these individuals increased by roughly 30 percent after receiving training, for a total of \$13 million in additional wages.
- The occupations with the greatest churn rate (expected openings in next ten years divided by current total workers) in 2011 were Rotary Drill Operators, Petroleum Engineers, Roustabouts, Pump System Operators, Service Unit Operators, Derrick Operators, and Geological and Petroleum Technicians.

PRIORITY OCCUPATIONS

- The oil & gas report identified 61 priority occupations, combining the top 25 oil & gas occupations ranked by four different measures (worker count, nonresident hire, average age, and earnings). No prioritization based on industry input was conducted. In order to make it more comparable to priority occupation lists in other industries, this list was shortened and modified with input from industry and workforce experts.



Photo courtesy Vigor Alaska

The Alaska Maritime Workforce Development Plan was developed by industry and agency representatives, under the leadership of the University of Alaska and published in May 2014.

WORKFORCE COMPOSITION

The plan estimates Alaska's maritime workforce at roughly 70,000 people, including more than 30,000 in seafood harvesting; 25,000 in seafood processing; 3,000 in marine transportation, freight, and other industries; 2,000 in research, enhancement, and management; and 600 in boat building and repair.⁷

KEY TRENDS AND STRATEGIES

The goals of the plan were to develop a responsive maritime workforce, guide Alaska's workforce to discover and prepare for jobs in the maritime industry, and increase the number of Alaskans working in skilled maritime occupations. Five strategies were identified as priorities toward accomplishing these goals:

- Grow awareness of occupations and develop career pathways
- Improve workforce readiness
- Train Alaskans for maritime careers
- Support recruitment and retention
- Promote sustained industry engagement.

PRIORITY OCCUPATIONS

The maritime workforce plan identifies 23 specific priority occupations — defined as those in need of focused tactics

Table 3 Priority Occupations in Alaska's Oil & Gas Industry

OCCUPATION	GROUPINGS
Process & Plant Operations	Process Technology
Platform Operations	Process Technology
Pipeline Operations	Process Technology
Drillers / Drilling Support	Heavy Equipment Operations
Welders & Pipefitters	Maintenance Technicians
Equipment Maintenance	Maintenance Technicians
Diesel & Equipment Mechanics	Maintenance Technicians
Project Engineers	Engineering
Mechanical Engineers	Engineering
Civil Engineers	Engineering
Electrical Engineers	Engineering
Process/Chemical/Petroleum Engineers	Engineering
Geologists & Geophysicists	Science & Technology
Telecommunications Specialists	Science & Technology
Environmental Specialists	Science & Technology
Automations Technicians	Science & Technology
Instrumentation Technicians	Science & Technology
Health and Safety Specialists	Science & Technology

⁷ Data are based on a 2012 McDowell Group report, Education and Training Gap Analysis for the FSM Workforce.

to increase the number of Alaskans employed in these occupation — in five main groupings. It also identifies five main skill sets required in the maritime industry and the occupations requiring each skill set. See Table 4 below.

Table 4 Priority Occupations identified in the Alaska Maritime Workforce Plan

PRIORITY OCCUPATIONS	GROUPING	SKILL SETS REQUIRED
Ship Building	Marine Occupations and Support Industries	Marine Industrial Trades
Vessel Operations: Deckhand, Vessel Engineer, Captain	Marine Occupations and Support Industries	Vessel Operation
Vessel Repair and Maintenance Service Provider	Marine Occupations and Support Industries; Seafood Harvesters	Marine Industrial Trades
Biometrician	Research, Enhancement, and Management	Scientific
Fish and Game Coordinator	Research, Enhancement, and Management	Scientific
Fish and Wildlife Technician	Research, Enhancement, and Management	Employability, Career-Readiness
Fisheries Scientist	Research, Enhancement, and Management	Scientific
Fishery Biologist	Research, Enhancement, and Management	Scientific
Fishery Economist, Analyst, and Management Specialist	Research, Enhancement, and Management	Scientific
Fishery Management Specialist at NOAA Fisheries	Research, Enhancement, and Management	Scientific
Hatchery Manager	Research, Enhancement, and Management	Scientific, Managerial
Commerical Seafood Harvester	Seafood Harvesters	Vessel Operation, Marine Industrial Trades
Shellfish Farmer	Seafood Harvesters	Scientific, Marine Industrial Trades
Baader Technician	Seafood Processors	Marine Industrial Trades
Can Machinist	Seafood Processors	Marine Industrial Trades
Deckhand	Seafood Processors	Employability, Career-Readiness
Electrician	Seafood Processors	Marine Industrial Trades
Quality Control and Assurance Manager and Technician	Seafood Processors	Scientific
Refrigeration Engineer and Technician	Seafood Processors	Marine Industrial Trades
Seafood Plant and Floating Processor Engineer	Seafood Processors	Managerial, Vessel Operation
Seafood Plant Manager	Seafood Processors	Managerial
Seafood Production Manager	Seafood Processors	Managerial





The Alaska Health Workforce Plan was prepared by the Health Workforce Planning Coalition and published in May 2010, in response to high vacancy rates and turnover in key positions. A new version of this plan is currently under development, with an expected release before the end of 2016.

WORKFORCE COMPOSITION

The Alaska health care workforce was conservatively estimated at 33,800 jobs in 2014 by the DOL&WD. Total payroll was estimated at \$1.8 billion (no estimate of the indirect or induced impacts of the industry were made). These estimates are conservative and do not include health care jobs held by members of the military or the jobs held by providers who own their own practice and are self-employed. In addition, the estimates above do not include jobs in the social assistance field, including behavioral health workers, due to data limitations.⁸

KEY TRENDS AND STRATEGIES

Health care is the fastest growing industry in Alaska. Roughly 7,400 new jobs were created in health care between 2001 and 2008. A 2012 survey of health care providers estimated vacancy rates in rural Alaska of 21 percent for family physicians, 17 percent for family nurse practitioners, and 18 percent (equivalent to

102 vacancies) for community health aides, for example.⁹ Between 2012 and 2022 the health care industry workforce is expected to grow by an estimated 25 percent, driven by a 10 percent increase in population in Alaska and a 79 percent increase in the number of Alaskans aged 65 and older over the same time period.¹⁰

To address these shortages – which are especially acute in rural Alaska – the Department of Health and Social Services (DHSS), the Alaska Mental Health Trust Authority, and the University of Alaska partnered to develop and implement a variety of new programs and efforts beginning in the early 2000s.

One of DHSS's programs, the Alaska Area Health Education Center (AHEC), has been supporting a “grow our own” approach to healthcare workforce development for over a decade. Regional AHEC centers develop community driven solutions to the health workforce crisis, including support that exposes health care students to rural health issues, as well as efforts that provide health care career exploration opportunities for rural and underserved youth. In a new program to start in 2016, AHEC centers are piloting behavioral health career camps in three locations in Alaska.

In 2008, the Alaska Health Workforce Coalition formed – with members from the public and private sectors – to address behavioral health and health care workforce challenges. In 2015, the State of Alaska was awarded a large federal grant to expand registered apprenticeship health care training in Alaska.

PRIORITY OCCUPATIONS

The health care workforce plan identified several key overall strategies — summarized as “engage, train, recruit, retain, sustain” — as well as a series of occupation-specific strategies for 15 groups of related occupations (encompassing 26 total occupations) in need of efforts to address shortages.

Table 5 Priority Occupations Identified by Alaska's Health Care Industry

PRIORITY OCCUPATIONAL GROUPINGS

Priority Occupational Groupings

Pharmacist

Pharmacy Technician

Primary Care Physician

Psychiatrist

Therapist and Therapist Assistant (occupational, physical, and speech)

Registered Nurse

Community Health Aide/Practitioner

Oral Health Practitioner

Direct Care Worker

Pharmacy Aides

Behavioral Health Aide/ Village Counselor

Advanced Nurse Practitioner

Health Informatics Staff

Nurse Educator

Substance Abuse Counselor

Human Services Worker

Social Worker



ANMC Hybrid Operating Room
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⁸ Stimpfle, Erik. (2011). *Alaska's Health Care Industry*. *Alaska Economic Trends*, August 2011:4-12.

⁹ Alaska Center for Rural Health. (2014). *2012 Alaska Health Workforce Vacancy Study*.

¹⁰ Martz, Paul. (2014). *Alaska Industry Forecast: Health care and mining will lead growth*. *Alaska Economic Trends*, October 2014:4-10.



