200-2000-08017, Task Order 18

National Assessment of the Occupational Safety and Health Workforce

Authors

M. Timothy McAdams, MSPH
Jeffrey J. Kerwin, PhD
Vanessa Olivo, MPH
Huseyin A. Goksel, M.St, MA

October 3, 2011

Prepared for:
National Institute for Occupational Safety and Health
Office of Extramural Programs
1600 Clifton Road
Atlanta, GA 30333

Prepared by:
Westat
1600 Research Boulevard
Rockville, Maryland 20850-3129
(301) 251-1500

Westat®

Acknowledgements

This report was prepared for the National Institute for Occupational Safety and Health, Office of Extramural Programs, under Contract 200-2000-08017, Task Order 18, by Westat, Rockville, MD.

The authors of this report are M. Timothy McAdams, MSPH, Project Director; Jeffrey J. Kerwin, Ph.D.; Vanessa Olivo, MPH; and Huseyin A. Goksel, M.St., MA. The authors thank Stephen K. Dietz, MA, retired Westat Vice President, for his assistance with focus groups, survey planning, questionnaire development, and materials review.

The authors also thank the NIOSH Task Order Technical Advisor for his leadership of this assessment, M. Chris Langub, Ph.D., of the NIOSH Office of Extramural Programs. He was assisted by the late John T. Talty, who for many decades served as program officer responsible for Education and Research Centers and Training Project Grants. The authors also thank W. James Newhall, Ph.D., former Director NIOSH Office of Extramural Programs; W. Allen Robison, Ph.D., current Director, NIOSH Office of Extramural Programs; and Sarah A. Felknor, Dr.PH, who served as chairperson of the Task Force and currently serves as NIOSH Associate Director for Research Integration and Extramural Performance.

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Executive Summary

Background

A fundamental part of the mission of the National Institute for Occupational Safety and Health (NIOSH) is developing and supporting a new generation of occupational safety and health (OS&H) professionals, which in turn is critical to the future of occupational safety and health. As part of its mission, NIOSH therefore funds programs to support occupational safety and health education through regional university-based Education and Research Centers and Training Project Grants. NIOSH currently supports training in nine disciplines—occupational safety, industrial hygiene, occupational medicine, occupational health nursing, health physics, ergonomics, occupational epidemiology, occupational health psychology, and occupational injury prevention.

The changing nature of the U.S. economy, along with the shifting needs of the workforce, requires NIOSH to understand whether it is providing sufficient support for the training of OS&H professionals and, of equal importance, whether it is supporting the kind of training employers need to meet their OS&H program requirements. The National Assessment of the Occupational Safety & Health Workforce was conducted to help NIOSH determine how best to utilize and disseminate its training funds. The two key needs NIOSH expressed for this assessment were to:

- Assess the current supply and future demand for OS&H professionals; and
- Determine the desired professional competencies (i.e., knowledge, skills, and abilities) required for the next 5 years.

NIOSH determined that any assessment capable of providing reliable information to answer these questions would require surveying both employers of OS&H professionals and providers of training to OS&H professionals. The Employer Survey component of the assessment was therefore drawn from across the broadest possible spectrum of the U. S. economy. The Provider Survey was directed at all U.S.-based educational institutions providing training to OS&H professionals at the bachelor's degree level and higher. An advisory Task Force, consisting of OS&H professionals from a variety of businesses, Government, unions and academia, was created to provide input on the development and conduct of the assessment. Prior to the two surveys, NIOSH also received valuable input from focus groups with professionals from the nine OS&H disciplines of interest to the assessment, as well as employers and trainers of OS&H professionals.

Westat, a statistical and survey support contractor based in Rockville, MD, conducted the assessment under a contract with NIOSH.

Employer Survey Methodology

The Employer Survey used a national probability sample designed to cover the vast majority of employers of OS&H professionals. Following this approach, North American Industry Classification System (NAICS) codes were selected that identified establishments employing 75 percent of all OS&H specialists. The study was limited to these establishments in consideration of costs and likelihood of locating OS&H professionals. A stratified sample of 7,602 establishments was drawn based on an assumption that at least 85 percent of them could be reached during the screening process. For most employer categories, the sample was limited to establishments employing 100 or more persons. For consultants and government locations, establishments with as few as 10 employees were included. A sample generated from a supplemental list of occupational health clinics, regardless of size, was also used.

Sampled establishments were screened by telephone to determine whether they directly employed at least one OS&H professional, and if so, to identify and invite the person most knowledgeable about OS&H activity at the establishment to respond to a web survey. The questionnaire collected information about OS&H professionals at the sampled establishment, the professionals' training needs, the establishment's expected hiring needs over the next 5 years, and related topics. During the January-April 2011 data collection period, 470 completed surveys, and another 69 partially completed surveys contributed to data analysis. The final response rate was 34.5 percent.

Provider Survey Methodology

For the Provider Survey, a survey population composed of NIOSH-supported and non-NIOSH supported OS&H academic programs at a U.S.-based institution that: (1) included coursework in one or more of the nine OS&H disciplines of interest to the survey; and (2) was part of a course of study leading to a bachelor's degree or higher. To identify eligible programs, information was obtained about programs through Education and Research Centers (ERCs) and Training Project Grants (TPGs) as well as through relevant professional associations and professional certification bodies. This information was supplemented through literature searches. After de-duplication, the

final product of this research was a list of 340 OS&H education and training programs, which served as the target population for the Provider Survey.

As with the Employer Survey, data collection was conducted through a web survey. This questionnaire collected information about numbers of expected graduates (both in the current year and over the next 5 years, trends in enrollment, quality of students, funding for the programs, barriers to students wishing to study OS&H, trends in employment for their graduates, faculty characteristics, including future hiring and expected retirements, and trends in continuing education needs. The Provider Survey was conducted from February until early May 2011. A total of 202 surveys were completed, for a final response rate of 65.2 percent.

Study Limitations

While the assessment provides a rich source of data on the demand for and supply of OS&H professionals, along with their training needs, it is important to recognize that like all surveys, the Employer and Provider Surveys are subject to various sources of error. Some of the estimates produced from the Employer Survey are based on rather small samples of employers. In particular, very few employers we surveyed reported that they employ ergonomists, health physicists, occupational epidemiologists, injury prevention specialists, or occupational health psychologists. As a result, the estimate we have generated for these professions are potentially subject to high degrees of sampling error, and thus have wide confidence intervals. The results may also be subject to various sources of measurement error—such as respondents misunderstanding the intent of survey questions, or possessing little knowledge on some of the topics addressed. Finally, the estimates derived from the data may be subject to some degree of nonresponse error—bias due to systematic differences between survey respondents and those who did not respond to our survey requests.

Results

The Employer and Provider Surveys provided considerable data on a variety of topics of interest to the many stakeholders in occupational safety and health professions. This report focuses on data pertaining to NIOSH's two key objectives for conducting the workforce assessment. Highlights of the research findings follow.

Current Size of Workforce

The survey shows that currently there are over 48,000 OS&H professionals in the U.S. workforce across the nine disciplines of interest to this study: The composition of the current OS&H workforce is primarily safety professionals (59%), followed by industrial hygienists (15%). The other major disciplines represented in the survey data were occupational health nursing (9%) and occupational medicine (3%).

Employer Survey Data

- Employers expect to hire over 25,000 OS&H professionals over the next 5 years, needing to fill an average of just over 5,000 positions per year; while many of these positions will be filled by new graduates of OS&H training programs, many are likely to be filled by OS&H professionals currently in the workforce or by professionals who do not have OS&H training. These latter groups were not included in this survey.
- Safety professionals represent about 71 percent of the OS&H professionals employers expect to hire over the next 5 years; about 76 percent of these are expected to be bachelor's degree-level professionals.
- Employers expect about 10 percent of safety professionals to retire within the next year; for the other OS&H professions the retirement projections are lower.
- The workforce is graying, more among occupational physicians and occupational health nurses than safety and industrial hygiene professionals; however, we estimate that a large number of OS&H professionals in these disciplines are over the age of 50.
- Employers generally seemed satisfied with the level of competency of current graduates. For future hires, employers for some disciplines seemed to desire that new OS&H graduates also have training in non-core competencies and in other OS&H areas.

Training Program Provider Expectations for New OS&H Graduates

- In 2011, OS&H programs graduated about 2,845 new OS&H professionals at the bachelor's degree level and higher; and over 5 years expect to graduate just under 13,000 OS&H professionals. The 5-year projection represents a slight decline in enrollment. The decline is projected to be about 3 percent in ERCS, 8 percent in TPGs, and 13 percent in non-NIOSH funded programs.
- Over the next 5 years, about 69 percent of OS&H graduates will be from safety programs, 12 percent will be from industrial hygiene programs, and 3 percent each will be from occupational medicine and occupational health nursing programs.

Data from providers also shows that there has been an overall decline in OS&H program funding over the past 5 years. While funding from outside sources has held steady or increased, funding from within the institution appears to have decreased. The decrease appears to be more common among non-NIOSH funded programs.

Conclusions and Recommendations

Difference Between Expected Hires and Expected Graduates. The estimated number of OS&H professionals employers expect to hire in 2011 and over the next 5 years is substantially higher than the number estimated to be produced from OS&H training programs. It is unclear to what extent the estimated number to be hired will be new OS&H program graduates versus OS&H professionals currently in the workforce or non-OS&H trained professionals. However, the differences overall and among individual disciplines suggest the need to produce additional graduates. Anticipated retirement figures notwithstanding, this applies to the four major OS&H disciplines (safety, industrial hygiene, occupational medicine, and occupational health nursing), but particularly to safety and occupational health nursing. A joint effort of employers and providers may be a desired approach to determining how to best address the apparent decline in enrollment to close the difference between estimates of OS&H professionals needed and the estimates of graduating OS&H professionals.

Apparent Decline in OS&H Program Funding. The apparent overall decline in funding for OS&H programs from university, college or department sources, particularly among programs not provided funding by NIOSH, along with the projected decline in the numbers of OS&H students, is troubling given employers' hiring expectations, anticipated retirement figures, the "graying" of some of the disciplines, and the quality of students enrolling in programs. Additional study may be worthwhile to identify means to address the decline in funding as well as the obstacles cited by provider respondents interfering with students who might wish to pursue an OS&H degree. The most frequently cited obstacles for students were financial aid and lack of knowledge of the program. Employers and providers should work together to determine how best to improve knowledge of programs among students in the early years of college and before they reach college.

Competencies of OS&H Professionals. Survey results regarding competencies of current OS&H professionals suggest that employers generally are satisfied with their employees' level of training in their work areas. Employers' desired competencies for new hires appear to be similar to those for

current OS&H employees. However, the survey data show a desire for new hires to have training in additional areas, primarily relating to leadership and various forms of communication, and to have training in one or more of the other disciplines of interest to this study. There also appears to be a preference on the part of many employers to focus hiring among bachelor's-level graduates. Providers and employers will also need to continue to work together to assess what competencies can or should be part of undergraduate education.

Background and Purpose 1

1.1 History and Previous Studies

In the United States, occupational safety and health (OS&H) emerged as a career field during the 1970s. Degree and other types of training programs focused at health and safety were developed after the U.S. Congress passed the Occupational Safety and Health Act of 1970, and created the National Institute for Occupational Safety and Health (NIOSH) and the Occupational Safety and Health Administration (OSHA)[1]. Since that time, workplaces in the United States have undergone continuous and substantial changes due to technological advances and global economic restructuring, including downsizing, off-site work, use of temporary labor, self-employment, growth in small and medium sized enterprises, and diversity in age, gender, race, and nationality[2]. In addition, the focus of the OS&H profession has shifted from being compliance-oriented to being prevention-oriented with emphasis on ensuring health and safety in the workplace[3]. To meet current needs, additional content and contextual modifications are required in OS&H professional training programs. Additionally, research is necessary to assess the impact on the OS&H workforce of the aging of qualified professionals and whether there are sufficient financial incentives to pursue careers or additional education in OS&H[4].

Because of the changes that have occurred over the past 4 decades, NIOSH has sponsored OS&H workforce assessments in 1977, 1985, and 2000. In 2000, the Institute of Medicine (IOM) conducted a fourfold assessment addressing: (1) demand and supply of OS&H professionals, (2) changes in workforce and work environment affecting the roles of OS&H professionals, (3) gaps in current OS&H education and training, and (4) critical curricula and skills needed to meet evolving OS&H concerns[5].

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[1] Home page of the National Institute for Occupational Safety and Health (NIOSH) -www.cdc.gov/niosh/about.html.

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[3] Janicak CA. Is history repeating itself? Safety Circle, American Society of Safety Engineers, Issue 668, May 2008. http://sanfrancisco.asse.org/docs/0805.pdf

[4] *Ibid.*

[5] Safe work in the 21st Century: Education and training needs for the next decade's occupational safety and health personnel. *Op cit.*

Recognizing the dynamic nature of the U.S. workplace, NIOSH has conducted this assessment to examine the OS&H workforce of the future. The objectives of this assessment were to: (1) assess the supply of, and demand for, OS&H professionals, and (2) determine required professional competencies (e.g., knowledge, skills, and abilities) for the coming decades. This work was designed to build on and update previous work conducted by the IOM.

Developing and supporting a new generation of practitioners is critical to the future of occupational safety and health. As part of its mission to increase safety and protect worker health, NIOSH supports training of OS&H professionals and researchers in regional university-based Education and Research Centers (ERCs) and Training Project Grants (TPGs) in the areas of industrial hygiene, occupational health nursing, occupational medicine, occupational safety, health physics, occupational injury prevention, occupational health epidemiology, and occupational health psychology[6] . The U.S. Bureau of Labor Statistics[7] (BLS) noted that in 2008, Occupational Health and Safety (OHS) specialists held about 55,800 jobs, with projected employment of 62,000 in the year 2018; representing an overall increase of 11 percent. It was estimated that 2 of 5 positions were with government agencies (local, state, and Federal). The OHS specialist designation encompasses several of the disciplines for which NIOSH provides training funds. However, it includes environmental protection specialists, for which NIOSH does not provide training support. Also, the OHS specialist designation does not include occupational medicine and occupational health nursing, which are part of NIOSH-supported training programs.

1.2 Current Need

The changes in the workplace cited above require that the training for OS&H professionals keep pace with evolving need. While the overall impact of contextual changes in the workplace on the demand for OS&H professionals is not clear, these changes have implications for sector specific balance in the demand and supply. They also have implications for the development and implementation of new curriculum and training modules within academic and non-academic settings.

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[6] Home page of the National Institute for Occupational Safety and Health (NIOSH) Office of Extramural Programs http://www.cdc.gov/niosh/oep/default.html.

[7] Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook, 2010-11 Edition*, Occupational Health and Safety Specialists, on the Internet at http://www.bls.gov/oco/ocos323.htm (visited *September 03, 2011*).

1.3 Rationale for the Present Study

Training in OS&H subject matter is provided in colleges, universities, and training centers across the United States in undergraduate, graduate, and continuing education curricula. In addition to being the focal point of many degree programs, some OS&H competencies are provided as part of degree requirements for other programs. For example, safety courses may be required as part of some engineering program curricula.

To foster growth and professionalism of OS&H professions, NIOSH provides funding for the training and continuing education of OS&H professionals through regional university-based ERCs and through the individual TPGs. The ERCs and TPGs represent an important fraction of the overall OS&H training conducted in the United States. Additionally, the OS&H professionals who complete these programs form an important component of the overall U.S. OS&H workforce. With the changing nature of the U.S. economy, along with the shifting needs of the workforce, NIOSH needs to understand whether it is providing sufficient support for the training of OS&H professionals and, of equal importance, is it supporting the kind of training employers need to meet their OS&H program requirements. Therefore, the National Assessment of the Occupational, Safety & Health Workforce was developed to help NIOSH determine how best to disseminate its training funds. The two key needs NIOSH expressed for this assessment were to:

- Assess the current supply and future demand for OS&H professionals; and
- Determine the desired professional competencies (i.e., knowledge, skills, and abilities) required for the next 5 years.

BLS data provides important information about the total numbers of OHS safety specialists needed; however, it does not provide information by individual discipline. NIOSH currently provides training funds in the nine disciplines listed below. These disciplines are listed along with a definition for each prepared with the assistance of members of the Task Force NIOSH created to advise it on this assessment:

- **Occupational Safety.** Work to minimize the frequency and severity of accidents, incidents, and events that harm workers, property, or the environment. They evaluate potential hazards to identify the likelihood and severity of occurrence, and implement measures to minimize the hazard.
- **Industrial Hygiene.** Identify, evaluate, and control of chemical, biological, and physical agents or ergonomic factors in the workplace that may cause illness, injury, discomfort, or inefficiency among workers.

- **Occupational Medicine.** Medical doctors or doctors of osteopathy, who prevent, diagnose and treat occupational and environmental diseases and injuries. They may also determine an employee's fitness for work.

- **Occupational Health Nursing.** Registered nurses and nurse practitioners with experience and additional education in occupational health. They routinely coordinate and manage the care of ill and injured workers, and support lifestyle changes that lower the risk of disease and injury.

- **Ergonomics.** Work to improve the workplace by fitting facilities, equipment, tools, and work activities to people. They consider the design of industrial, office, and other environments to enhance worker comfort, safety and productivity.

- **Health Physics.** Work to protect workers and the environment from hazardous radiation exposure.

- **Occupational Health Epidemiology.** Study the occurrence of disease and other health-related outcomes in the workplace. They use scientific and statistical methods to collect and analyze data to reduce the risk of adverse health outcomes, promote worker health, and support the scientific basis for regulation and control of occupational exposures.

- **Occupational Health Psychology.** Apply the discipline of psychology to improve the quality of work life, and to protect and promote the safety, health, and well-being of workers. The primary focus of occupational health psychology is on organizational and job-design factors that contribute to injury and illness at work, including stress-related disorders.

- **Occupational Injury Prevention.** Conduct research and/or develop and evaluate programs to reduce the burden of injury in the workplace. This involves the design and implementation of studies and programs that identify and evaluate environmental, behavioral, work culture, or other types of risk factors for injury incidence and the identification, implementation, and evaluation of programs that prevent injury occurrence or intervene to reduce injury severity and consequences.

NIOSH needed to know the current employment of, and future demand for, OS&H professionals trained in these disciplines, as well as the need for cross-training among these disciplines and the need for new and emerging skills and abilities.

Data collected through this assessment will be used to help NIOSH determine its priorities for OS&H training for the next several years.

1.4 Organization of the Report

A summary discussing how this assessment was planned and developed is contained in Section 2.0. Section 3.0 describes the Employer Survey. It includes a discussion of how it was conducted and the response rate and weights; also, data obtained from the survey are presented in a series of tables. A similar discussion of the Provider Survey is included in Section 4.0, also with survey data presented in a series of tables. A discussion of the data, focusing on the key research questions of interest to NIOSH, is presented in Section 5.0. The primary survey materials are presented in the appendices.

Survey Design 2

This section summarizes how NIOSH constructed the National Assessment of the OS&H Workforce to address the need for the data.

2.1 Key Research Questions

The key research questions to be answered by the present study were based on the rationale stated above. These objectives were re-stated into the following research questions:

- What is the current supply of OS&H professionals being produced by education providers across the United States?
- What is the current level of employment of OS&H professionals across the United States?
- What is the expected number of graduates of OS&H training programs over the next 5 years?
- What is the expected number of OS&H professionals employers expect to hire over the next 5 years?
- What are employers" desired professional competencies (i.e., knowledge, skills, and abilities) required of OS&H professionals for the next 5 years.

To meet the research objectives established for this workforce assessment, NIOSH requested that Westat conduct as broad a survey among employers as was possible to establish as accurately as possible the current supply of and future demand for OS&H professionals. NIOSH first expanded the assessment beyond the 4 disciplines whose training it traditionally had supported (safety, industrial hygiene, medicine, and nursing) to include ergonomics, health physics, occupational injury prevention, occupational epidemiology, and occupational health psychology. This breadth of coverage of employment of these OS&H disciplines included maximizing coverage across private and public sector employers included in the U.S. economy according to the North American Industry Classification System (NAICS). It also included ensuring that the questionnaire included the employment and training issues of greatest concern to employers.

NIOSH also requested that Westat identify and survey programs across the United States that provide training to OS&H professionals among the disciplines of interest to the study. No comprehensive list of these providers could be located. However, NIOSH provided a list of the regional university-based Education and Research Centers (ERCs) and Training Project Grants (TPGs) that it funds to train OS&H professionals. Westat supplemented this list with information obtained from professional associations, professional certification bodies, from Task Force contacts, and through literature review.

2.2 Need for a Two-Survey Strategy

A major challenge for this study was to construct an assessment that could provide reliable information to answer the key research questions. To meet the objectives, NIOSH determined that it would be necessary to survey both employers of OS&H professionals and providers of training to OS&H professionals. Therefore, they decided to conduct an Employer Survey from among the broadest possible spectrum of the U.S. economy, and a Provider Survey from among the educational institutions providing training to OS&H professionals at the bachelor's degree level and higher. NIOSH also determined that in constructing the assessment it would need to obtain input from across the spectrum of OS&H employers and employment arrangements, as well as from training providers, including those who do not receive NIOSH funds for training.

NIOSH created an advisory Task Force to provide input on the development and conduct of the assessment. Its members included OS&H professionals from a variety of businesses, government, unions and academia. Members from academia also included representatives from the ERCs and TPGs. The Task Force membership and their affiliations are shown in Table 2-1. Its members provided NIOSH with input on issues of key importance to employers and to providers of OS&H training based on their experience. They also helped to identify key measures needed for the comparison of data from the two surveys. The Task Force also provided feedback on questionnaires drafted for data collection.

In addition to the Task Force, an important means to ensuring broad input to the assessment was inclusion of a spectrum of employers and providers in designing the assessment. Therefore, NIOSH committed to conducting a series of focus groups from among employers and trainers of the nine OS&H disciplines of interest to the assessment.

Table 2-1. Workforce assessment task force members

Name	Affiliation
Sarah Felknor, Ph.D. (Chair)	University of Texas School of Public Health, Houston
Corinne Peek-Asa, Ph.D., MPH	University of Iowa
Dean Baker, MD, MPH	University of California-Irvine
Patricia Bertsche, MPH, RN	Abbott Laboratories
Michael Bisesi, Ph.D., REHS, CIH	Ohio State University
Wesley Bolch, Ph.D.	University of Florida
Thomas Broderick	Construction Safety Council
Peter Chen, Ph.D.	Colorado State University
Lorraine Conroy, Sc.D., CIH	University of Illinois at Chicago
Sue Davis, Ph.D., RN	University of Cincinnati
Kimberly Gordon, MSN, MA, COHN-S	University of Iowa
W. Monroe Keyserling, Ph.D.	University of Michigan
William Kojola. MS	AFL-CIO
Jeffrey Levin, MD, MSPH	University of Texas Health Science Center, Tyler
Elizabeth Maples, Ph.D., MPH	University of Alabama – Birmingham
Chris Martin, MD, MS	West Virginia University
Keshia Pollack, Ph.D., MPH	Johns Hopkins University
James D. Ramsay, Ph.D., MA, CSP	Embry-Riddle Aeronautical University
Bonnie Rogers, Dr.PH, COHN-S, FAAN	University of North Carolina at Chapel Hill
Lee Saperstein, Ph.D.	University of Missouri-Rolla (retired)
Charles Shields, MS, CIH, CSP	USDOL/OSHA
Pam Wilkerson	CDC-NIOSH
Frank White	ORC Worldwide

2.3 Survey Development

NIOSH contracted with Westat, a statistical and survey support contractor based in Rockville, Maryland, to conduct the workforce assessment. Westat's responsibilities for the assessment included conducting focus groups, designing and pretesting questionnaires for the two surveys, developing all survey materials including programming the surveys, preparing materials for Office of Management and Budget (OMB) review, drawing the sample of employers and developing a complete frame of OS&H education providers, conducting data collection, cleaning and weighting of the data, conducting data analyses and reporting.

Westat first met with the NIOSH Workforce Assessment leadership to learn about the research protocol and to discuss and identify issues of critical concern. Westat also participated in conference calls with members of the Workforce Assessment Task Force and recorded key decisions from these

meetings. These discussions provided information that was useful to preparation of focus group discussion guides.

2.3.1 Focus Groups

The primary source of information used to develop the questionnaire for the Employer Survey and the Provider Survey was a series of 12 focus groups with different stakeholder groups conducted between November 2008 and September 2009. Table 2-2 lists the focus groups conducted either in person or by teleconference. Westat conducted focus groups with large and small employers as well as among professionals representing the nine OS&H disciplines included in the assessment. Westat also conducted focus groups with providers of training to OS&H professionals from among programs supported with NIOSH training funds and those not supported by NIOSH.

Table 2-2. Workforce assessment focus groups

- Industrial Hygiene
- Occupational Safety and Ergonomics
- Occupational Medicine
- Occupational Health Nursing
- Health Physics*
- Occupational Injury Prevention*
- Occupational Epidemiology*
- Occupational Health Psychology*
- Large Business Employers of OS&H Professionals
- Small Business Employers of OS&H Professionals*
- NIOSH-funded Providers of OS&H Education Services
- Non-NIOSH-funded Providers of OS&H Education Services*

* Teleconference.

Information gained from the focus groups was used to identify important lines of questioning to use in the questionnaire. Also obtained were examples of critical skills required, the relative importance of cross training, certification, and other issues. In addition, these focus groups resulted in identification of issues that were of unique importance to a particular discipline and ensure they were included in the questionnaires for the respective surveys. The focus groups provided us with valuable information regarding the wide variety of potential employment arrangements and settings in which OS&H professionals may operate, as well as valuable insight about the typical sizes of different types of employers. This information contributed to the development of the sampling

strategy for the Employer Survey. Westat prepared a summary from each focus group and delivered it to NIOSH.

2.3.2 Questionnaire Development

Westat developed draft employer and provider questionnaires based on information learned from the focus groups as well as from discussions with NIOSH and the teleconferences with the Task Force. NIOSH and Westat thoroughly reviewed both draft instruments and provided feedback and critical input. To facilitate NIOSH and Task Force review, Westat also mapped key information obtained from focus groups and from Task Force review to questions included in each questionnaire. NIOSH then submitted the revised draft questionnaires to the Task Force for review and comment.

NIOSH convened a meeting of the Task Force at Westat facilities on June 8-9, 2009. The draft questionnaires for the Employer and Provider Surveys were reviewed as were the survey plans. Subsequent to the meeting, Westat and NIOSH reviewed the Task Force recommendations and then made revisions to the questionnaires based on the inputs received. Westat also prepared a document detailing NIOSH's response to each recommendation made and whether it was incorporated into the questionnaire or the survey plan.

Both surveys were designed and implemented as web surveys.

2.3.2.1 Employer Questionnaire

NIOSH, the Task Force members, and Westat staff all reviewed the Employer Survey questionnaire and contributed inputs that led to improvements. After incorporating all changes to the instrument based on NIOSH and Task Force comments, and then reviewing changes with NIOSH, Westat conducted a pre-test of the final draft questionnaire. Respondents from fewer than nine employers were recruited to obtain feedback on content, language and layout and then incorporated minor changes. The pre-test helped to ensure that the questionnaire proceeded smoothly and would not be overly burdensome on large employer respondents. Pre-test results also were used to help estimate the time required to complete the instrument, and this information was used in the OMB package to estimate respondent burden.

For the Employer Survey, Westat developed a modular questionnaire that began with key questions designed first to confirm the establishment's eligibility originally noted during the telephone screening process. The next questions were designed to identify which of the nine disciplines of interest to the survey were represented at the establishment. The responses to these questions directed the respondent to modules specific to each discipline that collected information about training needs in that discipline. Employers were also asked to indicate whether they expect to hire professionals within each of the disciplines of interest to NIOSH, and where applicable, to indicate the skills and capabilities in that discipline that would be desired in new hires. Respondents saw only those questions for disciplines they indicated were present among establishment employees, or in which they expected to hire. At the completion of module questions, a final section asked additional questions that pertained to OS&H at the establishment, including how they support OS&H Continuing Education for their employees, the degree of difficulty they have experienced hiring qualified OS&H professionals in recent years, and related issues.

The first question in the first module, the "Your Occupational Safety and Health Professionals" section, was designed to confirm the establishment's eligibility. The questions used during the telephone screening to determine establishment eligibility were designed to be answered by a gatekeeper if the caller was unable to reach designated OS&H staff. Therefore, they were constructed assuming the person answering questions may not have a depth of knowledge about OS&H work that the desired survey respondent would have. They therefore simply asked whether a person or persons responsible or OS&H activities were employed at the establishment. In the web questionnaire, the first question was designed to ascertain whether any OS&H professional who had obtained at least a bachelor's degree in an OS&H discipline was employed by the establishment. Please note that employers were instructed not to consider consultants and contractors who may work at the sampled location – instead, these OS&H professionals were to be counted by the organizations that directly employ them.

Upon an affirmative response to the first question, the respondent was asked to complete a grid requesting information about the types of OS&H work up to eight employees perform and what training they have had. Where establishments employed more than eight OS&H professionals, the respondent was asked to contact Westat for guidance in selecting a random sampling of eight professional staff about whom to provide responses. Based on the responses to the questions in the grid, the respondent was directed to one or more of up to nine modules regarding work activities and training; one each for the nine OS&H disciplines of interest to the assessment. The respondent was then directed to the sections future hiring expectations and relevant skills and capabilities

desired. The questionnaire ended with a set of questions about the facility and some general questions.

2.3.2.2 Provider Questionnaire

The unit of observation for the Provider Survey was the academic program rather than the department, college or university. Westat assigned each academic program identified to one of nine OS&H related disciplines based on research conducted as part of developing the comprehensive list of provider institutions and programs. Like the Employer Survey, the Provider Survey was a modular questionnaire. At the beginning, it included a short series of questions about the specified academic program and the respondent's expectations for the future.

The questionnaire was designed to record information only for the individual OS& H-related program specified in the questionnaire text. The information collected about each program surveyed included:

- The numbers of expected graduates;
- Trends in enrollment;
- Trends in continuing education needs;
- Trends in quality of students;
- Barriers to students wishing to study OS&H;
- Trends in funding to the program;
- Trends in employment for program graduates; and
- Faculty characteristics, including future hiring and expected retirements.

The draft questionnaire was updated based on comments received from NIOSH and Task Force reviewers. Westat then pre-tested the provider questionnaire with representatives from eight OS&H education and training providers to obtain feedback on content, language and layout and then incorporated additional minor changes. The pre-test was used to help estimate the time required to complete the instrument, and used this information in the OMB package. The pre-test helped to ensure that the questionnaire proceeded smoothly and would not be burdensome to respondents.

2.3.3 OMB Review and Approval

After questionnaire development was complete, Westat began preparing documentation necessary to submit to the OMB for approval of the surveys. The package included a draft Federal Register Notice, a discussion of the survey plan, sampling plan, and all survey materials. Descriptions of the survey plans, the Employer Survey sampling plan, and the Provider Survey study population are discussed in the sections for the respective surveys.

The 60-day Federal Register Notice was published on November 13, 2009. At the end of the comment period, NIOSH and Westat evaluated comments and began preparing responses. As part of preparing responses, NIOSH and Westat met by telephone with some commenter's to obtain additional information regarding their concerns and to discuss possible responses to allay their concerns. The final package addressed all concerns raised and no further objections were raised.

During the OMB review process, minor changes to the Employer Survey questionnaire were suggested and incorporated. Upon approval of the package in October 2010, Westat programmed the final questionnaire. Before deployment it was thoroughly tested to ensure that all content had been included and that the web questionnaire functioned properly.

Copies of OMB approved survey materials are contained in the appendices to this report. Versions of the Employer Survey questionnaire and Provider Survey questionnaire that are suitable for printing are included in Appendices A and B, respectively. For the Employer Survey, Appendix C contains the telephone screening materials used to identify eligible establishments, and Appendix D contains recruiting materials sent to establishments identified in the screening process. Appendix E contains the recruiting materials used for the Provider Survey.

Survey of Employers 3

The larger and more complex of the surveys was the Survey of Employers. NIOSH's intent was to conduct as broad an assessment of employers across the U. S. economy as was possible. Within the economic sectors, the survey needed to be able to locate the different types of OS&H employees in a wide variety of occupational settings. The sheer size and diversity of the economy made development of an inclusive survey plan a significant challenge. As a result, it also included considerable cost implications.

The following sections provide discussion of how the Employer Survey was conducted.

3.1 Development of Employer Survey Frame and Sample

For the Employer Survey, the sample was designed to select a national probability sample of the vast majority of employers of OS&H professionals. Westat reviewed BLS data to identify NAICS codes with the largest concentrations of OS&H professionals. Westat statisticians selected the codes that identified establishments employing 75 percent of all OS&H specialists. Based on BLS data, 12 percent of establishments within that set of NAICS codes would employ at least one professional in a relevant health and safety profession and would be eligible to participate in the survey. The study was limited to these establishments in consideration of costs and likelihood of locating OS&H professionals.

Westat then drew a stratified sample of 7,602 establishments based on an assumption that at least 85 percent of them could be reached during the screening process. For most employer categories, the sample was limited to establishments employing 100 or more persons. Establishments with as few as 10 employees were included for consultants and government locations. Westat also sampled from a supplemental list of occupational health clinics, regardless of their size.

This section provides a detailed description of the sample design, including the respondent universe and sampling frame, stratification, sample size allocation and selection.

3.2 Respondent Universe

The target population of employers of OS&H professionals represents a very small proportion of the general employer population. If a simple random sample of employers were selected, an enormous initial sample size would need to be screened in order to identify employers of OS&H professionals to target for the survey. To avoid this inefficiency, Westat used a stratified design that began with the industries where OS&H professionals are concentrated, and oversampled the employers in those industries to reduce the size of the screening effort. Industries where the numbers of OS&H workers are relatively small were excluded without increasing the overall under coverage substantially or causing noticeable bias in the estimates. The Occupational Employment Statistics (OES) survey data from BLS was used to identify the industries where employment of OS&H professionals is concentrated.

The OES survey provides employment and wage statistics for detailed occupations, including OHS specialists. Estimates are provided for detailed industries, e.g., by 4-digit NAICS codes. The BLS' OHS specialist occupation (OCC code 29-9011) included four of the largest specialties of interest for this survey: industrial hygienists, safety professionals, ergonomists, and health physicists. The BLS OHS technician occupation (OCC code 29-9012) included specialties of interest, however, a college degree was not required so this occupation was not used (NIOSH's interest for this project was OS&H professionals with at least a bachelor's degree). Membership numbers for the American College of Occupational and Environmental Medicine (ACOEM) and the American Association of Occupational Health Nurses (AAOHN) suggested there are sizable numbers of occupational physicians and occupational health nurses. However, these occupations do not have separate OCC codes in the BLS data. Also, the three other OS&H specialties of interest for this project (Injury Prevention, Occupational Epidemiology, and Occupational Health Psychology) were expected to have much smaller numbers relative to the other specialties and also do not have separate OCC Codes. Given the extensive coverage of the OHS specialists group, it was assumed that the specialties not included in this code are likely to be found in the same industries where OHS specialists are concentrated. Therefore, our sampling efforts to identify employers of the nine OS&H professional specialties of interest largely concentrated on those industries where OHS specialists are found.

Table 3-1 shows the 29 industries (defined by 4-digit NAICS) with the largest numbers of OHS specialists based on the 2008 OES data. As shown in Table 3-1, BLS estimated the total number of

Table 3-1. Industries with the largest numbers of occupational health and safety (OHS) specialists covering 75 percent of the total OHS specialist employment

Industries by 4-digit NAICS		OHS specialist employment	Percent of the total OHS specialist employment
NAICS Code	Description		
211100	Oil and Gas Extraction	480	0.93
212100	Coal Mining	220	0.42
212200	Metal Ore Mining	160	0.31
213100	Support Activities for Mining	770	1.49
221100	Electric Power Generation, Transmission and Distribution	940	1.81
311600	Animal Slaughtering and Processing	320	0.62
322100	Pulp, Paper, and Paperboard Mills	160	0.31
324100	Petroleum and Coal Products Manufacturing	310	0.60
325100	Basic Chemical Manufacturing	530	1.02
325200	Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing	380	0.73
325400	Pharmaceutical and Medicine Manufacturing	370	0.71
331100	Iron and Steel Mills and Ferroalloy Manufacturing	120	0.23
331300	Alumina and Aluminum Production and Processing	140	0.27
331400	Nonferrous Metal (except Aluminum) Production and Processing	180	0.35
331500	Foundries	180	0.35
336300	Motor Vehicle Parts Manufacturing	230	0.44
336400	Aerospace Product and Parts Manufacturing	670	1.29
482100	Rail Transportation	160	0.31
491100	Postal Service	410	0.79
492100	Couriers and Express Delivery Services	360	0.69
541600	Management, Scientific, and Technical Consulting Services	3,370	6.51
541700	Scientific Research and Development Services	1,110	2.14
551100	Management of Companies and Enterprises	1,450	2.80
611300	Colleges, Universities, and Professional Schools	1,650	3.19
622100	General Medical and Surgical Hospitals	3,040	5.87
622300	Specialty (except Psychiatric and Substance Abuse) Hospitals	190	0.37
999100 1/	Federal Executive Branch (OES Designation)	6,820	13.17
999200 1/	State Government (OES Designation)	7,330	14.15
999300 1/	Local Government (OES Designation)	6,790	13.11
Subtotal		38,840	74.98
All Remaining Industries		12,960	25.02
Total		51,800	100.00

Source: 2008 OES survey, Occupational Employment and Wage Estimates, http://www.bls.gov/oes/oes_dl.htm.