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A recent report by the Institute of Social and Economic Research at the University of Alaska Anchorage estimates spending by Alaska's construction industry at roughly \$8.9 billion in 2015. Unfortunately, due to depressed oil prices and a minimal state capital budget, a decline of 18 percent to \$7.3 billion is expected in 2016.¹¹

WORKFORCE COMPOSITION

According to Alaska Department of Labor and Workforce Development employment data for 2014, the construction industry in Alaska consists of roughly 17,000 workers, with a peak workforce of nearly 21,000 during summer months. These workers earn a total of \$1.4 billion in annual wages, for an average monthly wage per worker of \$6,604.

The construction industry can be divided into three main categories, as follows:

- Construction of buildings, including both residential and commercial, accounts for 4,636 average monthly workers, or 27 percent of the total construction workforce. Workers in this sector earn monthly wages of \$6,208 on average.



- Heavy construction – which includes construction projects related to utilities, highways, airports, and other civil projects – accounts for 25 percent of the construction workforce (4,188 workers roughly). Workers in this sector average monthly wages of \$8,621.
- Specialty trade contractors form the largest sector of the construction industry in Alaska, with an average of 8,251 workers throughout the year. These workers earn an average of \$5,803 a month.

These worker counts do not include self-employed construction workers, which were estimated at 9,000 in 2011.¹²

PRIORITY OCCUPATIONS

The most recent workforce development plan for Alaska's construction industry was published by the Alaska Workforce Investment Board in 2006. Unfortunately, this report does not identify priority occupations. The occupations listed below were identified with the assistance of the Alaska Department of Labor and industry representatives.

Table 6 Priority Occupations identified by the Alaska Construction Industry

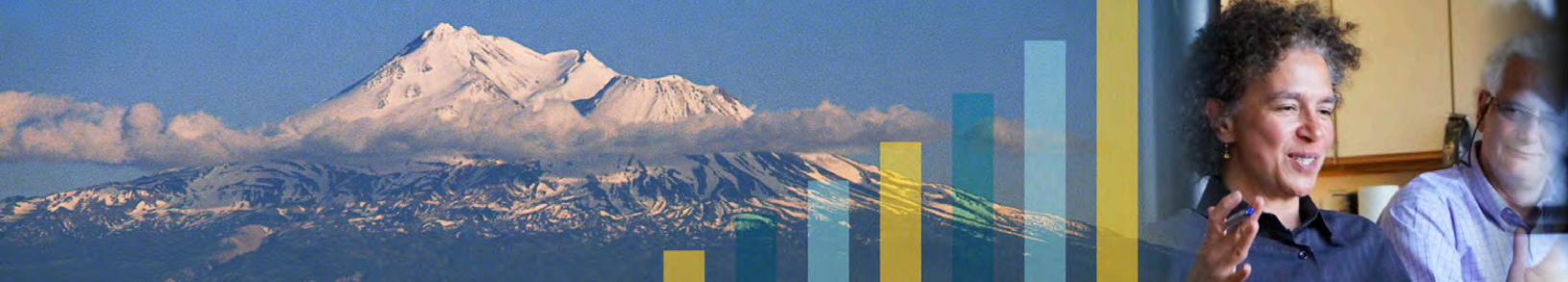
OCCUPATION
Pile Driver Operator
Millwrights
Heating, Air Conditioning, and Refrigeration Mechanics
Welders
Diesel Mechanics
Construction Supervisors
Heavy & Tractor-Trailer Truck Drivers
Earth Drillers
Plumbers
Hazardous Materials Removal Workers
Construction Managers
Equipment Operators
Carpenters
Electricians

Pedestrian Bridge between the Engineering & Industry building and the Health Sciences building, UAA, Anchorage, Alaska

© Ken Graham Photography.com

¹¹ Institute of Social and Economic Research, University of Alaska Anchorage. (2016). *Alaska's Construction Spending Forecast: 2016*. Prepared for the Construction Industry Progress Fund and the Associated General Contractors of Alaska.

¹² Institute of Social and Economic Research, University of Alaska Anchorage. (2016). *Alaska's Construction Spending Forecast: 2016*. Prepared for the Construction Industry Progress Fund and the Associated General Contractors of Alaska.



ALASKA DOL&WD TOP JOBS

The Alaska DOL&WD conducts an occupational forecast every two years, with the last forecast published in October 2014 (see Table 7).¹³ Expected openings include openings from attrition/turnover as well as new jobs created during

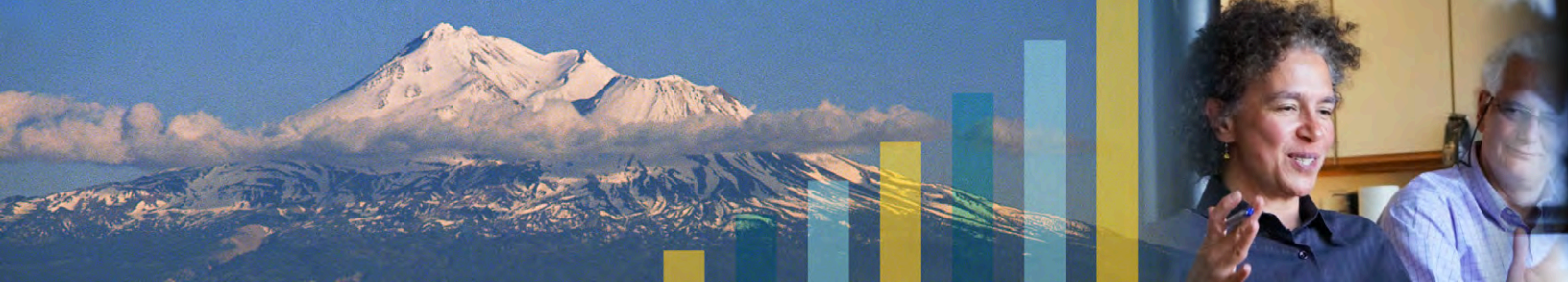
the forecast period. Wage quartiles are shown with dollar signs; \$\$\$\$ represents the top quartile (jobs making over \$73,245 annually) and \$\$\$ is equal to a salary of \$54,370 - \$73,245.

Table 7 Alaska Department of Labor and Workforce Development “Top Jobs”

PRIORITY OCCUPATION	DEGREE REQUIRED	EXPECTED OPENINGS 2012-2022	WAGE QUARTILE
Registered Nurses	Associate Degree or Postsecondary Nondegree Award	1867	\$\$\$\$
Operating Engineers and Other Construction Equipment Operators	High School Diploma or equivalent	1344	\$\$\$
General and Operations Managers	Bachelor's Degree	1005	\$\$\$\$
Carpenters	High School Diploma or equivalent	956	\$\$\$
Elementary School Teachers, Except Special Education	Bachelor's Degree	867	\$\$\$
First-Line Supervisors of Office and Admin Support Workers	High School Diploma or equivalent	822	\$\$\$
Electricians	High School Diploma or equivalent	791	\$\$\$\$
Administrative Services Managers	Bachelor's Degree	702	\$\$\$\$
Plumbers, Pipefitters, and Steamfitters	High School Diploma or equivalent	627	\$\$\$
Airline Pilots, Copilots, and Flight Engineers	Bachelor's Degree	597	\$\$\$\$
Accountants and Auditors	Bachelor's Degree	522	\$\$\$\$
Secondary School Teachers, Except Spec and Career/Technical Education	Bachelor's Degree	517	\$\$\$
Medical and Health Services Managers	Bachelor's Degree	412	\$\$\$\$
Aircraft Mechanics and Service Technicians	Associate Degree or Postsecondary Nondegree Award	412	\$\$\$
Construction Managers	Bachelor's Degree	392	\$\$\$\$
Commercial Pilots	High School Diploma or equivalent	391	\$\$\$
Geological and Petroleum Technicians	Associate Degree or Postsecondary Nondegree Award	378	\$\$\$
Mobile Heavy Equipment Mechanics, Except Engines	High School Diploma or equivalent	378	\$\$\$
Supervisors of Construction and Extraction Workers	High School Diploma or equivalent	360	\$\$\$\$
Chief Executives	Bachelor's Degree	353	\$\$\$\$
Service Unit Operators, Oil, Gas, and Mining	less than high school	349	\$\$\$
Police and Sheriff's Patrol Officers	High School Diploma or equivalent	335	\$\$\$\$
Financial Managers	Bachelor's Degree	324	\$\$\$\$

¹³ Martz, Paul. (2014). Alaska Occupational Forecast: 2012-2022. Alaska Economic Trends, October 2014:11-17.