Note: 1/This is not a regular NAICS code. It is a special code assigned by BLS.

OHS specialists in the nation to be 51,800 and the 29 industries, together, to contain 38,840 OHS specialists, thus covering 75 percent of total OHS specialist employment. To maximize the efficiency of this survey, Westat drew the bulk of the sample from these 29 industries. However, a supplemental list of occupational health clinics and occupational medicine physicians was obtained in addition to the 29 industries listed in Table 3-1. This special list was restricted to the 4-digit NAICS codes of: 6211 – office of physicians, 6213 – offices of other health professionals, 6214 – outpatient care centers, and 6219 – other ambulatory health care services.

A cutoff of establishments of fewer than 100 employees was determined to substantively decrease the cost of screening and increase its efficiency, since it was believed that small establishments are very unlikely to employ their own OS&H professionals. Thus, in most industries, the sampling universe excludes establishments with fewer than 100 employees. However, there are certain employers whose focus is on providing OS&H services, such as OS&H consultants and occupational health clinics that often have fewer than 100 employees. Therefore, a lower or no size cut-off was used for such establishments. All consulting establishments with 10 or more employees were included. Also included were all government establishments with 10 or more employees, including a group of government establishments with an unknown employee size, which were expected to be mostly small establishments. For the supplemental list of occupational health clinics and occupational medicine physicians, establishments of all sizes were included.

3.3 Sampling Frame

Several establishment lists of potential value were explored for developing population frames for the Employer Survey. The business registers maintained by BLS and the U.S. Census Bureau, although desirable choices for a sampling frame could not be accessed due to confidentiality and data restrictions. NIOSH and Westat also discussed with BLS the possibility of using the OES establishment sample list, which identifies the establishments containing an OHS specialist. This approach would have eliminated the effort and cost associated with screening establishments for OS&H employment almost completely. However, NIOSH's request to BLS for access was not granted.

The Dun & Bradstreet (D&B) database, formerly known as the Dun's Market Identifiers (DMI), is the most comprehensive commercial list of establishments available for public use. The D&B database, which is updated monthly, covers all of the U.S. economy, and its coverage of most

industries is considered to be quite complete. The records contain the following fields: a Data Universal Numbering System (D-U-N-S) number; NAICS code or Standard Industrial Classification (SIC) code; Federal Information Processing Standards (FIPS) state code; Standard Metropolitan Statistical Area (SMSA) code; number of employees at the location; total number of employees for the entire organization; status indicator, i.e., single location, headquarters, or branch; a subsidiary indicator; D-U-N-S numbers of the domestic topmost firm, headquarters, and parent (if a subsidiary); and hierarchy and DIAS codes to identify its location within the corporate structure.

The D&B database provides the option of choosing alternative organizational levels. The database includes both headquarters and branch-level records. It defines a headquarters as a business establishment that has branches or divisions reporting to it, and was financially responsible for those branches or divisions. The sampling unit for this survey was the establishment. Thus, both headquarters and branches were included as separate sampling units in the sampling frame. The headquarters record provided the total number of employees for the company, including the employees in the branches and the number of employees at the location. The D&B's data on the number of employees at the location was used in designing the sample.

Table 3-2 shows the number of establishment records in the sampling frame by the industry and establishment employee size sampling strata. The size classes that are not in the sampling universe are indicated by "niu" (not in universe). The employee size classes are based on the total number of employees in the establishment, including both full-time and part-time employees. Note that NAICS does not allow for identification of Federal, state, and local government establishments separately. The 8-digit SIC codes available in the D&B's database were used to identify them. However, some 8-digit SIC codes did not provide sufficient information to identify the level of government, and thus an "other government" category was developed for these establishments. The last row in Table 3-2 shows the population counts in the supplementary list of occupational health clinics and occupational medicine physicians obtained from Hoovers, a D&B affiliate company.

3.4 Stratification, Sample Allocation and Selection

The survey aimed for at least 400 completed surveys with employers of OS&H professionals. To reach this target statisticians estimated that it would be necessary to sample at least 9,271 establishments. An assumption was made that it would be possible to successfully complete

Table 3-2. Number of establishments in the sampling frame by industry and employee size sampling strata

Industry (4-digit NAICS code)	Establishment employee size classes										
	Unknown	1-4	5-9	10-24	25-49	50-99	100-249	250-499	500-999	1000 or more	Total
2111: Oil and Gas Extraction	niu	niu	Niu	niu	niu	niu	64	21	12	2	99
2121: Coal Mining	niu	niu	Niu	niu	niu	niu	57	34	13	1	105
2122: Metal Ore Mining	niu	niu	Niu	niu	niu	niu	30	14	14	4	62
2131: Support Activities for Mining	niu	niu	Niu	niu	niu	niu	299	53	30	10	392
2211: Support Activities for Mining	niu	niu	Niu	niu	niu	niu	558	153	59	39	809
3116: Animal Slaughtering and Processing	niu	niu	Niu	niu	niu	niu	230	134	101	79	544
3221: Pulp, Paper, and Paperboard Mills	niu	niu	Niu	niu	niu	niu	223	87	71	16	397
3241: Petroleum and Coal Products Manufacturing	niu	niu	Niu	niu	niu	niu	136	62	16	11	225
3251: Basic Chemical Manufacturing	niu	niu	Niu	niu	niu	niu	271	64	31	12	378
3252: Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing	niu	niu	Niu	niu	niu	niu	141	46	16	9	212
3254: Pharmaceutical and Medicine Manufacturing	niu	niu	Niu	niu	niu	niu	286	108	53	35	482
3311: Iron and Steel Mills and Ferroalloy Manufacturing	niu	niu	Niu	niu	niu	niu	117	57	24	9	207
3313: Alumina and Aluminum Production and Processing	niu	niu	Niu	niu	niu	niu	94	41	16	6	157
3314: Nonferrous Metal (except Aluminum) Production and Processing	niu	niu	Niu	niu	niu	niu	115	37	14	3	169
3315: Foundries	niu	niu	Niu	niu	niu	niu	231	83	32	8	354
3363: Motor Vehicle Parts Manufacturing	niu	niu	Niu	niu	niu	niu	553	325	150	61	1,089
3364:; Aerospace Product and Parts Manufacturing	niu	niu	Niu	niu	niu	niu	248	102	70	54	474
4821: Rail Transportation	niu	niu	Niu	niu	niu	niu	140	35	10	4	189
4911: Postal Service	niu	niu	Niu	niu	niu	niu	812	130	69	43	1,054
4921: Couriers and Express Delivery Services	niu	niu	Niu	niu	niu	niu	130	27	10	5	172
5416: Management, Scientific, and Technical Consulting Services	niu	niu	Niu	15,930	4,856	2,304	922	222	63	56	24,353
5417: Scientific Research and Development Services	niu	niu	Niu	3,991	1,628	948	576	171	74	72	7,460
5511: Management of Companies and Enterprises	niu	niu	Niu	niu	niu	niu	156	41	30	22	249
6113: Colleges, Universities, and Professional Schools	niu	niu	Niu	niu	niu	niu	1626	713	390	381	3,110
6221: General Medical and Surgical Hospitals	niu	niu	Niu	niu	niu	niu	1256	962	851	1168	4,237
6223: Specialty (except Psychiatric and Substance Abuse) Hospitals	niu	niu	Niu	niu	niu	niu	126	91	31	18	266
Federal	5,548	niu	Niu	3,912	2,002	1,513	1,122	428	265	240	15,030
State	2,999	niu	Niu	2,555	1,583	979	660	227	112	91	9,206
Local	19,310	niu	Niu	16,730	12,222	6,494	3,601	1,170	496	219	60,242
Other government	15,166	niu	Niu	13,711	7,542	5,494	3,956	1,734	866	516	48,985
Occupational health and medicine (special list)	niu	669	232	203	48	21	3	0	2	2	1,180
Total	43,023	669	232	57,032	29,881	17,753	18,739	7,372	3,991	3,196	181,888

Note: niu - not in universe.

telephone screening interviews with at least 85 percent of these establishments, expecting some would have gone out of business or refuse to participate in the screening interview. The statisticians then estimated that it would be necessary to screen 7,829 establishments by telephone to identify 1,000 eligible establishments (i.e., establishments that employed one or more OS&H professionals) to target for participation in the survey. When eligibility was established, project staff would obtain or confirm telephone, postal service and email contact information. It was expected that 40 percent of the 1,000 eligible establishments would complete the survey, yielding a total of 400 completed surveys.

A larger initial sample was selected due to uncertainty with the expected proportions of employers with OS&H professionals. A total of 13,132 establishment records were selected from the sampling frame (including the supplementary list frame for occupational health clinics and occupational medicine physicians). Table 3-3 shows the number of establishments selected for the initial sample by the industry and establishment size sampling strata. The OES survey of BLS provided estimates for the number of OS&H professionals (see Table 3-2) and proportion of establishments with at least one OS&H professional in each industry. Using these BLS estimates, statisticians computed a sample size for each selected industry designed to minimize the screening costs while yielding the desired total number of interviews. The total sample size assigned to each industry was then allocated to establishment size strata by the Neyman allocation method, which provides an optimum allocation by minimizing the variance of the estimate for a given total sample size.

The sample allocation for size stratum k in industry h, n_{hk}, was obtained, as:

$$n_{hk} = n_h \frac{N_{hk}S_{hk}}{\sum_{k=1}^{K} N_{hk}S_{hk}}$$

where,

n_h is the total sample size allocated to industry h;

N_{hk} is the number of in-scope establishments (in size universe) in size class k in industry h; and

S_{hk} is the standard deviation of the number of OS&H professionals in size class k in industry h.

Table 3-3. The number of establishment in the initial sample (including reserve) by industry and employee size sampling strata

Industry (4-digit NAICS code)	Establishment employee size classes										
	Unknown	1-4	5-9	10-24	25-49	50-99	100-249	250-499	500-999	1000 or more	Total
2111: Oil and Gas Extraction	niu	niu	niu	niu	niu	niu	45	21	12	2	80
2121: Coal Mining	niu	niu	niu	niu	niu	niu	26	26	12	1	65
2122: Metal Ore Mining	niu	niu	niu	niu	niu	niu	20	14	14	4	52
2131: Support Activities for Mining	niu	niu	niu	niu	niu	niu	78	25	18	10	131
2211: Support Activities for Mining	niu	niu	niu	niu	niu	niu	122	53	32	39	246
3116: Animal Slaughtering and Processing	niu	niu	niu	niu	niu	niu	28	24	26	31	109
3221: Pulp, Paper, and Paperboard Mills	niu	niu	niu	niu	niu	niu	21	12	14	6	53
3241: Petroleum and Coal Products Manufacturing	niu	niu	niu	niu	niu	niu	34	24	11	11	80
3251: Basic Chemical Manufacturing	niu	niu	niu	niu	niu	niu	69	27	19	12	127
3252: Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing	niu	niu	niu	niu	niu	niu	52	27	14	9	102
3254: Pharmaceutical and Medicine Manufacturing	niu	niu	niu	niu	niu	niu	45	27	18	22	112
3311: Iron and Steel Mills and Ferroalloy Manufacturing	niu	niu	niu	niu	niu	niu	13	11	6	4	34
3313: Alumina and Aluminum Production and Processing	niu	niu	niu	niu	niu	niu	20	13	8	4	45
3314: Nonferrous Metal (except Aluminum) Production and Processing	niu	niu	niu	niu	niu	niu	28	14	7	2	51
3315: Foundries	niu	niu	niu	niu	niu	niu	26	14	8	3	51
3363: Motor Vehicle Parts Manufacturing	niu	niu	niu	niu	niu	niu	27	24	16	11	78
3364:; Aerospace Product and Parts Manufacturing	niu	niu	niu	niu	niu	niu	76	49	46	54	225
4821: Rail Transportation	niu	niu	niu	niu	niu	niu	25	10	4	3	42
4911: Postal Service	niu	niu	niu	niu	niu	niu	49	12	10	10	81
4921: Couriers and Express Delivery Services	niu	niu	niu	niu	niu	niu	50	16	9	5	80
5416: Management, Scientific, and Technical Consulting Services	niu	niu	niu	426	197	132	77	28	11	17	888
5417: Scientific Research and Development Services	niu	niu	niu	124	76	62	55	24	15	29	385
5511: Management of Companies and Enterprises	niu	niu	niu	niu	niu	niu	156	41	30	22	249
6113: Colleges, Universities, and Professional Schools	niu	niu	niu	niu	niu	niu	181	121	93	177	572
6221: General Medical and Surgical Hospitals	niu	niu	niu	niu	niu	niu	167	190	241	585	1,183
6223: Specialty (except Psychiatric and Substance Abuse) Hospitals	niu	niu	niu	niu	niu	niu	20	21	10	11	62
Federal	574	niu	niu	406	308	330	363	209	178	234	2,602
State	163	niu	niu	140	127	109	110	57	39	57	802
Local	291	niu	niu	250	263	196	163	80	47	37	1,327
Other government	541	niu	niu	492	405	417	443	290	201	208	2,997
Occupational health and medicine (special list)	niu	61	31	77	24	21	3	0	2	2	221
Total	1,569	61	31	1,915	1,400	1,267	2,592	1,504	1,171	1,622	13,132

Note: niu - not in universe.

The number of OS&H professionals in establishments was assumed to follow a Poisson distribution with a mean $\frac{Y_{hk}}{N_{nk}}$ and standard deviation $\sqrt{\frac{Y_{hk}}{N_{hk}}}$, where Y_{hk} refers to the number of OS&H professionals in size class k in industry h and N_{hk} is the number of establishments in size class k in industry h.

The establishments were selected with equal probability within each industry and size sampling stratum. However, the establishments in larger size strata were selected with higher probability due to Neyman allocation. Larger establishments are much rarer than small establishments. Table 3-4 shows the reciprocal of the sampling rates used to select the establishments for the initial sample in each sampling stratum. For example, while only about 1 out of 10 Federal establishments with size 10-24 employees was selected, all Federal establishments with 1,000 or more employees were selected with certainty.

Again, due to our uncertainties regarding the proportions of eligible establishments to be found, the initial sample of establishments was partitioned systematically into 14 random groups to be released in waves. The random groups were created independently across the industries. Only 8 of the 14 random groups were released for screening in this project, as well as the full supplemental sample of occupational health clinics and occupational medicine physicians due to the higher expected eligibility rate for this list. Table 3-5 shows the number of establishments released for the screener by industry and employee size strata. In total, 7,602 establishments were released for the screener, which eventually resulted in 470 completed surveys. Table 3-6 shows the base weight, that is, the reciprocal of the selection probability of establishments in each industry by size stratum.

3.5 Data Collection

3.5.1 Data Collection Approach and Methods

Information obtained through the focus groups suggested that employer respondents would be much more receptive to a web survey than other methods, so questionnaire data collection was conducted exclusively through the web. During the establishment screening process, screeners obtained as many respondent email addresses as possible so that email could be used to supplement invitation and followup efforts. The data collection approach included distribution of an invitation letter by post and through email, distribution of a followup letter and email after 10 days to non-respondents, and telephone followup to establishments not responding after another 7 days.

Table 3-4. Reciprocal of the sampling rates for the initial sample (including reserve) by industry and employee size sampling strata

Industry (4-digit NAICS code)	Establishment employee size classes									
	Unknown	1-4	5-9	10-24	25-49	50-99	100-249	250-499	500-999	1000 or more
2111: Oil and Gas Extraction	niu	niu	niu	niu	niu	niu	1.4	1.0	1.0	1.0
2121: Coal Mining	niu	niu	niu	niu	niu	niu	2.2	1.3	1.1	1.0
2122: Metal Ore Mining	niu	niu	niu	niu	niu	niu	1.5	1.0	1.0	1.0
2131: Support Activities for Mining	niu	niu	niu	niu	niu	niu	3.8	2.1	1.7	1.0
2211: Support Activities for Mining	niu	niu	niu	niu	niu	niu	4.6	2.9	1.8	1.0
3116: Animal Slaughtering and Processing	niu	niu	niu	niu	niu	niu	8.2	5.6	3.9	2.5
3221: Pulp, Paper, and Paperboard Mills	niu	niu	niu	niu	niu	niu	10.6	7.3	5.1	2.7
3241: Petroleum and Coal Products Manufacturing	niu	niu	niu	niu	niu	niu	4.0	2.6	1.5	1.0
3251: Basic Chemical Manufacturing	niu	niu	niu	niu	niu	niu	3.9	2.4	1.6	1.0
3252: Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing	niu	niu	niu	niu	niu	niu	2.7	1.7	1.1	1.0
3254: Pharmaceutical and Medicine Manufacturing	niu	niu	niu	niu	niu	niu	6.4	4.0	2.9	1.6
3311: Iron and Steel Mills and Ferroalloy Manufacturing	niu	niu	niu	niu	niu	niu	9.0	5.2	4.0	2.3
3313: Alumina and Aluminum Production and Processing	niu	niu	niu	niu	niu	niu	4.7	3.2	2.0	1.5
3314: Nonferrous Metal (except Aluminum) Production and Processing	niu	niu	niu	niu	niu	niu	4.1	2.6	2.0	1.5
3315: Foundries	niu	niu	niu	niu	niu	niu	8.9	5.9	4.0	2.7
3363: Motor Vehicle Parts Manufacturing	niu	niu	niu	niu	niu	niu	20.5	13.5	9.4	5.5
3364:; Aerospace Product and Parts Manufacturing	niu	niu	niu	niu	niu	niu	3.3	2.1	1.5	1.0
4821: Rail Transportation	niu	niu	niu	niu	niu	niu	5.6	3.5	2.5	1.3
4911: Postal Service	niu	niu	niu	niu	niu	niu	16.6	10.8	6.9	4.3
4921: Couriers and Express Delivery Services	niu	niu	niu	niu	niu	niu	2.6	1.7	1.1	1.0
5416: Management, Scientific, and Technical Consulting Services	niu	niu	niu	37.4	24.6	17.5	12.0	7.9	5.7	3.3
5417: Scientific Research and Development Services	niu	niu	niu	32.2	21.4	15.3	10.5	7.1	4.9	2.5
5511: Management of Companies and Enterprises	niu	niu	niu	niu	niu	niu	1.0	1.0	1.0	1.0
6113: Colleges, Universities, and Professional Schools	niu	niu	niu	niu	niu	niu	9.0	5.9	4.2	2.2
6221: General Medical and Surgical Hospitals	niu	niu	niu	niu	niu	niu	7.5	5.1	3.5	2.0
6223: Specialty (except Psychiatric and Substance Abuse) Hospitals	niu	niu	niu	niu	niu	niu	6.3	4.3	3.1	1.6
Federal	9.7	niu	niu	9.6	6.5	4.6	3.1	2.0	1.5	1.0
State	18.4	niu	niu	18.3	12.5	9.0	6.0	4.0	2.9	1.6
Local	66.4	niu	niu	66.9	46.5	33.1	22.1	14.6	10.6	5.9
Other Government	28.0	niu	niu	27.9	18.6	13.2	8.9	6.0	4.3	2.5
Occupational health and medicine (special list)	niu	11.0	7.5	2.6	2.0	1.0	1.0	0.0	1.0	1.0

Note: niu - not in universe.

Table 3-5. Number of establishments released for the screener by industry and employee size sampling strata

Industry (4-digit NAICS code)	Establishment employee size classes										
	Unknown	1-4	5-9	10-24	25-49	50-99	100-249	250-499	500-999	1000 or more	Total
2111: Oil and Gas Extraction	niu	niu	Niu	niu	niu	niu	26	12	7	1	46
2121: Coal Mining	niu	niu	Niu	niu	niu	niu	16	14	7	1	38
2122: Metal Ore Mining	niu	niu	Niu	niu	niu	niu	12	8	8	2	30
2131: Support Activities for Mining	niu	niu	Niu	niu	niu	niu	46	14	10	6	76
2211: Support Activities for Mining	niu	niu	Niu	niu	niu	niu	68	32	17	23	140
3116: Animal Slaughtering and Processing	niu	niu	Niu	niu	niu	niu	16	13	16	16	61
3221: Pulp, Paper, and Paperboard Mills	niu	niu	Niu	niu	niu	niu	11	8	8	4	31
3241: Petroleum and Coal Products Manufacturing	niu	niu	Niu	niu	niu	niu	19	15	6	5	45
3251: Basic Chemical Manufacturing	niu	niu	Niu	niu	niu	niu	39	15	13	6	73
3252: Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing	niu	niu	Niu	niu	niu	niu	31	16	8	5	60
3254: Pharmaceutical and Medicine Manufacturing	niu	niu	Niu	niu	niu	niu	27	15	11	11	64
3311: Iron and Steel Mills and Ferroalloy Manufacturing	niu	niu	Niu	niu	niu	niu	7	7	4	2	20
3313: Alumina and Aluminum Production and Processing	niu	niu	Niu	niu	niu	niu	11	8	4	4	27
3314: Nonferrous Metal (except Aluminum) Production and Processing	niu	niu	Niu	niu	niu	niu	16	8	5	1	30
3315: Foundries	niu	niu	Niu	niu	niu	niu	14	8	5	2	29
3363: Motor Vehicle Parts Manufacturing	niu	niu	Niu	niu	niu	niu	15	15	9	6	45
3364:; Aerospace Product and Parts Manufacturing	niu	niu	Niu	niu	niu	niu	43	28	27	31	129
4821: Rail Transportation	niu	niu	Niu	niu	niu	niu	16	5	3	0	24
4911: Postal Service	niu	niu	Niu	niu	niu	niu	29	8	4	6	47
4921: Couriers and Express Delivery Services	niu	niu	Niu	niu	niu	niu	28	10	4	4	46
5416: Management, Scientific, and Technical Consulting Services	niu	niu	Niu	242	112	78	42	16	7	9	506
5417: Scientific Research and Development Services	niu	niu	Niu	71	42	36	31	13	9	17	219
5511: Management of Companies and Enterprises	niu	niu	Niu	niu	niu	niu	89	24	16	13	142
6113: Colleges, Universities, and Professional Schools	niu	niu	Niu	niu	niu	niu	103	69	53	101	326
6221: General Medical and Surgical Hospitals	niu	niu	Niu	niu	niu	niu	95	109	137	335	676
6223: Specialty (except Psychiatric and Substance Abuse) Hospitals	niu	niu	Niu	niu	niu	niu	12	12	5	7	36
Federal	328	niu	Niu	232	176	188	207	120	102	133	1,486
State	92	niu	Niu	80	72	63	64	32	22	33	458
Local	166	niu	Niu	143	151	112	92	46	26	22	758
Other Government	308	niu	Niu	282	231	238	255	164	116	119	1,713
Occupational health and medicine (special list)	niu	61	31	77	24	21	3	0	2	2	221
Total	894	61	31	1,127	808	736	1,483	864	671	927	7,602

Note: niu - not in universe.

Table 3-6. Base weight (reciprocal of the sampling selection probability) for the released sample

Industry (4-digit NAICS code)	Establishment employee size classes									
	Unknown	1-4	5-9	10-24	25-49	50-99	100-249	250-499	500-999	1000 or more
2111: Oil and Gas Extraction	niu	niu	niu	niu	niu	niu	2.5	1.7	1.7	1.7
2121: Coal Mining	niu	niu	niu	niu	niu	niu	3.8	2.2	1.9	1.7
2122: Metal Ore Mining	niu	niu	niu	niu	niu	niu	2.6	1.7	1.7	1.7
2131: Support Activities for Mining	niu	niu	niu	niu	niu	niu	6.6	3.7	2.9	1.7
2211: Support Activities for Mining	niu	niu	niu	niu	niu	niu	8.0	5.1	3.2	1.8
3116: Animal Slaughtering and Processing	niu	niu	niu	niu	niu	niu	14.7	10.0	6.9	4.6
3221: Pulp, Paper, and Paperboard Mills	niu	niu	niu	niu	niu	niu	18.2	12.4	8.7	4.6
3241: Petroleum and Coal Products Manufacturing	niu	niu	niu	niu	niu	niu	7.1	4.6	2.6	1.8
3251: Basic Chemical Manufacturing	niu	niu	niu	niu	niu	niu	6.8	4.1	2.8	1.7
3252: Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing	niu	niu	niu	niu	niu	niu	4.6	2.9	1.9	1.7
3254: Pharmaceutical and Medicine Manufacturing	niu	niu	niu	niu	niu	niu	11.1	7.0	5.2	2.8
3311: Iron and Steel Mills and Ferroalloy Manufacturing	niu	niu	niu	niu	niu	niu	15.3	8.8	6.8	3.8
3313: Alumina and Aluminum Production and Processing	niu	niu	niu	niu	niu	niu	7.8	5.3	3.3	2.5
3314: Nonferrous Metal (except Aluminum) Production and Processing	niu	niu	niu	niu	niu	niu	7.0	4.5	3.4	2.6
3315: Foundries	niu	niu	niu	niu	niu	niu	15.6	10.4	7.0	4.7
3363: Motor Vehicle Parts Manufacturing	niu	niu	niu	niu	niu	niu	35.5	23.5	16.3	9.6
3364:; Aerospace Product and Parts Manufacturing	niu	niu	niu	niu	niu	niu	5.7	3.6	2.7	1.7
4821: Rail Transportation	niu	niu	niu	niu	niu	niu	9.8	6.1	4.4	2.3
4911: Postal Service	niu	niu	niu	niu	niu	niu	28.6	18.7	11.9	7.4
4921: Couriers and Express Delivery Services	niu	niu	niu	niu	niu	niu	4.5	2.9	1.9	1.7
5416: Management, Scientific, and Technical Consulting Services	niu	niu	niu	65.6	43.3	30.6	21.0	13.9	10.1	5.8
5417: Scientific Research and Development Services	niu	niu	niu	56.6	37.7	26.9	18.4	12.5	8.7	4.4
5511: Management of Companies and Enterprises	niu	niu	niu	niu	niu	niu	1.8	1.8	1.8	1.8
6113: Colleges, Universities, and Professional Schools	niu	niu	niu	niu	niu	niu	15.8	10.3	7.4	3.8
6221: General Medical and Surgical Hospitals	niu	niu	niu	niu	niu	niu	13.2	8.9	6.2	3.5
6223: Specialty (except Psychiatric and Substance Abuse) Hospitals	niu	niu	niu	niu	niu	niu	10.9	7.5	5.3	2.8
Federal	16.9	niu	niu	16.9	11.4	8.0	5.4	3.6	2.6	1.8
State	32.2	niu	niu	32.0	21.8	15.7	10.5	7.0	5.0	2.8
Local	116.2	niu	niu	117.2	81.4	58.0	38.7	25.6	18.5	10.4
Other Government	49.0	niu	niu	48.8	32.6	23.1	15.6	10.5	7.5	4.3
Occupational health and medicine (special list)	niu	11.0	7.5	2.6	2.0	1.0	1.0	0.0	1.0	1.0

Note: niu - not in universe.

Because a significant number of email addresses were obtained, they could be used for additional non-response followup.

Westat's Help Desk was available so that respondents could make contact by email or through a toll-free number to ask questions or communicate problems. The majority of the questions received were of a general nature. Some respondents had questions regarding their eligibility for the survey; others had problems with logging into the survey or with specific survey questions. Westat staff responded to questions as quickly as possible and the outcomes of these Help Desk contacts were entered into a study log.

3.5.2 Step-by-Step Data Collection and Followup Activities

Data collection for the Employer Survey began on January 5, 2011 with the initiation of the telephone screening effort to identify eligible establishments, and was closed on April 15, 2011. During January-February 2011 Westat Telephone Research Center staff placed calls to 7,602 establishments selected for the Employer Survey sample to determine eligibility and to correct or secure contact information for the most appropriate respondent. The goal was to identify 1,000 establishments eligible (i.e., eligible establishments employ one or more OS&H professionals) to participate in the survey.

Callers were instructed to make up to seven attempts to complete a call to each establishment to administer an OMB-approved script to determine the establishment's eligibility to participate in the survey see (Appendix C). At each establishment reached the caller attempted to speak with the person most knowledgeable about OS&H issues, and asked that person to confirm whether there were any persons at that location whose jobs specialized in worker safety and health. Where the caller received an affirmative response, the name and contact information for the most senior person(s) whose job involves worker safety and health at this location was recorded. Because people who specialize in worker safety and health often work in more than one department within a company, the caller also asked whether there were one or more additional senior persons who should be contacted for the study and, where applicable, obtained their contact information. Screening results for each establishment were recorded into the study management database.

Invitations to participate were sent to screening-eligible establishments starting at the end of January 2011, about 3½ weeks after screening began. So that data collection could proceed in a timely way, the distribution of invitations was completed in batches over about a 4-week period, with the final

batch distributed in early March. A total 1,722 establishments were identified through the telephone screening process as potentially eligible for the survey.

The invitation letter sent to each of these establishments was signed by John Howard, MD, Ph.D., the NIOSH Director, and included a listing of organizations that had endorsed the purposes of the study. A few days after the invitation letters were sent by post, the same invitation was distributed by email where email addresses had been obtained.

Within a few days after the initial invitations were distributed, Westat began receiving responses to the web survey and inquiries to the Help Desk. About 10 days after the initial invitation was sent, each non-respondent was sent a followup invitation by mail. Again, a few days later the same followup letter was sent by email where an email address was available. One week following the posting of the non-response letter, the telephone center began conducting followup contacts to each non-respondent. Followup contacts also were made to respondents who had logged into the questionnaire but who had not completed the survey. Telephone staff made up to seven attempts to reach each non-respondent and recorded the results in the study management database. These followup prompts produced the desired increases in response. Because of the success of these followups, an additional email prompt was sent to each non-respondent for whom an email address was available prior to the end of the data collection effort. Westat staff produced daily updates of the status of survey response to monitor progress and to determine the most effective followup measures. Table 3-7 shows the Employer Survey data collection schedule.

Table 3-7. Employer survey data collection schedule

Contact type	Batch 1	Batch 2	Batch 3	Batch 4
Invitation Letter	1/31/2011	2/10/2011	2/15/2011	3/3/2011
Invitation Email	2/3/2011	2/14/2011	2/18/2011	3/7/2011
Non-Response Letter	2/10/2011	2/22/2011	2/25/2011	3/14/2011
Non-Response Email	2/14/2011	2/25/2011	3/2/2011	3/18/2011
Telephone Followup Start	2/17/2011	2/28/2011	3/7/2011	3/21/2011
Non-Response Conversion Email	3/2/2011	3/9/2011	3/14/2011	3/30/2011
Prompt to Complete Email	3/2/2011	3/9/2011	3/14/2011	3/30/2011

Throughout the period during which invitations to participate were distributed by post, Westat received a small number of letters that were returned as undeliverable. No attempts were made to re-contact these establishments to obtain a corrected address. In a small number of instances, the

invitation letter also had been distributed by email. Also, in a small number of instances the email addresses were found to be incorrect, and no attempts were made to correct them.

Data collection for the Employer Survey closed on April 15, 2011, after which the website for the survey was closed.

3.5.3 Data Cleaning Efforts

Data cleaning efforts were conducted throughout the data collection period and immediately after it closed. They were focused on surveys returned that were incomplete. Project staff attempted to reach respondents by telephone and email to clarify responses or to request that they go to the website to complete the survey. (The website was re-opened for those respondents who agreed to complete updates to the survey.)

Some large establishments had completed the section "Your Occupational Safety and Health Professionals" incorrectly, potentially invalidating data provided for their completed surveys. Each of these establishments was contacted to assess to what extent their data were usable and to determine how many of each type of OS&H professional they employed. Responses were received from 21 of these establishments, allowing Westat to develop more accurate estimates for each type of OS&H professional.

3.6 Employer Survey Response Rate Calculation

The survey achieved a final survey response rate of 34.5 percent. Table 3-8 shows the major outcome categories for our attempts to screen and survey establishments, based on the final survey disposition codes and the number of sampled cases. As noted above, 21 employers included among the 69 partially completed surveys used for estimations were large employers of OS&H professionals whose data contributed to our estimates of the counts of OS&H professionals; however, these respondents did not select a random sample of eight professionals on which to provide employee-level characteristics (as described in Section 2.3.2.1). Thus, their data were used for some estimates generated from the survey (total counts of OS&H professionals by discipline and future hiring expectations), but not others (employee-level characteristics such as education level and age-group,

Table 3-8. Major response categories, survey disposition codes, and the number of sample cases

	Major outcomes of survey attempts with employers	Number of sample cases
Total Sample		**7,602**
1.	**Web Respondents**	**539**
	Completed Surveys	470
	Partially completed surveys, used for estimations	69
2.	**Non-respondent – Web Eligible**	**20**
	Responses could not be used in estimations	5
	Eligible screener - Not enough web survey answers	15
3.	**Web Non-respondent – Web eligibility unknown**	**635**
	Eligible Screener but no response to web survey	533
	Eligible Screener - Logged in only (no response)	101
	Eligible Screener - Respondent not locatable	1
4.	**Web Ineligible**	**505**
	Ineligible web response. No OSH professionals (Q1=no)	505
5.	**Screener Ineligible**	**2,165**
	Ineligible Screener. No OSH employees	2,165
6.	**Screener Non-response – In-scope**	**1152**
	Other Non-response	2
	Not Available in Field Period	23
	Final Refusal Non-TRC	2
	Final Refusal	2
	Maximum Calls – Refusal	703
	Maximum Calls (at least one contact established)	420
7.	**Screener Non-response – Unknown in-scope status**	**1,956**
	Maximum Calls – Language Barrier	4
	Maximum Phone Attempts	1
	No Answer	6
	Not Locatable	1,397
	Non-Working Number	548
8.	**Screener out of scope**	**630**
	Duplicate Case	7
	Other out of scope	177
	Out of Business	32
	Ineligible – Location	414

and current training needs). If these employers were not considered survey respondents, the overall survey response rate would decrease to 33.2 percent.

3.6.1 Response Rate Calculation

In Table 3-8, the first major response group includes respondents who completed the web survey (including a number of partial completes). The second group includes employers appeared to be eligible based on responses to the web questionnaire but did not provide enough information for their responses to be useful for any estimations. The third group consists of employers who were identified as eligible in the screener but did not respond to the web survey and their eligibility could not be confirmed by the web survey. The fourth group includes those employers who after being identified as eligible in the screener reported as ineligible on the web survey. The fifth group includes those employers who were identified as ineligible by the screener. The sixth group includes the employers, who refused to participate in the screener but verified as being in business at the location (i.e., in-scope). The seventh group includes those cases that could not be located and thus their in-scope status could not be determined. The last group includes the sampled cases that were identified as out of scope: establishments that were no longer in business at the location.

The un-weighted response rate is basically the proportion survey respondents among the eligible employers in the sample. Thus, the un-weighted response rate (as percent) is calculated as:

$$R = 100 \times \frac{S_1}{S_1 + S_2 + cS_3 + bcS_6 + abcS_7}$$

S_1 is the number of respondents, that is, who completed the web survey (including a number of partial completes);

S_2 is the number of employers reported as eligible on the web survey but who did not complete the questionnaire;

S_3 is the number of employers who were identified as eligible by the screener but did not complete the web survey and their eligibility could not be confirmed on the web survey;

S_6 is the number of in-scope employers who did not respond to the screener;

S_7 is the number of sample cases that did not respond to the screener and their in-scope status could not be determined;

c is the proportion of employers with unconfirmed eligibility on the web who actually are web eligible;

b is the proportion of screener completes who were found to be eligible by the screener;

a is the proportion of the sample cases of unknown in-scope status that are actually in-scope;

c is estimated as:

$$c = \frac{S_1+S_2}{S_1+S_2+S_4}$$

b is obtained as:

$$b = \frac{S_1+S_2+S_3+S_4}{S_1+S_2+S_3+S_4+S_5}$$

a is estimated as:

$$a = \frac{S_1+S_2+S_3+S_4+S_5+S_6}{S_1+S_2+S_3+S_4+S_5+S_6+S_8}$$

where,

S_1 is the number of employers after being identified as eligible by the screener, reported as ineligible on the web survey;

S_5 is the number of employers, who were identified as ineligible by the screener; and

S_8 is the number of sample cases that were identified as out of scope by the screener.

3.6.2 Calculation of Weights

3.6.2.1 Sampling Weights

A sampling weight was attached to every establishment record with a completed web survey response. The purpose of the weight is (1) to account for differential probabilities of selection across the industry and establishment size classes and (2) to reduce the potential bias resulting from non-response. The sampling weights are necessary for unbiased estimation of the characteristics of interest for this project.

The first step in derivation of the sampling weights was to derive a base weight, which is the reciprocal of the probability of selection of the establishment. The base weights were then adjusted for the screener non-response and web survey non-response in order to reduce potential biases resulting from not obtaining an interview with every establishment in the sample. These adjustments were made by redistributing the weights of non-responding establishments to responding establishments with similar propensities for response. A predictive model for response propensity was developed to identify subgroups of employer population with differential response rates within industry/size sampling strata and Census region. These subgroups were then used as non-response adjustment cells and a separate weight adjustment was applied in each cell. The potential predictors that can be used in this modeling effort have to be known for both respondents and non-

respondents. These included industry groups, establishment employee size classes, and Census region.

All sample establishments were classified into eight major survey response categories based on the outcome of the survey. These eight categories were:

1. Respondent: completed the web survey;
2. Web eligible non-respondent: reported as eligible on the web survey. However, the respondent either did not select a proper random sample of OSH professionals or the questionnaire was so incomplete that classified as non-respondent;
3. Web non-respondent and web eligibility unknown: Identified as eligible by the screener but eligibility could not be confirmed by the web survey;
4. Web ineligible: Identified as eligible by the screener but reported no OSH professionals on the web survey;
5. Screener ineligible: identified as ineligible by the screener;
6. Screener in-scope non-response: identified as in-scope (in business) by the screener but refused to participate to the screener;
7. Screener non-response with in-scope status could not be determined: non-locatables and nonworking phone numbers; and
8. Identified as out of scope.

The groups 1 through 5 are screener respondents. See Table 2-1 for a detailed breakdown of these major response categories by the survey disposition codes and the numbers of the sampled cases.

The weights first were adjusted for screener non-response, which was followed by the adjustments for the web non-response.

3.6.2.2 Adjusting the Weights for Screener Non-response

Separate weight adjustments were applied to compensate for the screener non-respondents, who were non-locatable or with a nonworking phone number and thus their "in-scope" status could not be determined, and those non-respondents, who were identified as in business (i.e., in scope) but refused to participate to the screener. The weights first were adjusted to compensate for the former group. A separate set of adjustment cells, based on a response propensity model, was formed for

this group. A weight adjustment factor was computed within each adjustment cell, as the ratio of the weighted (by the base weight) total number of sampled establishments to the weighted number of establishments, whose in-scope status could be determined (including out of scope cases). Note that a very small number of sampled records were identified as duplicate records for the same establishments. The weights of these establishments were adjusted to reflect their multiple chances of selection.

In the second step, the sampling weights were adjusted to compensate for the establishments that were determined to be in scope (establishments determined to be in business) but refused to participate to the screener. A set of adjustment cells was formed based on a response propensity model developed. A non-response adjustment factor was computed within each adjustment cell as the ratio of the weighted (after adjusting for non-locatables) number of all in scope establishments to the weighted number of establishments that completed the screener.

Next, each weight adjustment is discussed in detail and the formulae used are provided.

Adjusting the Weights to Compensate for Screener Non-Respondents with Unknown In-Scope Status

First, the weights were adjusted to compensate for screener non-respondents with unknown in-scope status (mainly non-locatables and nonworking phone numbers). The adjustment factor for adjustment class h, λ_h was computed as:

$$\lambda_h = \frac{\sum_{i \in A_{1h}} W_{hi}^B + \sum_{i \in A_{2h}} W_{hi}^B + \sum_{i \in A_{3h}} W_{hi}^B + \sum_{i \in A_{4h}} W_{hi}^B}{\sum_{i \in A_{1h}} W_{hi}^B + \sum_{i \in A_{2h}} W_{hi}^B + \sum_{i \in A_{4h}} W_{hi}^B}$$

where,

A_{1h} is the set of establishments with a completed screener interview in adjustment class h;

A_{2h} is the set of in-scope establishments refused to participate to the screener, in adjustment class h;

A_{3h} is the set of screener non-respondents, whose in-scope status could not be determined, in adjustment class h;

A_{4h} is the set of establishments that were identified as out of scope by the screener in adjustment class h; and

W_{hi}^{B} is the base weight of establishment i in adjustment class h.

Then, the weight adjusted to compensate for the screener non-respondents with unknown in-scope status, for an in-scope establishment i in adjustment class h, W_{hi}^{C}, was computed as:

$$W_{hi}^{C} = W_{hi}^{B} \times \lambda_{h}$$

Adjusting the Weights for In Scope Establishments who Refused to Respond to the Screener

Next, the weights were adjusted to compensate for those in-scope establishments refused to participate to the screener. The non-response adjustment factor for cell g, δ_g was computed as:

$$\delta_g = \frac{\sum_{i \in A_{1g}} W_{gi}^{C} + \sum_{i \in A_{2g}} W_{gi}^{C}}{\sum_{i \in A_{1g}} W_{gi}^{C}}$$

where,

A_{1g} is the set of establishments with a completed screener interview in adjustment class g;

A_{2g} is the set of in-scope establishments refused to participate to the screener in adjustment class g; and

W_{gi}^{C} is the sampling weight adjusted for the screener non-respondents with unknown in-scope status, for establishment i in adjustment class g.

Then, the final screener non-response adjusted weight was computed by multiplying the weight that was adjusted for the screener non-response with unknown in-scope status, with the above non-response adjustment factor. The final screener non-response adjusted weight for a screener respondent i in non-response adjustment class g, W_{gi}^{D}, was computed as follows:

$$W_{gi}^{D} = W_{gi}^{C} \times \delta_{g}$$

3.6.2.3 Adjusting the Weights for Web Survey Non-Response

There were also two groups of web survey non-respondents: (1) those that were identified as eligible by the screener but their eligibility could not be confirmed by the web survey and (2) those reported as eligible to the web survey but did not complete the web questionnaire. The weights first were adjusted to compensate for the first group of non-respondents. A separate set of adjustment cells, based on a response propensity model, were formed for this group. A weight adjustment factor was computed within each adjustment cell, as the ratio of the weighted (by the screener non-response adjusted weight) total number of establishments that were found to be eligible by the screener to the weighted number of establishments, who reported their eligibility status (either as eligible or ineligible) for the web survey.

In the second step, the sampling weights of the web respondents were adjusted to compensate for those reported as eligible to the web survey but did not complete the instrument. A set of adjustment cells were formed based on a response propensity model developed. A non-response adjustment factor was computed within each adjustment cell as the ratio of the weighted (after adjusting for the first group of web non-respondents) number of eligible establishments to the weighted number of establishments that completed the web instrument. Next, each weight adjustment is discussed in detail and the formulae are presented.

Adjusting the Weights to Compensate for the Web Non-Respondents, Whose Eligibility Could Not be Confirmed by the Web Survey

First, the weights were adjusted to compensate for non-respondents to web survey, whose eligibility could not be confirmed by the web survey. The adjustment factor for the adjustment class l, α_l, was computed as:

$$\alpha_l = \frac{\sum_{i \in S_{1l}} W_{li}^D + \sum_{i \in S_{2l}} W_{li}^D + \sum_{i \in S_{3l}} W_{li}^D + \sum_{i \in S_{4l}} W_{li}^D}{\sum_{i \in S_{1l}} W_{li}^D + \sum_{i \in S_{2l}} W_{li}^D + \sum_{i \in S_{4l}} W_{li}^D}$$

where,

S_{1l}	is the set of establishments with a completed web survey in adjustment class l;
S_{2l}	is the set of establishments reported as eligible to the web survey but did not complete the web questionnaire in adjustment class l;
S_{3l}	is the set of non-respondents to the web survey, whose eligibility could not be confirmed by the web survey, in adjustment class l;
S_{4l}	is the set of establishments that reported as ineligible on the web survey after being identified as eligible by the screener, in adjustment class l; and
W_{li}^D	is the screener non-response adjusted weight of establishment i in adjustment class l.

Then, the sampling weight adjusted for the web non-response with unconfirmed eligibility on the web survey, for web eligible establishment i in adjustment class l, W_{li}^E, was computed as:

$$W_{li}^E = W_{li}^D \times \alpha_l$$

Adjusting the Weights to Compensate for the Web Non-Respondents, Who Reported as Eligible for the Web Survey

Next, the weights were adjusted to compensate for those employers reported as eligible for the web survey but failed to complete the web questionnaire. This non-response adjustment factor for cell t, γ_t was computed as:

$$\gamma_t = \frac{\sum_{i \in S_{1t}} W_{ti}^E + \sum_{i \in S_{2t}} W_{ti}^E}{\sum_{i \in S_{1t}} W_{ti}^E}$$

where,

S_{1t} is the set of establishments with a completed web survey in adjustment class t;
S_{2t} is the set of establishment that did not complete the web survey but reported as eligible to the web survey in adjustment class t; and
W_{ti}^E is the weight adjusted for the web non-response with unconfirmed eligibility on the web survey, for eligible establishment i in adjustment class t.

Then, the final non-response adjusted weight was computed by multiplying the weight that was adjusted for the web non-response with unconfirmed eligibility on the web survey, with the non-response adjustment factor derived above. Thus, the final non-response adjusted sample weight for a responding establishment i in non-response adjustment class t, W_{ti}^F, was computed as follows:

$$W_{ti}^F = W_{ti}^E \times \gamma_t$$

3.7 Survey Results

The survey asked employers to tell how many OS&H professionals they employed (at the sampled location) at the end of December 2010.They were asked to include only staff that they directly employ. They also were asked to consider only persons with at least a bachelor's degree in OS&H or a related field, and who devote a significant portion of work time to the OS&H field. The survey also asked employers to indicate each professional's primary OS&H job category, and (if applicable), a second OS&H job category. For response choices on these "job category" items, the web survey

provided a drop-down menu listing each of the nine OS&H fields of interest, plus an "Other OS&H field" option.

Finally, it must be noted that all of the estimates shown under-estimate the nation's OS&H workforce due to the survey sampling strategy. As discussed in Section 3.3, the survey sample was developed from the set of NAICS codes thought to cover approximately 75 percent of the OS&H workforce. In addition, data collection was restricted to establishments with 100 or more employees, with the exception of government or consulting establishments, and those obtained from a supplemental list of occupational health clinics.

3.7.1 Describing the Current OS&H Workforce

The tables in this section (Tables 3-9 through 3-18) describe the current (December 2010) OS&H workforce by size and distribution among the nine disciplines of interest to this assessment and among Census regions of the United States. The degree of precision associated with these estimates, in the form of standard errors and the lower and upper bounds of the 95 percent confidence intervals for the estimates also is provided.

3.7.1.1 Estimated Numbers of OS&H Professionals (Nationally, Regionally, and by Discipline)

To report the estimates of the numbers of OS&H professionals employed at the end of 2010, we generated weighted sums of the counts of OS&H professionals, both overall and by OS&H discipline and Census region. The estimates shown by discipline are based on the primary OS&H job category reported by employers for their professionals.

As noted above and in Section 3.2, establishments with less than 100 employees were excluded for many of the NAICS codes. This was done to maximize the efficiency of data collection as these smaller establishments were expected to provide relatively few eligible OS&H employees while requiring a disproportionate screening effort to locate them. Below is a description of an analysis conducted to estimate the numbers of eligible OS&H employees that might have been under-covered by this sample design strategy.

The number of OS&H eligible professionals reported in the survey was modeled as a function of establishment size (in terms of total number of employees) and industry, as identified by the 4-digit NAICS code. Westat statisticians tried a number of model formats and fit these models separately to each of the 9 OS&H disciplines of interest to the project. After attempting various transformations of the employee counts to obtain a better model fit (higher R-squared), they observed that the best fit was to predict the square root of the number of OS&H professionals (in a discipline) to the logarithm of the total number of employees and industry indicators. They also fit a simultaneous equation model, which treated the specialist counts as endogenous variables along with 4-digit NAICS and total employment as exogenous variables. The predicted counts obtained from both models were similar. Among the other models attempted and which did not fit as well were Poisson regression and negative binomial regression.

Table F in Appendix F provides the estimate of total OS&H employees in each discipline that might be employed in the smaller establishments excluded from the Employer Survey. Note that only in the Occupational Safety, Occupational Health Nursing and Occupational Health Physics categories did the numbers provide any significant increases to the survey estimates. Although this best fit model did not have strong predictive power (the R-squares never exceeded 0.15), these results are offered as a useful but rough estimate of the numbers of OS&H employees in the smaller establishments, and can be used to supplement the figures in Table 3-9.

Table 3-9. Total number of OS&H professionals employed (December 2010), nationwide and by region

			95% Confidence interval	
	Estimate	Standard error	LB	UB
Nationwide*	48,660	6,005	36,885	60,435
Northeast	6,612	1,177	4,303	8,920
Midwest	11,512	2,995	5,640	17,384
South	19,553	4,760	10,221	28,886
West	10,983	1,909	7,240	14,726

* Total includes professionals reported by employers as being OS&H professionals, but not reported to be in the specialties of interest to NIOSH. Thus, this total is greater than the sum of professionals employed in the nine specialties shown below.

Table 3-10. Total number of OS&H professionals employed (December, 2010), by discipline

	Estimate	Standard error	95% Confidence interval	
			LB	UB
Occupational Safety	28,722	4,230	20,429	37,016
Industrial Hygiene	7,348	1,496	4,415	10,282
Occupational Medicine	1,455	240	984	1,927
Occupational Health Nursing	4,498	562	3,396	5,600
Occupational Ergonomics	831	194	452	1,211
Occupational Health Physics	1,305	579	170	2,439
Occupational Injury Prevention	1,249	461	344	2,153
Occupational Epidemiology	132	52	29	234
Occupational Health Psychology	22	21	0	63

Table 3-11. Total number of OS&H professionals employed (December, 2010), by discipline and region

	Estimate	Standard error	95% Confidence interval	
			LB	UB
Occupational Safety				
Northeast	4,087	898	2,327	5,847
Midwest	7,762	2,728	2,413	13,111
South	10,841	2,788	5,374	16,309
West	6,032	1,439	3,210	8,854
Industrial Hygiene				
Northeast	1,070	356	372	1,767
Midwest	785	397	7	1,562
South	3,476	1,236	1,053	5,900
West	2,018	665	714	3,322
Occupational Medicine				
Northeast	237	78	83	391
Midwest	646	177	298	994
South	346	117	116	577
West	226	88	53	398
Occupational Health Nursing				
Northeast	610	171	274	945
Midwest	1,556	311	947	2,165
South	1,855	438	996	2,715
West	477	127	227	726
Occupational Ergonomics				
Northeast	90	54	0	195
Midwest	142	71	3	281
South	181	79	26	336
West	418	153	118	718
Occupational Health Physics				
Northeast	16	16	0	47
Midwest	108	59	0	223
South	957	559	0	2,054
West	224	144	0	506

Table 3-11. Total number of OS&H professionals employed (December, 2010), by discipline and region (continued)

	Estimate	Standard error	95% Confidence interval	
			LB	UB
Occupational Injury Prevention				
Northeast	117	56	6	227
Midwest	97	54	0	203
South	750	442	0	1,616
West	285	108	73	497
Occupational Epidemiology				
Northeast	15	15	0	44
Midwest	28	28	0	83
South	75	40	0	154
West	13	12	0	36
Occupational Health Psychology				
Not enough data for this discipline				

3.7.1.2 OS&H Professionals Spanning Multiple Disciplines (That Is, Those Who Work in Areas Outside Degree or Training Area) (Nationally and Regionally)

To determine the degree to which OS&H Professionals are working across multiple disciplines, the survey asked employers to indicate if their OS&H employees did additional work in areas outside of their specific degree or training area. Tables 3-12 through 3-14 provide estimates of persons working across multiple OS&H disciplines and take into account the reported secondary OS&H category. Note that in some cases these data are based on small numbers of responding employers, resulting in rather imprecise estimates (i.e., wide confidence intervals).

Table 3-12. Total number of professionals working in multiple OS&H disciplines, nationwide and by region

	Estimate	Standard error	95% Confidence interval	
			LB	UB
Nationwide	9,908	962	8,022	11,795
Northeast	1,909	429	1,068	2,750
Midwest	1,851	297	1,270	2,433
South	3,232	526	2,200	4,264
West	2,916	633	1,675	4,157

Table 3-13. What percentage of this person's time in OS&H activity is spent working in their primary field?

	Percentage of OS&H professionals	Standard error	95% Confidence interval	
			LB	UB
Occupational Safety				
50 percent or less	25%	4%	17%	34%
51 to 99 percent	37%	5%	27%	47%
100 percent	37%	5%	28%	46%
Industrial Hygiene				
50 percent or less	19%	7%	6%	32%
51 to 99 percent	56%	9%	38%	73%
100 percent	25%	6%	13%	37%
Occupational Medicine				
50 percent or less	16%	6%	4%	28%
51 to 99 percent	16%	7%	2%	29%
100 percent	68%	8%	52%	85%
Occupational Health Nursing				
50 percent or less	22%	4%	14%	30%
51 to 99 percent	21%	4%	13%	29%
100 percent	57%	6%	46%	69%
Occupational Ergonomics				
50 percent or less	50%	14%	22%	77%
51 to 99 percent	36%	15%	7%	65%
100 percent	14%	8%	0%	29%
Occupational Health Physics				
50 percent or less	35%	17%	1%	69%
51 to 99 percent	38%	16%	6%	70%
100 percent	27%	12%	4%	50%
Occupational Injury Prevention				
50 percent or less	56%	11%	35%	77%
51 to 99 percent	15%	7%	2%	28%
100 percent	28%	10%	8%	48%
Occupational Epidemiology				
50 percent or less	55%	16%	23%	86%
51 to 99 percent	20%	11%	0%	42%
100 percent	25%	16%	0%	57%
Occupational Health Psychology				
50 percent or less	-	-	-	-
51 to 99 percent	-	-	-	-
100 percent	-	-	-	-

* Percentage of those working in the discipline as their secondary (rather than primary) field.

- Insufficient data.

Table 3-14. What percentage of this person's time in OS&H activity is spent working in their secondary OS&H field?

	Percentage of OS&H professionals*	Standard error	95% Confidence interval	
			LB	UB
Occupational Safety				
10 percent or less	19%	5%	8%	29%
11 to 25 percent	50%	8%	34%	66%
More than 25 percent	31%	7%	17%	45%
Industrial Hygiene				
10 percent or less	54%	7%	41%	67%
11 to 25 percent	33%	6%	21%	45%
More than 25 percent	13%	4%	4%	22%
Occupational Medicine				
10 percent or less	-	-	-	-
11 to 25 percent	-	-	-	-
More than 25 percent	-	-	-	-
Occupational Health Nursing				
10 percent or less	48%	25%	0%	96%
11 to 25 percent	42%	25%	0%	90%
More than 25 percent	10%	10%	0%	29%
Occupational Ergonomics				
10 percent or less	53%	12%	30%	76%
11 to 25 percent	31%	11%	9%	54%
More than 25 percent	16%	6%	4%	28%
Occupational Health Physics				
10 percent or less	25%	15%	0%	53%
11 to 25 percent	25%	22%	0%	68%
More than 25 percent	50%	17%	17%	83%
Occupational Injury Prevention				
10 percent or less	24%	6%	13%	35%
11 to 25 percent	38%	7%	25%	52%
More than 25 percent	38%	8%	23%	53%
Occupational Epidemiology				
10 percent or less	40%	27%	0%	93%
11 to 25 percent	24%	21%	0%	64%
More than 25 percent	37%	23%	0%	82%
Occupational Health Psychology				
10 percent or less	-	-	-	-
11 to 25 percent	-	-	-	-
More than 25 percent	-	-	-	-

* Percentage of those working in the discipline as their secondary (rather than primary) field.

- Insufficient data.

3.7.1.3 Education and Certification (By Specialty)

This section contains findings on the education levels and certifications of OS&H professionals. Employers were asked to indicate the highest level of education each of their professionals had completed in their primary OS&H (or closely related) field. For almost all disciplines, the available response categories were bachelor's degree, master's degree, and doctoral degree (recall that NIOSH defined the professionals of interest for this survey to be those with at least a bachelor's degree). For professionals reported to be in the discipline of occupational medicine, respondents were shown a different set of response options: M.D. with residency training in occupational medicine, and M.D. with residency training in another area of medicine.

With respect to certifications, employers were asked to indicate whether each professional holds an active professional certification in their primary OS&H field. Respondents were specifically asked to not count certifications granted by OSHA and MSHA. If a professional held an active certification, respondents were asked to indicate whether it was in this person's primary field or another field. If the person did not hold such a certification, respondents were asked to further indicate whether the person was working toward it.

Table 3-15. What is the highest level of education this person has completed in their primary OS&H (or closely related) field?

	Percentage of OS&H professionals	Standard error	95% Confidence interval	
			LB	UB
Occupational Safety				
Bachelor's degree	75%	3%	69%	81%
Master's degree	23%	3%	18%	29%
Doctoral degree	2%	1%	0%	3%
Industrial Hygiene				
Bachelor's degree	41%	7%	27%	56%
Master's degree	50%	6%	37%	62%
Doctoral degree	9%	3%	3%	15%
Occupational Medicine				
M.D., residency in Occ. Medicine	73%	9%	55%	90%
M.D., residency in other area of medicine	27%	9%	10%	45%
Occupational Health Nursing				
Bachelor's degree	75%	5%	65%	86%
Master's degree	25%	5%	14%	35%
Doctoral degree	-	-	-	-

Table 3-15. What is the highest level of education this person has completed in their primary OS&H (or closely related) field? (continued)

	Percentage of OS&H professionals	Standard error	95% Confidence interval	
			LB	UB
Occupational Ergonomics				
Bachelor's degree	63%	16%	31%	95%
Master's degree	37%	16%	5%	69%
Doctoral degree	-	-	-	-
Occupational Health Physics				
Bachelor's degree	77%	12%	53%	100%
Master's degree	19%	11%	0%	41%
Doctoral degree	4%	4%	0%	12%
Occupational Injury Prevention				
Bachelor's degree	69%	10%	49%	90%
Master's degree	31%	10%	10%	51%
Doctoral degree	-	-	-	-
Occupational Epidemiology				
Bachelor's degree	63%	16%	31%	94%
Master's degree	37%	16%	6%	69%
Doctoral degree	-	-	-	-
Occupational Health Psychology				
Bachelor's degree	-	-	-	-
Master's degree	-	-	-	-
Doctoral degree	-	-	-	-

- Insufficient data.

Table 3-16. Does this person hold an active professional certification in their primary OS&H field?

	Percentage of OS&H professionals	Standard error	95% Confidence interval	
			LB	UB
Occupational Safety				
Yes, in primary discipline	28%	4%	21%	35%
Yes, in another discipline	10%	2%	5%	14%
No, working towards it	27%	5%	17%	36%
No, not working towards it	36%	4%	28%	44%
Industrial Hygiene				
Yes, in primary discipline	66%	7%	51%	80%
Yes, in another discipline	5%	3%	0%	11%
No, working towards it	10%	3%	4%	16%
No, not working towards it	19%	5%	10%	29%

Table 3-16. Does this person hold an active professional certification in their primary OS&H field? (continued)

	Percentage of OS&H professionals	Standard error	95% Confidence interval	
			LB	UB
Occupational Medicine				
Yes, in primary discipline	67%	7%	54%	80%
Yes, in another discipline	11%	4%	2%	19%
No, working towards it	9%	5%	0%	18%
No, not working towards it	14%	5%	4%	24%
Occupational Health Nursing				
Yes, in primary discipline	57%	6%	46%	69%
Yes, in another discipline	7%	2%	2%	11%
No, working towards it	11%	3%	5%	17%
No, not working towards it	25%	6%	14%	36%
Occupational Ergonomics				
Yes, in primary discipline	35%	17%	2%	68%
Yes, in another discipline	4%	4%	0%	11%
No, working towards it	19%	10%	0%	38%
No, not working towards it	43%	17%	10%	76%
Occupational Health Physics				
Yes, in primary discipline	37%	18%	1%	72%
Yes, in another discipline	-	-	-	-
No, working towards it	17%	11%	0	40%
No, not working towards it	46%	17%	13%	80%
Occupational Injury Prevention				
Yes, in primary discipline	22%	8%	6%	38%
Yes, in another discipline	10%	6%	0%	21%
No, working towards it	31%	12%	8%	55%
No, not working towards it	37%	11%	16%	59%
Occupational Epidemiology				
Yes, in primary discipline	64%	21%	23%	106%
Yes, in another discipline	-	-	-	-
No, working towards it	10%	10%	0%	29%
No, not working towards it	26%	21%	0%	66%
Occupational Health Psychology				
Yes, in primary discipline	-	-	-	-
Yes, in another discipline	-	-	-	-
No, working towards it	-	-	-	-
No, not working towards it	-	-	-	-

- Insufficient data.

3.7.1.4 Age Levels and Expectations for Retirement/Leaving Profession

Employers were asked to indicate which of the following age groups apply to each of their OS&H professionals: 60 or older, 50-59, or 49 or younger. This was followed by a question seeking to determine whether each professional was likely to retire or leave the profession within the next year.

Table 3-17. Which of the following age categories applies to this person?

	Percentage of OS&H professionals	Standard error	95% Confidence interval	
			LB	UB
Occupational Safety				
60 or older	10%	2%	7%	14%
50 to 59	38%	3%	33%	43%
49 or younger	52%	3%	45%	58%
Industrial Hygiene				
60 or older	4%	2%	0%	7%
50 to 59	36%	5%	26%	45%
49 or younger	60%	5%	50%	70%
Occupational Medicine				
60 or older	13%	4%	6%	20%
50 to 59	44%	7%	31%	58%
49 or younger	42%	6%	30%	55%
Occupational Health Nursing				
60 or older	12%	3%	7%	17%
50 to 59	46%	4%	38%	53%
49 or younger	42%	4%	35%	49%
Occupational Ergonomics				
60 or older	17%	10%	0%	38%
50 to 59	16%	7%	2%	29%
49 or younger	67%	11%	45%	89%
Occupational Health Physics				
60 or older	10%	7%	0%	25%
50 to 59	45%	18%	10%	80%
49 or younger	44%	16%	13%	76%
Occupational Injury Prevention				
60 or older	6%	4%	0%	15%
50 to 59	21%	8%	6%	37%
49 or younger	73%	9%	56%	90%
Occupational Epidemiology				
60 or older	-	-	-	-
50 to 59	45%	16%	14%	77%
49 or younger	55%	16%	23%	86%

Table 3-17. Which of the following age categories applies to this person? (continued)

	Percentage of OS&H professionals	Standard error	95% Confidence interval	
			LB	UB
Occupational Health Psychology				
60 or older	-	-	-	-
50 to 59	-	-	-	-
49 or younger	-	-	-	-

- Insufficient data.

Table 3-18. Do you think that this person is likely to retire or leave the profession within the next year?

	Percentage of OS&H professionals	Standard error	95% Confidence Interval	
			LB	UB
Occupational Safety	10%	2%	6%	13%
Industrial Hygiene	4%	2%	0%	8%
Occupational Medicine	5%	2%	1%	9%
Occupational Health Nursing	6%	1%	3%	8%
Occupational Ergonomics	8%	6%	0%	20%
Occupational Health Physics	6%	6%	0%	18%
Occupational Injury Prevention	1%	1%	0%	4%
Occupational Epidemiology	10%	2%	6%	13%
Occupational Health Psychology	-	-	-	-

- Insufficient data.

3.7.2 Training Needs of the OS&H Workforce

The survey of employers asked about perceived training needs of professionals within each of the OS&H disciplines of interest for this project. These questions were asked in an open-ended format, allowing respondents to enter any answer they desired. These questions were accompanied by lists of examples in an effort to stimulate respondent thinking on the subject. The examples of technical training needs were tailored to each discipline, and were compiled with assistance from the NIOSH Workforce Assessment Task Force. Most respondents used one or more of these examples when answering the question.

3.7.2.1 Perceived Additional Training Needs of OS&H Professionals

The following tables (Tables 3-19a a through 3-24b) contain estimates of the perceived training needs for the disciplines of Occupational Safety, Occupational Hygiene, Occupational Health Nursing, Occupational Medicine, Occupational Ergonomics, and Occupational Injury Prevention. Data regarding Occupational Health Physics, Occupational Epidemiology, and Occupational Health Psychology were insufficient to allow presentation.

Occupational Safety

Table 3-19a. In what specialties or technical aspects of their jobs do you believe that at least some of your occupational safety professionals could benefit from additional training?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Investigating accidents	31%	3%	24%	38%
Planning for / responding to emergencies	26%	3%	20%	32%
Ergonomics	31%	3%	24%	37%
Fire safety	22%	3%	16%	28%
Electrical safety	29%	3%	23%	35%
Industrial Hygiene	27%	3%	21%	33%
Hazardous materials management	28%	3%	22%	35%
Finding and utilizing sources of safety information	25%	4%	18%	33%
Measuring safety program outcomes (e.g., on health status, injury rates)	36%	4%	29%	43%
Measuring economic value of safety programs	29%	3%	23%	36%
Job safety analysis	32%	4%	24%	39%
Other needs	17%	2%	12%	22%

* Percentage of establishments employing at least one occupational safety professional. Respondents could indicate as many training needs as desired.

- Insufficient data.

Table 3-19b. In what additional aspects of their jobs do you believe that at least some of your occupational safety professionals could benefit from additional training?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Communication with workers/training skills	32%	3%	25%	38%
Communication with upper management	24%	3%	19%	30%
Organizational Science	18%	3%	13%	24%
Technical writing	26%	3%	20%	32%
Leadership skills	24%	3%	18%	30%
Understanding workers' jobs	12%	2%	8%	16%
Understanding our industry (e.g., products, markets, practices)	11%	2%	6%	15%
Local, state, or Federal regulations and compliance	25%	3%	19%	32%
Workers' Compensation	25%	3%	19%	31%
Environmental regulations	26%	3%	21%	32%
Other needs	8%	2%	5%	12%

* Percentage of establishments employing at least one occupational safety professional.

Respondents could indicate as many training needs as desired.

Industrial Hygiene

Table 3-20a. In what specialties or technical aspects of their jobs do you believe that at least some of your industrial hygiene professionals could benefit from additional training?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Indoor air quality	27%	6%	14%	39%
Evaluating and controlling lead exposure and asbestos exposure in the workplace	15%	4%	6%	24%
Emergency response planning and community right-to-know	18%	5%	8%	28%
Recognition of workplace diseases	19%	5%	9%	28%
Potentially hazardous agents	19%	5%	9%	29%
Radiation (electromagnetic fields, microwaves)	24%	6%	14%	36%
Reproductive health hazards in the workplace	15%	4%	7%	23%
Proper interpretation of exposure monitoring data	18%	4%	9%	27%
Detection and control of potential hazards due to noise and illumination	12%	4%	5%	20%
Hazardous waste management	18%	5%	8%	28%
Other needs	13%	5%	4%	23%

* Percentage of establishments employing at least one industrial hygiene professional.

Respondents could indicate as many training needs as desired.

Table 3-20b. In what additional aspects of their jobs do you believe that at least some of your industrial hygiene professionals could benefit from additional training?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Communicating with workers/training skills	34%	7%	20%	47%
Communicating with upper management	29%	7%	16%	42%
Organizational science	15%	4%	7%	23%
Technical writing	25%	6%	13%	36%
Leadership skills	33%	7%	19%	46%
Understanding of workers' jobs	8%	3%	3%	14%
Understanding of our industry (e.g., products, markets, practices)	5%	2%	1%	9%
Local, state, or Federal regulations	10%	3%	4%	17%
Workers' Compensation	10%	4%	2%	18%
Environmental regulations	16%	4%	8%	25%
Other needs	11%	5%	1%	20%

* Percentage of establishments employing at least one industrial hygiene professional.

Respondents could indicate as many training needs as desired.

Occupational Medicine

Table 3-21a. In what specialties or technical aspects of their jobs do you believe that at least some of your occupational medicine professionals could benefit from additional training?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Evidence-based clinical evaluation and treatment	8%	4%	1%	15%
Determining fitness for work	19%	7%	6%	32%
Developing/managing medical surveillance programs	9%	4%	2%	16%
Laws and regulations related to occupational medicine	23%	7%	9%	37%
Evaluating environmental health risks	15%	5%	4%	25%
Disaster and emergency management	14%	6%	2%	27%
Health and productivity management	0%	0%	0%	0%
Medical Review officer functions	8%	4%	0%	15%
Wellness and health promotion	3%	2%	0%	8%
Managing mental health issues in the workplace	14%	6%	2%	26%
Toxic chemical exposure	21%	8%	6%	36%
Other needs	10%	5%	0%	20%

*Percentage of establishments employing at least one occupational medicine professional.

Respondents could indicate as many training needs as desired.

Table 3-21b. In what additional aspects of their jobs do you believe that at least some of your occupational medicine professionals could benefit from additional training?

	Estimate*	Standard error	95% Confidence interval	
			LB	UB
Communicating with workers/training skills	7%	4%	0%	15%
Communicating with upper management	15%	6%	4%	26%
Organizational science	3%	2%	0%	7%
Technical writing	10%	6%	0%	21%
Leadership skills	17%	7%	4%	31%
Understanding of workers' jobs	11%	5%	3%	20%
Understanding of our industry (e.g., products, markets, practices)	14%	7%	0%	28%
Local, state, or Federal regulations and compliance	22%	7%	8%	35%
Workers' Compensation	19%	7%	6%	32%
Environmental regulations	10%	4%	2%	18%
Other needs	8%	5%	0%	17%

* Percentage of establishments employing at least one occupational medicine professional.

Respondents could indicate as many training needs as desired.

Occupational Health Nursing

Table 3-22a. In what specialties or technical aspects of their jobs do you believe that at least some of your occupational health nursing professionals could benefit from additional training?

	Estimate*	Standard Error	95% Confidence Interval	
			LB	UB
Case management and transitional work programs	33%	5%	23%	42%
Conducting health and injury assessments	31%	5%	21%	40%
Managing and evaluating substance abuse programs	16%	4%	7%	24%
Wellness and health promotion initiatives	50%	5%	40%	60%
Analyzing workplace hazards	37%	5%	28%	47%
Prevention of workplace accidents	34%	5%	24%	43%
Managing and evaluating travel health programs	14%	4%	6%	22%
Managing and evaluating workplace violence programs	17%	4%	8%	25%
Health Quality Improvement initiatives	28%	5%	18%	38%
Managing and evaluating safety programs	28%	5%	19%	38%
Other needs	7%	2%	3%	12%

* Percentage of establishments employing at least one occupational health nursing professional.

Respondents could indicate as many training needs as desired.

Table 3-22b. In what additional aspects of their jobs do you believe that at least some of your occupational health nursing professionals could benefit from additional training?

	Estimate*	Standard Error	95% Confidence interval LB	95% Confidence interval UB
Communicating with workers/training skills	16%	4%	9%	24%
Communicating with upper management	21%	4%	13%	30%
Organizational science	16%	4%	8%	24%
Technical writing	19%	4%	11%	27%
Leadership/Management skills	27%	5%	18%	36%
Understanding of workers' jobs	17%	4%	10%	24%
Understanding of our industry (e.g., products, markets, practices)	12%	3%	6%	18%
Local, state, or Federal regulations and compliance	30%	5%	21%	39%
Workers' Compensation	26%	4%	18%	35%
Environmental regulations	22%	4%	14%	29%
Other needs	11%	4%	3%	18%

* Percentage of establishments employing at least one occupational health nursing professional.

Respondents could indicate as many training needs as desired.

Ergonomics

Table 3-23a. In what specialties or technical aspects of their jobs do you believe that at least some of your occupational ergonomics professionals could benefit from additional training?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Recognition of ergonomic hazards in equipment, manufacturing processes, and production systems	17%	13%	0%	43%
Biomechanics/prevention of work-related musculoskeletal disorders	12%	7%	0%	26%
Cognitive ergonomics/prevention of human error/ enhancing human performance reliability	25%	11%	3%	48%
Instrumentation for human measurements	12%	8%	0%	27%
Facility and workstation design	15%	8%	0%	30%
Usability Testing (product design, selection of tools, etc.)	4%	4%	0%	11%
Systems Integration	10%	7%	0%	24%
Ergonomic Job Analysis	26%	12%	3%	49%
Accident/Incident investigation	24%	14%	0%	51%
Anthropometry	-	-	-	-
Prevention through design/Design reviews	19%	12%	0%	44%
Other needs	2%	2%	0%	6%

* Percentage of establishments employing at least one occupational ergonomics professional.