PRIORITY OCCUPATION	DEGREE REQUIRED	EXPECTED OPENINGS 2012-2022	WAGE QUARTILE
Welders, Cutters, Solderers, and Brazers	High School Diploma or equivalent	318	\$\$\$
Captains, Mates, and Pilots of Water Vessels	Bachelor's Degree	311	\$\$\$
Dental Hygienists	Associate Degree or Postsecondary Nondegree Award	270	\$\$\$\$
Environmental Scientists and Specialists, Including Health	Bachelor's Degree	270	\$\$\$
Sales Managers	Bachelor's Degree	260	\$\$\$\$
First-Line Supervisors of Mechanics, Installers, and Repairers	High School Diploma or equivalent	252	\$\$\$\$
Middle School Teachers, Except Spec and Career/Tech Ed	Bachelor's Degree	250	\$\$\$
Bus and Truck Mechanics and Diesel Engine Specialists	High School Diploma or equivalent	243	\$\$\$
Zoologists and Wildlife Biologists	Bachelor's Degree	243	\$\$\$
First-Line Supervisors of Production and Operating Workers	Associate Degree or Postsecondary Nondegree Award	239	\$\$\$\$
Civil Engineers	Bachelor's Degree	228	\$\$\$\$
Computer and Information Systems Managers	Bachelor's Degree	225	\$\$\$\$
Hazardous Materials Removal Workers	High School Diploma or equivalent	198	\$\$\$
Petroleum Engineers	Bachelor's Degree	198	\$\$\$\$
Geoscientists, Except Hydrologists and Geographers	Bachelor's Degree	193	\$\$\$\$
Correctional Officers and Jailers	High School Diploma or equivalent	192	\$\$\$
Education Administrators, Elementary and Secondary School	Master's Degree	190	\$\$\$\$
Inspectors, Testers, Sorters, Samplers, and Weighers	High School Diploma or equivalent	189	\$\$\$
Lawyers	Doctoral or Professional Degree	188	\$\$\$\$
Probation Officers and Correctional Treatment Specialists	Bachelor's Degree	185	\$\$\$
Compliance Officers	Bachelor's Degree	179	\$\$\$
Water and Wastewater Treatment Plant and Systems Operators	High School Diploma or equivalent	176	\$\$\$
Air Traffic Controllers	Associate Degree or Postsecondary Nondegree Award	176	\$\$\$\$
Mental Health Counselors	Master's Degree	175	\$\$\$
Purchasing Agents, Except Wholesale, Retail, and Farm	High School Diploma or equivalent	173	\$\$\$
Family and General Practitioners	Doctoral or Professional Degree	172	\$\$\$\$
Physician Assistants	Master's Degree	166	\$\$\$\$
Radiologic Technologists	Associate Degree or Postsecondary Nondegree Award	164	\$\$\$
Medical and Clinical Laboratory Technicians	Associate Degree or Postsecondary Nondegree Award	149	\$\$\$
Physical Therapists	Doctoral or Professional Degree	138	\$\$\$\$



COMMONALITIES BETWEEN INDUSTRY PRIORITIES

OCCUPATIONS

Table 8 combines the priority occupations of the five industries documented in this report and presents them by total expected openings predicted by the Alaska Department of Labor for the next decade. It is important to

note total openings and other occupational data reflect all jobs in Alaska for a given occupation, not necessarily limited to the five industries of focus in this report.

Check marks in Table 8 indicate the industries in which each occupation was listed as a top priority.

Table 8 Expected Job Openings, Total Jobs, and Average Salary for Priority Occupations in the Alaska Mining, Oil & Gas, Maritime, Construction, and Health Care Industries

OCCUPATION	EXPECTED OPENINGS 2012-2022	NUMBER OF JOBS 2014	AVERAGE SALARY 2014	M	O&G	MA	C	HC
Direct Care Worker	3,502	13,042	\$13,421					●
Nurses	1,954	6,809	\$55,969					●
Operating Engineers	1,344	5,751	\$49,802	●	●		●	
Carpenters	956	5,427	\$31,328			●	●	
Heavy and Tractor-Trailer Truck Drivers	901	4,873	\$41,842	●			●	
Electricians	791	3,193	\$59,795			●	●	
Behavioral Health Clinicians	700	1,768	\$31,196					●
Plumbers, Pipefitters, and Steamfitters	627	2,480	\$54,282		●		●	
Vessel Operations	623	2,504	\$34,255			●		
Geo/Chemical/Env. Lab Techs	566	1,300	\$50,556	●				
Equipment Maintenance	504	1,940	\$62,256	●	●			
Oil/Gas Drilling	499	3,125	\$71,733		●			
Electrical and Instrumentation	416	1,405	\$68,246	●	●			
Process and Plant Operations	409	2,071	\$42,304		●			
Construction Managers	392	1,753	\$88,083				●	
Geological and Petroleum Technicians	378	781	\$59,719	●	●			
Pharmacists	360	1,195	\$47,779					●
Construction Supervisors	359	1,606	\$84,837				●	
Platform and Pipeline Operations	343	1,366	\$97,510	●				
Welders	318	1,579	\$41,154		●	●	●	
Environmental Specialists	270	864	\$52,830	●				
Fishery Biologist	243	998	\$39,078			●		
Diesel Mechanics	242	1,219	\$49,535	●	●	●	●	
Primary Care Providers and Practitioners	242	790	\$106,460					●
Fish and Wildlife Technician	240	908	n/a			●		
Commercial Seafood Harvester	229	2,457	\$14,088			●		
Civil Engineers	228	1,053	\$76,688		●			
Hazardous Materials Removal Workers	198	895	\$34,770				●	
Petroleum Engineers	198	595	\$200,765		●			

OCCUPATION	EXPECTED OPENINGS 2012-2022	NUMBER OF JOBS 2014	AVERAGE SALARY 2014	M	O&G	MA	C	HC
Geoscientists	193	561	\$137,101	●	●			
Inspectors	189	637	\$77,526		●	●		
Underground Miner	184	1,012	\$53,078	●				
Permitting Specialist	178	646	\$43,600	●				
Physical Therapists	138	539	\$52,560					●
Telecommunications Specialists	131	975	\$63,305		●			
Health and Safety Specialists	113	532	\$81,926	●	●			
Mechanical Engineers	110	438	\$74,900	●	●			
Electrical Engineers	104	325	\$88,519	●				
Millwrights	97	333	\$77,351	●			●	
Baader Technician	86	664	\$36,742			●		
Heating, Air Conditioning, and Refrigeration Mechanics & Installers	83	565	\$33,170			●	●	
Mining Engineers	71	279	\$69,745		●			
Drillers and Blasters	70	400	\$42,953	●			●	
Ship Builder	68	547	\$19,909			●		
Speech-Language Pathologists	68	368	\$42,762					●
Mill Operators	64	135	\$22,412	●				
Fisheries Scientists	63	230	n/a			●		
Machinists	62	367	\$48,026			●		
Can Machinist	47	197	\$14,339			●		
Automations Technicians	39	76	\$86,069		●			
Vessel Repair and Maintenance	39	178	\$39,108			●		
Nurse Educators	35	106	\$35,981					●
Seafood Production Manager	31	99	\$52,116			●		
Metallurgist	29	81	\$69,885	●				
Psychiatrists	26	75	\$134,448					●
Pile-Driver Operators	23	205	\$49,171				●	
Chemical Engineers	15	79	\$155,885		●			
Fishery Economist, Analyst, and Management Specialist	15	52	n/a			●		
Biometrician	11	34	n/a			●		
Hatchery Manager	11	36	\$38,611			●		
Seafood Plant and Floating Processor Engineer	11	37	\$81,299			●		
Refrigeration Technician	n/a	27	n/a			●		
Specialty Nurses	n/a	134	\$95,799					●

Source and Notes: Priority occupations derived from a combination of feedback from key industry stakeholders and workforce development plans prepared by the oil & gas (O&G), mining (MI), maritime (MA), construction (C), and health care (HC) industries. The absence of a checkmark for a particular occupation does not mean that the occupation is not needed for a particular industry, only that it wasn't listed as the top priority. Expected openings, number of jobs, and average salary data obtained from the Alaska Department of Labor.



O*NET SKILLS, KNOWLEDGE, AND ABILITIES

To meet the goal of identifying workforce needs held in common across industries, it is useful to look at the knowledge, skills, and abilities required in each occupation. O*NET data, compiled and updated by the U.S. Department of Labor, provides this information, based on input from job incumbents, occupational experts, and occupational analysts.

Table 9 below lists the key skills required in the priority occupations detailed in this report, ranked by the total expected vacancies in all of the occupations that require each skill.