Respondents could indicate as many training needs as desired.

- Insufficient data

Table 3-23b. In what additional aspects of their jobs do you believe that at least some of your occupational ergonomics professionals could benefit from additional training?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Communicating with workers/training skills	20%	11%	0%	42%
Communicating with upper management	29%	12%	6%	53%
Organizational science	4%	3%	0%	10%
Technical writing	4%	3%	0%	9%
Leadership skills	15%	8%	0%	30%
Understanding of workers' jobs	18%	9%	0%	36%
Understanding of our industry (e.g., products, markets, practices)	2%	2%	0%	6%
Local, state, or Federal regulations and compliance	17%	13%	0%	43%
Workers' Compensation	34%	14%	7%	61%
Environmental regulations	17%	13%	0%	43%

* Percentage of establishments employing at least one occupational ergonomics professional.

Respondents could indicate as many training needs as desired.

Occupational Injury Prevention

Table 3-24a. In what specialties or technical aspects of their jobs do you believe that at least some of your occupational injury prevention professionals could benefit from additional training?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Recognition, evaluation, and prevention of occupational injuries	17%	7%	4%	29%
Measurement of risk factors for occupational injury	32%	11%	10%	54%
Understanding the influence of occupational injury on disability and return to work	1%	1%	0%	4%
Evaluating environmental, behavioral, and work practice contributors to injury risk	19%	8%	3%	36%
Interpretation and dissemination of research findings to formulate occupational injury prevention programs and policies	6%	4%	0%	14%
Design and implementation of evidence-based occupational injury prevention approaches	16%	8%	1%	31%
Evaluation of occupational injury prevention strategies	18%	10%	0%	37%
Disaster and emergency management	5%	4%	0%	12%
Identifying and responding to violence in the workplace	11%	9%	0%	28%
Health and productivity management	4%	4%	0%	12%
Wellness and health promotion	23%	11%	2%	45%
Managing treatment and recovery from occupational injury	7%	4%	0%	16%
Other needs	7%	5%	0%	17%

* Percentage of establishments employing at least one occupational ergonomics professional.

Respondents could indicate as many training needs as desired.

Table 3-24b. In what additional aspects of their jobs do you believe that at least some of your occupational injury prevention professionals could benefit from additional training?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Communicating with workers/training skills	26%	11%	4%	47%
Communicating with upper management	20%	10%	1%	40%
Organizational science	7%	5%	0%	16%
Technical writing	4%	4%	0%	12%
Leadership skills	5%	4%	0%	14%
Understanding of workers' jobs	22%	4%	0%	45%
Understanding of our industry (e.g., products, markets, practices)	8%	5%	0%	18%
Local, state, or Federal regulations	13%	7%	0%	26%
Workers' Compensation	3%	2%	0%	7%
Environmental regulations	21%	11%	0%	43%
Other needs	1%	1%	0%	4%

* Percentage of establishments employing at least one occupational injury prevention professional.

Respondents could indicate as many training needs as desired.

3.7.2.2 Desired OS&H New Courses or Topics

Respondents were asked whether they thought any new OS&H topics should be introduced in the continuing education component of OS&H training. The response estimate to this question is shown in Table 3-25a. Where a "yes" response was recorded, the respondent was asked to specify. In Table 3-25b, the specific responses offered are listed.

Table 3-25a. Are there any new occupational safety and health courses or topics that you would like to see introduced in OS&H continuing education within the next few years?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Yes	26%	3%	20%	32%
No	74%	3%	68%	80%

* Percentage of employers.

Table 3-25b. OS&H continuing education topics that employers would like to see introduced

Interpersonal skills between insurance company, doctor, adjuster
More distance learning
Safe handling of engineered nanomaterials
Ergonomics, workers compensation
Recycling
Ergonomics and new hire orientation
Safety system management and industrial psychology
Identifying/containing new emerging infectious diseases.
Biological lab safety BSL-1 through 4 and animal lab research safety
Environmental compliance
Injury management
Occupational safety and an aging workforce
Finding funds for work safety
Advances in fire safety equipment, life safety issues.
Indoor air quality
Understanding regulations
Arc flash
Wellness and prevention, workers' compensation
Aging workforce safety
Would like to know what the field is seeing as the direction of OH&S.
Ergonomics
Safety perception survey
Biosafety
Ergonomic studies and regulations for repetitive motion
Hazardous materials handling, flammable materials handling
Safe patient handling
Hands-on industrial hygiene
CSP (Certified Safety Professional) exam online prep
OSHA 501 /502
Violence in the workplace legislation
Certification courses in workers' compensation case management
Updates on new requirements
Injury/lost time reduction specific to safe patient handling
Update regarding sharp safety; ergonomics in workplace
Zoonotics
Injury prevention
Specifically addressing violence in hospitals
Hazardous materials management
Management of workplace exposure to infectious diseases, worker immunizations.
Job safety analysis
Radiation safety / mold & mildew / Indoor air quality / OSH trends & analysis
Safe patient handling, workplace violence, aging workforce
Topics specific to occupational health nursing
GHS (globally harmonized systems)
OSHA requirements and how to implement in regards to respiratory protection
Patient lift policies
Occupational health and safety for small manufacturers
Correctional Injuries
How to prevent injuries in prison units

Table 3-25b. OS&H continuing education topics that employers would like to see introduced (continued)

How to manage occupational health and safety with reduced resources.
Behavior based
Ergonomic research, fall protection and prevention, industrial hygiene
The financial case for promoting a safe workplace.
Need more training for the public sector
Safety management systems
Leadership in safety cultures
Health and wellness and security
Behavior based safety
Respiratory protection, biosafety, ladder safety
Slips trips and fall reduction, ergonomic safety, back safety
Sharps safety in health care
30 hr. training
Use of patient lifting devices to reduce injuries
Robotics safety
Health coaching to increase employee engagement in safety & health
Laboratory Safety for Students and Faculty
HFACS (Human Factors Analysis and Classification System), near-miss and situational awareness
Risk assessment and root cause analysis
Complying with regulations on risk based method
Nanotech hazards; aerosol transmissible diseases
Fundamentals of industrial hygiene sampling
Occupational psychology (I had not seen this before this survey)
Patient safe lifting
OSHA, environmental, IH, record keeping,
Leadership
OSHA training for hearing and PFT (pulmonary function testing) programs
Presenteeism and worker productivity
IH for engineered nanomaterials
MSHA related issues
Managing worker injuries in a "virtual" work environment
Systems safety, safety engineering, design, and contracting
Health and safety related to nanotechnology
Updates on occupational health
How to use emerging technology to enhance safety training
VPP (voluntary protection programs)
Risk management
Nanoparticle sampling, testing, and exposure
Aerosol transmissible diseases
Workers' compensation issues
General safety for property maintenance personnel
Planning and conducting of drills; which includes help with writing scenarios.
Risk assessing, incident investigation, pandemic
Radiation training
Coursework dedicated to reducing injuries for all emergency responders
Documenting hazard analyses
Arc flash
New OSHA guidelines and implementation procedures

Table 3-25b. OS&H continuing education topics that employers would like to see introduced (continued)

Ergonomics, enforcement of safety regulations
Nanotechnology
Spirometry
CLCS-Certified Loss Control Specialist
NEBOSH IGC (National Examination Board in Occupational Safety & Health international general certificate) equivalent
Safe patient handling in an operating room environment
Occupational safety and health for healthcare and hospitals
An OSHA 10-hour course for electric utilities
Practical information on arc flash
Continuity of operations planning
More professional training
Contesting false claims
Biological safety
Non-ionizing radiation
Statistic analyses, job safety analysis
Integrating new technology into OSH
Indoor air quality problems, Research Education Health and Safety (REHS), continuing education units
Ladder usage and roof work
Nanotechnology safety
Emergency/disaster preparedness
Workplace safety
Clinic-based audiometry programs; clinic-based respirator training programs
City area
New crane area

3.7.3 Hiring Expectations of Employers, and Characteristics/Skills of OS&H Professionals Desired By Employers

Respondents were asked to indicate whether they expected to hire professionals in each of OS&H disciplines of interest for this assessment over the next 5 years. For each discipline where responding employers indicated an expectation to hire, the survey asked them to tell how many professionals they expected to hire (considering both new positions and positions to replace staff that leave), and to record how many they expected to hire at various levels of education, i.e., persons with a bachelor's degree, a master's degree, or a doctoral degree (a different approach was taken for expected new hires in occupational medicine, as described below). As with the estimates of those currently employed, weighted sums of these counts, both overall and by OS&H discipline and Census region, were generated.

It is important to note that the estimates of future hiring of OS&H professionals are likely to be under-estimates, for two (perhaps related) reasons. First, data collection for this survey took place during a time of significant uncertainty and relatively high unemployment in the U.S. economy. Second, predicting how many professionals (of any type) an establishment will need to hire over the coming 5 years is a difficult task for many respondents. In fact, many respondents told us that they simply do not know if they expect to hire any OS&H professionals. Among those who told us they do expect to hire within a given discipline, they often did not report a specific number of persons they expect to hire. There was still more missing data observed at the question asking how many professionals the employer expected to hire at various degree levels. The counts of expected future hires from these respondents were treated as "zeroes" in the calculations, and thus serve to minimize the estimates. As a result, the estimated numbers of professionals to be hired at various degree levels should be viewed and assessed relative to one another, rather than to the previously reported estimates. Finally, it is important to note that some estimates are imprecise because they are based on a small number of responding employers.

The survey also collected information on employer expectations regarding professional certification. Respondents who indicated that they expect to hire within a given OS&H area were asked to record how many of the professionals they expect to hire will be required to have an active certification prior to being hired (or shortly afterward). For ease of presentation, our tables show the extent to which employers indicated they will require none, some, or all of their hires in a given discipline to have such certification.

For occupational medicine, rather than being asked about degree levels for expected new hires, employers were asked to indicate how many of their new hires they hoped will have completed a formal residency specifically in occupational medicine, In addition, for employers who will not require all of their new hires in occupational medicine to be board certified in this specific area of medicine, the survey asked if they will require these future hires to be board certified in another medical specialty, and whether training in occupational medicine through short courses, continuing medical education (CME) courses, or similar training would be required. Findings from these questions are shown in Tables 3-30 and 3-31.

3.7.3.1 OS&H Professionals We Will Need in the Next 5 Years (Nationally, Regionally, and By Discipline)

Table 3-26. Total number of OS&H professionals that employers expect to hire over the next 5 years, nationwide and by region

	Estimate	Standard error	95% Confidence interval	
			LB	UB
Nationwide*	25,078	6,992	11,368	38,788
Northeast	6,995	5,744	0	18,257
Midwest	3,110	1,383	398	5,822
South	10,159	3,529	3,239	17,079
West	4,814	1280	2,305	7,324

* Total includes OS&H professionals employers report expecting to hire outside of the specialties of interest to NIOSH. Thus, this total is greater than the sum of professionals expected to be hired in the nine specialties shown below.

Table 3-27. Total number of OS&H professionals that employers expect to hire over the next 5 years, by discipline

	Estimate	Standard error	95% Confidence interval	
			LB	UB
Occupational Safety	17,801	6,417	5,219	30,382
Industrial Hygiene	2,310	770	801	3,819
Occupational Medicine	489	174	147	830
Occupational Health Nursing	1,373	253	877	1,870
Occupational Ergonomics	314	118	84	545
Occupational Health Physics	742	328	98	1,386
Occupational Injury Prevention	1,145	300	556	1,734
Occupational Epidemiology	99	63	0	222
Occupational Health Psychology	92	62	0	214

Table 3-28. Total number of OS&H professionals that employers expect to hire over the next 5 years, by discipline and region

	Estimate	Standard error	95% Confidence interval	
			LB	UB
Occupational Safety				
Northeast	6,473	5,616	0	17,484
Midwest	2,265	1,355	0	4,922
South	5,915	2,626	766	11,064
West	3,147	982	1,222	5,073
Industrial Hygiene				
Northeast	81	64	0	206
Midwest	124	52	23	226
South	1,456	715	54	2,859
West	649	274	111	1,186
Occupational Medicine				
Northeast	56	33	0	121
Midwest	73	33	8	138
South	306	165	0	629
West	54	33	0	119
Occupational Health Nursing				
Northeast	152	64	26	277
Midwest	383	122	144	622
South	558	181	203	912
West	281	116	54	509
Occupational Ergonomics				
Northeast	-	-	-	-
Midwest	46	26	0	98
South	175	103	0	376
West	93	51	0	192
Occupational Health Physics				
Northeast	-	-	-	-
Midwest	60	50	0	159
South	608	322	0	1,239
West	74	45	0	163
Occupational Injury Prevention				
Northeast	222	149	0	514
Midwest	87	60	0	205
South	481	184	119	842
West	356	175	13	699
Occupational Epidemiology				
Not enough data for this discipline				
Occupational Health Psychology				
Not enough data for this discipline				

- Insufficient data.

Table 3-29. Employer expectations for hiring OS&H professionals, by discipline and degree level

	Estimate	Standard error	95% Confidence interval	
			LB	UB
Occupational Safety				
Bachelor's degree	13,552	5,880	2,023	25,081
Master's degree	1,962	814	366	3,558
Doctoral degree	385	303	0	978
Industrial Hygiene				
Bachelor's degree	1,538	547	465	2,610
Master's degree	706	308	102	1,311
Doctoral degree	-	-	-	-
Occupational Medicine				
Formal residency in this specialty of medicine	453	172	115	791
Occupational Health Nursing				
Bachelor's degree	847	167	521	1,174
Master's degree	195	75	49	342
Doctoral	151 *	150	0	445
Occupational Ergonomics				
Bachelor's degree	234	102	33	434
Master's degree	25	17	0	58
Doctoral degree	-	-	-	-
Occupational Health Physics				
Bachelor's degree	551	315	0	1,168
Master's degree	116	68	0	249
Doctoral degree	19	13	0	44
Occupational Injury Prevention				
Bachelor's degree	789	250	299	1,280
Master's degree	233	147	0	520
Doctoral degree	-	-	-	-
Occupational Epidemiology				
Bachelor's degree	43	29	0	100
Master's degree	-	-	-	-
Doctoral degree	-	-	-	-
Occupational Health Psychology				
Bachelor's degree	-	-	-	-
Master's degree	28	28	0	83
Doctoral degree	7	7	0	21

* Employers who expect to hire occupational health nursing professionals were presented with three doctoral degrees: Doctor of Philosophy (Ph.D.), Doctor of Nursing Science (DNSc) and the Doctor of Nursing Practice (DNP). It should be noted that the estimate above reflects only expected hires for the DNSc degree, since no respondents indicated an expectation to hire Ph.D.s or DNPs.

- Insufficient data.

Table 3-30. If you expect to hire any physicians who are not board certified in occupational medicine, will you require board certification in another medical specialty?

	Estimate*	Standard error	95% Confidence interval	
			LB	UB
Yes	41%	21%	1%	82%
No	59%	21%	18%	99%

* Percentage of employers that expect to hire occupational medicine professionals not board certified in occupational medicine.

Table 3-31. If you expect to hire any physicians who are not board certified in occupational medicine, will you require training in occupational medicine through professional short-courses, continuing medical education (CME) courses, or similar training?

	Percentage of employers*	Standard error	95% Confidence interval	
			LB	UB
Yes	79%	15%	50%	107%
No	21%	15%	0%	50%

* Percentage of employers that expect to hire occupational medicine professionals not board certified in occupational medicine.

Table 3-32. Employer expectations for requiring professional certification among future hires, by discipline

	Estimate*	Standard error	95% Confidence interval	
			LB	UB
Occupational Safety				
None	49%	6%	37%	61%
Some	15%	5%	6%	24%
All	36%	6%	24%	48%
Industrial Hygiene				
None	30%	9%	12%	47%
Some	14%	10%	0%	34%
All	56%	11%	34%	79%
Occupational Medicine				
None	13%	9%	0%	30%
Some	7%	4%	0%	16%
All	80%	10%	60%	100%
Occupational Health Nursing				
None	27%	8%	12%	42%
Some	6%	3%	0%	12%
All	67%	8%	51%	84%
Occupational Ergonomics				
None	34%	17%	0%	68%
Some	-	-	-	-
All	66%	17%	32%	1%

Table 3-32. Employer expectations for requiring professional certification among future hires, by discipline (continued)

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Occupational Health Physics				
None	33%	17%	0%	66%
Some	5%	5%	0%	15%
All	62%	18%	27%	97%
Occupational Injury Prevention				
None	24%	10%	5%	43%
Some	4%	3%	0%	9%
All	72%	10%	52%	92%
Occupational Epidemiology				
None	64%	28%	8%	100%
Some	-	-	-	-
All	36%	28%	0%	92%
Occupational Health Psychology				
None	61%	30%	2%	100%
Some	-	-	-	-
All	39%	30%	0%	98%

* Percentage of employers that expect to hire within a discipline indicating that none, some, or all of the professionals they expect to hire are to have an active professional certification, either prior to being hired or shortly afterward.

- Insufficient data.

3.7.3.2 Specialties and Special Skills Employers Are Seeking in New Hires in the Next 5 Years (By Discipline)

When employers indicated they expected to hire professionals in a given discipline in the coming 5 years, they were asked to tell us about the important skills they will be looking for in these new employees. Specifically, there were asked to indicate the "most important specialties or technical skills" they will be seeking, as well as the "most important additional skills or knowledge areas." These were very similar in format to the earlier questions on training needs of current professionals – that is, these questions were asked in an open-ended format, allowing respondents to enter any answer they desired. But the questions were accompanied by lists of examples in an effort to stimulate respondent thinking on the subject. The examples were the same as those presented in the sections asking about technical training needs, and were tailored to each discipline. As with the questions on training needs, most respondents used one or more of these examples when answering the question.

In addition to these two open-ended questions, respondents were asked which, if any, of the other OS&H disciplines they would like these new hires to be trained. This question was designed to target more specifically employer desires for cross-training in OS&H professionals.

The following tables (Tables 3-33a through 3-39c) provide estimates of the desired skills and cross-training for the disciplines of Occupational Safety, Occupational Hygiene, Occupational Health Nursing, Occupational Medicine, Occupational Ergonomics, Occupational Health Physics, and Occupational Injury Prevention. Data regarding Occupational Health Psychology and Occupational Epidemiology were insufficient to allow presentation.

For occupational health nursing, NIOSH asked us to collect additional information regarding employers' awareness of, and interest in, the emerging Doctor of Nursing Practice (DNP) degree. Thus, employers who indicated that they expect to hire occupational health nurses in the coming 5 years were provided some background about this degree, and asked two questions about it. The background material read as follows:

> There has been considerable discussion in the field of advanced nursing practice and occupational health nursing about the pros and cons of moving the level of training from the Master's degree to the Doctor of Nursing Practice (DNP) by 2015. DNP training is expected to build on traditional nursing practice master's programs by providing education in evidence-based practice, quality improvement, and systems leadership, among other areas. Some nursing schools have already begun offering the DNP degree and graduates are beginning to enter the workplace.

One question asked these employers likely it is they would hire an occupational health nurse with a DNP degree within the next 5 years. A second question asked if they had heard of the DNP degree before this survey. Findings on these two questions can be found in Tables 3-36d and 3-36e.

Occupational Safety Professionals

Table 3-33a. What are the most important specialties or technical skills that you will be looking for when hiring occupational safety professionals over the next 5 years?

	Estimate*	Standard error	95% Confidence interval	
			LB	UB
Investigating accidents	47%	6%	37%	58%
Planning for/responding to emergencies	21%	4%	13%	29%
Ergonomics	28%	5%	18%	38%
Fire safety	21%	5%	11%	31%
Electrical safety	16%	4%	9%	24%
Industrial hygiene	33%	5%	22%	43%
Hazardous materials management	23%	5%	14%	32%
Finding and utilizing sources of safety information	24%	5%	15%	33%
Measuring safety program outcomes (e.g., on health status, injury rates)	30%	5%	20%	40%
Measuring economic value of safety programs	19%	5%	9%	29%
Job safety analysis	43%	6%	32%	54%
Other skills	20%	4%	12%	28%

* Percentage of establishments expecting to hire occupational safety professionals.

Respondents could indicate as many skills as desired.

Table 3-33b. What are the most important additional skills or knowledge areas that you will be looking for when hiring occupational safety professionals over the next 5 years?

	Estimate*	Standard error	95% Confidence interval	
			LB	UB
Communicating with workers/training skills	59%	5%	49%	70%
Communicating with upper management	29%	5%	19%	39%
Organizational science	17%	5%	7%	26%
Technical writing	40%	6%	29%	51%
Leadership skills	48%	6%	37%	59%
Understanding of workers' jobs	25%	5%	16%	34%
Understanding of our industry (e.g., products, markets, practices)	22%	5%	12%	32%
Local, state, or general regulations	30%	5%	20%	40%
Workers' Compensation	18%	5%	9%	28%
Environmental regulations	16%	5%	7%	25%
Other skills	15%	4%	8%	22%

* Percentage of establishments expecting to hire occupational safety professionals.

Respondents could indicate as many skills as desired.

Table 3-33c. In which of the following additional areas, if any, would you like for these occupational safety professionals to be trained?

	Estimate*	Standard error	95% Confidence interval	
			LB	UB
Industrial Hygiene	62%	6%	51%	73%
Occupational Medicine	22%	5%	11%	33%
Occupational Health Nursing	10%	3%	4%	17%
Occupational Ergonomics	46%	6%	35%	57%
Occupational Health Physics	10%	3%	4%	16%
Occupational Injury Prevention	60%	5%	49%	70%
Occupational Epidemiology	7%	3%	1%	13%
Occupational Health Psychology	16%	5%	6%	25%
Other OS&H Areas	12%	4%	5%	19%

* Percentage of establishments expecting to hire occupational safety professionals.

Respondents could indicate as many areas as desired.

Industrial Hygiene

Table 3-34a. What are the most important specialties or technical skills that you will be looking for when hiring industrial hygiene professionals over the next 5 years?

	Estimate*	Standard error	95% Confidence interval	
			LB	UB
Indoor air quality	30%	8%	15%	45%
Evaluating and controlling lead exposure and asbestos exposure in the workplace	9%	3%	3%	14%
Emergency response planning and community right-to-know	25%	8%	10%	39%
Recognition of workplace diseases	18%	6%	5%	30%
Potentially hazardous agents	23%	7%	10%	37%
Radiation (electromagnetic fields, microwaves)	7%	3%	2%	13%
Reproductive health hazards in the workplace	2%	1%	0%	4%
Proper interpretation of exposure monitoring data	36%	8%	20%	52%
Detection and control of potential hazards due to noise and illumination	10%	5%	1%	19%
Hazardous waste management	10%	4%	3%	18%
Other Skills	8%	3%	2%	14%

* Percentage of establishments expecting to hire industrial hygiene professionals.

Respondents could indicate as many skills as desired.

Table 3-34b. What are the most important additional skills or knowledge areas that you will be looking for when hiring industrial hygiene professionals over the next 5 years?

	Estimate*	Standard error	95% Confidence interval	
			LB	UB
Communicating with workers/training skills	43%	8%	27%	60%
Communicating with upper management	31%	8%	15%	47%
Organizational science	23%	8%	7%	38%
Technical writing	31%	8%	15%	46%
Leadership skills	32%	8%	16%	48%
Understanding of workers' jobs	25%	7%	10%	40%
Understanding of our industry (e.g., products, markets, practices)	17%	7%	3%	31%
Local, state, or Federal regulations	11%	4%	3%	18%
Workers/ Compensation	12%	6%	0%	24%
Environmental regulations	7%	3%	0%	14%
Other skills	11%	5%	2%	20%

* Percentage of establishments expecting to hire industrial hygiene professionals.

Respondents could indicate as many skills as desired.

Table 3-34c. In which of the following additional areas, if any, would you like for these industrial hygiene professionals to be trained?

	Estimate*	Standard error	95% Confidence interval	
			LB	UB
Occupational Safety	40%	8%	24%	56%
Occupational Medicine	7%	4%	0%	14%
Occupational Health Nursing	8%	6%	0%	20%
Occupational Ergonomics	22%	6%	10%	35%
Occupational Health Physics	7%	3%	2%	13%
Occupational Injury Prevention	29%	8%	13%	45%
Occupational Epidemiology	3%	1%	0%	6%
Occupational Health Psychology	3%	1%	0%	6%
Other OS&H Areas	6%	3%	1%	12%

* Percentage of establishments expecting to hire industrial hygiene professionals.

Respondents could indicate as many areas as desired.

Occupational Medicine

Table 3-35a. What are the most important specialties or technical skills that you will be looking for when hiring occupational medicine physicians over the next 5 years?

	Estimate*	Standard error	95% Confidence interval	
			LB	UB
Evidence-based clinical evaluation and treatment	40%	12%	17%	64%
Determining fitness for work	41%	12%	18%	64%
Developing/managing medical surveillance programs	15%	6%	4%	26%
Laws and regulations related to occupational medicine	14%	5%	4%	24%
Evaluating environmental health risks	5%	3%	0%	12%
Disaster and emergency management	1%	1%	0%	4%
Health and productivity management	9%	5%	0%	19%
Medical Review officer functions	5%	2%	0%	9%
Wellness and health promotion	14%	6%	3%	25%
Managing mental health issues in the workplace	2%	1%	0%	4%
Toxic chemical exposure	2%	2%	0%	5%
Other skills	21%	14%	0%	48%

* Percentage of establishments expecting to hire occupational medicine physicians.

Respondents could indicate as many skills as desired.

Table 3-35b. What are the most important additional skills or knowledge areas that you will be looking for when hiring occupational medicine physicians over the next 5 years?

	Estimate*	Standard error	95% Confidence interval	
			LB	UB
Communicating with workers/training skills	38%	12%	14%	61%
Communicating with upper management	27%	13%	1%	53%
Organizational science	6%	4%	0%	13%
Technical writing	21%	14%	0%	47%
Leadership skills	32%	13%	7%	57%
Understanding of workers' jobs	19%	6%	7%	32%
Understanding of our industry (e.g., products, markets, practices)	14%	5%	4%	24%
Local, state, or Federal regulations	15%	5%	4%	25%
Workers' Compensation	19%	6%	7%	31%
Environmental regulations	4%	3%	0%	11%
Other skills	1%	1%	0%	2%

* Percentage of establishments expecting to hire occupational medicine physicians.

Respondents could indicate as many skills as desired.

Table 3-35c. In which of the following additional areas, if any, would you like for these occupational medicine physicians to be trained?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Occupational Safety	36%	9%	18%	54%
Industrial Hygiene	23%	7%	9%	36%
Occupational Health Nursing	14%	5%	3%	24%
Occupational Ergonomics	28%	8%	13%	43%
Occupational Health Physics	8%	4%	1%	15%
Occupational Injury Prevention	51%	11%	30%	73%
Occupational Epidemiology	6%	3%	0%	12%
Occupational Health Psychology	9%	4%	1%	17%
Other OS&H Areas	4%	3%	0%	10%

* Percentage of establishments expecting to hire occupational medicine physicians.

Respondents could indicate as many areas as desired.

Occupational Health Nursing

Table 3-36a. What are the most important specialties or technical skills that you will be looking for when hiring occupational health nurses over the next 5 years?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Case management and transitional work programs	47%	8%	30%	63%
Conducting health and injury assessments	45%	9%	28%	62%
Managing and evaluating substance abuse programs	7%	3%	1%	12%
Wellness and health promotion initiatives	32%	9%	14%	49%
Analyzing workplace hazards	11%	3%	4%	18%
Prevention of workplace accidents	28%	9%	10%	46%
Managing and evaluating travel health programs	6%	4%	0%	13%
Managing and evaluating workplace violence programs	1%	1%	0%	2%
Health Quality Improvement initiatives	13%	6%	2%	24%
Managing and evaluating safety programs	5%	2%	0%	9%
Other skills	5%	2%	1%	9%

* Percentage of establishments expecting to hire occupational health nurses.

Respondents could indicate as many skills as desired.

Table 3-36b. What are the most important additional skills or knowledge areas that you will be looking for when hiring occupational health nurses over the next 5 years?

	Estimate*	Standard error	95% Confidence interval LB	UB
Communicating with workers/training skills	31%	7%	18%	44%
Communicating with upper management	35%	9%	18%	53%
Organizational science	9%	4%	1%	17%
Technical writing	15%	9%	0%	33%
Leadership skills	30%	9%	11%	48%
Understanding of workers' jobs	25%	6%	14%	36%
Understanding of our industry (e.g., products, markets, practices)	12%	4%	5%	19%
Local, state, or Federal regulations	6%	3%	1%	11%
Workers' Compensation	26%	6%	14%	37%
Environmental regulations	1%	1%	0%	3%
Other skills	6%	2%	1%	10%

* Percentage of establishments expecting to hire occupational health nurses.

Respondents could indicate as many skills as desired.

Table 3-36c. In which of the following additional areas, if any, would you like for these occupational health nurses to be trained?

	Estimate*	Standard error	95% Confidence interval LB	UB
Occupational Safety	47%	9%	30%	64%
Industrial Hygiene	28%	7%	15%	41%
Occupational Medicine	18%	5%	9%	27%
Occupational Ergonomics	31%	7%	18%	43%
Occupational Health Physics	9%	3%	2%	16%
Occupational Injury Prevention	48%	9%	31%	65%
Occupational Epidemiology	11%	4%	4%	18%
Occupational Health Psychology	17%	5%	7%	26%
Other OS&H Areas	6%	3%	0%	12%

* Percentage of establishments expecting to hire occupational health nurses.

Respondents could indicate as many areas as desired.

Table 3-36d. How likely do you think it is that this location will seek to hire an occupational health nurse with the DNP degree within the next 5 years?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Very likely	1%	1%	0%	4%
Somewhat likely	30%	11%	8%	53%
Somewhat unlikely	20%	6%	7%	32%
Not at all likely	38%	8%	21%	55%
Don't know	11%	4%	3%	19%

* Percentage of establishments expecting to hire occupational health nurses.

Table 3-36e. Had you ever heard of the DNP degree before this survey?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Yes	40%	10%	20%	60%
No	60%	10%	40%	80%

* Percentage of establishments expecting to hire occupational health nurses.

Ergonomics

Table 3-37a. What are the most important specialties or technical skills that you will be looking for when hiring occupational ergonomics professionals over the next 5 years?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Recognition of ergonomic hazards in equipment, manufacturing processes, and production systems	22%	9%	4%	40%
Biomechanics/prevention of work-related musculoskeletal disorders	4%	2%	0%	8%
Cognitive ergonomics/prevention of human error/enhancing human performance reliability	6%	3%	0%	13%
Instrumentation for human measurements	1%	1%	0%	2%
Facility and workstation design	8%	4%	0%	15%
Usability testing (product design, selection of tools, etc.)	1%	1%	0%	2%
Systems integration	1%	1%	0%	2%
Ergonomic job analysis	6%	4%	0%	14%
Accident/Incident investigation	13%	7%	1%	26%
Anthropometry	1%	1%	0%	2%
Prevention through design/Design reviews	5%	3%	0%	11%
Other skills	-	-	-	-

* Percentage of establishments expecting to hire occupational ergonomics professionals.

Respondents could indicate as many skills as desired.

- Insufficient data.

Table 3-37b. What are the most important additional skills or knowledge areas that you will be looking for when hiring occupational ergonomics professionals over the next 5 years?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Communicating with workers/training skills	32%	10%	12%	52%
Communicating with upper management	22%	10%	3%	41%
Organizational science	15%	9%	0%	33%
Technical writing	19%	9%	1%	37%
Leadership skills	17%	9%	0%	35%
Understanding of workers' jobs	23%	10%	4%	42%
Understanding of our industry (e.g., products, markets, practices)	14%	9%	0%	31%
Local, state, or Federal regulations	5%	3%	0%	12%
Workers' Compensation	2%	1%	0%	4%
Environmental regulations	2%	1%	0%	4%
Other skills	3%	2%	0%	8%

* Percentage of establishments expecting to hire occupational ergonomics professionals.

Respondents could indicate as many skills as desired.

Table 3-37c. In which of the following additional areas, if any, would you like for these occupational ergonomics professionals to be trained?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Occupational Safety	40%	10%	19%	59%
Industrial Hygiene	19%	7%	4%	31%
Occupational Medicine	4%	4%	0%	12%
Occupational Health Nursing	-	-	-	-
Occupational Health Physics	2%	1%	0%	4%
Occupational Injury Prevention	16%	6%	3%	25%
Occupational Epidemiology	2%	2%	0%	5%
Occupational Health Psychology	7%	5%	0%	17%
Other OS&H Areas	12%	10%	0%	31%

* Percentage of establishments expecting to hire occupational ergonomics professionals.

Respondents could indicate as many areas as desired.

- Insufficient data.

Health Physics

Table 3-38a. What are the most important specialties or technical skills that you will be looking for when hiring health physics professionals over the next 5 years?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Proper selection of measurement instruments	4%	2%	0%	9%
Calibration and maintenance of measurement instruments	8%	6%	0%	19%
Identifying the appropriate regulations and standards for the facility	41%	13%	16%	66%
Evaluating challenges to radioactive material control barriers	14%	7%	0%	28%
Implementing double contingency controls for nuclear criticality safety	1%	1%	0%	4%
Specifying the necessary personal protective equipment and clothing for contamination control	3%	2%	0%	7%
Procedures for handling of radioactively contaminated persons	2%	2%	0%	5%
Conducting audits to determine compliance	22%	12%	0%	46%
Radiation protection records required for a facility	3%	2%	0%	7%
Training as a Radiation Safety Officer	34%	13%	9%	60%
Other skills	8%	5%	0%	18%

* Percentage of establishments expecting to hire health physics professionals.

Respondents could indicate as many skills as desired.

Table 3-38b. What are the most important additional skills or knowledge areas that you will be looking for when hiring health physics professionals over the next 5 years?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Communicating with workers/training skills	8%	6%	0%	19%
Communicating with upper management	37%	13%	12%	62%
Organizational science	22%	13%	0%	47%
Technical writing	23%	13%	0%	48%
Leadership skills	21%	8%	4%	37%
Understanding of workers' jobs	6%	5%	0%	16%
Understanding of our industry (e.g., products, markets, practices)	-	-	-	-
Local state, or Federal regulations	7%	4%	0%	16%
Workers' Compensation	-	-	-	-
Environmental regulations	1%	1%	0%	3%
Other skills	6%	5%	0%	16%

* Percentage of establishments expecting to hire health physics professionals.

Respondents could indicate as many skills as desired.

- Insufficient data.

Table 3-38c. In which of the following additional areas, if any, would you like for these health physics professionals to be trained?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Occupational Safety	40%	13%	15%	65%
Industrial Hygiene	24%	9%	7%	41%
Occupational Medicine	10%	7%	0%	23%
Occupational Health Nursing	-	-	-	-
Occupational Ergonomics	10%	7%	0%	23%
Occupational Injury Prevention	12%	7%	0%	25%
Occupational Epidemiology	-	-	-	-
Occupational Health Psychology	7%	6%	0%	18%
Other OS&H Areas	3%	2%	0%	7%

* Percentage of establishments expecting to hire health physics professionals.

Respondents could indicate as many areas as desired.

- Insufficient data.

Occupational Injury Prevention

Table 3-39a. What are the most important specialties or technical skills that you will be looking for when hiring occupational injury prevention professionals over the next 5 years?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Recognition, evaluation, and prevention of occupational injuries	24%	7%	11%	38%
Measurement of risk factors for occupational injury	30%	8%	14%	46%
Understanding the influence of Occupational injury on disability and return to work	6%	3%	0%	12%
Evaluating environmental, behavioral, and work practice contributors to injury risk	14%	5%	4%	24%
Interpretation and dissemination of research findings to formulate occupational injury prevention programs and policies	1%	1%	0%	2%
Design and implementation of evidence-based occupational injury prevention approaches	7%	6%	0%	19%
Evaluation of occupational injury prevention strategies	15%	8%	0%	31%
Disaster and emergency management	9%	6%	0%	21%
Identifying and responding to violence in the workplace	3%	3%	0%	8%
Health and productivity management	4%	3%	0%	10%
Wellness and health promotion	6%	4%	0%	14%
Managing treatment and recovery from occupational injury	1%	1%	0%	2%
Other skills	4%	2%	1%	8%

* Percentage of establishments expecting to hire occupational injury prevention professionals.

Respondents could indicate as many skills as desired.

- Insufficient data.

Table 3-39b. What are the most important additional skills or knowledge areas that you will be looking for when hiring occupational injury prevention professionals over the next 5 years?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Communicating with workers/training skills	27%	7%	13%	41%
Communicating with upper management	29%	8%	13%	45%
Organizational science	4%	3%	0%	9%
Technical writing	8%	4%	0%	17%
Leadership skills	14%	5%	3%	24%
Understanding or workers' jobs	10%	4%	2%	18%
Understanding of our industry (e.g., products, markets, practices)	7%	3%	1%	13%
Local, state, or Federal regulations	4%	2%	0%	8%
Workers' Compensation	1%	1%	0%	2%
Environmental regulations	-	-	-	-
Other skills	4%	2%	1%	8%

* Percentage of establishments expecting to hire occupational injury prevention professionals.

Respondents could indicate as many skills as desired.

- Insufficient data.

Table 3-39c. In which of the following additional areas, if any, would you like for these occupational injury prevention professionals to be trained?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Occupational Safety	35%	8%	20%	49%
Industrial Hygiene	27%	8%	12%	42%
Occupational Medicine	3%	3%	0%	8%
Occupational Health Nursing	10%	6%	0%	21%
Occupational Health Physics	4%	3%	0%	9%
Occupational Ergonomics	24%	6%	11%	36%
Occupational Epidemiology	3%	2%	0%	6%
Occupational Health Psychology	11%	5%	1%	20%
Other OS&H Areas	4%	2%	1%	8%

* Percentage of establishments expecting to hire occupational injury prevention professionals.

Respondents could indicate as many areas as desired.

3.7.4 Additional Findings from the Employer Survey

This section includes findings on some additional questions asked of employers about OS&H activity at their establishments. These topics include support for OS&H Continuing Education, recent difficulties hiring OS&H professionals, and priorities for hiring among OS&H disciplines in the coming years.

3.7.4.1 How Employers Support OS&H Continuing Education for Employees

Earlier, the extent to which employers would like to see new topics introduced in OS&H Continuing Education was discussed. The survey also asked employers to tell how their organization supports OS&H Continuing Education for its employees, presenting response options concerning payment of tuition, paying for travel, allow time off for attendance, as well as an option for no support. Table 3-40 presents our findings on this question.

Table 3-40. In which of the following ways, if any, does your company or organization support occupational safety and health (OS&H) continuing education for your employees?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
We pay for tuition	74%	3%	68%	80%
We pay for travel	65%	3%	58%	72%
We allow time off for attendance	79%	3%	74%	85%
We do not provide any support for OS&H continuing education	10%	3%	5%	15%

* Percentage of all employers within scope for the survey (i.e., employing at least one OS&H professional at the end of 2010). Respondents could choose more than one answer.

3.7.4.2 Difficulties Hiring OS&H Professionals Over The Past 2 Years, By Specialty

All employers were asked to indicate how much difficulty their location had experienced in recruiting and hiring qualified persons in each of the OS&H disciplines of interest to NIOSH. Respondents were asked to choose from among "No difficulty," "Some difficulty," "A lot of difficulty," or "We were unable to hire qualified persons." These items also allowed for respondents to indicate that they had not tried to hire anyone in a given discipline. Findings with respect to each discipline are presented in Table 3-41.

Table 3-41. Over the past 2 years, how much difficulty has this location experienced in recruiting and hiring qualified persons in each job category below?

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Occupational Safety				
Have not tried to hire persons in this category	64%	3%	58%	70%
No difficulty	20%	3%	15%	25%
Some difficulty	10%	2%	6%	13%
A lot of difficulty	4%	1%	2%	6%
We were unable to hire qualified persons	2%	1%	0%	3%
Industrial Hygiene				
Have not tried to hire persons in this category	81%	2%	76%	85%
No difficulty	9%	2%	6%	13%
Some difficulty	6%	1%	3%	9%
A lot of difficulty	2%	1%	1%	3%
We were unable to hire qualified persons	2%	1%	0%	3%
Occupational Medicine				
Have not tried to hire persons in this category	88%	2%	84%	92%
No difficulty	7%	2%	4%	10%
Some difficulty	3%	1%	2%	5%
A lot of difficulty	1%	0%	0%	2%
We were unable to hire qualified persons	1%	1%	0%	2%
Occupational Health Nursing				
Have not tried to hire persons in this category	85%	2%	82%	89%
No difficulty	9%	2%	6%	12%
Some difficulty	3%	1%	2%	4%
A lot of difficulty	2%	0%	1%	2%
We were unable to hire qualified persons	1%	1%	0%	2%
Occupational Ergonomics				
Have not tried to hire persons in this category	92%	2%	89%	95%
No difficulty	4%	1%	1%	6%
Some difficulty	2%	1%	1%	3%
A lot of difficulty	1%	1%	0%	2%
We were unable to hire qualified persons	1%	1%	0%	2%
Occupational Health Physics				
Have not tried to hire persons in this category	94%	1%	91%	97%
No difficulty	4%	1%	1%	6%
Some difficulty	1%	0%	0%	1%
A lot of difficulty	-	-	-	-
We were unable to hire qualified persons	1%	1%	0%	3%
Occupational Injury Prevention				
Have not tried to hire persons in this category	87%	2%	83%	91%
No difficulty	7%	2%	4%	11%
Some difficulty	3%	1%	1%	4%
A lot of difficulty	1%	1%	0%	2%
We were unable to hire qualified persons	2%	1%	0%	3%
Occupational Epidemiology				
Have not tried to hire persons in this category	94%	1%	91%	97%
No difficulty	4%	1%	2%	7%
Some difficulty	1%	0%	0%	1%
A lot of difficulty	-	-	-	-
We were unable to hire qualified persons	1%	1%	0%	2%

Table 3-41. Over the past 2 years, how much difficulty has this location experienced in recruiting and hiring qualified persons in each job category below? (continued)

	Estimate*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Occupational Health Psychology				
Have not tried to hire persons in this category	96%	1%	93%	98%
No difficulty	3%	1%	1%	6%
Some difficulty	-	-	-	-
A lot of difficulty	-	-	-	-
We were unable to hire qualified persons	-	-	-	-

* Percentage of all employers within scope for the survey (i.e., employing at least one OS&H professional at the end of 2010).

- Insufficient data

3.7.4.3 Employer Priorities for Hiring OS&H Professionals

Employers who had indicated an expectation of hiring professionals within two or more OS&H disciplines over the next 5 years were asked to indicate their priorities among these disciplines. Results are shown in Table 3-42. Please note that the percentages for disciplines other than occupational safety are based on small numbers of responding employers, resulting in rather imprecise estimates (i.e., wide confidence intervals).

Table 3-42. Earlier you told us that this location expects to hire professional staff over the next 5 years in the OS&H fields shown below. Please rank the priority that you expect this location to give each OS&H area with respect to future hiring.

	Percentage of employers ranking as the top priority*	Standard error	95% Confidence interval LB	95% Confidence interval UB
Occupational Safety	67%	7%	54%	81%
Industrial Hygiene	12%	5%	2%	22%
Occupational Medicine	45%	18%	10%	81%
Occupational Health Nursing	21%	7%	7%	35%
Occupational Ergonomics	-	-	-	-
Occupational Health Physics	22%	11%	0%	45%
Occupational Injury Prevention	19%	7%	4%	33%
Occupational Epidemiology	12%	9%	0%	30%
Occupational Health Psychology	-	-	-	-

* Percentages are based on those employers indicating they expect to hire in this OS&H discipline plus at least one other discipline.

- Insufficient data.

Survey of Providers 4

Westat also conducted a survey of providers of OS& H education and training. Westat's approach and the methods employed for the planning and development of the Provider Survey were similar to that used for the Employer Survey. Separate focus groups were conducted with directors of OS&H training programs that receive funding from NIOSH for OS&H education and training; and with representatives of programs that do not receive funding from NIOSH for their OS&H education and training. Westat worked with NIOSH and the Task Force to develop and refine the instrument.

4.1 Development of Provider Survey Frame

For the Provider Survey, the unit of analysis was any OS&H program at a U.S.-based institution that:

- Included coursework in one or more of the 9 OS&H disciplines of interest to the survey; and
- Was part of a course of study leading to a bachelor's degree or higher.

Therefore, Westat's goal was to build a survey population that included all OS&H programs in the United States that met these requirements. To identify eligible programs, Westat study staff first obtained from NIOSH their lists of programs supported through Education and Research Centers (ERCs) and Training Project Grants (TPGs). Project staff then identified and contacted relevant professional associations and professional certification bodies. They then contacted key persons in these and other organizations, explained the survey's purpose and how "program" was defined, and discussed best approaches for obtaining information regarding OS&H educational programs.

4.1.1 Frame Development Activities

The process by which Westat developed the Provider Survey frame is summarized below.

Westat began by compiling a list of the programs offered through the NIOSH-funded ERCs and TPGs, and worked to expand this list to cover all programs offering OS&H education and training in any of the nine OS&H related disciplines.

Westat reviewed all information available from the NIOSH-funded ERCs and TPGs. For the ERCs they identified over 90 distinct programs. From the listing of NIOSH-funded TPGs, Westat identified another 32 distinct programs to include in the Provider Survey frame. For each ERC and TPG program, project staff visited the link provided from NIOSH's website and selected the list of academic programs from the Center or School's homepage. They then visited the webpage associated with each individual program and in many instances there were links within those programs that they also visited and reviewed. These searches were supplemented where necessary with literature searches or telephone contacts to ensure that eligible programs were identified.

All program information obtained was maintained in a database created for this purpose. For each program identified it included the level of degree(s) awarded for that individual discipline (e.g., MPH or Ph.D. in Industrial Hygiene, Occupational Health) and contact information for the program coordinator or, in some cases, the department head based on the information provided for each individual program

Next, Westat project staff conducted research to identify OS&H education and training programs not funded by NIOSH. They first contacted relevant professional associations and key professionals for each discipline to identify programs. Next they conducted web searches using the school name and the discipline as keywords to identify additional programs. Additional research was conducted to determine if a relevant degree program was offered, the degree level, and the program contact person. Some programs on the association listings were already listed in the database because they were offered within an ERC or TPG. Programs identified through this method were compared against the database to eliminate duplicates. Below are brief descriptions of the additional data sources used to construct the frame.

- **American Society of Safety Engineers (ASSE).** A listing was obtained from the ASSE of colleges and universities that offer degrees in safety management, occupational safety, environmental protection or a related field. In addition to colleges and universities offering specific degrees in safety, there are some engineering schools that offer a safety specialty within their traditional engineering degree programs. The ASSE website has a search function that allows users to locate educational programs throughout the country (http://www.asse.org/professionalaffairs_new/directory).

- **American Industrial Hygiene Association (AIHA).** The AIHA is one of the largest international associations for occupational and environmental health and safety professionals practicing industrial hygiene in industry, government, labor, academic institutions, and independent organizations. Westat obtained a list of schools that offer industrial hygiene-related programs directly from the AIHA website. (http://www.aiha.org).

- **ABET.** ABET, Inc., or the Accreditation Board for Engineering and Technology, is the recognized accrediting organization for college and university programs in applied science, computing, engineering, and technology. ABET maintains a listing of their accredited programs. A listing was created by using the search function on their website to specifically search for accredited programs in safety, industrial hygiene, environmental health and safety, and health physics (http://www.abet.org/AccredProgramSearch/AccreditationSearch.aspx).

- **Human Factors and Ergonomics Society (HFES).** HFES is an interdisciplinary nonprofit organization of professional people who are involved in the human factors field. The HFES website provides a listing of undergraduate and graduate programs in the United States and Canada. (http://hfes.org)

- **Board of Certification in Professional Ergonomics (BCPE).** BCPE is the certifying body for individuals whose education and experience indicate broad expertise in the practice of human factors/ergonomics. There is a listing of accredited programs on the BCPE website (http://www.bcpe.org/page/accredited-hf-e-programs).

- **Health Physics Society (HPS).** HPS is a scientific organization of professionals who specialize in radiation safety. The Health Physics Society website provides an education reference book. (http://hps.org/documents/edrefbook.pdf) that lists educational programs.

- **American Association of Occupational Health Nurses (AAOHN) and the American Board of Occupational Health Nurses (ABOHN).** AAOHN is an 8,000 member professional association that provides education, research, public policy and practice resources for occupational and environmental health nurses. ABOHN is the sole certifying body for occupational health nurses in the United States and awards four credentials: Certified Occupational Health Nurse (COHN), Certified Occupational Health Nurse - Specialist (COHN-S), Case Management (CM), and Safety Management (SM). According to the ABOHN website, there are over 12,000 certified OHNs.

- Westat contacted both the AAOHN and that ABOHN to determine if there were listings of educational institutions that provided specific training in occupational health nursing (OHN). AAOHN replied that they have no listing and ABOHN stated that there is no listing of specific academic programs for training of OHNs other than what is available through the NIOSH sponsored ERCs.

- **American College of Occupational and Environmental Medicine (ACOEM).** ACOEM represents physicians and other health care professionals specializing in the field of Occupational and Environmental Medicine (OEM). ACOEM maintains a listing

of Occupational & Environmental Medicine residency programs. The Accreditation Council on Graduate Medical Education (ACGME) recognized residency programs in occupational medicine are listed on this website. (http://www.aoec.org/training.htm).

- **Society for Occupational Health Psychology (SOHP).** SOHP maintains a list of graduate training programs in occupational health psychology. According to the website, the nature of training programs listed ranges from course sequences and graduate certificates to master's degrees and Ph.D. concentrations. (http://sohp.psy.uconn.edu).

- **Schools of Public Health.** In an effort to ensure that all colleges and institutions that provide training in the OS&H disciplines were included, Westat also reviewed the lists of schools of public health available from the American Public Health Association (APHA), The Association of Schools of Public Health (ASPH), and Schools of Public Health Application Service (SOPHAS). These listings were cross-referenced against the information already contained in the Provider Survey frame database. Westat reviewed each program not already in the database and included any found to be eligible.

- **Other Sources.** To ensure complete coverage, Westat study staff researched and reviewed other potential sources for information on other programs that may provide education and training in OS&H that were not represented on any of the association lists. In addition to conducting web searches, Westat reviewed the sources described below.

  1. **The Association of Technology, Management, and Applied Engineering (ATMAE).** ATMAE sets standards for academic program accreditation, personal certification, and professional development for educators and industry professionals involved in integrating technology, leadership and design. Three additional programs were identified through this search. (http://atmae.org).

  2. **The Integrated Postsecondary Education Data System (IPEDS).** IPEDS is a system of interrelated surveys conducted annually by the U.S. Department of Education's National Center for Education Statistics (NCES). IPEDS gathers data from every college, university, and technical and vocational institution that participates in the Federal student financial aid programs. Relevant information such as institutional characteristics, enrollments, completions, and graduation rates was available and customized datasets were retrieved from the IPEDs online data center. IPEDS uses the Classification of Instructional Programs (CIP) as a taxonomic scheme to support the accurate tracking, assessment, and reporting of fields of study and program completions activity, and the 2000 edition (CIP-2000) is the most current edition. IPEDs provided a crosswalk of CIP codes to related BLS occupational codes and allowed identification of the CIP codes most closely related to the OS&H disciplines of interest. Westat acquired a dataset from IPEDs of all institutions that conferred a degree in the relevant CIP codes for years 2007-2009. Any listing not already included in the Provider Survey Frame was investigated and added if found to be eligible. (http://nces.ed.gov/ipeds).

Finally, focus group data collection efforts and other Internet searches failed to identify any specific professional organization or association related to occupational epidemiology and occupational injury prevention. Westat staff researched the groups listed above for these disciplines and also contacted key OS&H professionals identified through the Task Force membership to confirm the lack of these groups.

Because the frame was constructed from multiple sources, it was necessary to complete a thorough harmonization and de-duplication effort. This de-duplication and refinement yielded a final survey frame of 340 programs that met the survey criteria.

4.1.2 Inclusion and Exclusion Criteria

As described previously, Westat conducted a critical review of each identified program to determine whether it met the criteria for being considered a "program" for this survey before including it in the Provider Survey frame. This review included the program's name, description, and where necessary, the associated coursework to ensure that the course of study led to a bachelor's degree or higher. When each program was entered into the databases, it was assigned one of the nine OS&H specialties. The OS&H specialty or discipline was assigned based on a review of the description of the program. Keywords used included the nine disciplines of primary interest to the survey and other references to safety, occupational health, etc. The presence of these words in program and course descriptions did not result in automatic inclusion, but helped to identify programs requiring further review. The description of the program director's background was also taken into consideration. If there was a clear track or concentration in one of the OS&H specialties, then it was included in the database. If the description of the program was vague or not readily available, project staff compared the description of the program to the definitions of the OS&H specialties developed for the study. In those instances where after this review no determination was possible, the named program director or coordinator was contacted by telephone to seek clarification.

If an institution listed a single program with multiple degree levels in the same OS&H discipline (e.g., MS in Industrial Hygiene and a Ph.D. in Industrial Hygiene), one entry was included in the database. If a school had multiple OS&H related programs (e.g., an industrial hygiene program and an occupational medicine program) with the same contact person, then each different program was listed separately in the database but with the same key contact person. This meant that one person could be the respondent for multiple programs. Before the start of data collection, these persons were contacted by telephone to determine whether it would be appropriate for them to serve as the

respondent for all individual surveys, or if they could provide an alternate contact person to serve as respondent for individual programs.

4.2 Data Collection

4.2.1 Data Collection Approach and Methods

Data collection for the Provider Survey began in February 2011 with the initial mailing of the invitation letters to providers. The schedule followed for the Provider Survey is shown in Table 4-1. The invitation letter sent to each of the identified provider contact persons was signed by John Howard, MD, Ph.D., the NIOSH Director, and included a listing of organizations who had endorsed the purposes of the study. The initial invitation letter was also sent by email a few days after the letters were sent by post. Within a few days after the initial invitations were distributed, Westat began receiving responses to the web survey. Each non-respondent was mailed a followup invitation letter 10 days after the initial invitation was sent. The same followup letter was sent by email three days after it was sent by post. A very small number of mailed letters were returned. Any errors in the mailing address that could be corrected easily were fixed and the letter was re-sent. However, no further attempts were made to seek updated or corrected addresses. In a few instances email addresses were found to be incorrect. These email addresses were reviewed to correct any obvious typographical or formatting errors, but no additional attempts were made to seek an updated address.

One week after the followup invitation letter was sent, a second email was sent with the same followup letter to any non-respondents. Because of the success of the email followups, Westat continued to send additional email prompts to each non-respondent at regular intervals until the end of the data collection effort. These followup prompts produced the desired increases in response. Therefore, the planned telephone followup of non-respondents to the provider was deferred until the end of data collection period to conserve funds and allocate resources to improving the Employer Survey response rate. Westat staff produced daily updates of the status of survey response to monitor progress and to determine the most effective followup measures.

Table 4-1. Provider Survey data collection schedule

Contact type	Provider
Invitation Letter	2/4/2011
Invitation Email	2/9/2011
Non-Response Letter	2/14/2011
Non-Response Email	2/17/2011
Second Non-Response Email	2/23/2011
Prompt to Complete Email	3/2/2011
Non-Response Conversion Email	3/30/2011
Telephone Followup Start	4/26/2011

Followup emails were also sent to respondents who had logged into the questionnaire but who had not completed the survey. This email prompted them to complete the survey. Additionally this email requested that providers contact Westat's Help Desk if they were having difficulty completing the survey or if there were any questions. The email also specifically instructed the respondent to contact Westat if they felt that this survey was not applicable to the degree program specified in the web, or if the degree program was not offered. At the end of March, NIOSH also sent a reminder email to the directors of all NIOSH supported training programs to encourage them to ensure that responses were returned for their programs. Also at the end of March, Westat also sent additional prompting emails to all non-respondents.

Westat's Telephone Research Center staff began making followup phone calls to providers who had not yet responded on April 26, 2011. Callers were instructed to make up to 7 attempts to complete a call to each establishment to administer a followup script and recorded the results in the study management database. They also made targeted phone calls to non-responding providers where one respondent was assigned to multiple programs and those respondents who had started the web survey but had not yet completed it.

Data collection for the Provider Survey closed on May 17, 2011, after which the website for the survey was closed.

4.2.2 Help Desk Responses

Because the Provider Survey was designed to ask questions regarding the particular degree program offered at the institution, the questions in the questionnaire were pre-filled with a designated OS&H related area. During the data collection effort, the Westat Help Desk received some inquiries from

some program contacts who stated that the institution did not offer the degree program as specified in the questionnaire. The Help Desk staff contacted the program contact person to clarify what degree programs were offered and to ask whether the respondent could classify their program into one of the nine established OS&H disciplines of interest to the survey. If a program could not fit into one of the nine disciplines then the program was classified as General Occupational Health in order to capture information from all education and training programs that produce professionals in fields related to OS&H. In a few instances the respondent indicated that the program was no longer offered or not related to OS&H, and the program was coded as ineligible.

4.2.3 Data Cleaning Efforts

Data cleaning efforts were conducted throughout the data collection period and immediately after it closed. It focused on surveys returned with a web partial status indicating that the survey had been started but not completed. Project staff reviewed partially completed surveys to determine whether the provider had answered enough questions to be considered complete.

Because of the edits built into the web instruments, minimal additional editing was needed to ensure the quality of the data. Data clean-up activities mostly consisted of up-coding of open-ended items. During data processing, project staff cross-referenced lists of known ERC and TPG programs with the provider frame to assign a flag to designate whether the specified program received funding from NIOSH.

4.3 Provider Survey Response Rates and Weighting

4.3.1 Response Rate Calculation

The Provider Survey achieved a final survey response rate of 65.2 percent. Table 4-2 shows the major response categories as defined by the survey disposition codes and the number of providers.

Table 4-2. Major response categories, survey disposition codes, and the number of providers

Major response categories and disposition codes	Number of providers
Total Population	**340**
1. Respondent – Completed Web Survey	**202**
2. Non-respondent – Eligible	**12**
Not available in Field Period	1
Partial complete	11
3. Non-respondent – Eligibility unknown	**105**
Maximum Calls	16
Maximum Calls – Language Barrier	1
Maximum Calls – Refusal	2
No Return	65
Non-Working Telephone Number	4
Not Locatable	4
Logged in but no responses	13
4. Ineligible	**21**
Duplicate case	3
Other out of scope	18

In Table 4-2, the first major response group includes respondents who completed the web survey. The second group includes providers who were identified as eligible by confirming that the program exists, but they did not complete the web instrument. The third group consists of non-responding providers whose eligibility could not be determined. A proportion of these providers were believed to have the relevant programs and thus would have been eligible. Thus, only an estimated proportion of their total count was included in the denominator. A proportion of the non-working and non-locatable count also was included in the denominator since A proportion of them were believed to have been eligible. The fourth group includes those providers that were identified as ineligible as having no program or identified as a duplicate record of a provider.

The un-weighted response rate is basically the proportion of survey respondents among the eligible providers. Thus, the un-weighted response rate (as percent) is calculated as:

$$R = 100 \times \frac{S_1}{S_1 + S_2 + aS_3}$$

S_1 is the number of respondents, that is, completed the web survey;

S_2 is the number of eligible providers who did not complete the web survey;

S_1 is the number of providers whose eligibility could not be determined;

a is the proportion of providers with unknown eligibility who are eligible;
a is estimated as:

$$a = \frac{S_1+S_2}{S_1+S_2+S_4}$$

where,

S_4 is the number of providers who were found to be ineligible.

4.3.2 Weighting the Provider Survey Data

A weight was attached to every educational provider record with a completed web survey to reduce potential bias resulting from non-response. These weights are necessary for unbiased estimation for characteristics of interest for the OS&H educational provider population, their students, and faculty (e.g., expected number of graduates, trends in enrollment, trends in continuing education needs, faculty characteristics, etc.).

All providers listed in the sampling frame were included for the survey with certainty. Thus, the base weight, reciprocal of the selection probability of a provider, was assigned as 1 to each provider. The base weights were then adjusted for non-response in order to reduce potential biases resulting from not obtaining an interview with every provider. These adjustments were made by redistributing the weights of non-responding providers to responding providers with similar propensities for response. A predictive model for response propensity was developed to identify subgroups of the provider population with differential response rates. These subgroups were then used as non-response adjustment cells and a separate weight adjustment was applied in each cell. The potential predictors that can be used for such a modeling effort have to be known for both respondents and non-respondents. Such variables available from the sampling frame included the OS&H program area, degree offered (Bachelors, masters, Ph.D., MD, multiple degrees), indicators for Education and Research Centers (ERCs) and Training Project Grants (TPGs, and Census region.

All providers were classified into four major survey response categories based on the outcome of the survey. These four categories were:

- **Respondent.** Completed the questionnaire.
- **Non-respondent, Eligible.** The provider was confirmed as having the relevant OS&H program. However, the questionnaire yielded so little data that the provider was classified as a non-respondent.

- **Non-respondent, Eligibility Unknown.** No confirmation was possible as to whether the provider had the relevant OS&H programs required to be eligible for the survey.
- **Ineligible.** It was determined that the provider did not offer the relevant OS&H programs, including a very small number of cases that were found to be duplicate records of the same provider.

See Table 4-2 in the response rate section for a detailed breakdown of these major response categories by the survey disposition codes and the numbers of the sampled cases.

First, the provider weights were adjusted for those non-respondents with an undetermined eligibility status, which was followed by the adjustments for the eligible non-respondents.

There were two groups of survey non-respondents: (1) those providers, whose eligibility status could not be determined by the survey and (2) those that were determined to be eligible but did not complete the questionnaire. The weights were first adjusted to compensate for the first group of non-respondents. A separate set of adjustment cells, based on a response propensity model, were formed for this group. A weight adjustment factor was computed within each adjustment cell, as the ratio of the weighted (by the base weight) number of providers in the sample to the weighted number of providers, whose eligibility status could be determined (either as eligible or ineligible).

In the second step, the sampling weights of the survey respondents were adjusted to compensate for the eligible providers who did not complete the instrument. A set of adjustment cells were formed based on a response propensity model. A non-response adjustment factor was computed within each adjustment cell as the ratio of the weighted (after adjusting for the first group of non-respondents) number of eligible providers to the weighted number of providers, who completed the survey. Next, each weight adjustment is discussed in detail and the formulae are presented.

4.3.2.1 Adjusting the Weights to Compensate For the Non-Respondents, Whose Eligibility Status Could Not Be Determined By the Survey

First, the weights were adjusted to compensate for the non-respondents, whose eligibility status could not be determined. The adjustment factor for the adjustment class h, λ_h, was computed as:

$$\lambda_h = \frac{\sum_{i \in S_{1h}} W_{hi}^B + \sum_{i \in S_{2h}} W_{hi}^B + \sum_{i \in S_{3h}} W_{hi}^B + \sum_{i \in S_{4h}} W_{hi}^B}{\sum_{i \in S_{1h}} W_{hi}^B + \sum_{i \in S_{2h}} W_{hi}^B + \sum_{i \in S_{4h}} W_{hi}^B}$$

where,

S_{1h} is the set of providers with a completed questionnaire in adjustment class h,

S_{2h} is the set of providers determined to be eligible to the survey but did not complete the questionnaire in adjustment class h,

S_{3h} is the set of non-responding providers, whose eligibility status could not be determined, in adjustment class h,

S_{4h} is the set of providers that were determined to be ineligible by the survey, in adjustment class h,

W_{hi}^B is the base weight of provider i in adjustment class h (note that the base weight was equal to 1 for all providers since they were included to the survey with certainty).

Then, the weights were adjusted for the non-responding providers with an undetermined eligibility status, for an eligible provider i in adjustment class h, W_{hi}^C, was computed as:

$$W_{hi}^C = W_{hi}^B \times \lambda_h$$

4.3.2.2 Adjusting the Weights to Compensate For the Providers, Who Were Identified As Eligible for the Survey But Failed to Complete the Questionnaire

Next, the weights were adjusted to compensate for those providers, who were identified as eligible for the survey but failed to complete the questionnaire. This non-response adjustment factor for cell t, δ_t, was computed as:

$$\delta_t = \frac{\sum_{i \in S_{1t}} W_{ti}^C + \sum_{i \in S_{2t}} W_{ti}^C}{\sum_{i \in S_{1t}} W_{ti}^C}$$

where,

S_{1t} is the set of providers with a completed questionnaire in adjustment class t;
S_{2t} is the set of providers determined to be eligible for the survey but failed to complete the questionnaire in adjustment class t; and
W_{ti}^C is the weight adjusted for the non-responding providers with an undetermined eligibility status, for eligible provider i in adjustment class t.

Then, the final non-response adjusted weight was computed by multiplying the weight that was adjusted for the providers with an undermined eligibility status with the non-response adjustment factor derived above. Thus, the final non-response adjusted sample weight for a responding provider i in non-response adjustment class t, W_{ti}^F, was computed as follows:

$$W_{ti}^F = W_{ti}^C \times \delta_t$$

4.4 Survey Results

The survey attempted to include all known academic OS&H programs, rather than a probability-based sample. So, unlike the Employer Survey, there is no sampling error associated with the estimates from the Provider Survey. However, these estimates may be affected by other sources of error, including error due to the lack of response on the part of some programs and measurement error.

Throughout the reporting of findings from the Provider Survey, some estimates are presented separately for ERCs and TPGs (along with non-NIOSH-funded programs), while other estimates

are shown only for "NIOSH funded programs," a group that combines ERCs and TPGs together. This later grouping is generally used when further estimates are presented by OS&H discipline, and its purpose is to protect the confidentiality of respondents. As an additional measure of protection, estimates in some tables are purposely not displayed separately for NIOSH funded and non-funded programs.

4.4.1 Professionals Entering the OS&H Workforce

Respondents in academic training programs in each of the nine OS&H disciplines were first asked to indicate if they offered each of three degree levels: bachelor's, master's, and doctoral. For each applicable degree level, programs were then asked to indicate the number of students they expect to have graduate at that level in 2011. To estimate the numbers of professionals expected to graduate in 2011 (in Tables 4-3 through 4-7), figures are summed across each applicable degree level for a program in order to obtain the expected total number of graduates. Then weighted sums were generated to provide estimates for the full population of OS&H training programs.

Table 4-3. Total number of OS&H professionals expected to graduate in 2011, by degree level*

	Estimate	ERCS	TPGs	Non-NIOSH funded
Bachelor's	1,397	8	118	1,271
Master's	1,249	320	199	730
Doctoral	198	82	21	95
Total	2,845	410	338	2,097

* Total includes students in general OS&H programs. Thus, this total is greater than the sum of graduates expected across the nine disciplines, shown in Table 4-7.

Table 4-4. Total number of OS&H professionals expected to graduate (bachelor's degree or higher) in 2011, by region

	Estimate
Northeast	658
Midwest	703
South	1,255
West	228

Table 4-5a. Total number of professionals expected to graduate (bachelor's degree or higher) in 2011, by discipline*

	Estimate	ERCS	TPGs	Non-NIOSH funded
Occupational Safety	1,979	47	231	1,701
Industrial Hygiene	317	158	53	106
Occupational Medicine	69	39	18	12
Occupational Health Nursing	65	65	-	-
Occupational Ergonomics	198	51	21	125
Occupational Health Physics	85	-	-	-
Occupational Injury Prevention	8	-	-	-

* For some disciplines, the number of responding providers is too small to allow presentation by region and ensure that confidentiality is maintained.

- Insufficient data.

Table 4-5b. Total number of professionals expected to graduate (bachelor's degree or higher) in 2011, by discipline

	Estimate	NIOSH funded	Non-NIOSH funded
Occupational Epidemiology	48	44	4
Occupational Health Psychology	26	10	16

Table 4-6. Total number of professionals expected to graduate in selected disciplines (bachelor's degree or higher) in 2011, by region*

	Estimate
Occupational Safety	
Northeast	484
Midwest	463
South	919
West	114
Industrial Hygiene	
Northeast	51
Midwest	91
South	140
West	36
Occupational Medicine	
Northeast	20
Midwest	9
South	25
West	15
Occupational Ergonomics	
Northeast	45
Midwest	48
South	81
West	24

* For some disciplines, the number of responding providers is too small to allow presentation by region and ensure that confidentiality is maintained.

Table 4-7. Total number of professionals expected to graduate in 2011, by discipline and degree*

	Estimate	NIOSH funded	Non-NIOSH funded
Occupational Safety			
Bachelor's	1,295	119	1,177
Master's	651	141	509
Doctoral	33	18	15
Industrial Hygiene			
Bachelor's	59	7	51
Master's	228	177	51
Doctoral	30	26	4
Occupational Health Nursing			
Master's	60	60	-
Doctoral	5	5	-
Occupational Ergonomics			
Bachelor's	15	-	15
Master's	116	49	67
Doctoral	66	23	43
Occupational Health Physics			
Bachelor's	28	-	-
Master's	40	-	-
Doctoral	17	-	-
Occupational Injury Prevention			
Master's	5	-	-
Doctoral	3	-	-
Occupational Epidemiology			
Master's	28	26	2
Doctoral	19	17	2
Occupational Health Psychology			
Master's	5	-	-
Doctoral	22	10	12

*For some degree levels, the number of responding providers from a discipline is too small to allow presentation and ensure that confidentiality is maintained.

- Insufficient data.

4.4.2 Student Trends in OS&H Academic Settings

This section contains estimates on recent and expected future trends in OS&H education. Providers were also asked to tell us how many students they expect will graduate from their programs (at each applicable degree level) in the next 5 years (2011 to 2015). As with the estimates of graduates for 2011, weighted sums of these responses were generated. These estimates are shown in Tables 4-8 through 4-12.

Presented later in this section are findings on trends in program enrollment, perceived quality of students, and obstacles that providers believe exist for students who may wish to study OS&H at their institutions.

4.4.2.1 Expected Number of Graduates Over Next 5 Years (By Specialty, Program Type, and Region)

Table 4-8. Total number of OS&H professionals expected to graduate over the next 5 years (2011 to 2015), by degree level*

	Estimate	ERCs	TPGs	Non-NIOSH funded
Bachelor's	6,322	83	574	5,666
Master's**	5,544	1,500	910	3,134
Doctoral	970	414	84	472
Total	12,837*	1,997	1,567	9,272

* Total includes students in general OS&H programs. Thus, this total is greater than the sum of graduates expected across the nine disciplines, shown below.

**This row includes graduates of occupational medicine programs, who are awarded the Masters of Public Health degree.

Table 4-9. Total number of OS&H professionals expected to graduate over the next 5 years (2011 to 2015), by region

	Estimate
Northeast	3,114
Midwest	3,074
South	5,604
West	1,046

Table 4-10a. Total number of professionals expected to graduate over the next 5 years (2011 to 2015), by discipline *

	Estimate	ERCs	TPGs	Non-NIOSH funded
Occupational Safety	8,843	271	1,084	7,488
Industrial Hygiene	1,483	730	243	510
Occupational Medicine	373	217	86	70
Occupational Health Nursing	336	327	-	-
Occupational Ergonomics	808	210	82	516
Occupational Health Physics	418	-	-	-
Occupational Injury Prevention	53	-	-	-

* For some degree levels, the number of responding providers from a discipline is too small to allow presentation and ensure that confidentiality is maintained.

Table 4-10b. Total number of professionals expected to graduate over the next 5 years (2011 to 2015), by discipline

	Estimate	NIOSH funded	Non-NIOSH funded
Occupational Epidemiology	194	184	10
Occupational Health Psychology	117	40	77

Table 4-11. Total number of professionals expected to graduate over the next 5 years (2011 to 2015), by region*

	Estimate
Occupational Safety	
Northeast	2,316
Midwest	2,017
South	4,041
West	469
Industrial Hygiene	
Northeast	227
Midwest	399
South	666
West	190
Occupational Medicine	
Northeast	94
Midwest	48
South	132
West	99
Occupational Ergonomics	
Northeast	223
Midwest	200
South	298
West	50

* For several disciplines (occupational health nursing, occupational health physics, occupational epidemiology, occupational injury prevention, and occupational health psychology), the number of responding providers is too small to allow presentation by region and ensure that confidentiality is maintained.

Table 4-12. Total number of professionals expected to graduate over the next 5 years (2011 to 2015), by discipline and degree*

	Estimate	NIOSH funded	Non-NIOSH funded
Occupational Safety			
Bachelor's	5,831	617	5,214
Master's	2,893	675	2,218
Doctoral	121	64	57
Industrial Hygiene			
Bachelor's	257	37	220
Master's	976	793	183
Doctoral	249	143	106
Occupational Health Nursing			
Master's	288	-	-
Doctoral	48	-	-
Occupational Ergonomics			
Bachelor's	78	-	-
Master's	444	197	247
Doctoral	285	93	192
Occupational Health Physics			
Bachelor's	156	-	-
Master's	205	-	-
Doctoral	57	-	-
Occupational Injury Prevention			
Master's	24	-	-
Doctoral	28	-	-
Occupational Epidemiology			
Master's	111	-	-
Doctoral	83	-	-
Occupational Health Psychology			
Bachelor's	1	-	-
Master's	25	-	-
Doctoral	91	37	54

* For some degree levels, the number of responding providers from a discipline is too small to allow presentation and ensure that confidentiality is maintained. In addition, no bachelor's degree programs were identified for occupational health nursing. Occupational medicine programs confer only the Master's of Public Health degree so this discipline is not shown here. Estimates for the number of occupational medicine graduates are shown in Table 4-10a.