Not all skills required in each occupation are included in the tables below. In O*NET data each skill associated with an occupation is given a data score, with higher scores meaning that a higher level of attainment is required for that skill. In this report, only skills with data scores of 3.5 or greater were included – focusing attention on the most important skills for each occupation. A similar approach was used for O*NET data on knowledge (Table 10) and abilities (Table 11).

As shown in Table 9, critical thinking is the most important skill in the priority occupations detailed in this report. A total of 10,045 openings are expected over the next ten years in 58 different priority occupations that require this skill at a high level. This result matches a theme expressed by the employers interviewed for this report. Critical thinking was the most common skill that was mentioned by employers as in demand in their industry and hard to find among applicants. It was also listed as especially important for workers interested in advancement to higher level jobs and occupations.



Table 9 Key Skills Required for Priority Occupations in the Alaska Mining, Oil & Gas, Maritime, Construction, and Health Care Industries

SKILL	EXPECTED OPENINGS IN PRIORITY OCCUPATIONS REQUIRING SKILL, 2012-2022	NUMBER OF PRIORITY OCCUPATIONS REQUIRING SKILL
Critical Thinking	10,045	58
Active Listening	8,050	47
Monitoring	7,768	49
Reading Comprehension	7,424	47
Social Perceptiveness	6,819	25
Service Orientation	6,634	17
Speaking	6,563	38
Coordination	6,327	28
Judgment & Decision Making	5,748	34
Writing	5,720	35
Active Learning	5,350	31
Complex Problem Solving	4,862	30
Science	4,745	24
Time Management	4,616	19
Operation and Control	4,509	25
Operation Monitoring	4,202	32
Instructing	4,046	21
Persuasion	3,615	11
Learning Strategies	3,385	16
Negotiation	2,909	6
Operations Analysis	2,356	7
Troubleshooting	2,337	14
Repairing	2,107	12
Systems Evaluation	1,658	16
Mathematics	1,498	15
Quality Control Analysis	1,447	14
Systems Analysis	1,444	13
Management of Personnel Resources	1,339	6
Equipment Maintenance	1,048	9
Installation	971	3
Management of Financial Resources	299	2
Equipment Selection	229	2
Technology Design	121	2
Programming	11	1

Source and Notes: McDowell Group analysis, based on O*NET data and expected openings data from the Alaska Department of Labor. Only abilities with an O*NET data score of 3.5 or greater – the most important skills for each occupation – were included.

Table 10 Key Knowledge Required for Priority Occupations in the Alaska Mining, Oil & Gas, Maritime, Construction, and Health Care Industries

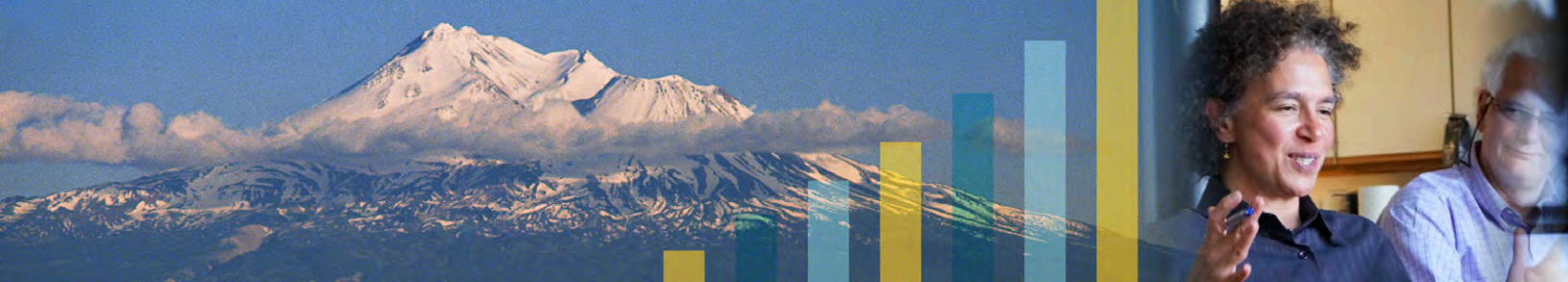
KNOWLEDGE	EXPECTED OPENINGS IN PRIORITY OCCUPATIONS REQUIRING KNOWLEDGE, 2012-2022	NUMBER OF PRIORITY OCCUPATIONS REQUIRING KNOWLEDGE
English Language	14,487	57
Customer and Personal Service	14,312	47
Mathematics	10,408	52
Mechanical	10,054	53
Education and Training	8,743	47
Public Safety and Security	8,215	31
Administration and Management	7,059	31
Engineering and Technology	6,281	35
Psychology	6,182	19
Building and Construction	5,166	16
Computers and Electronics	4,693	39
Design	4,569	22
Physics	4,356	24
Production and Processing	3,666	27
Biology	3,545	16
Therapy and Counseling	3,506	16
Chemistry	3,349	30
Clerical	3,203	23
Transportation	3,054	12
Sociology and Anthropology	2,932	10
Medicine and Dentistry	2,746	12
Law and Government	1,782	13
Geography	1,642	9
Personnel and Human Resources	1,310	10
Philosophy and Theology	761	5
Telecommunications	588	3
Sales and Marketing	442	2
Food Production	240	2
Economics and Accounting	198	1
Communications and Media	35	1

Source and Notes: McDowell Group analysis, based on O*NET data and expected openings data from the Alaska Department of Labor. Only abilities with an O*NET data score of 3.25 or greater – the most important skills for each occupation – were included.

Table 11 Key Abilities Required for Priority Occupations in Alaska Mining, Oil & Gas, Maritime, Construction, and Health Care Industries

ABILITY	EXPECTED OPENINGS IN PRIORITY OCCUPATIONS REQUIRING ABILITY, 2012-2022	NUMBER OF PRIORITY OCCUPATIONS REQUIRING ABILITY
Oral Comprehension	10,513	57
Oral Expression	9,496	51
Problem Sensitivity	9,423	55
Near Vision	8,300	45
Deductive Reasoning	7,547	43
Written Comprehension	7,241	44
Inductive Reasoning	6,589	39
Information Ordering	6,273	34
Written Expression	5,999	35
Category Flexibility	4,279	22
Speech Clarity	4,159	20
Control Precision	3,698	13
Arm-Hand Steadiness	3,342	11
Flexibility of Closure	3,115	8
Visualization	3,017	13
Speech Recognition	2,958	13
Multilimb Coordination	2,826	9
Perceptual Speed	2,092	5
Depth Perception	2,016	5
Far Vision	1,931	5
Static Strength	1,916	6
Reaction Time	1,511	9
Extent Flexibility	1,489	7
Fluency of Ideas	1,486	14
Originality	1,438	12
Mathematical Reasoning	1,401	13
Response Orientation	1,276	4
Visual Color Discrimination	1,181	5
Finger Dexterity	865	6
Manual Dexterity	730	7
Selective Attention	614	4
Number Facility	554	7
Auditory Attention	395	3
Glare Sensitivity	311	1
Spatial Orientation	311	1
Time Sharing	311	1
Hearing Sensitivity	192	3

Source and Notes: McDowell Group analysis, based on O*NET data and expected openings data from the Alaska Department of Labor. Only abilities with an O*NET data score of 3.75 or greater – the most important skills for each occupation – were included.



CAREER CLUSTERS AND PATHWAYS

Another useful perspective on workforce issues is the concept of career clusters and pathways.

A NATIONAL FRAMEWORK

The National Career Cluster Framework, developed by the National Association of State Directors of Career Technical Education Consortium, organizes career and technical education programs into 16 Career Clusters and 79 Career Pathways. Within each cluster, multiple Career Pathways are identified. For each pathway, a set of resources have been developed describing the education, training, and skills needed for that type of work.

In Alaska, school districts can apply for grant money through the Alaska Department of Education and Early Development for workforce-related training needs (for example, a 3D

printer or specialized training software); however, in order to receive these funds, districts must place these educational programs within the context of at least one specific Career Pathway from the national framework.

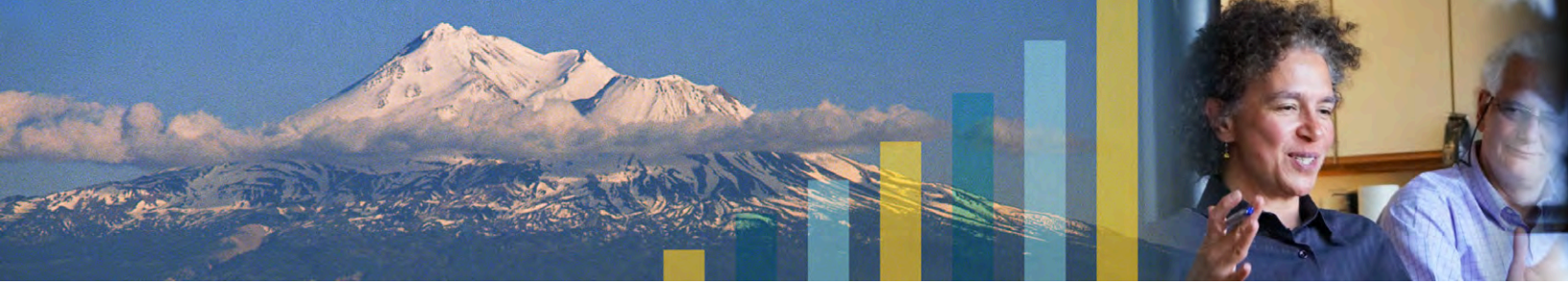
CLUSTERS AND PATHWAYS FOR COMMON PRIORITY OCCUPATIONS

Using National Career Cluster crosswalk spreadsheets, Table 12 places each of the common priority occupations identified above into Career Clusters and Pathways. Presenting priority occupations for Alaska's key industries in the National Career Cluster Framework helps provide constancy and alignment when presenting the information to different audiences including federal and state agencies, educational institutions, training facilities, private industry, economic development organizations, and funders.

Table 12 Career Clusters and Pathways for Common Priority Occupations

CLUSTERS AND PATHWAYS	EXPECTED OPENINGS IN PRIORITY OCCUPATIONS IN CLUSTER/PATHWAY 2012-2022	PRIORITY OCCUPATIONS IN CLUSTER/PATHWAY
Agriculture, Food and Natural Resource Cluster	2,191	14
Environmental Service Systems Pathway	198	1
Food Products and Processing Systems Pathway	31	2
Natural Resources Systems Pathway	1,962	11
Architecture and Construction Cluster	4,437	12
Maintenance/Operations Pathway	83	1
Construction Pathway	4,354	11
Arts, Audio/Video Technology and Communications Cluster	131	1
Telecommunications Pathway	131	1
Business, Management and Administration Cluster	15	1
Management Pathway	15	1
Health Science Cluster	7,873	20
Diagnostics Services Pathway	n/a	2
Therapeutic Services Pathway	4,233	14
Human Service Cluster	700	3
Counseling and Mental Health Services Pathway	700	3
Manufacturing Career Cluster	3,066	29
Maintenance, Installation and Repair Pathway	927	5
Manufacturing Production Process Development Pathway	1,455	17
Production Pathway	495	6
Quality Assurance Pathway	189	1
Science, Technology, Engineering and Mathematics Cluster	1,009	11
Engineering and Technology Pathway	805	9
Science and Mathematics Pathway	204	2
Transportation, Distribution, and Logistics Cluster	1,805	6
Facility and Mobile Equipment Maintenance Pathway	281	3
Transportation Operations Pathway	1,524	3

Source and Notes: Occupations matched to SOC codes and then to Career Clusters and Pathways via a crosswalk spreadsheet available at <http://www.careertech.org/crosswalks>. When multiple clusters/pathways were matched to an occupation, one option was chosen based on fit with Alaska industries. Data on projected openings obtained from the Alaska Department of Labor.



HIGH PRIORITY WORKFORCE AREAS IN ALASKA

As shown in Table 12, key career pathways for the industries of focus in this report include the following:

- **Manufacturing Production Process Development Pathway**
- **Engineering and Technology Pathway**
- **Transportation Operations Pathway**
- **Therapeutic Services Pathway**
- **Construction Pathway**
- **Natural Resources Systems Pathway**
- **Maintenance, Installation, and Repair Pathway**

This report does not provide a detailed, Alaska-specific overview of each career pathway. However, the information below may provide a useful description of the skills, trainings, and concepts relevant to the above pathways. This information is organized not by the national framework, but rather by the high priority workforce areas that emerged out of stakeholder interviews and workforce plans reviewed for this report. Examples of trainings available and key skills are not meant to be exhaustive.

Photo courtesy of Kyle Moffitt



Process Technology

Process technology occupations require skills to use and control mechanical, physical, or chemical processes to produce a final product. These well-paid jobs require an understanding of how to operate and troubleshoot various types of equipment (typically by using advanced instrumentation and controls) to move and process materials in a mill, lab or processing facility. Key industry sectors in need of process technology workers include oil & gas production, chemical manufacturing, petroleum refining, mining and milling, wastewater treatment, and seafood and other food processing industries.

Two prominent training programs in Alaska (at UAF and Kenai Peninsula College) offer certifications and degrees in process technology. Such trainings are not necessarily required for employment in this area, but they can replace some of the typically extensive on-the-job training required.

The Process Technology skillset includes the following skills, among others:

- **Electronics and instrumentation operation and troubleshooting.**
- **Operating and troubleshooting pumps, turbines, and related equipment.**
- **Piping and material transport systems.**
- **Safety and quality control systems.**

Heavy Equipment

Heavy equipment operators use cranes, bulldozers, front end loaders, backhoes, graders, dredges, hoists, drills, pumps, and heavy trucks, often in challenging conditions. These jobs are in demand in the mining, construction, and oil & gas industries in Alaska. Maintenance of heavy equipment is also an essential task, and while generally handled by separate workers, there is significant overlap between operations and maintenance skills and knowledge. Equipment and diesel engine maintenance workers are also in high demand in the maritime industry.

Heavy equipment operators often participate in training programs, apprenticeships, and on-the-job field and classroom training. For jobs in maintenance of heavy equipment, programs such as AVTEC's diesel/heavy equipment technologies certificate programs and the University of Alaska Southeast's Juneau-based mine-mechanic associate's degree and occupational endorsement program are particularly well regarded.

The following skills and requirements are key to jobs in heavy equipment operations:

- **Diesel engine maintenance.**
- **An understanding of heavy equipment hydraulic, lubrication, electrical, tires, and other systems.**
- **A good work ethic and a responsible attitude.**
- **Ability to pass drug tests and avoid alcohol and substance abuse problems.**
- **The ability to work away from home under difficult living and working conditions, including working underground and night shifts, particularly in mining.**
- **Knowledge of and adherence to safety procedures in all situations.**

Engineering and Technology

Engineering and technology jobs involve the application of empirical evidence, mathematics, and practical and scientific knowledge to invent, design, build, maintain, and improve machines, structures, tools, engines, public works, processes, and systems. The main branches of engineering are chemical, civil, electrical, and mechanical engineering. Engineering and technology occupations are well paid and in high demand in Alaska.

A variety of engineering degrees are offered at the University of Alaska Fairbanks' College of Engineering and Mines, as well as at the University of Alaska Anchorage. A bachelor's degree is required for work in this area and many also require post-graduate training.

Maintenance, Installation, and Repair

Maintenance, installation, and repair functions tend to be specific to particular trades. While there is less overlap between these occupations, specific skills are often transferable between industries. For example, carpenters, electricians, and machinists can find work in many industries, including mining, oil & gas, maritime, and construction industries.

Many training programs, as well as union and non-union apprenticeships, are available throughout the state to build skills in these trades. One is the industrial electricity program at AVTEC, which prepares electrical technicians for jobs in every major industry in Alaska, including construction, facilities maintenance, power generation, renewable energy, oil & gas fields and refineries, mining, fishing boats, seafood processing plants, and other types of jobs. More entry-level preparation is available through the Alaska Construction Academies.

Marine Operations

Alaska is one of the most challenging places in the world to conduct marine operations, which include transferring passengers and cargo; commercial fishing and processing; vessel salvage, construction and repair, and many other tasks. The marine operations skill set include the following skills, among others:

- **Use of radar, electronic charts, GPS, radios, and other electronic navigation and communication equipment.**
- **Operation of safety gear, including life rafts.**
- **Knots and rope handling techniques for securing and towing vessels.**
- **Diesel engine maintenance and operation.**
- **Ability to install and service marine hydraulics, refrigeration, electrical, and other systems.**

Many marine occupations are heavily regulated by the

U.S. Coast Guard and other agencies, and each position on a ship may have specific training and certification requirements. Notable Alaska training programs in Marine Operations include the University of Alaska Southeast's Marine Transportation program in Ketchikan and numerous programs at AVTEC's Alaska Maritime Training Center.