- Insufficient data.

4.4.2.2 Trends in Program Enrollment over Last 5 Years (By Specialty and Program Type)

Providers of OS&H education were asked whether the number of students entering their programs over the last 5 years had increased, decreased, or remained about the same. If a provider indicated an increase or decrease, they were asked to indicate the percentage change, cumulatively, over the 5 year period. Tables 4-13 through 4-16 show findings on these survey items.

Table 4-13. Over the last 5 years, has the number of students entering your program increased, decreased, or remained about the same?

	Percentage of providers	ERCs	TPGs	Non-NIOSH funded
Number of students has increased	43%	47%	44%	41%
Number of students has decreased	18%	10%	8%	24%
Remained about the same	39%	43%	48%	35%

Table 4-14. Cumulative percentage increase in the number of students entering OS&H programs over the last 5 years*

	Percentage of providers
Increase in students of less than 25%	32%
Increase in students of 25% to less than 50%	29%
Increase in students of 50% to less than 100%	20%
Increase in students of 100% or greater	19%

* Among programs reporting that the number of students has *increased* over the last 5 years

Table 4-15. Cumulative percentage decrease in the number of students entering OS&H programs over the last 5 years*

	Percentage of providers
Decrease in students of less than 25%	34%
Decrease in students of 25% to less than 50%	23%
Decrease in students of 50% to less than 75%	25%
Decrease in students of 75% or greater	18%

* Among programs reporting that the number of students has *decreased* over the last 5 years

Table 4-16. Over the last 5 years, has the number of students entering your program increased, decreased, or remained about the same? (by discipline)*

	Percentage of providers	NIOSH funded	Non-NIOSH funded
Occupational Safety			
Increased	50%	62%	46%
Decreased	20%	15%	22%
Remained about the same	30%	23%	32%
Industrial Hygiene			
Increased	32%	36%	25%
Decreased	22%	8%	50%
Remained about the same	46%	56%	25%
Occupational Medicine			
Increased	21%	19%	28%
Decreased	14%	10%	28%
Remained about the same	65%	71%	44%
Occupational Health Nursing			
Increased	40%	-	-
Decreased	14%	-	-
Remained about the same	46%	-	-
Occupational Ergonomics			
Increased	39%	60%	30%
Decreased	14%	0%	20%
Remained about the same	47%	40%	50%
Occupational Health Physics			
Increased	34%	-	-
Decreased	33%	-	-
Remained about the same	33%	-	-
Occupational Injury Prevention			
Increased	27%	-	-
Decreased	24%	-	-
Remained about the same	49%	-	-
Occupational Epidemiology			
Increased	63%	-	-
Decreased	0%	-	-
Remained about the same	37%	-	-
Occupational Health Psychology			
Increased	82%	100%	75%
Decreased	0%	0%	0%
Remained about the same	18%	0%	25%

* For some degree levels, the number of responding providers from a discipline is too small to allow presentation and ensure that confidentiality is maintained.

- Insufficient data.

4.4.2.3 Trends in Quality of Students over Last 5 Years (By Specialty and Program Type)

Providers were asked to indicate whether the quality of students (in terms of test scores, motivation, and dedication, for example) had increased over the last 5 years, had decreased, or remained about the same. Resulting estimates are shown in Tables 4-17 and 4-18.

Table 4-17. Over the last 5 years, has the quality (e.g., test scores, motivation, dedication) of students applying to your program increased, decreased, or remained about the same?

	Percentage of providers	ERCs	TPGs	Non-NIOSH funded
Quality of students has increased	33%	39%	29%	31%
Quality of students has decreased	8%	4%	4%	11%
Remained about the same	59%	57%	68%	58%

Table 4-18. Over the last 5 years, has the quality (e.g., test scores, motivation, dedication) of students applying to your program increased, decreased, or remained about the same? (by discipline)*

	Percentage of providers	NIOSH funded	Non-NIOSH funded
Occupational Safety			
Increased	36%	35%	36%
Decreased	13%	5%	15%
Remained about the same	52%	60%	49%
Industrial Hygiene			
Increased	23%	33%	0%
Decreased	4%	0%	13%
Remained about the same	73%	66%	88%
Occupational Medicine			
Increased	42%	35%	72%
Decreased	14%	10%	28%
Remained about the same	44%	55%	0%
Occupational Health Nursing			
Increased	34%	-	-
Decreased	0%	-	-
Remained about the same	66%	-	-
Occupational Ergonomics			
Increased	27%	21%	30%
Decreased	3%	11%	0%
Remained about the same	70%	69%	70%
Occupational Health Physics			
Increased	25%	-	-
Decreased	9%	-	-
Remained about the same	66%	-	-

- Insufficient data.

Table 4-18. Over the last 5 years, has the quality (e.g., test scores, motivation, dedication) of students applying to your program increased, decreased, or remained about the same? (by discipline)* (continued)

	Percentage of providers	NIOSH funded	Non-NIOSH funded
Occupational Injury Prevention			
Increased	51%	-	-
Decreased	0%	-	-
Remained about the same	49%	-	-
Occupational Epidemiology			
Increased	27%	-	-
Decreased	0%	-	-
Remained about the same	73%	-	-
Occupational Health Psychology			
Increased	64%	100%	50%
Decreased	0%	0%	0%
Remained about the same	36%	0%	50%

* For some degree levels, the number of responding providers from a discipline is too small to allow presentation and ensure that confidentiality is maintained.

- Insufficient data.

4.4.2.4 Obstacles for Students Wishing To Study OS&H (by Specialty and Program Type)

Providers were asked to indicate what obstacles (if any) exist at their institutions for students who may wish to study their particular OS&H discipline. The questionnaire provided a list of potential obstacles for this item, and respondents could choose as many obstacles as they felt apply to their students. Tables 4-19 and 4-20 present the estimates of providers' views on this issue.

Table 4-19. What obstacles (if any) exist at your institution for the typical student who may wish to study [*OS&H discipline*]?

	Percentage of providers	ERCs	TPGs	Non-NIOSH funded
No obstacles	6%	3%	0%	8%
Financial	64%	75%	82%	55%
Job prospects	18%	6%	14%	25%
Lack of knowledge of the program	59%	50%	66%	63%
Program rigor	18%	18%	18%	17%
Other obstacles	19%	22%	13%	18%

Table 4-20. What obstacles (if any) exist at your institution for the typical student who may wish to study [*OS&H discipline*]? (by discipline)*

	Percentage of providers	NIOSH funded	Non-NIOSH funded
Occupational Safety			
No obstacles	7%	0%	9%
Financial	63%	77%	58%
Job prospects	21%	10%	24%
Lack of knowledge of the program	65%	41%	72%
Program rigor	25%	24%	25%
Other obstacles	13%	4%	16%
Industrial Hygiene			
No obstacles	0%	0%	0%
Financial	62%	74%	38%
Job prospects	7%	4%	13%
Lack of knowledge of the program	80%	76%	88%
Program rigor	22%	26%	13%
Other obstacles	18%	9%	38%
Occupational Medicine			
No obstacles	4%	5%	0%
Financial	65%	76%	28%
Job prospects	7%	9%	0%
Lack of knowledge of the program	64%	61%	72%
Program rigor	8%	10%	0%
Other obstacles	41%	38%	50%
Occupational Health Nursing			
No obstacles	0%	-	-
Financial	87%	-	-
Job prospects	27%	-	-
Lack of knowledge of the program	67%	-	-
Program rigor	6%	-	-
Other obstacles	46%	-	-
Occupational Ergonomics			
No obstacles	7%	0%	10%
Financial	56%	70%	50%
Job prospects	30%	9%	40%
Lack of knowledge of the program	46%	60%	40%
Program rigor	10%	11%	10%
Other obstacles	6%	11%	0%
Occupational Health Physics			
No obstacles	8%	-	-
Financial	56%	-	-
Job prospects	17%	-	-
Lack of knowledge of the program	36%	-	-
Program rigor	17%	-	-
Other obstacles	23%	-	-

Table 4-20. What obstacles (if any) exist at your institution for the typical student who may wish to study [*OS&H discipline*]? (by discipline)* (continued)

	Percentage of providers	NIOSH funded	Non-NIOSH funded
Occupational Injury Prevention			
No obstacles	0%	-	-
Financial	76%	-	-
Job prospects	24%	-	-
Lack of knowledge of the program	24%	-	-
Program rigor	49%	-	-
Other obstacles	0%	-	-
Occupational Epidemiology			
No obstacles	12%	-	-
Financial	88%	-	-
Job prospects	0%	-	-
Lack of knowledge of the program	34%	-	-
Program rigor	0%	-	-
Other obstacles	0%	-	-
Occupational Health Psychology			
No obstacles	0%	0%	0%
Financial	73%	67%	75%
Job prospects	18%	0%	25%
Lack of knowledge of the program	36%	0%	50%
Program rigor	9%	33%	0%
Other obstacles	45%	33%	50%

*For some degree levels, the number of responding providers from a discipline is too small to allow presentation and ensure that confidentiality is maintained.

- Insufficient data.

4.4.3 Outcomes of OS&H Education

Particular outcomes of OS&H education are discussed in this section. Estimates are presented for the percentage of program graduates that find a job within the discipline within two years of leaving providers' programs (Tables 4-21 to 4-23) and the economic sectors that hire program graduates (Tables 4-25 and 4-26). In addition, estimates are shown for the percentage of occupational medicine program graduates that obtain board certification in this discipline upon leaving the program (Table 4-24).

4.4.3.1 Percentage of Program Graduates Obtaining a Job Within 2 Years of Leaving Program (by Degree Level, Specialty, Program Type)

Table 4-21. Approximately what percent of graduates obtain a job in [OS&H discipline] within 2 years of leaving your program with a bachelor's degree?

	Percentage of providers offering bachelor's degree	NIOSH funded	Non-NIOSH funded
More than 95 percent	31%	56%	29%
75 to 95 percent	52%	44%	53%
Less than 75 percent	17%	0%	19%

Table 4-22. Approximately what percent of graduates obtain a job in [*OS&H discipline*] within 2 years of leaving your program with a master's or higher degree?

	Percentage of providers offering graduate degrees	ERCs	TPGs	Non-NIOSH funded
More than 95 percent	41%	51%	49%	33%
75 to 95 percent	41%	41%	44%	41%
Less than 75 percent	18%	8%	7%	27%

Table 4-23. Percentage of graduates obtaining a job in discipline within 2 years of leaving the program, by discipline and degree level*

	Percentage of providers offering bachelor's degree	Percentage of providers offering graduate degrees
Occupational Safety		
More than 95 percent	29%	40%
75 to 95 percent	56%	37%
Less than 75 percent	15%	24%
Industrial Hygiene		
More than 95 percent	53%	53%
75 to 95 percent	47%	43%
Less than 75 percent	0%	5%
Occupational Medicine		
More than 95 percent	n/a	63%
75 to 95 percent	n/a	34%
Less than 75 percent	n/a	4%
Occupational Health Nursing		
More than 95 percent	n/a	32%
75 to 95 percent	n/a	61%
Less than 75 percent	n/a	7%

Table 4-23. Percentage of graduates obtaining a job in discipline within 2 years of leaving the program, by discipline and degree level* (continued)

	Percentage of providers offering bachelor's degree	Percentage of providers offering graduate degrees
Occupational Ergonomics		
More than 95 percent	-	27%
75 to 95 percent	-	56%
Less than 75 percent	-	17%
Occupational Health Physics		
More than 95 percent	23%	28%
75 to 95 percent	53%	21%
Less than 75 percent	23%	51%
Occupational Injury Prevention		
More than 95 percent	-	51%
75 to 95 percent	-	24%
Less than 75 percent	-	24%
Occupational Epidemiology		
More than 95 percent	-	15%
75 to 95 percent	-	73%
Less than 75 percent	-	12%
Occupational Health Psychology		
More than 95 percent	-	64%
75 to 95 percent	-	18%
Less than 75 percent	-	18%

*For some disciplines, the number of respondents is too small to allow presentation and ensure that confidentiality is maintained.

- Insufficient data.

4.4.3.2 Percentage of Program Graduates That Obtain Board Certification after Graduating (Occupational Medicine Only)

Table 4-24. Approximately what percent of graduates obtain board certification in occupational medicine after leaving your program?

	Percentage of OM providers	ERCs	TPGs	Non-NIOSH funded
90 percent or more	48%	50%	40%	50%
75 to less than 90 percent	37%	32%	40%	50%
Less than 75 percent	14%	18%	19%	0%

4.4.3.3 Economic Sectors That Have Hired Program Graduates (by Specialty, Program Type)

Table 4-25. Thinking about your program graduates who have obtained jobs over the last few years, approximately what percent of your graduates have gone to work within the following economic sectors?

	Mean provider response	ERCs	TPGs	Non-NIOSH funded
Government	26%	23%	19%	29%
OS&H Consulting Services	19%	18%	17%	19%
Manufacturing	30%	28%	31%	30%
Mining	4%	2%	7%	3%
Construction	12%	4%	11%	14%
Transportation, Warehousing, & Utilities	8%	9%	4%	9%
Agriculture, Forestry, & Fishing	3%	8%	1%	1%
Health Care & Social Services	23%	31%	20%	19%
Wholesale or Retail Trade	2%	2%	0%	3%
Educational Services	20%	27%	16%	16%
Other sectors	21%	13%	20%	25%

Table 4-26. Percentage of program graduates obtaining work in various economic sectors, by discipline*

	Mean provider response	NIOSH funded	Non-NIOSH funded
Occupational Safety			
Government	21%	17%	23%
OS&H Consulting Services	17%	15%	18%
Manufacturing	33%	41%	32%
Mining	5%	8%	4%
Construction	17%	15%	17%
Transportation, Warehousing, & Utilities	9%	8%	9%
Agriculture, Forestry, & Fishing	5%	17%	1%
Health Care & Social Services	13%	12%	14%
Wholesale or Retail Trade	4%	2%	4%
Educational Services	10%	21%	7%
Other sectors	16%	28%	13%
Industrial Hygiene			
Government	25%	23%	28%
OS&H Consulting Services	19%	18%	19%
Manufacturing	34%	33%	38%
Mining	5%	5%	5%
Construction	8%	6%	10
Transportation, Warehousing, & Utilities	9%	6%	15%
Agriculture, Forestry, & Fishing	0%	0%	0%
Health Care & Social Services	10%	11%	9%
Wholesale or Retail Trade	1%	1%	0%
Educational Services	13%	15%	7%
Other sectors	10%	10%	10%

Table 4-26. Percentage of program graduates obtaining work in various economic sectors, by discipline* (continued)

	Mean provider response	NIOSH funded	Non-NIOSH funded
Occupational Medicine			
Government	24%	19%	45%
OS&H Consulting Services	20%	21%	17%
Manufacturing	12%	9%	25%
Mining	0%	0%	0%
Construction	0%	0%	0%
Transportation, Warehousing, & Utilities	6%	6%	0%
Agriculture, Forestry, & Fishing	2%	3%	0%
Health Care & Social Services	58%	56%	80%
Wholesale or Retail Trade	0%	0%	0%
Educational Services	14%	14%	0%
Other sectors	39%	15%	63%
Occupational Health Nursing			
Government	14%	-	-
OS&H Consulting Services	6%	-	-
Manufacturing	21%	-	-
Mining	0%	-	-
Construction	0%	-	-
Transportation, Warehousing, & Utilities	11%	-	-
Agriculture, Forestry, & Fishing	4%	-	-
Health Care & Social Services	53%	-	-
Wholesale or Retail Trade	4%	-	-
Educational Services	19%	-	-
Other sectors	6%	-	-
Occupational Ergonomics			
Government	30%	23%	34%
OS&H Consulting Services	19%	22%	16%
Manufacturing	29%	31%	27%
Mining	0%	0%	0%
Construction	3%	6%	0%
Transportation, Warehousing, & Utilities	3%	6%	0%
Agriculture, Forestry, & Fishing	0%	0%	0%
Health Care & Social Services	18%	20%	17%
Wholesale or Retail Trade	0%	0%	0%
Educational Services	29%	32%	28%
Other sectors	33%	5%	40%
Occupational Health Physics			
Government	33%	-	-
OS&H Consulting Services	27%	-	-
Manufacturing	21%	-	-
Mining	4%	-	-
Construction	2%	-	-
Transportation, Warehousing, & Utilities	15%	-	-
Agriculture, Forestry, & Fishing	0%	-	-
Health Care & Social Services	25%	-	-
Wholesale or Retail Trade	0%	-	-
Educational Services	14%	-	-
Other sectors	38%	-	-

Table 4-26. Percentage of program graduates obtaining work in various economic sectors, by discipline* (continued)

	Mean provider response	NIOSH funded	Non-NIOSH funded
Occupational Epidemiology			
Government	55%	-	-
OS&H Consulting Services	22%	-	-
Manufacturing	14%	-	-
Mining	0%	-	-
Construction	0%	-	-
Transportation, Warehousing, & Utilities	0%	-	-
Agriculture, Forestry, & Fishing	3%	-	-
Health Care & Social Services	8%	-	-
Wholesale or Retail Trade	0%	-	-
Educational Services	27%	-	-
Other sectors	12%	-	-
Occupational Injury Prevention			
Government	25%	-	-
OS&H Consulting Services	0%	-	-
Manufacturing	20%	-	-
Mining	0%	-	-
Construction	0%	-	-
Transportation, Warehousing, & Utilities	20%	-	-
Agriculture, Forestry, & Fishing	0%	-	-
Health Care & Social Services	60%	-	-
Wholesale or Retail Trade	0%	-	-
Educational Services	71%	-	-
Other sectors	40%	-	-
Occupational Health Psychology			
Government	53%	20%	58%
OS&H Consulting Services	29%	5%	35%
Manufacturing	16%	0%	20%
Mining	0%	0%	0%
Construction	0%	0%	0%
Transportation, Warehousing, & Utilities	2%	0%	3%
Agriculture, Forestry, & Fishing	0%	0%	0%
Health Care & Social Services	13%	20%	10%
Wholesale or Retail Trade	0%	0%	0%
Educational Services	44%	65%	33%

* Some data is not shown because the number of responding providers from these disciplines was too small to allow presentation and ensure that confidentiality is maintained.

- Insufficient data.

4.4.4 Funding and Faculty Trends for OS&H Education

Here estimates are presented from the Provider Survey on trends in funding and faculty hiring for OS&H education programs. First shown are provider indications of whether their internal funding has increased or decreased in recent years (Tables 4-27a-b). Next presented are estimates of the extent to which OS&H programs have received outside funding for the support of students over the last 5 years, and (if applicable) whether this funding has been increasing or decreasing (Tables 4-28a to Tables 4-29b). Next shown are estimates on the numbers of faculty (both full-time and part-time/adjunct) employed by OS&H programs (Tables 4-30a-b), expectations for hiring new faculty in the coming 5 years, as well as expectations of full-time faculty retiring (or leave the profession for other reasons) over this same period (Tables 4-31 to 4-33).

4.4.4.1 Trends in Funding of OS&H Programs over Last 5 Years (by Specialty, Program Type)

Table 4-27a. Over the last 5 years, has the level of general (recurring) funding from your university/college for training in [*OS&H discipline*] increased, decreased, or remained about the same?

	Percentage of providers	ERCs	TPGs	Non-NIOSH funded
Increased	11%	9%	18%	10%
Decreased	37%	36%	30%	39%
Remained about the same	52%	55%	52%	51%

Table 4-27b. Over the last 5 years, has the level of general (recurring) funding from your university/college for training in [*OS&H discipline*] increased, decreased, or remained about the same? (by discipline)*

	Percentage of providers	NIOSH funded	Non-NIOSH funded
Occupational Safety			
Increased	10%	10%	10%
Decreased	36%	31%	37%
Remained about the same	55%	59%	53%
Industrial Hygiene			
Increased	10%	9%	13%
Decreased	36%	30%	50%
Remained about the same	54%	61%	37%
Occupational Medicine			
Increased	20%	18%	28%
Decreased	41%	38%	50%
Remained about the same	39%	44%	22%

Table 4-27b. Over the last 5 years, has the level of general (recurring) funding from your university/college for training in [*OS&H discipline*] increased, decreased, or remained about the same? (by discipline)* (continued)

	Percentage of providers	NIOSH funded	Non-NIOSH funded
Occupational Health Nursing			
Increased	20%	-	-
Decreased	34%	-	-
Remained about the same	46%	-	-
Occupational Ergonomics			
Increased	7%	0%	10%
Decreased	29%	49%	20%
Remained about the same	64%	51%	70%
Occupational Health Physics			
Increased	6%	-	-
Decreased	58%	-	-
Remained about the same	36%	-	-
Occupational Injury Prevention			
Increased	0%	-	-
Decreased	49%	-	-
Remained about the same	51%	-	-
Occupational Epidemiology			
Increased	27%	-	-
Decreased	15%	-	-
Remained about the same	59%	-	-
Occupational Health Psychology			
Increased	0%	0%	0%
Decreased	63%	33%	75%
Remained about the same	37%	67%	25%

* For some disciplines, the number of responding providers from a discipline is too small to allow presentation and ensure that confidentiality is maintained.

- Insufficient data.

Table 4-28a. Over the last 5 years, has your program received funding from any source outside the university for the support of students in [*OS&H discipline*]?

	Percentage of providers	ERCs	TPGs	Non-NIOSH funded
Yes	66%	85%	92%	50%
No	34%	15%	8%	50%

Table 4-28b. Over the last 5 years, has your program received funding from any source outside the university for the support of students in [*OS&H discipline*]? (by discipline)*

	Percentage of providers	NIOSH funded	Non-NIOSH funded
Occupational Safety			
Yes	45%	76%	37%
No	55%	24%	63%
Industrial Hygiene			
Yes	78%	92%	50%
No	22%	8%	50%
Occupational Medicine			
Yes	96%	95%	100%
No	4%	5%	0%
Occupational Health Nursing			
Yes	73%	-	-
No	27%	-	-
Occupational Ergonomics			
Yes	80%	79%	80%
No	20%	21%	20%
Occupational Health Physics			
Yes	67%	-	-
No	33%	-	-
Occupational Injury Prevention			
Yes	100%	-	-
No	0%	-	-
Occupational Epidemiology			
Yes	88%	-	-
No	12%	-	-
Occupational Health Psychology			
Yes	46%	100%	37%
No	54%	0%	63%

* For some disciplines, the number of responding providers from a discipline is too small to allow presentation and ensure that confidentiality is maintained.

- Insufficient data.

Table 4-29a. Over the last 5 years, has the level of funding from outside sources for the support of students in [*OS&H discipline*] increased, decreased, or remained about the same?

	Percentage of providers (among those receiving outside funding)	ERCs	TPGs	Non-NIOSH funded
Increased	27%	20%	41%	29%
Decreased	18%	15%	17%	21%
Remained about the same	55%	65%	42%	50%

Table 4-29b. Over the last 5 years, has the level of funding from outside sources for the support of students in [*OS&H discipline*] increased, decreased, or remained about the same? (by discipline)*

	Percentage of providers (among those receiving outside funding)	NIOSH funded	Non-NIOSH funded
Occupational Safety			
Increased	18%	13%	21%
Decreased	15%	7%	20%
Remained about the same	66%	80%	59%
Industrial Hygiene			
Increased	34%	24%	75%
Decreased	18%	23%	0%
Remained about the same	48%	54%	25%
Occupational Medicine			
Increased	35%	31%	50%
Decreased	23%	15%	50%
Remained about the same	42%	55%	0%
Occupational Health Nursing			
Increased	0%	-	-
Decreased	27%	-	-
Remained about the same	73%	-	-
Occupational Ergonomics			
Increased	28%	62%	13%
Decreased	21%	13%	25%
Remained about the same	51%	24%	63%
Occupational Health Physics			
Increased	63%	-	-
Decreased	0%	-	-
Remained about the same	37%	-	-
Occupational Injury Prevention			
Increased	0%	-	-
Decreased	24%	-	-
Remained about the same	76%	-	-
Occupational Epidemiology			
Increased	17%	-	-
Decreased	0%	-	-
Remained about the same	83%	-	-
Occupational Health Psychology			
Increased	41%	67%	0%
Decreased	0%	0%	0%
Remained about the same	59%	33%	100%

* For some disciplines, the number of responding providers from a discipline is too small to allow presentation and ensure that confidentiality is maintained.

- Insufficient data.

4.4.4.2 Number of OS&H Faculty Currently Employed (by Specialty, Program Type)

Table 4-30a. How many faculty members trained in [*OS&H discipline*] or a related area does your program currently employ?

	Estimated total	ERCs	TPGs	Non-NIOSH funded
Full-time faculty	1,040	403	160	477
Part-time faculty	840	255	139	446

Table 4-30b. How many faculty members trained in [OS&H discipline] or a related area does your program currently employ? (by discipline)*

	Estimated total	NIOSH funded	Non-NIOSH funded
Occupational Safety			
Full-time faculty	379	117	260
Part-time faculty	341	74	267
Industrial Hygiene			
Full-time faculty	161	135	26
Part-time faculty	150	102	48
Occupational Medicine			
Full-time faculty	145	134	11
Part-time faculty	130	85	45
Occupational Health Nursing			
Full-time faculty	35	-	-
Part-time faculty	25	-	-
Occupational Ergonomics			
Full-time faculty	127	41	85
Part-time faculty	33	27	6
Occupational Health Physics			
Full-time faculty	45	-	-
Part-time faculty	59	-	-
Occupational Injury Prevention			
Full-time faculty	19	-	-
Part-time faculty	28	-	-
Occupational Epidemiology			
Full-time faculty	73	-	-
Part-time faculty	53	-	-
Occupational Health Psychology			
Full-time faculty	38	10	28
Part-time faculty	6	4	2

* For some disciplines, the number of responding providers from a discipline is too small to allow presentation and ensure that confidentiality is maintained.

- Insufficient data.

4.4.4.3 Anticipated Changes in OS&H Faculty over the Next 5 Years (by Specialty, Program Type)

Table 4-31. How many full-time faculty members trained in [OS&H discipline] or a related area do you expect will retire or leave the profession over the next 5 years?

Estimated total	ERCs	TPGs	Non-NIOSH funded
252	116	36	100

Table 4-32. How many full-time faculty members trained in [*OS&H discipline*] or a related area do you expect your program will hire over the next 5 years?

Estimated total	ERCs	TPGs	Non-NIOSH funded
340	103	71	166

Table 4-33. Expected numbers of full-time faculty hires and those leaving the profession: (by discipline)*

	Estimated total	NIOSH funded	Non-NIOSH funded
Occupational Safety			
New full-time faculty hires	149	47	111
Full-time faculty expected to leave	95	32	63
Industrial Hygiene			
New full-time faculty hires	53	44	9
Full-time faculty expected to leave	51	46	6
Occupational Medicine			
New full-time faculty hires	41	36	5
Full-time faculty expected to leave	33	30	3
Occupational Health Nursing			
New full-time faculty hires	9	-	-
Full-time faculty expected to leave	16	-	-
Occupational Ergonomics			
New full-time faculty hires	41	17	24
Full-time faculty expected to leave	25	10	15
Occupational Health Physics			
New full-time faculty hires	9	-	-
Full-time faculty expected to leave	14	-	-
Occupational Injury Prevention			
New full-time faculty hires	8	-	-
Full-time faculty expected to leave	3	-	-
Occupational Epidemiology			
New full-time faculty hires	11	-	-
Full-time faculty expected to leave	12	-	-
Occupational Health Psychology			
New full-time faculty hires	10	2	7
Full-time faculty expected to leave	1	1	0

* For some disciplines, the number of responding providers from a discipline is too small to allow presentation and ensure that confidentiality is maintained.

- Insufficient data.

4.4.5 Additional Estimates from the Provider Survey

This section contains estimates on the extent to which OS&H programs are accredited, and reasons why programs have not obtained accreditation (Tables 4-34 through 4-37b). Also shown are the extent to which OS&H programs are offering Continuing Education on topics related to the field, and trends in enrollment in their Continuing Education courses (Tables 4-38 to 4-41). Next presented are estimates on whether OS&H programs offer their students internships or other practice experience (Tables 4-41 to 4-43).

4.4.5.1 Accreditation

Table 4-34. Is any of your program's training in [*OS&H discipline*] accredited?*

	Percentage of providers*	ERCs	TPGs	Non-NIOSH funded
Yes, all of this training is accredited	46%	46%	58%	44%
Some of the training is accredited	14%	19%	14%	12%
No, none of this training is accredited	40%	35%	27%	44%

* This question was not asked for programs in occupational medicine

Table 4-35. Is any of your program's training in [*OS&H discipline*] accredited? (by discipline)*

	Percentage of providers**	NIOSH funded	Non-NIOSH funded
Occupational Safety			
Yes, all of this training is accredited	45%	28%	50%
Some of the training is accredited	16%	14%	17%
No, none of this training is accredited	39%	58%	33%
Industrial Hygiene			
Yes, all of this training is accredited	54%	55%	50%
Some of the training is accredited	29%	37%	13%
No, none of this training is accredited	18%	8%	37%
Occupational Health Nursing			
Yes, all of this training is accredited	81%	-	-
Some of the training is accredited	13%	-	-
No, none of this training is accredited	6%	-	-
Occupational Ergonomics			
Yes, all of this training is accredited	40%	40%	40%
Some of the training is accredited	3%	9%	0%
No, none of this training is accredited	57%	51%	60%

Table 4-35. Is any of your program's training in [*OS&H discipline*] accredited? (by discipline)* (continued)

	Percentage of providers**	NIOSH funded	Non-NIOSH funded
Occupational Health Physics			
Yes, all of this training is accredited	42%	–	–
Some of the training is accredited	8%	–	–
No, none of this training is accredited	50%	–	–
Occupational Injury Prevention			
Yes, all of this training is accredited	51%	–	–
Some of the training is accredited	0%	–	–
No, none of this training is accredited	49%	–	–
Occupational Epidemiology			
Yes, all of this training is accredited	63%	–	–
Some of the training is accredited	0%	–	–
No, none of this training is accredited	37%	–	–
Occupational Health Psychology			
Yes, all of this training is accredited	0%	0%	0%
Some of the training is accredited	0%	0%	0%
No, none of this training is accredited	100%	100%	100%

* For some disciplines, the number of responding providers from a discipline is too small to allow presentation and ensure that confidentiality is maintained.

**This question was not asked for programs in occupational medicine

- Insufficient data.

Table 4-36. What are the reasons why you have not obtained program-specific accreditation in [*OS&H discipline*]?*

	Percentage of providers (among those stating that none of their training is accredited)	ERCs	TPGs	Non-NIOSH funded
Too expensive	22%	9%	18%	27%
Requires too much work	23%	25%	18%	22%
Offers too little value	35%	23%	52%	38%
No accreditation organization for discipline	31%	35%	48%	28%
Other reason	32%	26%	0%	37%

* Respondents could choose more than one reason

Table 4-37. What are the reasons why you have not obtained program-specific accreditation in [*OS&H discipline*]? (by discipline)*

	Percentage of providers** (among those stating that none of their training is accredited)
Occupational Safety	
Too expensive	31%
Requires too much work	24%
Offers too little value	31%
No accreditation organization for discipline	9%
Other reason	47%
Industrial Hygiene	
Too expensive	31%
Requires too much work	16%
Offers too little value	54%
No accreditation organization for discipline	0%
Other reason	23%
Occupational Health Nursing	
Too expensive	0%
Requires too much work	0%
Offers too little value	0%
No accreditation organization for discipline	100%
Other reason	0%
Occupational Ergonomics	
Too expensive	12%
Requires too much work	23%
Offers too little value	41%
No accreditation organization for discipline	41%
Other reason	30%
Occupational Health Physics	
Too expensive	50%
Requires too much work	50%
Offers too little value	50%
No accreditation organization for discipline	36%
Other reason	17%
Occupational Injury Prevention	
Too expensive	0%
Requires too much work	0%
Offers too little value	0%
No accreditation organization for discipline	100%
Other reason	0%
Occupational Epidemiology	
Too expensive	0%
Requires too much work	0%
Offers too little value	0%
No accreditation organization for discipline	100%
Other reason	0%

Table 4-37. What are the reasons why you have not obtained program-specific accreditation in [*OS&H discipline*]? (by discipline)* (continued)

	Percentage of providers** (among those stating that none of their training is accredited)
Occupational Health Psychology	
Too expensive	0%
Requires too much work	18%
Offers too little value	36%
No accreditation organization for discipline	64%
Other reason	18%

* This question was not asked for programs in occupational medicine.

** Respondents could choose more than one reason.

4.4.5.2 Continuing Education

Table 4-38. Does your program offer continuing education courses on topics related to [*OS&H discipline*]?

	Percentage of providers	ERCs	TPGs	Non-NIOSH funded
Yes	44%	80%	29%	27%
No	56%	20%	71%	73%

Table 4-39. How many people do you anticipate will take continuing education courses offered by your program during 2011 on topics related to [OS&H discipline]?

	Percentage of providers (among those offering continuing education)	ERCs	TPGs	Non-NIOSH funded
Fewer than 40	40%	20%	50%	73%
40 to 150	41%	52%	27%	23%
More than 150	19%	28%	23%	4%

Table 4-40. Over the last 5 years, has the number of attendees in your continuing education courses in these areas increased, decreased, or remained about the same?

	Percentage of providers (among those offering continuing education)	ERCs	TPGs	Non-NIOSH funded
Increased	24%	23%	0%	33%
Decreased	17%	17%	12%	18%
Remained about the same	45%	59%	88%	13%
Our CE courses in this area are too new	14%	2%	0%	36%

Table 4-41. Does your program offer continuing education courses on topics related to [*OS&H discipline*]? (by discipline)*

	Percentage of providers	NIOSH funded	Non-NIOSH funded
Occupational Safety			
Yes	37%	53%	32%
No	63%	47%	68%
Industrial Hygiene			
Yes	52%	70%	13%
No	48%	30%	87%
Occupational Medicine			
Yes	78%	86%	50%
No	22%	14%	50%
Occupational Health Nursing			
Yes	86%	-	-
No	14%	-	-
Occupational Ergonomics			
Yes	42%	91%	20%
No	58%	9%	80%
Occupational Health Physics			
Yes	31%	-	-
No	69%	-	-
Occupational Injury Prevention			
Yes	27%	-	-
No	73%	-	-
Occupational Epidemiology			
Yes	24%	-	-
No	76%	-	-
Occupational Health Psychology			
Yes	0%	0%	0%
No	100%	100%	100%

*For some disciplines, the number of responding providers from a discipline is too small to allow presentation and ensure that confidentiality is maintained.

- Insufficient data.

4.4.5.3 Internships

Table 4-42. Does your program in [*OS&H discipline*] offer students an internship or other practice experience?

	Percentage of providers*	ERCs	TPGs	Non-NIOSH funded
Yes	85%	91%	95%	81%
No	15%	9%	5%	19%

* This question was not asked for programs in occupational medicine

Table 4-43. Does your program in [*OS&H discipline*] offer students an internship or other practice experience? (by discipline)*

	Percentage of providers**	NIOSH funded	Non-NIOSH funded
Occupational Safety			
Yes	93%	91%	93%
No	7%	9%	7%
Industrial Hygiene			
Yes	92%	100%	75%
No	8%	0%	25%
Occupational Health Nursing			
Yes	100%	-	-
No	0%	-	-
Occupational Ergonomics			
Yes	63%	70%	60%
No	37%	30%	40%
Occupational Health Physics			
Yes	58%	-	-
No	42%	-	-
Occupational Injury Prevention			
Yes	100%	-	-
No	0%	-	-
Occupational Epidemiology			
Yes	78%	-	-
No	22%	-	-
Occupational Health Psychology			
Yes	100%	100%	100%
No	0%	0%	0%

* For some disciplines, the number of responding providers from a discipline is too small to allow presentation and ensure that confidentiality is maintained.

**This question was not asked for programs in occupational medicine

- Insufficient data.

Discussion 5

5.1 Summary of Results

This discussion focuses on the key research questions designed to meet NIOSH's primary objectives for this assessment, which are to:

- Assess the current supply and future demand for OS&H professionals; and
- Determine the desired professional competencies (i.e., knowledge, skills, and abilities) required for the next 5 years.

The survey produced significant amounts of data relative to these key objectives and to related issues of concern focused on the employment and training of OS&H professionals. In this section the highlights from the data related to these objectives are summarized.