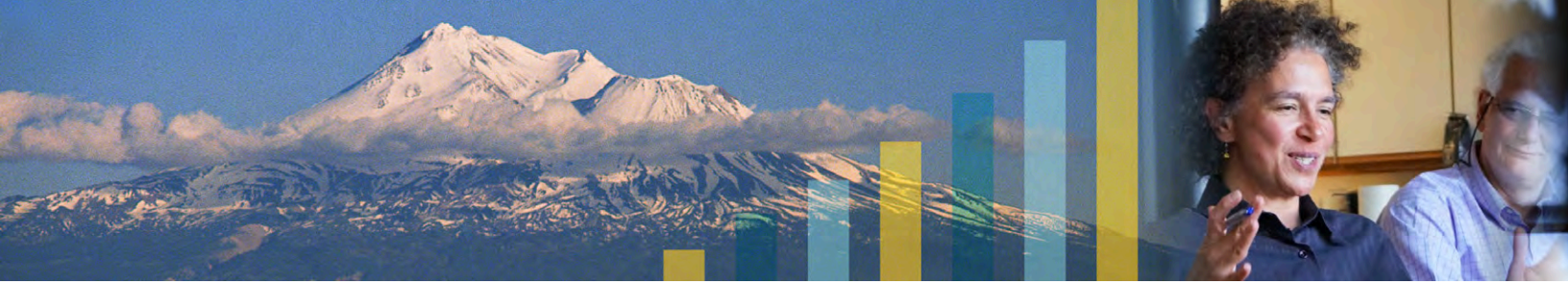
*UAA Health and Human Services graduates
Photo courtesy UAA*

Therapeutic Health Services

Those employed in therapeutic health services work to improve the health status of patients over time, including by providing direct care, treatment, counseling, and information. Alaska is an innovative state with respect to therapeutic health services. Two occupations unique to Alaska include community health aide and behavioral health aide – both of which work under the supervision of licensed professionals to address the needs of the state's many residents in isolated, largely Alaska Native villages.

Health care professions require specific qualifications and academic preparation. Notable trainings available in Alaska include the University of Alaska Anchorage nursing program; the Alaska Training Cooperative's mental health first aide and suicide prevention trainings; AVTEC's nurse assistant and other programs; and a partnership with the University of Washington medical school that facilitates the education of Alaska doctors.¹⁴ In 2015, the state of Alaska was awarded a large federal grant to expand registered apprenticeship health care training in Alaska. Through this grant, career exploration workshops will be offered throughout the state by the DOLWD Alaska Health Care Academy. Alaska also provides incentives to attract and retain nurses and other medical professionals, including loan repayment and direct payments through the SHARP program.

¹⁴ The Alaska Training Cooperative has also developed a set of core competencies for direct care workers in health and human services in Alaska.



FINDINGS AND CONCLUSIONS

The workforce development plans for the oil & gas, mining, maritime, construction, and health care industries include many calls to action for industry and government. However, few of these challenges lend themselves to specific actions, such as adding a new training program. Many of the specific training gaps identified in these plans are being addressed, for example through a new refrigeration training at AVTEC, expanded maritime programs at UAS-Ketchikan, efforts at UAF related to metallurgy education, expanding nursing and other health care programs at UAA, and other efforts. Additional training issues were discussed in the plans and by those interviewed, including additional health care training programs and improved web delivery and other options to address access issues for those in remote areas of Alaska.

Perhaps the most significant issue, however, surfaces earlier in the career development process and is evidenced by a shortage of prepared Alaskans entering career pathways that lead to the priority occupations identified in this report. This problem has two components: 1) a lack of Alaskans deciding to pursue these careers and 2) too many of those who do embark are constrained in their success by lack of comprehensive employability skills. A contributing factor may be that jobs in mining, oil & gas, maritime, construction, and health care – though potentially rewarding – can be difficult, with long hours, night shifts, and/or time away from home, and in some cases dangerous and stressful conditions.

A key component of the workforce challenge is how to increase awareness and convince more Alaskans to obtain the foundational skills they need to successfully enter these careers. This issue is also particularly well suited for cross-industry collaboration. Conditions that may seem too big or intractable from the perspective of the workforce development stakeholders in one industry may be more feasible for a coalition of stakeholders from multiple industries.

Action Items

Action items identified below reflect common themes that surfaced in the industry plans, stakeholder interviews, and other research. Additional details are provided for employability skills, career awareness outreach, and direct work experience opportunities given their significance across the industries.

BASIC EMPLOYABILITY SKILLS

Especially in the maritime, oil & gas, construction, and mining industries, a readily trainable employee with a good attitude, an aptitude for critical thinking and problem solving, and a good work ethic can be more valuable than an employee with occupational certifications who lacks those qualities.

Other key soft skills include basic computer proficiency, drug-free, safety awareness, interpersonal communication skills, and ability to handle stress. These last two skills were noted as especially important in the health care industry.

Specific efforts to address gaps in employability skills could include the following:

- Soft skills start with efforts to build the confidence of our youth, through repeated exposure to positive role models and exciting and interesting opportunities. Possible avenues to provide these opportunities include creative partnerships with mentorship organizations such as Big Brothers / Big Sisters and middle and high school programs. The key is that one presentation in a classroom is often not enough; repetition from many different avenues is needed.
- Support for existing programs such as WorkKeys and Youth Employability Skills was also mentioned.

NEED FOR MORE OUTREACH AND AWARENESS ON CAREER OPTIONS

Youth and adults often have a hard time imagining themselves in a career other than those held by members of their family and close friends. This is especially true for jobs that require substantial investments of time and money in education and training, where paybacks lie mostly in the future. Various proposals to address a lack of career awareness were suggested in the plans reviewed and by the stakeholders interviewed:

- Awareness campaigns and public outreach efforts are useful, especially when targeted at key populations such as Alaska Natives, young people entering the workforce, and adults undergoing periods of unemployment. These should include social media outreach among other tools.
- Consider using specialized firms, industry partners, and other experts to help design campaigns that “meet students where they are” and find creative ways to reach Alaskan youth and adults who may not have a specific career in mind or do not have the confidence to devise and follow a career plan.
- Development and promotion of existing industry-related summer camps, short courses, workshops, mentoring opportunities, and introductory programs such as the Intro to Mining program at UAS, the Construction Education Foundation academies, the Alaska Health Care Academy career exploration workshops, and AHEC health career promotion and preparation programs.
- School districts and educators would benefit from additional exposure to Alaska’s industries. Potential outcomes of such efforts include professional development and first-hand experience for educators, career cluster and

pathway resources tailored to Alaska, and an increased understanding of the workforce needs of Alaska's industries.

EXPANDING DIRECT WORK EXPERIENCE OPPORTUNITIES

Employers interviewed put a very high value on direct work experience when evaluating potential job applicants. Across Alaska's industries, a number of approaches are used to provide structured work experience for potential workers. Despite these successes, there is also a recognition of a need to share models, training infrastructure, and recruiting efforts to realize the maximum the potential of direct work experience opportunities. In particular, outreach efforts are needed to increase the number of workers ready to take advantage of these opportunities, as well as the number of employers offering them.

INTERNSHIPS

Many companies utilize internships as either an entry-level hire or a mid-career training opportunity. In health care, internships and residencies are part of the development and qualification process for physicians, imaging specialists, nurses, and other occupations. In the fields of engineering, science, IT, and business services, among others, internships are a common way for students to gain experience and for employers to find promising workers without the commitment of a full-time hire.

TECH-PREP / COOPERATIVE EXPERIENCE

Over 30 high schools in Alaska have tech-prep programs, many of which include employer-assisted experience opportunities (including King Career Center, Hutchison, Mat-Su Career and Technical, and Juneau-Douglas high schools). Most of the tech-prep programs are in the construction and health care areas and include dual-credit (high school and college) options. There are opportunities to add programs, especially in rural school districts, as well as expand local employer involvement in existing programs.

STRUCTURED ON THE JOB TRAINING PROGRAMS

Structured on the job training programs are commonplace in Alaska industries, especially mining, oil & gas, maritime, and health care. These programs speed up the development of entry-level employees into workers that meet the specific needs of employers, including for specialized professions as well as for management and higher level positions that require a broad base of experience. While these programs are highly tailored to each industry and each employer, the lessons learned have broader applications and deserve more widespread attention from workforce development practitioners in Alaska.

REGISTERED APPRENTICESHIPS

Apprenticeship programs have long been a crucial workforce development tool for the Alaska construction industry. According to the Alaska Department of Labor, from 2004 through 2014 registered apprentices in the construction industry represented 12.6 percent of the Alaska construction workforce and 50 percent of all registered apprenticeships in the state.

In Alaska as well as nationwide, the registered apprenticeship model is increasingly being applied to industries not traditionally associated with the practice. The State of Alaska's apprenticeship website (<http://earnandlearnak.org/>) highlights opportunities in traditional apprenticeship fields (for example, oil & gas, construction, and mining) as well as in health care (certified nurse's aides, dispensing opticians, and EMTs, for example), information technology (database administrators, computer and IT managers, and computer support technicians, for example), and other fields with workforce shortages.

These changes are supported by expanded recognition of the importance of apprenticeships under WIOA and related regulations and policies. Given the many industries that can benefit from registered apprenticeships, it is a fruitful area for cross-industry collaboration.

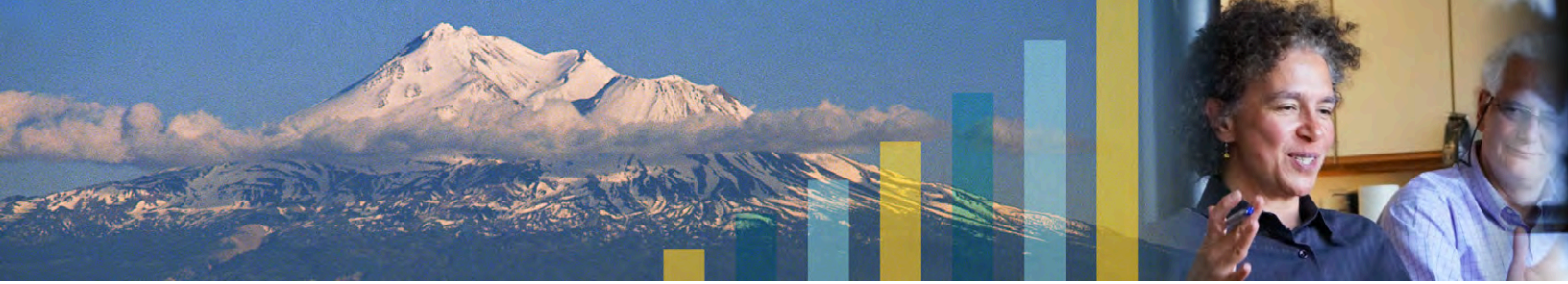
ADDITIONAL AREAS FOR COLLABORATION

- Creative thinking is needed to ensure that more rural residents, including Alaska Natives, can take advantage of the trainings and jobs available in our state. These individuals often struggle with the extreme cultural shifts between home and the various training institutions and programs around the state.

One approach that has shown promise is to organize training efforts and scholarships around cohorts of individuals from similar cultures. This approach takes advantage of group peer support and provides a more tailored network of administrative and other kinds of support.

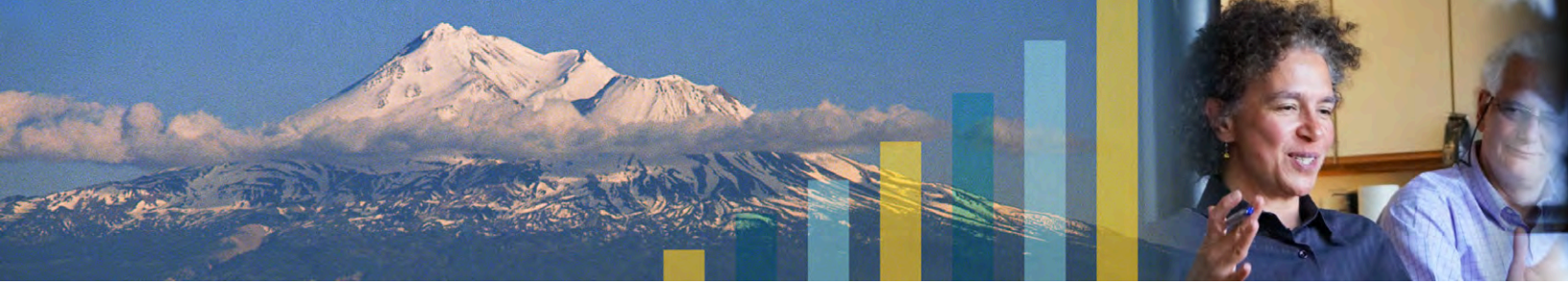
Notable examples in Alaska include EXCEL Alaska, Voyage to Excellence Alaska, Rural Alaska Honors Institute, and others. A successful example in the Lower 48 focused on college age students is the Posse Program (possefoundation.org). The Posse Program brings groups of minority, urban youth to prestigious colleges around the country and has produced graduation rates at or above the average for these schools.

- Support existing STEM education programs where present. In communities or schools without STEM programs, support the creation of new programs built on models that have been shown to be successful – such as the Alaska Native Science and Engineering Program – and are tailored to the particular community or school.
- Further research into effective workforce development strategies that address the needs of businesses and industries for supervisors and managers may be warranted. It is unclear whether such efforts would benefit from a cross-industry approach or are best tackled through industry-specific and company-specific efforts.
- A variety of workforce planning efforts are currently underway, especially as the state adjusts to new regulations and requirements under WIOA. APICC, industry, and key agencies will need to continue to communicate, collaborate, and evolve as new information and plans are developed.



APPENDIX A STAKEHOLDERS INTERVIEWED

- Bill Popp** Anchorage Economic Development Corporation
- Mike Andrews** DOL&WD – Business Partnerships
- Alicia Amberg** Alaska Miners Association
- Meg Day** Donlin Gold LLC
- Mark Hylen** Beacon Occupational Health and Safety Services
- Curtis Clough** Alaska Department of Education and Early Development
- Melanie Millhorn** Hecla Mining
- Gary Turner Kenai** Peninsula College
- Doug Ward** Vigor Alaska
- Ben Eveland** AVTEC
- Julie Decker** Alaska Fisheries Development Association
- Vince O’Shea** Pacific Seafood Processors Association
- Aggie Fouts** Maritime Works
- Dennis Murray** Alaska State Hospital and Nursing Home Association
- Lisa Parady** Alaska Council of School Administrators
- Paul Martz** ADOL&WD – Research & Analysis
- Robby Capps** F&W Construction
- Mike Miller** Granite Construction
- Eryn Jones** Knik Construction
- Andre Spinell** Spinell Homes
- Deborah Erickson** Alaska Department of Health & Social Services
- Pat Carr** Alaska Department of Health & Social Services
- Gloria Burnett** University of Alaska Anchorage, Alaska Center for Rural Health
- Wayne Kuykendall** Savant Alaska LLC
- Kelly Mercer** Bartlett Regional Hospital
- Kathleen Castle** Alaska Construction Academies