5.1.1 Assess the Current Supply and Future Demand for OS&H Professionals

Current Workforce

This survey estimates that currently there are over 48,000 OS&H professionals in the U.S. workforce across the nine disciplines of interest to this study, according to survey results shown in Table 3-9. The estimates show that the composition of the current OS&H workforce is primarily safety professionals (59%), followed by industrial hygienists (15%). The other major disciplines represented in the survey data were occupational health nursing (9%) and occupational medicine (3%).

The overall employment figure from this survey is about 15 percent lower than the number of about 55,800 OHS specialists estimated by BLS in 2010[8]. The difference between these figures may be due to a number of factors. First, the BLS definition of OHS specialists includes a different set of disciplines than this survey. While the BLS includes safety, industrial hygiene, ergonomics, and

[8] Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook, 2010-11 Edition, Op cit.*

health physics from among the NIOSH disciplines of interest, it does not include occupational medicine, occupational health nursing, and it is unclear whether it includes professionals in occupational injury prevention, occupational health epidemiology, and occupational health psychology. Together these five disciplines account for about 21 percent of the total employment in OS&H professions identified in this study. Also, the BLS definition of OHS specialist includes a number of disciplines not included in this survey, most notably, environmental protection specialists. Second, as discussed in Section 3, the current survey included NAICS codes thought to include approximately 75 percent of the OS&H workforce. Additionally, data collection was limited to establishments with 100 or more employees, with the exception of government or consulting establishments and those obtained from a supplemental list of occupational health clinics. These restrictions of our sampling strategy, done to maximize the efficiency of data collection, have likely produced an under-estimation of the current size of the OS&H workforce.

Of the estimated 48,000 current OS&H professionals, as shown in Table 3-12, about 20 percent work across multiple OS&H disciplines. However, 75 percent or more of the professionals in safety, industrial hygiene, occupational medicine, and occupational health nursing professionals spend more than half of their time in their primary area of training.

Changes in Size of Workforce

The Employer Survey asked a set of questions about anticipated changes in the current employment figures and projections for future needs to allow estimates of OS&H professionals needed for open positions. Changes in these employment figures could come through creation of new positions, through replacement of persons who retire or leave the profession, or through elimination of positions. Therefore, employers were asked to estimate planned new hires and likely retirements. The study was not designed to estimate employees' job changes for reasons other than projected retirements. Therefore, the survey included no questions asking employers to estimate how many of their OS&H professionals would leave for another job, and it is unlikely that employers would be able to give meaningful answers to such questions. Position openings also are created by job changes, where a person holding one OS&H position leaves to assume responsibilities for another OS&H position.

The estimates presented in Table 3-18 showed that within a year employers expect about 10 percent of safety professionals to retire; while they expected 4 percent of industrial hygienists, 5 percent of occupational physicians and 6 percent of occupational health nurses to retire. To help gauge the

extent to which current OS&H professionals may be retiring or leaving the profession within the next few years, the survey also asked employers about age ranges of their current OS&H workforce. The estimates in Table 3-17 show that in the more prevalent disciplines, such as safety , industrial hygiene, occupational medicine and occupational health nursing, sizable proportions of workers are over age 50, although only small proportions are over age 60. Occupational physicians and nurses are estimated to have the largest proportions over age 50, suggesting that fewer people are entering these professions. The survey results show that the majority of safety and industrial hygiene workers are under the age of 50. The estimates for these for disciplines overall suggest, though do not clearly demonstrate, that there may be an increase in retirements among these professionals over the next few years.

Of the employers surveyed, an estimated 39 percent intend to hire OS&H professionals over the next 5 years to fill a new or replacement position. The estimates showed that these employers expect to hire over 25,000 OS&H professionals over the next 5 years, or just over 5,000 per year. The survey did not identify any distinction as to what proportion of these hires will be for new positions or replacing persons who have left the employer's establishment. Additionally, although the survey asked employers to provide information about OS&H professionals (as defined in Section 1.3), it is likely that some positions may be filled by persons with non-OS&H training. For example, an employer may hire a person with an engineering degree with coursework, training, or on-the-job experience related to one or more OS&H discipline.

To fill available positions both currently and over the next 5 years, the source of OS&H professionals of interest to this assessment are the academic OS&H training programs. In 2011, there were an estimated 2,845 graduates of OS&H programs across the United States (Table 4-3). Of this total, about 70 percent were from safety programs, 11 percent from industrial hygiene, 2 percent from occupational medicine and 2 percent from occupational health nursing. Over the next 5 years, OS&H programs expect to graduate just fewer than 13,000 new professionals to fill many of the available positions. Table 4-10a estimates show that about 69 percent of these will be from safety programs, 12 percent will be from industrial hygiene programs, and 3 percent each will be from occupational medicine and occupational health nursing programs.

The estimates show that the largest difference between current supply and future need is among occupational health nurses, where the current and projected 5-year supply of program graduates is about 24 percent of the expected employer hiring figure. It should be noted again that not all of employers' occupational health nursing positions will be filled by persons who graduated from an occupational health nursing program. However, this difference is by far the largest among all OS&H

professions. In occupational safety, which is the OS&H profession with the largest number of employees, the estimates show that employers expect to hire about twice the number of graduates of safety OS&H programs. Over the same period, employers' projected needs for industrial hygienists and occupational physicians also will exceed the number of graduates of these respective OS&H programs. The estimated number of new industrial hygienists is expected to be about 64 percent of hiring projections; and the number of occupational physicians, about 76 percent of expected hires.

The projected difference in occupational health nursing figures may be of particular concern because of the specialized training nurses receive. Estimates show (Table 3-13) that about 57 percent of occupational health nurses spend 100 percent of their time in their primary area of training. Table 3-14 shows that 48 percent of professionals for whom occupational nursing is a secondary field spend only 10 percent or less of their time working in that area.

Employers were asked whether they had experienced any difficulty in the past 2 years in recruiting and hiring qualified candidates. Table 3-41 shows that during this period, for any given OS&H discipline, most employers made no attempts to hire any OS&H professionals; the only discipline where more than 30 percent of employers responded affirmatively was for occupational safety. However, where employers did attempt to recruit and hire any type of OS&H professional, more than half indicated they encountered no difficulties—a finding which aligns well with provider data shown in Tables 4-21 through 4-26 showing that most OS&H graduates have been able to find work within 2 years of graduation.

Educational providers indicate that their OS&H program enrollment figures have experienced modest increases in recent years along with a modest increase in the quality of students who have enrolled (Tables 4-16, 4-17, 4-18). If the number of graduates in 2011 (Table 4-8 shows this number to be 2,845) were to continue without change, then the expected number of graduates over the 2011-2015 period would be about 14,225 OS&H professionals. However, as noted above, provider projections over the next 5 years show that they expect the actual enrollment to be under 13,000 students. This represents an overall decrease in enrollment despite the demand shown by employers. These estimates also show that the numbers of expected graduates from NIOSH-funded Education and Research Centers (ERCs) will decline by about 3 percent. At the same time, those from NIOSH-funded Training Project Grants (TPGs) (8% decrease) and from non-NIOSH-funded programs (13% decrease) will see even larger decreases.

Tables 4-19 through 4-21 present estimates regarding obstacles students who want to study OS&H disciplines face, as reported by providers. Financial issues and lack of knowledge of the program are

cited as the major obstacles for students wishing to study OS&H. Estimates regarding provider program funding levels are presented in Tables 4-27 through 4-29, and they indicate a modest decline overall. Respondents indicate that funding provided by the university/college has decreased over the past 5 years. However, funding obtained from sources outside the university has roughly held steady over the past 5 years.

The survey also asked providers to estimate changes in faculty over the next 5 years. They were asked to estimate the number of current faculty supporting the OS&H programs who they thought would retire or leave the program within the next 5 years. As a followup question, they were asked to estimate the number of faculty the program(s) would need to hire over the next 5 years. Surprisingly, while providers estimated an overall decline in the number of enrollees in their programs, overall they estimated a net substantial increase in the number of faculty (Tables 4-31 and 4-32). However, the results for ERCs indicate a net decrease in the number of faculty supporting their programs over the next 5 years.

Providers were asked to tell us how successful their graduates are in finding employment in their OS&H discipline within 2 years of leaving their programs. Their responses, in Tables 4-21 through 4-23, show wide differences based on discipline, highest degree obtained, and source of program funding. For example, Table 4-23 shows for safety programs that after 2 years, about 85 percent of providers of bachelor's degrees stated that at least 75 percent of their graduates had found employment, and 77 percent of providers of graduate level programs indicated that their graduates had found employment. In occupational medicine, 97 percent of providers indicated that after 2 years at least 75 percent of their graduates had found employment. Conversely, only about 49 percent of health physics providers stated that at least 75 percent of their graduates had found employment in their discipline after 2 years. Interestingly, survey results indicate that OS&H graduates of NIOSH-funded programs appear to find jobs in their disciplines more easily than do graduates of non-NIOSH-funded programs, suggesting the high regard that NIOSH-funded programs have in the eyes of employers. However, two notes are in order regarding these estimates. First, NIOSH requires ERCs and TPGs to collect and report these statistics, and no such requirements exist for non-NIOSH-funded programs. As a result, the records for these data may be more complete for the ERC and TPG programs responding to this survey. Second, graduates from NIOSH-funded programs make up only about 10 percent of all OS&H graduates, both currently and projected over the next 5 years.

As shown in Table 4-26, providers indicate that their program graduates appear to be finding work across a broad spectrum of economic sectors, as well as in other sectors. The disciplines for which

providers listed the largest number of sectors were safety, industrial hygiene, ergonomics and health physics. Graduating occupational physicians and nurses find work in a somewhat narrower set of sectors. Provider estimates indicated that over 50 percent of these graduates find work in the health care and social services sector, which might be expected. Occupational epidemiology, occupational injury prevention and occupational health psychology graduates appear to find work within the narrowest set of sectors, according to providers. For occupational injury prevention, the estimates showed that 71 percent of graduates find work in educational services, while 60 percent find work in health care and social services. For occupational epidemiology, 55 percent of graduates find work in government.

Of the total estimated number of OS&H professionals in the nine disciplines who are employed in the United States, just fewer than 29,000 of them (about 59%) are occupational safety professionals. The highest level of education completed for 75 percent of these safety professionals is a bachelor's degree. About 70 percent of the 2011 OS&H program graduates were safety professionals and about 69 percent of the projected graduates of OS&H programs over the next 5 years will be safety professionals. This is consistent with employers' projections, shown in Table 3-27, where safety professionals will be about 71 percent of new hires over the next 5 years. Bachelor's degree-level safety professionals represent approximately 76 percent of employers' intended hires over the next 5 years (Table 3-36).

5.1.2 Assess the Desired Professional Competencies Required for the Next 5 Years

For current employees, employers were asked whether they felt their employees would benefit from additional training in specialties or technical aspects of their jobs (i.e., core competencies). Employers who indicated plans to hire OS&H professionals within the next 5 years were asked what competencies they desired in new hires.

Employers were asked to indicate, for each discipline where they expected to hire an OS&H professional, the most important core or technical skills they would be seeking in new hires, as well as the most important additional skills or knowledge areas they would be looking for in these hires. They also were asked to indicate what additional disciplines, if any, they would like to see a professional in that discipline trained. The options the respondent could select in response to this question were the other disciplines of interest to the study. Estimates from these data are contained in Tables 3-29 to 3-35. For additional aspects of the job, those registering interest among at least 30

percent of employers were similar among the reporting disciplines. Over 30 percent of employers who expect to hire safety, industrial hygiene, medicine or nursing professionals felt that communicating with workers and training skills were important. Leadership also was important for these four disciplines, and ability to communicate effectively with upper management was important for industrial hygiene and nursing.

The Employer Survey also asked respondents whether their current OS&H professionals could benefit from additional training in both specialty and technical aspects of their disciplines as well as in additional aspects of their jobs. The responses are displayed in Tables 3-19 through 3-24. In only one discipline did as many as half of employers suggest that additional training would be beneficial. In this instance, an estimated 50 percent of employers who employ occupational health nurses suggested that these professionals could benefit from additional training in wellness and health promotion issues. Only in a few instances did more than 30 percent of employers, and in no instance other than that cited above was the figure as high as 40 percent, feel their employees in a particular discipline would benefit from additional training in these areas.

For occupational safety, the most frequently identified areas where employers felt their employees would benefit from additional training included measuring safety program outcomes, job safety analysis, investigating accidents, and ergonomics. With occupational health nursing, in addition to wellness and health promotion, employers most frequently cited case management and transitional work programs, conducting health and safety assessments, analyzing workplace hazards, and prevention of workplace accidents. About a quarter of employers with industrial hygienists felt that that these professionals would benefit from additional training in competencies related to indoor air quality and radiation. Just under a quarter of employers felt their occupational medicine professionals would benefit from additional training regarding laws and regulations related to occupational medicine.

When asked to indicate the additional aspects of their jobs for which employers' current OS&H professionals could benefit from additional training, no single aspect was cited by more than a third of employers (Tables 3-19 through 3-24). Leadership skills were cited by employers as an additional area of training for safety, industrial hygiene and occupational nursing professionals. Knowledge of local, state and Federal regulations and compliance was cited for safety, occupational physicians and occupational health nurses. For safety and industrial hygiene professionals, employers also often cited communication with workers/training skills and communication with upper management, and technical writing as desirable additional areas of training.

The Employer Survey also offered employers, through open end responses, an opportunity to write their thoughts on continuing education or new courses. As shown in Table 3-25a, an estimated 26 percent of employers say there are new courses or topics of interest. Those who responded affirmatively were offered the opportunity to list any topics or courses of interest. The full list of responses received shown in Table 3-25b indicates the variety of topics of interest to respondents. Although no single response was repeated by more than 8 respondents, topics regarding ergonomics and nanomaterials were repeated most often.

5.2 Limitations of This Study

The National Assessment of the Occupational Safety & Health Workforce was perhaps the most ambitious project ever undertaken to assess employer demand for OS&H professionals, the supply of incoming professionals, and the training needs of OS&H professionals. The two surveys conducted as part of this project provide a rich source of data on these topics. However, every survey is subject to some degree of error – that is, variation in the data deriving from sources other than true differences among respondents. There are three broad categories of error in survey research: (1) sampling error, (2) measurement error, and (3) non-response bias. These sources of error should be viewed as reasons for caution in drawing conclusions from the assessment.

5.2.1 Sampling Error

Sampling error refers to the difference between population values and the sample-based statistics used to estimate these values. In general, the larger the sample size used to generate a statistic, the lower the degree of sampling error associated with the statistic. Smaller samples result in larger standard errors (a measure of the sampling error), wider confidence intervals, and less precise and reliable estimates. It is important to note that many of the estimates provided in this report are based on very small samples of respondents. This is particularly true with respect to estimates from the Employer Survey on the disciplines of Ergonomics, Health Physics, Occupational Epidemiology, Occupational Injury Prevention, and Occupational Health Psychology. These occupations are less common than Occupational Safety, Industrial Hygiene, Occupational Medicine, and Occupational Health Nursing. Few employers in our sample reported that they currently employ professionals in the first five disciplines, and even fewer indicated an expectation of hiring in these disciplines over the next 5 years. The Employer Survey was not designed to yield equally reliable estimates for each

of the nine OS&H disciplines of interest to NIOSH. Findings for all nine disciplines (where possible) have been provided because each discipline will be of interest to some readers of this report. However, conclusions about these emerging, less well-established disciplines should be made with extreme caution. Note that the reliability of the estimates shown in this report can be gleaned from the confidence intervals associated with the estimates.

As discussed in Section 4, the survey of OS&H education providers was not done with a probability-based statistical sample. Instead, Westat attempted to administer the survey to all known OS&H degree programs in the nine disciplines of interest to NIOSH for this project. As a result, sampling error does not apply to these estimates. However, findings from the Provider Survey may be affected by the other two main sources of error, as discussed below.

5.2.2 Measurement Error

In working with NIOSH and the advisory Task Force, survey questions were designed to fit the measures of interest to NIOSH as closely as possible. It is important to recognize that a survey question will rarely (if ever) perfectly measure the intended concept. The extent to which the questions reliably and validly measure the concepts of interest in this project (e.g., expectations to hire industrial hygiene professionals over the next 5 years) is not known. The inability to confirm the reliability and validity of questions is hardly unusual in survey research, as often there are practical difficulties associated with demonstrating these qualities.

A few specific sources of measurement error in these surveys should be noted. Respondents can misinterpret questions, due to confusing wording or failing to closely attend to the wording. For example, the Employer Survey aimed to collect data only about "OS&H professionals" (i.e., those with a bachelor's degree or higher in a relevant OS&H field). While it seems unlikely that this definition would be a controversial for many, it is possible that some employers used their own definition of an OS&H professional, or a relevant OS&H field when reporting the number of these professionals on staff, their characteristics, and training needs. For example, an organization's safety officer with a general engineering degree has been viewed as an OS&H professional.

In addition, the person serving as the respondent may not be the most appropriate respondent. As noted earlier, the survey was designed to collect data for the Employer Survey from the person identified as being the most knowledgeable about OS&H activity at the sampled establishment. In the Provider Survey the target respondent was the person identified as heading the program of

interest. It is possible, however, that in some cases the responses to the web survey were provided by someone with less knowledge about the topics covered in the survey than someone else in the organization.

Finally, the Employer Survey included some questions that were very important to the project yet also no doubt were very difficult for employers to consider, such as the questions concerning expectations for hiring OS&H professionals over the next 5 years. Indeed, for each of the OS&H disciplines of interest, many employers (as high as 25 %, for occupational safety) told us that they do not know if they will hire anyone in that discipline. Among those who indicated they expect to hire, many were unable to specify the number of professionals they anticipate hiring, or the numbers at various levels of education.

5.2.3 Non-response Bias

Non-response error can occur because not everyone asked to respond to a survey does so. For example, some intended respondents cannot be found, while others refuse to participate. The degree of non-response bias in a survey's findings is determined by: (1) the degree to which the views of non-respondents differ systematically from the views reported by respondents, and (2) the response rate. In both surveys, the weighting procedures were designed to correct for potential non-response bias as much as possible, taking into account known characteristics of both respondents and non-respondents. However, the degree to which this form of bias exists in the findings cannot be known without an in-depth investigation, such as a concerted effort to followup and collect data from selected non-respondents.

5.3 Conclusions and Recommendations

This survey of employers of OS&H professionals and OS&H educational providers produced a significant amount of data that will be useful to the many stakeholders interested in issues of OS&H professional training and employment. Researchers will be able to review these data carefully and hopefully draw meaningful conclusions in many areas. For this report, the conclusions are narrowed to those directly related to the objectives cited in Section 5.1.

1. The estimated number of OS&H professionals employers expect to hire in 2011 and over the next 5 years is substantially higher than the number to be produced from

OS&H training programs. It is unclear to what extent the estimated numbers to be hired will be new OS&H program graduates versus OS&H professionals currently in the workforce or non-OS&H trained professionals. However, the differences overall and among individual disciplines suggest the need to produce additional graduates. Anticipated retirement figures notwithstanding, this applies to the 4 major OS&H disciplines (safety, industrial hygiene, occupational medicine, and occupational health nursing), but particularly to safety and occupational health nursing. A joint effort of employers and providers may be a desired approach to determining how to best address the apparent decline in enrollment numbers to close the difference between numbers of OS&H professionals needed and the numbers of graduating OS&H professionals.

2. The apparent overall decline in funding for OS&H programs from university, college or department sources, particularly among programs not provided funding by NIOSH, along with the projected decline in the numbers of OS&H students, is troubling given employers' hiring expectations, anticipated retirement figures, the "graying" of some of the disciplines, and the increasing quality of students enrolling in programs. Additional study may be worthwhile to identify means to address obstacles cited by provider respondents interfering with students who might wish to pursue an OS&H degree. The most frequently cited obstacles were financial aid and lack of knowledge of the program. Employers and providers should work together to determine how best to improve knowledge of programs among students both in the early years of college and before they reach college.

3. Survey results regarding competencies of current OS&H professionals suggest that employers generally have no serious concerns regarding their employees' level of training in their work areas. Additionally, cross performing in areas outside of primary competence, while common for some disciplines, does not appear to be widespread or consume a large proportion of work time. Providers will need to continue to monitor employers' desired competencies. They appear to be in line with what providers are including in curricula but as technologies, work issues, and workplace organization change the needs are likely to change. Providers and employers also will need to continue to work together to assess what competencies can be part of undergraduate education.

4. Employers' desired competencies for new hires appear to be similar to those for current OS&H employees. However, the survey results suggest a desire for new hires to have training in additional areas, primarily relating to leadership and various forms of communication, and to have training in one or more of the other disciplines of interest to this study. There also appears to be a desire on the part of many employers to focus hiring among bachelor's-level graduates.

Appendix A

OS&H Workforce Assessment
Employer Survey Instrument

Thank you for your willingness to help us assess the state of the nation's occupational safety and health (OS&H) professional workforce. Please note that in this survey, we will be asking you about OS&H at the following location only:

ESTABLISHMENT NAME

ESTABLISHMENT ADDRESS

We realize that your organization may have multiple locations. Any of your locations could have been sampled for this project. While the one location addressed in this survey may not represent your entire organization, the locations sampled for the project are representative of workplaces across the nation that are most likely to employ occupational safety and health workers.

If there is someone else in your organization who would be a more knowledgeable respondent for this survey, we ask that you forward the letter or email containing your survey PIN to that individual. If more than one individual is needed to complete the survey, we ask that you work together in to provide information that is as complete as possible.

If you have any questions, please contact Westat toll-free at 1-xxx-xxx-xxxx (or by email: Support@OSHSurvey.org).

Overview

This page provides information about:

- What kinds of questions you'll be asked
- How to navigate through the survey
- When are your answers saved
- The three ways to leave the survey: Exit, Timeout, and Submit

What kinds of question will be asked?

There are four sections to the survey (though not all may apply to you):

1. Your Occupational Safety and Health Professionals
2. Training Needs of Your Occupational Safety and Health Professionals
3. Future Hires in Occupational Safety and Health
4. About this Location

How to navigate through the survey

Each page of the survey has two buttons that allow you move forward and backward through the pages of the survey. They are the "Previous Page" and "Next Page" buttons, appearing at the button of the page. You can change your responses as often as you like, and you can revisit sections of the survey as often as you like.

When are your answers saved?

Your answers are saved each time you move to a new page, go back to an earlier page, or exit the survey by clicking on "Save & Exit". If you click on the X in your browser window to exit the survey, your responses on the current page will not be saved. If you need to leave the survey before you have completed it, always click on the "Save & Exit" button that appears on each page of the survey.

The three ways to leave the survey: Exit, Timeout, and Submit

Exit

You do not have to complete the survey in one sitting. If you wish to exit the survey to return at a later time, all you have to do is click on the "Save & Exit" button and all your responses will be saved. However, your survey will not be considered complete until you "submit" it (see Submit section below).

Timeout

After 25 minutes of inactivity (that is, you haven't interacted with the survey in 25 minutes), you will be given a "timeout" warning. After you get this warning, you'll have 5 minutes to resume activity or you will be timed out. If you are timed out, new or changed responses to the questions on your current page will not be saved.

Submit

After you have navigated through the last section of the survey, you will be taken to a Finish page. If you have left any questions blank, you will be notified of this and you will be given the opportunity to go back and fill in missing answers. If you are satisfied that you are done with the survey, you will be instructed to click on the "Submit Survey" button, and this will complete your participation. Once you have clicked on this button, your survey is considered complete and you will not be able to access the survey online again.

Where you can get help if you have additional questions

If you have any questions, please email us at Support@OSHSurvey.org. You can also call us toll-free at 1-xxx-xxx-xxxx.

Q1. First, we would like to know if any occupational safety and health (OS&H) professionals were employed by this location (i.e. this worksite, building, plant, etc.) at the end of December, 2010. Please include only staff you directly employ. Be sure to count yourself (if applicable).

- By OS&H professional, we mean a person who meets each of the following three criteria: 1) has obtained at least a bachelor's degree in OS&H or a related field, 2) has experience in the OS&H field, and 3) devotes a significant portion of work time to the OS&H field. OS&H professionals in some disciplines (e.g., medicine, nursing, hygiene, safety) may also be formally certified by a professional body that has established competency standards. However, certification is not required for being counted in this survey.

- Below is a list of some OS&H fields. You can click on each for a description of the profession

[NOTE: definitions are shown pages 32-33.

Occupational Safety	Occupational Health Physics
Industrial Hygiene	Occupational Injury Prevention
Occupational Medicine	Occupational Epidemiology
Occupational Health Nursing	Occupational Health Psychology
Occupational Ergonomics	

Check one: Q1 1=yes 2=no

○ OS&H professionals were employed by this location at the end of December, 2010

○ No OS&H professionals were employed by this location at the end of December, 2010 → Skip to Question 2.

Q1a. How many OS&H professionals were employed by this location at the end of December, 2010?

_____ Q1a 3 columns

Q2. Does this location expect to hire any OS&H professionals within the next five years? Consider both new positions and positions to replace staff that leave. Q2 1=yes 2=no 3=not sure

○ Yes

○ No

○ Not Sure

Respondents who answer "Yes" to Q1 will continue to the next page

Respondents who answer "No" to Q1 are ineligible for the survey

YOUR OCCUPATIONAL SAFETY AND HEALTH (OS&H) PROFESSIONALS

We have several questions about each of the occupational safety and health (OS&H) professionals employed by this location. The table below allows for up to eight OS&H professionals – if you have more than eight OS&H professionals, please allow us to assist in selecting a random sample of 8 for which to report - contact us at xxx-xxx-xxxxx or Support@OSHSurvey.org.

Before answering questions 3-5 below, please enter your own identifier(s) for each of these persons in the first column, such as their first name or initials (such as "MS" for Mary Smith). This information will NOT be submitted with the survey data – it will be erased when you complete and submit your answers. Please do not overlook yourself (if applicable).

	Person Identifier (first name or initials)	**Q3. In a typical week, how many hours does this person work?**	**Q4. What percentage of this person's time is spent working in activities related to OS&H?**
1	P1 8 columns	Q3P1 2 columns _____ hours	*[Each row in this column will a drop-down menu showing percentages in increments of 5, i.e., 5%, 10%, ...100%]* Q4P1 .
2	P2 8 columns	Q3P2 2 columns _____ hours	Q4P2
3	P3 8 columns	Q3P3 2 columns _____ hours	Q4P3
4	P4 8 columns	Q3P4 2 columns _____ hours	Q4P4
5	P5 8 columns	Q3P5 2 columns _____ hours	Q4P5
6	P6 8 columns	Q3P6 2 columns _____ hours	Q4P6
7	P7 8 columns	Q3P7 2 columns _____ hours	Q4P7
8	P8 8 columns	Q3P8 2 columns _____ hours	Q4P8

YOUR OCCUPATIONAL HEALTH AND SAFETY (OS&H) PROFESSIONALS

Q5. We would like to know the specific areas or disciplines of occupational and safety and health (OS&H) in which these professionals work. *[Note: Questions 5c and 5d will appear grayed out until R indicates less than 100% for primary field]*

	Person Identifier (first name or initials)	Q5a. What is this person's primary OS&H job category? (the category that accounts for the largest amount of this persons OS&H work time – if you would like to see descriptions of the job categories, click here)	Q5b. What percentage of this person's time in OS&H activity is spent working in their primary OS&H field?	Q5c. If this person performs work in a second OS&H job category, please indicate which one:	Q5d. What percentage of this person's time in OS&H activity is spent working in their secondary OS&H field?
1	*[carried over from Screen 1]*	*[Each row in this column will show a drop-down menu of the nine OSH categories, plus "Other OSH profession." If R chooses "Other" an entry box will also appear.]* Q5AP1	*[Each row in this column will a drop-down menu showing percentages in increments of 5, i.e., 5%, 10%, 15%, ...100%]* Q5BP1	*[Each row in this column will show a drop-down menu of the nine OSH categories, plus "Other OSH profession." If R chooses "Other" an entry box will also appear.]* Q5CP1	*[Each row in this column will a drop-down menu showing percentages in increments of 5, i.e., 5%, 10%, ...100%]* Q5DP1
2	*[carried over from Screen 1]*	Q5AP2	Q5BP2	Q5CP2	Q5DP2
3	*[carried over from Screen 1]*	Q5AP3	Q5BP3	Q5CP3	Q5DP3
4	*[carried over from Screen 1]*	Q5AP4	Q5BP4	Q5CP4	Q5DP4
5	*[carried over from Screen 1]*	Q5AP5	Q5BP5	Q5CP5	Q5DP5
6	*[carried over from Screen 1]*	Q5AP6	Q5BP6	Q5CP6	Q5DP6
7	*[carried over from Screen 1]*	Q5AP7	Q5BP7	Q5CP7	Q5DP7
8	*[carried over from Screen 1]*	Q5AP8	Q5BP8	Q5CP8	Q5DP8

YOUR OCCUPATIONAL HEALTH AND SAFETY (OS&H) PROFESSIONALS

	Person Identifier	Q6. What is the highest level of education this person has completed in their primary OS&H (or closely related) field? Q6P1 – Q6P8	Q7. Does this person hold an active professional certification in their primary OS&H field? If you would like to see examples of relevant certifications, click here. (Please do not count certifications granted by OSHA and MSHA) Q7P1 – Q7P8	Q8. Which of the following age categories applies to this person? Q8P1 – Q8P8	Q9. Do you think that this person is likely to retire or leave the profession within the next year? Q9P1 – Q9P8
1	*[carried over from Screen 1]*	*[Each row in this column will show the education categories shown below. But unique if Q5APX=Occupational Medicine. See below]* *Standard set of response categories for Q6 will be:* ○ Bachelor's degree =1 ○ Master's degree =2 ○ Doctoral degree =3 *For Occupational Medicine:* ○ M.D. with residency training in occupational medicine =4 ○ M.D. with residency training in another area of medicine =5	○ Yes, in primary field =1 ○ Yes, in another field =2 ○ No, but working towards it =3 ○ No, not working towards it =4	○ 60 or older =1 ○ 50-59 =2 ○ 49 or younger =3	○ Yes =1 ○ No =2
2	*[carried over from Screen 1]*		○ Yes, in primary field ○ Yes, in another field ○ No, but working towards it ○ No, not working towards it	○ 60 or older ○ 50-59 ○ 49 or younger	○ Yes ○ No
3	*[carried over from Screen 1]*		○ Yes, in primary field ○ Yes, in another field ○ No, but working towards it ○ No, not working towards it	○ 60 or older ○ 50-59 ○ 49 or younger	○ Yes ○ No
4	*[carried over from Screen 1]*		○ Yes, in primary field ○ Yes, in another field ○ No, but working towards it ○ No, not working towards it	○ 60 or older ○ 50-59 ○ 49 or younger	○ Yes ○ No
5	*[carried over from Screen 1]*		○ Yes, in primary field ○ Yes, in another field ○ No, but working towards it ○ No, not working towards it	○ 60 or older ○ 50-59 ○ 49 or younger	○ Yes ○ No
6	*[carried over from Screen 1]*		○ Yes, in primary field ○ Yes, in another field ○ No, but working towards it ○ No, not working towards it	○ 60 or older ○ 50-59 ○ 49 or younger	○ Yes ○ No
7	*[carried over from Screen 1]*		○ Yes, in primary field ○ Yes, in another field ○ No, but working towards it ○ No, not working towards it	○ 60 or older ○ 50-59 ○ 49 or younger	○ Yes ○ No
8	*[carried over from Screen 1]*		○ Yes, in primary field ○ Yes, in another field ○ No, but working towards it ○ No, not working towards it	○ 60 or older ○ 50-59 ○ 49 or younger	○ Yes ○ No

Respondents will next be presented with the appropriate section on training needs for each OSH area in which they reported at Q5a at least one professional working as their primary field.

If no employees were identified in a given OHS area, then the training needs section for that OSH should not be presented.

(SEE INSTRUCTION AT BEGINNING OF EACH TRAINING NEEDS SECTION)

Present this section if any item among Q5AP1-Q5AP8 = "Occupational Safety" / 1

TRAINING NEEDS OF YOUR OCCUPATIONAL SAFETY PROFESSIONALS

You indicated that (*identifier 1, identifier 2,..*) was employed at this location in occupational safety at the end of 2010.

Q1. In what specialties or technical aspects of their jobs do you believe that at least some of your occupational safety professionals could benefit from additional training?

Examples include:

Investigating accidents
Planning for / responding to emergencies
Ergonomics
Fire safety
Electrical safety
Industrial hygiene
Hazardous materials management
Finding and utilizing sources of safety information
Measuring safety program outcomes (e.g., on health status, injury rates)
Measuring economic value of safety programs
Job Safety Analysis

[open entry box]
SAFTR1_A
Allow up to 240 characters

Q2. In what additional aspects of their jobs do you believe that at least some of your occupational safety professionals could benefit from additional training?

Examples include:

Communicating with workers/training skills
Communicating with upper management
Organizational science
Technical writing
Leadership skills
Understanding of workers' jobs
Understanding of our industry (e.g., products, markets, practices)
Local, state, or federal regulations
Workers' Compensation
Environmental regulations

[open entry box]
SAFTR2_A
Allow up to 240 characters

SAFTR3

Q3. Are any of your occupational safety professionals currently pursuing any academic degree in occupational safety or a closely related field? [yes=1, no=2]

- ○ Yes → How many are pursuing such a degree? _____ SAFTRHM1 2 Chars
- ○ No

SAFTR4

Q4. Do any of your occupational safety professionals plan to obtain academic training in another area of occupational safety and health within the next 5 years? [yes=1, no=2, don't know=8]

- ○ Yes → How many plan to do this? _____ SAFTRHM2 2 Chars
- ○ No
- ○ Don't know

NOTE: VALUES OF SAFTRHM1 AND SAFTRHM2 CANNOT BE GREATER THAN THE NUMBER OF EMPLOYEES IDENTIFIED AT TOP OF SECTION

Q5. Given the continued introduction of new technologies and systems in the workplace, are there any emerging areas of training you would like for your safety professionals to pursue? If so, what are they?

[open entry box] *SAFTR5* *Allow up to 240 characters*

Q6. If you have any additional comments related to the training needs of your occupational safety professionals, please share them with us:

[open entry box] *SAFTR5_A* *Allow up to 240 characters*

Present this section if any item among Q5AP1-Q5AP8 = "Industrial Hygiene" / 2

TRAINING NEEDS OF YOUR INDUSTRIAL HYGIENE PROFESSIONALS

You indicated that (*identifier 1, identifier 2,..*) was employed at this location in industrial hygiene at the end of 2010.

Q1. In what specialties or technical aspects of their jobs do you believe that at least some of your industrial hygiene professionals could benefit from additional training?

Examples include:

Indoor air quality
Evaluating and controlling lead exposure and asbestos exposure in the workplace
Emergency response planning and community right-to-know
Recognition of workplace diseases
Potentially hazardous agents
Radiation (electromagnetic fields, microwaves)
Reproductive health hazards in the workplace
Proper interpretation of exposure monitoring data
Detection and control of potential hazards due to noise and illumination
Hazardous waste management

[open entry box] *IHTR1_A* *Allow up to 240 characters*

Q2. In what additional aspects of their jobs do you believe that at least some of your industrial hygiene professionals could benefit from additional training?

Examples include:

Communicating with workers/training skills
Communicating with upper management
Organizational science
Technical writing
Leadership skills
Understanding of workers' jobs
Understanding of our industry (e.g., products, markets, practices)
Local, state, or federal regulations
Workers' Compensation
Environmental regulations

[open entry box] *IHTR2_A* *Allow up to 240 characters*

IHTR3

Q3. Are any of your industrial hygiene professionals currently pursuing any academic degree in industrial hygiene or a closely related field? [yes=1, no=2]

- ○ Yes → How many are pursuing such a degree? _____ IHTRHM1 2 Chars
- ○ No

IHTR4

Q4. Do any of your industrial hygiene professionals plan to obtain academic training in another area of occupational safety and health within the next 5 years? [yes=1, no=2, don't know=8]

- ○ Yes → How many plan to do this? _____ IHTRHM2 2 Chars
- ○ No
- ○ Don't know

NOTE: VALUES OF IHTRHM1 AND IHTRHM2 CANNOT BE GREATER THAN THE NUMBER OF EMPLOYEES IDENTIFIED AT TOP OF SECTION

Q5. Given the continued introduction of new technologies and systems in the workplace, are there any emerging areas of training you would like for your industrial hygiene professionals to pursue? If so, what are they?

[open entry box] *IHTR5* *Allow up to 240 characters*

Q6. If you have any additional comments related to the training needs of your industrial hygiene professionals, please share them with us:

[open entry box] *IHTR5_A* *Allow up to 240 characters*

Present this section if any item among Q5AP1-Q5AP8 = "Occupational Medicine" / 3

TRAINING NEEDS OF YOUR OCCUPATIONAL MEDICINE PROFESSIONALS

You indicated that (*identifier 1, identifier 2,..*) was employed at this location in occupational medicine at the end of 2010.