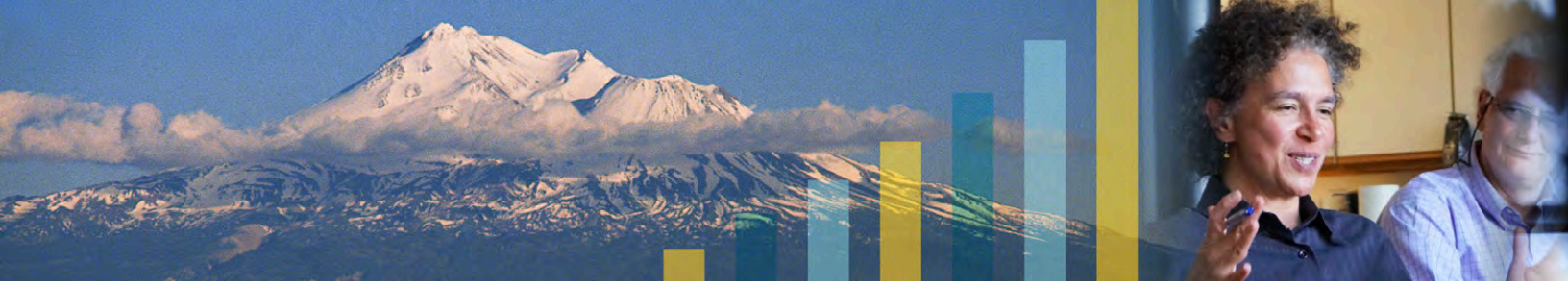
APPENDIX B SOC CODE/OCCUPATION CROSSWALK

SOC CODE	PRIORITY OCCUPATION NAME USED IN THIS REPORT	M	O&G	MA	C	HC
17-3024	Automations Technicians		●			
49-9043	Baader Technician			●		
21-1023	Behavioral Health Clinicians					●
21-1011	Behavioral Health Clinicians					●
21-1014	Behavioral Health Clinicians					●
15-2041	Biometrician			●		
51-9111	Can Machinist			●		
47-2031	Carpenters			●	●	
17-2041	Chemical Engineers		●			
17-2051	Civil Engineers		●			
45-3011	Commercial Seafood Harvester			●		
11-9021	Construction Managers				●	
47-1011	Construction Supervisors				●	
49-3031	Diesel Mechanics	●	●	●	●	
39-9021	Direct Care Worker					●
31-1011	Direct Care Worker					●
29-2053	Direct Care Worker					●
31-1013	Direct Care Worker					●
47-5021	Drillers and Blasters	●			●	
47-5031	Drillers and Blasters	●			●	
49-2094	Electrical and Instrumentation	●	●			
51-2022	Electrical and Instrumentation	●	●			
17-3024	Electrical and Instrumentation	●	●			
17-3029	Electrical and Instrumentation	●	●			
17-3023	Electrical and Instrumentation	●	●			
17-2071	Electrical Engineers		●			
47-2111	Electricians			●	●	
19-2041	Environmental Specialists		●			
49-3042	Equipment Maintenance		●			
49-9041	Equipment Maintenance		●			
19-4021	Fish and Wildlife Technician			●		
11-9121	Fisheries Scientists			●		
19-1023	Fishery Biologist			●		
19-3011	Fishery Economist, Analyst, and Management Specialist			●		
19-4041	Geological and Petroleum Technicians		●			
19-2042	Geoscientists	●	●			
11-9013	Hatchery Manager			●		
47-4041	Hazardous Materials Removal Workers				●	
29-9011	Health and Safety Specialists	●	●			
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers			●	●	
53-3032	Heavy and Tractor-Trailer Truck Drivers	●			●	
51-9061	Inspectors		●	●		
19-4091	Lab Techs	●				
19-4041	Lab Techs	●				
19-4031	Lab Techs	●				
51-4041	Machinists			●		
17-2141	Mechanical Engineers	●	●			

Continued next page →

SOC CODE	PRIORITY OCCUPATION NAME USED IN THIS REPORT	M	O&G	MA	C	HC
17-2131	Metallurgist	●				
51-9021	Mill Operators	●	●			
17-3026	Mill Operators	●	●			
51-8091	Mill Operators	●	●			
49-9044	Millwrights	●			●	
17-2151	Mining Engineers	●				
25-1072	Nurse Educators					●
29-1141	Nurses					●
29-1171	Nurses					●
47-5012	Oil/Gas Drilling		●			
47-5011	Oil/Gas Drilling		●			
47-5013	Oil/Gas Drilling		●			
47-2073	Operating Engineers	●	●		●	
13-1041	Permitting Specialist	●				
17-2171	Petroleum Engineers		●			
29-2052	Pharmacists					●
29-1051	Pharmacists					●
29-1123	Physical Therapists					●
47-2072	Pile-Driver Operators				●	
51-8093	Platform and Pipeline Operations		●			
53-7071	Platform and Pipeline Operations		●			
51-8093	Platform and Pipeline Operations		●			
53-7072	Platform and Pipeline Operations		●			
47-2152	Plumbers, Pipefitters, and Steamfitters		●		●	
29-1062	Primary Care Providers and Practitioners					●
29-1063	Primary Care Providers and Practitioners					●
29-1065	Primary Care Providers and Practitioners					●
29-1064	Primary Care Providers and Practitioners					●
51-8091	Process and Plant Operations		●			
51-9011	Process and Plant Operations		●			
51-8031	Process and Plant Operations		●			
51-8013	Process and Plant Operations		●			
51-8021	Process and Plant Operations		●			
51-8092	Process and Plant Operations		●			
29-1066	Psychiatrists					●
51-9193	Refrigeration Technician			●		
17-2112	Seafood Plant and Floating Processor Engineer			●		
11-3051	Seafood Production Manager			●		
19-4011	Seafood Production Manager			●		
51-2099	Ship Builder			●		
51-2041	Ship Builder			●		
29-1151	Specialty Nurses					●
29-1124	Specialty Nurses					●
29-1127	Speech-Language Pathologists					●
49-2022	Telecommunications Specialists		●			
47-5049	Underground Miner	●				
47-5041	Underground Miner	●				
47-5061	Underground Miner	●				
53-5011	Vessel Operations			●		
53-5021	Vessel Operations			●		
51-4121	Welders		●	●	●	

Source and Notes: Priority occupations derived from a combination of feedback from key industry stakeholders and workforce development plans prepared by the oil & gas (O&G), mining (MI), maritime (MA), construction (C), and health care (HC) industries. The absence of checkmark for a particular occupation, does not mean that the occupation is not needed for a particular industry, only that it wasn't listed as the top priority occupations for that industry.



APPENDIX C CLUSTERS AND PATHWAYS BY PRIORITY OCCUPATION

CLUSTERS AND PATHWAYS	EXPECTED OPENINGS IN PRIORITY OCCUPATIONS IN CLUSTER/PATHWAY 2012-2022	PRIORITY OCCUPATIONS IN CLUSTER/PATHWAY
Agriculture, Food and Natural Resource Cluster	2,191	14
Environmental Service Systems Pathway	198	1
Hazardous Materials Removal Workers	198	1
Food Products and Processing Systems Pathway	31	2
Seafood Production Manager	31	2
Natural Resources Systems Pathway	1,962	11
Commercial Seafood Harvester	229	1
Environmental Specialists	270	1
Fishery Biologist	243	1
Geological and Petroleum Technicians	378	1
Oil/Gas Drilling	499	3
Platform and Pipeline Operations	343	4
Architecture and Construction Cluster	4,437	12
Maintenance/Operations Pathway	83	1
Heating, Air Conditioning, and Refrigeration Mechanics	83	1
Construction Pathway	4,354	11
Carpenters	956	1
Construction Supervisors	359	1
Drillers and Blasters	70	2
Electricians	791	1
Operating Engineers	1,344	1
Pile-Driver Operators	23	1
Plumbers, Pipefitters, and Steamfitters	627	1
Underground Miner	184	3
Arts, Audio/Video Technology and Communications Cluster	131	1
Telecommunications Pathway	131	1
Telecommunications Specialists	131	1
Business, Management and Administration Cluster	15	1
Management Pathway	15	1
Fishery Economist, Analyst, and Management Specialist	15	1
Health Science Cluster	7,873	20
Diagnostics Services Pathway	n/a	2
Specialty Nurses	n/a	2
Therapeutic Services Pathway	4,233	14
Direct Care Worker	3,502	4
Nurse Educators	35	1
Pharmacists	360	2
Physical Therapists	138	1
Primary Care Providers and Practitioners	242	4
Psychiatrists	26	1

CLUSTERS AND PATHWAYS	EXPECTED OPENINGS IN PRIORITY OCCUPATIONS IN CLUSTER/PATHWAY 2012-2022	PRIORITY OCCUPATIONS IN CLUSTER/PATHWAY
Speech-Language Pathologists	68	1
Human Service Cluster	700	3
Counseling and Mental Health Services Pathway	700	3
Behavioral Health Clinicians	700	3
Manufacturing Career Cluster	3,066	29
Maintenance, Installation and Repair Pathway	927	5
– Baader Technician	86	1
– Equipment Maintenance	504	2
– Fish and Wildlife Technician	240	1
– Millwrights	97	1
Manufacturing Production Process Development Pathway	1,455	17
– Lab Techs	566	3
– Mill Operators	64	3
– Process and Plant Operations	409	6
– Electrical and Instrumentation	416	5
Production Pathway	495	6
– Can Machinist	47	1
– Machinists	62	1
– Refrigeration Technician	n/a	1
– Ship Builder	68	2
– Welders	318	1
Quality Assurance Pathway	189	1
– Inspectors	189	1
Science, Technology, Engineering and Mathematics Cluster	1,009	11
Engineering and Technology Pathway	805	9
– Automations Technicians	39	1
– Chemical Engineers	15	1
– Civil Engineers	228	1
– Electrical Engineers	104	1
– Mechanical Engineers	110	1
– Metallurgist	29	1
– Mining Engineers	71	1
– Petroleum Engineers	198	1
– Seafood Plant and Floating Processor Engineer	11	1
Science and Mathematics Pathway	204	2
– Biometrician	11	1
– Geoscientists	193	1
Transportation, Distribution, and Logistics Cluster	1,805	6
Facility and Mobile Equipment Maintenance Pathway	281	3
– Diesel Mechanics	242	1
– Vessel Repair and Maintenance	39	2
Transportation Operations Pathway	1,524	3
– Heavy and Tractor-Trailer Truck Drivers	901	1
– Vessel Operations	623	2

Source and Notes: Occupations matched to SOC codes and then to Career Clusters and Pathways via a crosswalk spreadsheet available at <http://www.careertech.org/crosswalks>. When multiple clusters/pathways were matched to an occupation, one option was chosen based on fit with Alaska industries. Data on projected openings by occupation obtained from the Alaska Department of Labor.