Q1. In what specialties or technical aspects of their jobs do you believe that at least some of your occupational medicine professionals could benefit from additional training?

Examples include:

Evidence-based clinical evaluation and treatment
Determining fitness for work
Developing/managing medical surveillance programs
Laws and regulations related to occupational medicine
Evaluating environmental health risks
Disaster and emergency management
Health and productivity management
Medical Review officer functions
Wellness and health promotion
Managing mental health issues in the workplace
Toxic chemical exposure

[open entry box]
OMTR1_A
Allow up to 240 characters

Q2. In what additional aspects of their jobs do you believe that at least some of your occupational medicine professionals could benefit from additional training?

Examples include:

Communicating with workers/training skills
Communicating with upper management
Organizational science
Technical writing
Leadership skills
Understanding of workers' jobs
Understanding of our industry (e.g., products, markets, practices)
Local, state, or federal regulations
Workers' Compensation
Environmental regulations

[open entry box]
OMTR2_A
Allow up to 240 characters

OMTR3

Q3. Do any of your occupational medicine professionals plan to enter a formal occupational medicine residency program within the next 5 years? [yes=1, no=2, don't know=8]

- ○ Yes → How many plan to do this? _____ OMTRHM 2 Chars
- ○ No
- ○ Don't know

NOTE: VALUE OF OMTRHM CANNOT BE GREATER THAN THE NUMBER OF EMPLOYEES IDENTIFIED AT TOP OF SECTION

Q4. Given the continued introduction of new technologies and systems in the workplace, are there any emerging areas of training you would like for your occupational medicine professionals to pursue? If so, what are they?

[open entry box] *OMTR4* *Allow up to 240 characters*

Q5. If you have any additional comments related to the training needs of your occupational medicine professionals, please share them with us:

[open entry box] *OMTR4_A* *Allow up to 240 characters*

Present this section if any item among Q5AP1-Q5AP8 = "Occupational Health Nursing" / 4

TRAINING NEEDS OF YOUR OCCUPATIONAL HEALTH NURSING PROFESSIONALS

You indicated that (*identifier 1, identifier 2,..*) was employed at this location in occupational health nursing at the end of 2010.

Q1. In what specialties or technical aspects of their jobs do you believe that at least some of your occupational health nursing professionals could benefit from additional training?

Examples include:

Case management and transitional work programs
Conducting health and injury assessments
Managing and evaluating substance abuse programs
Wellness and health promotion initiatives
Analyzing workplace hazards
Prevention of workplace accidents
Managing and evaluating travel health programs
Managing and evaluating workplace violence programs
Health Quality Improvement initiatives
Managing and evaluating safety programs

[open entry box] OHNTR1_A *Allow up to 240 characters*

Q2. In what additional aspects of their jobs do you believe that at least some of your occupational health nursing professionals could benefit from additional training?

Examples include:

Communicating with workers/training skills
Communicating with upper management
Organizational science
Technical writing
Leadership skills
Understanding of workers' jobs
Understanding of our industry (e.g., products, markets, practices)
Local, state, or federal regulations
Workers' Compensation
Environmental regulations

[open entry box] OHNTR2_A *Allow up to 240 characters*

OHNTR3

Q3. Are any of your occupational health nursing professionals currently pursuing any academic degree in occupational health nursing or a closely related field? [yes=1, no=2]

- ○ Yes → How many are pursuing such a degree? _____ OHNTRHM1 2 Chars
- ○ No

OHNTR4

Q4. Do any of your occupational health nursing professionals plan to obtain academic training in another area of occupational safety and health within the next 5 years? [yes=1, no=2, don't know=8]

- ○ Yes → How many plan to do this? _____ OHNTRHM2 2 Chars
- ○ No
- ○ Don't know

NOTE: VALUES OF OHNTRHM1 AND OHNTRHM2 CANNOT BE GREATER THAN THE NUMBER OF EMPLOYEES IDENTIFIED AT TOP OF SECTION

[Note: Q4a will only be asked if respondent has listed an occupational health nurse with a doctoral degree in the matrix. That is: ***Q5A=4 and Q6=3;*** *Otherwise, gray out]*

OHNTR4A

Q4a. You indicated earlier that (identifier…) has a doctoral degree in nursing. Please specify which type of doctoral degree this person holds:

- ○ Doctor of Philosophy (PhD) =1
- ○ Doctor of Nursing Science (DNSc) =2
- ○ Doctor of Nursing Practice (DNP) =3

Q5. Given the continued introduction of new technologies and systems in the workplace, are there any emerging areas of training you would like for your occupational health nursing professionals to pursue? If so, what are they?

[open entry box] *OHNTR5* *Allow up to 240 characters*

Q6. If you have any additional comments related to the training needs of your occupational health nursing professionals, please share them with us:

[open entry box] *OHNTR5_A* *Allow up to 240 characters*

Present this section if any item among Q5AP1-Q5AP8 = "Occupational Ergonomics" / 5

TRAINING NEEDS OF YOUR OCCUPATIONAL ERGONOMICS PROFESSIONALS

You indicated that (*identifier 1, identifier 2,..*) was employed at this location in occupational ergonomics at the end of 2010.

Q1. In what specialties or technical aspects of their jobs do you believe that at least some of your occupational ergonomics professionals could benefit from additional training?

Examples include:

Recognition of ergonomic hazards in equipment, manufacturing processes, and production systems
Biomechanics/prevention of work-related musculoskeletal disorders
Cognitive ergonomics / prevention of human error / enhancing human performance reliability
Instrumentation for human measurements
Facility and workstation design
Usability Testing (product design, selection of tools, etc.)
Systems Integration
Ergonomic Job Analysis
Accident/Incident investigation
Anthropometry
Prevention through design / Design reviews

[open entry box] ERGTR1_A *Allow up to 240 characters*

Q2. In what additional aspects of their jobs do you believe that at least some of your occupational ergonomics professionals could benefit from additional training?

Examples include:

Communicating with workers/training skills
Communicating with upper management
Organizational science
Technical writing
Leadership skills
Understanding of workers' jobs
Understanding of our industry (e.g., products, markets, practices)
Local, state, or federal regulations
Workers' Compensation
Environmental regulations

[open entry box] ERGTR2_A *Allow up to 240 characters*

ERGTR3

Q3. Are any of your occupational ergonomics professionals currently pursuing any academic degree in occupational ergonomics or a closely related field? [yes=1, no=2]

- ○ Yes → How many are pursuing such a degree? _____ ERGTRHM1 2 Chars
- ○ No

ERGTR4

Q4. Do any of your occupational ergonomics professionals plan to obtain academic training in another area of occupational safety and health within the next 5 years? [yes=1, no=2, don't know=8]

- ○ Yes → How many plan to do this? _____ ERGTRHM2 2 Chars
- ○ No
- ○ Don't know

NOTE: VALUES OF ERGTRHM1 AND ERGTRHM2 CANNOT BE GREATER THAN THE NUMBER OF EMPLOYEES IDENTIFIED AT TOP OF SECTION

Q5. Given the continued introduction of new technologies and systems in the workplace, are there any emerging areas of training you would like for your occupational ergonomics professionals to pursue? If so, what are they?

[open entry box] *ERGTR5* *Allow up to 240 characters*

Q6. If you have any additional comments related to the training needs of your occupational ergonomics professionals, please share them with us:

[open entry box] *ERGTR5_A* *Allow up to 240 characters*

Present this section if any item among Q5AP1-Q5AP8 = "Occupational Health Physics" / 6

TRAINING NEEDS OF YOUR OCCUPATIONAL HEALTH PHYSICS PROFESSIONALS

You indicated that (*identifier 1, identifier 2,..*) was employed at this location in occupational health physics at the end of 2010.

Q1. In what specialties or technical aspects of their jobs do you believe that at least some of your occupational health physics professionals could benefit from additional training?

Examples include:

Proper selection of measurement instruments
Calibration and maintenance of measurement instruments
Identifying the appropriate regulations and standards for the facility
Evaluating challenges to radioactive material control barriers
Implementing double contingency controls for nuclear criticality safety
Specifying the necessary personal protective equipment and clothing for contamination control
Procedures for handling of radioactively contaminated persons
Conducting audits to determine compliance
Radiation protection records required for a facility
Training as a Radiation Safety Officer

[open entry box]
HPTR1_A
Allow up to 240 characters

Q2. In what additional aspects of their jobs do you believe that at least some of your occupational health physics professionals could benefit from additional training?

Examples include:

Communicating with workers/training skills
Communicating with upper management
Organizational science
Technical writing
Leadership skills
Understanding of workers' jobs
Understanding of our industry (e.g., products, markets, practices)
Local, state, or federal regulations
Workers' Compensation
Environmental regulations

[open entry box]
HPTR2_A
Allow up to 240 characters each

HPTR3

Q3. Are any of your occupational health physics professionals currently pursuing any academic degree in occupational health physics or a closely related field? [yes=1, no=2]

- ○ Yes → How many are pursuing such a degree? _____ HPTRHM1 2 Chars
- ○ No

HPTR4

Q4. Do any of your occupational health physics professionals plan to obtain academic training in another area of occupational safety and health within the next 5 years? [yes=1, no=2, don't know=8]

- ○ Yes → How many plan to do this? _____ HPTRHM2 2 Chars
- ○ No
- ○ Don't know

NOTE: VALUES OF HPTRHM1 AND HPTRHM2 CANNOT BE GREATER THAN THE NUMBER OF EMPLOYEES IDENTIFIED AT TOP OF SECTION

Q5. Given the continued introduction of new technologies and systems in the workplace, are there any emerging areas of training you would like for your occupational health physics professionals to pursue? If so, what are they?

[open entry box] *HPTR5* *Allow up to 240 characters*

Q6. If you have any additional comments related to the training needs of your occupational health physics professionals, please share them with us:

[open entry box] *HPTR5_A* *Allow up to 240 characters*

Present this section if any item among Q5AP1-Q5AP8 = "Occupational Injury Prevention" / 7

TRAINING NEEDS OF YOUR OCCUPATIONAL INJURY PREVENTION PROFESSIONALS

You indicated that (*identifier 1, identifier 2,..*) was employed at this location in occupational injury prevention at the end of 2010.

Q1. In what specialties or technical aspects of their jobs do you believe that at least some of your occupational injury prevention professionals could benefit from additional training?

Examples include:

Recognition, evaluation, and prevention of occupational injuries.
Measurement of risk factors for occupational injury
Understanding the influence of occupational injury on disability and return to work
Evaluating environmental, behavioral, and work practice contributors to injury risk
Interpretation and dissemination of research findings to formulate occupational injury prevention programs and policies.
Design and implementation of evidence-based occupational injury prevention approaches
Evaluation of occupational injury prevention strategies
Disaster and emergency management
Identifying and responding to violence in the workplace
Health and productivity management
Wellness and health promotion
Managing treatment and recovery from occupational injury

[open entry box] *IPTR1_A* *Allow up to 240 characters*

Q2. In what additional aspects of their jobs do you believe that at least some of your occupational injury prevention professionals could benefit from additional training?

Examples include:

Communicating with workers/training skills
Communicating with upper management
Organizational science
Technical writing
Leadership skills
Understanding of workers' jobs
Understanding of our industry (e.g., products, markets, practices)
Local, state, or federal regulations
Workers' Compensation
Environmental regulations

[open entry box] *IPTR2_A* *Allow up to 240 characters*

IPTR3

Q3. Are any of your occupational injury prevention professionals currently pursuing any academic degree in occupational injury prevention or a closely related field? [yes=1, no=2]

- ○ Yes → How many are pursuing such a degree? _____ IPTRHM1 2 Chars
- ○ No

IPTR4

Q4. Do any of your occupational injury prevention professionals plan to obtain academic training in another area of occupational safety and health within the next 5 years? [yes=1, no=2, don't know=8]

- ○ Yes → How many plan to do this? _____ IPTRHM2 2 Chars
- ○ No
- ○ Don't know

NOTE: VALUES OF IPTRHM1 AND IPTRHM2 CANNOT BE GREATER THAN THE NUMBER OF EMPLOYEES IDENTIFIED AT TOP OF SECTION

Q5. Given the continued introduction of new technologies and systems in the workplace, are there any emerging areas of training you would like for your occupational injury prevention professionals to pursue? If so, what are they?

[open entry box] *IPTR5* *Allow up to 240 characters*

Q6. If you have any additional comments related to the training needs of your occupational injury prevention professionals, please share them with us:

[open entry box] *IPTR5_A* *Allow up to 240 characters*

Present this section if any item among Q5AP1-Q5AP8 = "Occupational Epidemiology" / 8

TRAINING NEEDS OF YOUR OCCUPATIONAL EPIDEMIOLOGY PROFESSIONALS

You indicated that (*identifier 1, identifier 2,..*) was employed at this location in occupational epidemiology at the end of 2010.

Q1. In what specialties or technical aspects of their jobs do you believe that at least some of your occupational epidemiology professionals could benefit from additional training?

Examples include:

Characterizing the health of a community
Designing and conducting an epidemiological study
Designing and operating a surveillance system
Selecting and conducting appropriate statistical analyses
Designing and conducting an outbreak or cluster investigation
Interpreting and explaining the implications of epidemiological studies
Translating epidemiological findings into a recommendation for a specific intervention

[open entry box]
EPITR1_A
Allow up to 240 characters

Q2. In what additional aspects of their jobs do you believe that at least some of your occupational epidemiology professionals could benefit from additional training?

Examples include:

Communicating with workers/training skills
Communicating with upper management
Organizational science
Technical writing
Leadership skills
Understanding of workers' jobs
Understanding of our industry (e.g., products, markets, practices)
Local, state, or federal regulations
Workers' Compensation
Environmental regulations

[open entry box]
EPITR2_A
Allow up to 240 characters

EPITR3

Q3. Are any of your occupational epidemiology professionals currently pursuing any academic degree in occupational epidemiology or a closely related field? [yes=1, no=2]

- ○ Yes → How many are pursuing such a degree? _____ EPITRHM1 2 Chars
- ○ No

EPITR4

Q4. Do any of your occupational epidemiology professionals plan to obtain academic training in another area of occupational safety and health within the next 5 years? [yes=1, no=2, don't know=8]

- ○ Yes → How many plan to do this? _____ EPITRHM2 2 Chars
- ○ No
- ○ Don't know

NOTE: VALUES OF EPITRHM1 AND EPITRHM2 CANNOT BE GREATER THAN THE NUMBER OF EMPLOYEES IDENTIFIED AT TOP OF SECTION

Q5. Given the continued introduction of new technologies and systems in the workplace, are there any emerging areas of training you would like for your occupational epidemiology professionals to pursue? If so, what are they?

[open entry box] *EPTR5* *Allow up to 240 characters*

Q6. If you have any additional comments related to the training needs of your occupational epidemiology professionals, please share them with us:

[open entry box] *EPITR5_A* *Allow up to 240 characters*

Present this section if any item among Q5AP1-Q5AP8 = "Occupational Health Psychology" / 9

TRAINING NEEDS OF YOUR OCCUPATIONAL HEALTH PSYCHOLOGY PROFESSIONALS

You indicated that (*identifier 1, identifier 2,..*) was employed at this location in occupational health psychology at the end of 2010.

Q1. In what specialties or technical aspects of their jobs do you believe that at least some of your occupational health psychology professionals could benefit from additional training?

Examples include:

Develop, validate, administer, and interpret psychological tests and organization surveys
Develop, validate, administer, and interpret psychological tests and organization surveys
Develop, lead, and evaluate safety initiatives (e.g., safety management systems, training, safety culture)
Develop, lead, and evaluate health promotion programs
Develop, lead, and evaluate work-family/work-life balance initiatives
Building a business case for workplace safety & health
Health Services and Health and Productivity Management
Human Resource Management and Benefits
Workplace diversity, minority and immigrant workers, health disparities
Changing workforce demographics (e.g., older/younger workers, gender issues)
Individual differences and occupational health
Team/group dynamics and organizational culture/climate
Workplace mistreatment (e.g., violence prevention, harassment, bullying)
Part-time, temporary, and contingent work
Task design and worker health
Mental health at work (e.g., PTSD, substance abuse, depression, well-being, resilience)
Work schedules, sleep, and fatigue
Effects of job and organizational Stress
Organizational Change, downsizing, and reorganization

[open entry box]
OHPTR1_A
Allow up to 240 characters

Q2. In what additional aspects of their jobs do you believe that at least some of your occupational health psychology professionals could benefit from additional training?

Examples include:

Communicating with workers/training skills
Communicating with upper management
Organizational science
Technical writing
Leadership skills
Understanding of workers' jobs
Understanding of our industry (e.g., products, markets, practices)
Local, state, or federal regulations
Workers' Compensation
Environmental regulations

[open entry box]
OHPTR2_A
Allow up to 240 characters

OHPTR3

Q3. Are any of your occupational health psychology professionals currently pursuing any academic degree in occupational health psychology or a closely related field? [yes=1, no=2, don't know=8]

- ○ Yes → How many are pursuing such a degree? _____ OHPTRHM1 2 Chars
- ○ No

OHPTR4

Q4. Do any of your occupational health psychology professionals plan to obtain academic training in another area of occupational safety and health within the next 5 years? [yes=1, no=2]

- ○ Yes → How many plan to do this? _____ OHPTRHM2 2 Chars
- ○ No
- ○ Don't know

NOTE: VALUES OF OHPTRHM1 AND OHPTRHM2 CANNOT BE GREATER THAN THE NUMBER OF EMPLOYEES IDENTIFIED AT TOP OF SECTION

Q5. Given the continued introduction of new technologies and systems in the workplace, are there any emerging areas of training you would like for your occupational injury prevention professionals to pursue? If so, what are they?

[open entry box] *OHPTR5* *Allow up to 240 characters*

Q6. If you have any additional comments related to the training needs of your occupational health psychology professionals, please share them with us:

[open entry box] *OHPTR5_A* *Allow up to 240 characters*

Present this section if any item among Q5AP1-Q5AP8 = "Other field" / 10

TRAINING NEEDS OF YOUR PROFESSIONALS IN OTHER AREAS OF OCCUPATIONAL SAFETY AND HEALTH

This section will be administered for up to three additional specified areas of OS&H, using information respondent supplied in the matrix on Q4 on page 2

You indicated that (*identifier 1, identifier 2,..*) was employed at this location in another area of occupational safety and health, specially: [fill from matrix entry on Q4, page 2] at the end of 2010.

Q1. In what specialties or technical aspects of their jobs do you believe that at least some of these professionals could benefit from additional training?

Examples include:

Investigating accidents
Planning for / responding to emergencies
Ergonomics
Fire safety
Electrical safety
Industrial hygiene
Ergonomics
Hazardous materials management
Finding and utilizing sources of safety information
Proper selection of measurement instruments
Calibration and maintenance of measurement instruments

[open entry box] OT1TR1_A *Allow up to 240 characters*	*[open entry box]* OT2TR1_A *Allow up to 240 characters*	*[open entry box]* OT3TR1_A *Allow up to 240 characters*

Q2. In what additional aspects of their jobs do you believe that at least some of these professionals could benefit from additional training?

Examples include:

Communicating with workers/training skills
Communicating with upper management
Organizational science
Technical writing
Leadership skills
Understanding of workers' jobs
Understanding of our industry (e.g., products, markets, practices)
Local, state, or federal regulations
Workers' Compensation
Environmental regulations

[open entry box] OT1TR2_A *Allow up to 240 characters each*	*[open entry box]* OT2TR2_A *Allow up to 240 characters each*	*[open entry box]* OT3TR2_A *Allow up to 240 characters each*

OT1TR3 OT2TR3 OT3TR3

Q3. Are any of these professionals currently pursuing any academic degree in the field (or a closely related field) in which they currently work? [yes=1, no=2]

- ○ Yes → How many are pursuing such a degree? _____ OT1TRHM1 OT2TRHM1 OT3TRHM1 2 Chars
- ○ No

OT1TR4 OT2TR4 OT3TR4

Q4. Do any of these professionals plan to obtain academic training in another area of occupational safety and health within the next 5 years? [yes=1, no=2, don't know=8]

- ○ Yes → How many plan to do this? _____ OT1TRHM2 OT2TRHM2 OT3TRHM2 2 Chars
- ○ No
- ○ Don't know

NOTE: VALUES OF (OT1TRHM1 AND OT1TRHM2) (OT2TRHM1 AND OT2TRHM2) (OT3TRHM1 AND OT3TRHM2) CANNOT BE GREATER THAN THE NUMBER OF EMPLOYEES IDENTIFIED AT TOP OF SECTION

Q5. Given the continued introduction of new technologies and systems in the workplace, are there any emerging areas of training you would like for your occupational injury prevention professionals to pursue? If so, what are they?

[open entry box] *OT1TR5 OT2TR5 OT3TR5* *Allow up to 240 characters*

Q6. If you have any additional comments related to the training needs of these professionals, please share them with us:

[open entry box] OT1TR5_A *Allow up to 60 characters each*	*[open entry box]* OT2TR5_A *Allow up to 60 characters each*	*[open entry box]* OT3TR5_A *Allow up to 60 characters each*

YOUR FUTURE HIRES IN OCCUPATIONAL SAFETY AND HEALTH

For each area of occupational safety and health shown below, please indicate whether or not this location expects to hire any professionals in this specialty within the next five years. By "professionals" we mean persons with at least a bachelor's degree in OS&H or a related field, experience in the OS&H field, and who devotes a significant portion of work time in the OS&H field. OS&H professionals in some disciplines (e.g., medicine, nursing, hygiene, safety) may also be formally certified by a professional body that has established competency standards. However, certification is not required for being counted in this survey.

Variable Names: HIRE_SAF, HIRE_IH, HIRE_OM, HIRE_OHN, HIRE_ERG, HIRE_HP

Occupational Safety - work to minimize the frequency and severity of accidents, incidents, and events that harm workers, property, or the environment. They evaluate potential hazards to identify the likelihood and severity of occurrence, and implement measures to minimize the hazard.

- ○ Yes =1
- ○ No =2
- ○ Not sure =8

Industrial Hygiene – identify, evaluate, and control of chemical, biological, and physical agents or ergonomic factors in the workplace that may cause illness, injury, discomfort, or inefficiency among workers.

- ○ Yes
- ○ No
- ○ Not sure

Occupational Medicine – medical doctors or doctors of osteopathy who prevent, diagnose and treat occupational and environmental diseases and injuries. They may also determine an employee's fitness for work.

- ○ Yes
- ○ No
- ○ Not sure

Occupational Health Nursing – registered nurses and nurse practitioners with experience and additional education in occupational health. They routinely coordinate and manage the care of ill and injured workers, and support lifestyle changes that lower the risk of disease and injury.

- ○ Yes
- ○ No
- ○ Not sure

Occupational Ergonomics – work to improve the workplace by fitting facilities, equipment, tools, and work activities to people. They consider the design of industrial, office, and other environments to enhance worker comfort, safety and productivity

- ○ Yes
- ○ No
- ○ Not sure

Occupational Health Physics – work to protect workers and the environment from hazardous radiation exposure.

- ○ Yes
- ○ No
- ○ Not sure

(continued on next page)

Variable Names: HIRE_IP, HIRE_EPI, HIRE_OHP, HIRE_OTH

Occupational Injury Prevention– conduct research and/or develop and evaluate programs to reduce the burden of injury in the workplace. This involves the design and implementation of studies and programs that identify and evaluate environmental, behavioral, work culture, or other types of risk factors for injury incidence and the identification, implementation, and evaluation of programs that prevent injury occurrence or intervene to reduce injury severity and consequences.

- ○ Yes =1
- ○ No =2
- ○ Not sure =8

Occupational Epidemiology – study the occurrence of disease and other health-related outcomes in the workplace. They use scientific and statistical methods to collect and analyze data to reduce the risk of adverse health outcomes, promote worker health, and support the scientific basis for regulation and control of occupational exposures.

- ○ Yes
- ○ No
- ○ Not sure

Occupational Health Psychology – apply the discipline of psychology to improve the quality of work life, and to protect and promote the safety, health, and well-being of workers. The primary focus of occupational health psychology is on organizational and job-design factors that contribute to injury and illness at work, including stress-related disorders

- ○ Yes
- ○ No
- ○ Not sure

Other areas of Occupational Health and Safety

- ○ Yes
- ○ No
- ○ Not sure
- ○

If Yes, please specify (up to three areas): __HIREOTH1____30 Chars_____

__HIREOTH2____30 Chars_____

__HIREOTH3____30 Chars_____

For each "Yes" above, respondents will be administered the appropriate module to follow on expectations for future hires (see instruction at beginning of each).

If all "No/Not Sure" to all, then skip to "About this Location" section.

WHERE HIRE_SAF=1

EXPECTATIONS FOR FUTURE HIRING OF OCCUPATIONAL SAFETY PROFESSIONALS

FUSAFQ1

Q1. How many occupational safety professionals do you expect to hire at this location within the next five years? Consider both new positions and positions to replace staff that leave.

_____ 2 Chars

Q2. Of the number you reported in question 1, please indicate the number of these professionals you expect to hire whose highest level of formal education in occupational safety (or a closely related field) is....

Bachelor's degree: _____ 2 Chars FUSAFBA
Master's degree: _____ 2 Chars FUSAFMA
Doctoral degree: _____ 2 Chars FUSAFDR

NOTE: TOTAL REPORTED IN Q2 CANNOT BE GREATER THAN FUSAFQ1

FUSAFQ3

Q3. How many of these occupational safety professionals will be required to have an active professional certification (e.g., CSP, ARM, OHST), either prior to hiring or shortly afterward?

_____ 2 Chars Maximum value = FUSAFQ1

Q4. Given the evolving nature of the field and the venues or contexts in which you see OS&H professionals needed, in which of the following additional areas, if any, would you like for these professionals to be trained?

Mark all that apply

- ☐ Industrial Hygiene SAF_IH
- ☐ Occupational Medicine SAF_OM
- ☐ Occupational Health Nursing SAF_OHN
- ☐ Occupational Ergonomics SAF_ERG
- ☐ Occupational Health Physics SAF_HP
- ☐ Occupational Injury Prevention SAF_IP
- ☐ Occupational Epidemiology SAF_EPI
- ☐ Occupational Health Psychology SAF_OHP
- ☐ Other OS&H areas (please specify below): SAF_OTH

[open entry box]
SAF_SPEC
(40 Chars)

Q5. What are the three most important specialties or technical skills that you will be looking for when hiring occupational safety professionals over the next five years?

Examples include:

Investigating accidents
Planning for / responding to emergencies
Ergonomics
Fire safety
Electrical safety
Industrial hygiene
Hazardous materials management
Finding and utilizing sources of safety information
Measuring safety program outcomes (e.g., on health status, injury rates)
Measuring economic value of safety programs
Job Safety Analysis

[open entry box] SAFSK1_A *180 characters*

Q6. What are the three most important additional skills or knowledge areas that you will be looking for when hiring occupational safety professionals over the next five years?

Examples include:

Communicating with workers/training skills
Communicating with upper management
Organizational science
Technical writing
Leadership skills
Understanding of workers' jobs
Understanding of our industry (e.g., products, markets, practices)
Local, state, or federal regulations
Workers' Compensation
Environmental regulations

[open entry box] SAFSK2_A *240 characters*

Q7. As we continue to see new technologies and systems introduced into the workplace, are there emerging areas of support in which you would like your new safety professionals to be trained? If yes, please describe:

[open entry box] SAFEXP_A *240 characters*

WHERE HIRE_IH=1

EXPECTATIONS FOR FUTURE HIRING OF INDUSTRIAL HYGIENE PROFESSIONALS

FUIHQ1

Q1. How many industrial hygiene professionals do you expect to hire at this location within the next five years? Consider both new positions and positions to replace staff that leave.

_____ 2 Chars

Q2. Of the number you reported in question 1, please indicate the number of these professionals you expect to hire whose highest level of formal education in industrial hygiene (or a closely related field) is....

Bachelor's degree: _____ 2 Chars FUIHBA
Master's degree: _____ 2 Chars FUIHMA
Doctoral degree: _____ 2 Chars FUIHDR

NOTE: TOTAL REPORTED IN Q2 CANNOT BE GREATER THAN FUIHQ1

FUIHQ3

Q3. How many of these industrial hygiene professionals will be required to have an active professional certification (e.g., CIH), either prior to hiring or shortly afterward?

_____ 2 Chars Maximum value = FUIHQ1

Q4. Given the evolving nature of the field and the venues or contexts in which you see OS&H professionals needed, in which of the following additional areas, if any, would you like for these professionals to be trained?

Mark all that apply

- ☐ Occupational Safety IH_SAF
- ☐ Occupational Medicine IH_OM
- ☐ Occupational Health Nursing IH_OHN
- ☐ Occupational Ergonomics IH_ERG
- ☐ Occupational Health Physics IH_HP
- ☐ Occupational Injury Prevention IH_IP
- ☐ Occupational Epidemiology IH_EPI
- ☐ Occupational Health Psychology IH_OHP
- ☐ Other OS&H areas (please specify below): IH_OTH

[open entry box]
IH_SPEC
(40 Chars)

Q5. What are the three most important specialties or technical skills that you will be looking for when hiring industrial hygiene professionals over the next five years?

Examples include:

Indoor air quality
Evaluating and controlling lead exposure and asbestos exposure in the workplace
Emergency response planning and community right-to-know
Recognition of workplace diseases
Potentially hazardous agents
Radiation (electromagnetic fields, microwaves)
Reproductive health hazards in the workplace
Proper interpretation of exposure monitoring data
Detection and control of potential hazards due to noise and illumination
Hazardous waste management

[open entry box]
IHSK1_A
240 characters

Q6. What are the three most important additional skills or knowledge areas that you will be looking for when hiring industrial hygiene professionals over the next five years?

Examples include:

Communicating with workers/training skills
Communicating with upper management
Organizational science
Technical writing
Leadership skills
Understanding of workers' jobs
Understanding of our industry (e.g., products, markets, practices)
Local, state, or federal regulations
Workers' Compensation
Environmental regulations

[open entry box]
IHSK2_A
240 characters

Q7. As we continue to see new technologies and systems introduced into the workplace, are there emerging areas of support in which you would like your new industrial hygiene professionals to be trained? If yes, please describe:

[open entry box]
IHEXP_A
240 characters

WHERE HIRE_OM=1

EXPECTATIONS FOR FUTURE HIRING OF OCCUPATIONAL MEDICINE PHYSICIANS

FUOMQ1

Q1. How many occupational medicine physicians do you expect to hire at this location within the next five years? Consider both new positions and positions to replace staff that leave.

_____ 2 Chars

FUOMQ2

Q2. Of the number you reported in question 1, how many do you hope will have completed a formal residency specifically in occupational medicine

_____ 2 Chars Maximum value = FUOMQ1

If FUOMQ2=FUOMQ1, SKIP TO FUOMQ3A

FUOMQ3

Q3. How many of these physicians will be required to have board certification in occupational medicine (either prior to hiring or shortly afterward)?

_____ (if all, skip to Q4) 2 Chars Maximum value = FUOMQ1

FUOMQ3A

Q3a. If you expect to hire any physicians who are not board certified in occupational medicine, will you require board certification in another medical specialty? (yes=1, no=2)

- ○ Yes
- ○ No

FUOMQ3B

Q3b. If you expect to hire any physicians who are not board certified in occupational medicine, will you require training in occupational medicine through professional short-courses, continuing medical education (CME) courses, or similar training? (yes=1, no=2)

- ○ Yes
- ○ No

Q4. Given the evolving nature of the field and the venues or contexts in which you see OS&H professionals needed, in which of the following additional areas, if any, would you like for these professionals to be trained?

Mark all that apply

- □ Occupational Safety OM_SAF
- □ Industrial Hygiene OM_IH
- □ Occupational Health Nursing OM_OHN
- □ Occupational Ergonomics OM_ERG
- □ Occupational Health Physics OM_HP

- ☐ Occupational Injury Prevention OM_IP
- ☐ Occupational Epidemiology OM_EPI
- ☐ Occupational Health Psychology OM_OHP
- ☐ Other OS&H areas (please specify below): OM_OTH

[open entry box]
OM_SPEC
(40 Chars)

Q5. What are the three <u>most important</u> specialties or technical skills that you will be looking for when hiring occupational medicine physicians over the next five years?

Examples include:

Evidence-based clinical evaluation and treatment
Determining fitness for work
Developing/managing medical surveillance programs
Laws and regulations related to occupational medicine
Evaluating environmental health risks
Disaster and emergency management
Health and productivity management
Medical Review officer functions
Wellness and health promotion
Managing mental health issues in the workplace
Toxic chemical exposure

[open entry box]
OMSK1_A
240 characters

Q6. What are the three most important additional skills or knowledge areas that you will be looking for when hiring occupational medicine physicians over the next five years? (

Examples include:

Communicating with workers/training skills
Communicating with upper management
Organizational science
Technical writing
Leadership skills
Understanding of workers' jobs
Understanding of our industry (e.g., products, markets, practices)
Local, state, or federal regulations
Workers' Compensation
Environmental regulations

[open entry box] *OMSK2_A* *240 characters*

Q7. As we continue to see new technologies and systems introduced into the workplace, are there emerging areas of support in which you would like your new occupational medicine professionals to be trained? If yes, please describe:

[open entry box] *OMEXP_A* *240 characters*

WHERE HIRE_OHN=1

EXPECTATIONS FOR FUTURE HIRING OF OCCUPATIONAL HEALTH NURSES

FUOHNQ1

Q1. How many occupational health nurses do you expect to hire at this location within the next five years? Consider both new positions and positions to replace staff that leave.

_____ 2 Chars

Q2. Of the number you reported in question 1, please indicate the number of these nurses you expect to hire whose highest level of formal education in occupational health nursing (or a closely related field) is....

Bachelor's degree:	_____	FUOHNBA	
Master's degree:	_____	FUOHNMA	2 Chars
Doctor of Philosophy (PhD):	_____	FUOHNPHD	
Doctor of Nursing Science (DNSc):	_____	FUOHNDNS	
Doctor of Nursing Practice (DNP):	_____	FUOHNDNP	
Other (Specify – *for example, RN with no degree but coursework in occupational health nursing)*	_____	FUOHNOT	
	_____	FUOHNSPE	40 Chars

FUOHNQ2A

Q2a. There has been considerable discussion in the field of advanced nursing practice and occupational health nursing about the pros and cons of moving the level of training from the Master's degree to the Doctor of Nursing Practice (DNP) by 2015. DNP training is expected to build on traditional nursing practice master's programs by providing education in evidence-based practice, quality improvement, and systems leadership, among other areas. Some nursing schools have already begun offering the DNP degree and graduates are beginning to enter the workplace.

How likely do you think it is that this location will seek to hire an occupational health nurse with the DNP degree within the next five years?

- ○ Very likely =1
- ○ Somewhat likely =2
- ○ Somewhat unlikely =3
- ○ Not at all likely =4
- ○ Don't know =8

FUOHNQ2B

Q2b. Had you ever heard of the Doctor of Nursing Practice degree before this survey?

- ○ Yes (yes=1, no=2)
- ○ No

FUOHNQ3

Q3. How many of these occupational health nurses will be required to have an active professional certification (e.g., COHN) either prior to hiring or shortly afterward?

_____ 2 Chars Maximum value = FUOHNQ1

Q4. Given the evolving nature of the field and the venues or contexts in which you see OS&H professionals needed, in which of the following additional areas, if any, would you like for these professionals to be trained?

Mark all that apply

- □ Occupational Safety OHN_SAF
- □ Industrial Hygiene OHN_IH
- □ Occupational Medicine OHN_OM
- □ Occupational Ergonomics OHN_ERG
- □ Occupational Health Physics OHN_HP
- □ Occupational Injury Prevention OHN_IP
- □ Occupational Epidemiology OHN_EPI
- □ Occupational Health Psychology OHN_OHP
- □ Other OS&H areas (please specify below): OHN_OTH

[open entry box]
OHN_SPEC
(40 Chars)

Q5. What are the three most important specialties or technical skills that you will be looking for when hiring occupational health nurses over the next five years?

Examples include:

Case management and transitional work programs
Conducting health and injury assessments
Managing and evaluating substance abuse programs
Wellness and health promotion initiatives
Analyzing workplace hazards
Prevention of workplace accidents
Managing and evaluating travel health programs
Managing and evaluating workplace violence programs
Health Quality Improvement initiatives
Managing and evaluating safety programs

[open entry box]
OHNSK1_A
240 characters

Q6. What are the three most important additional skills or knowledge areas that you will be looking for when hiring occupational health nurses over the next five years?

Examples include:

Communicating with workers/training skills
Communicating with upper management
Organizational science
Technical writing
Leadership skills
Understanding of workers' jobs
Understanding of our industry (e.g., products, markets, practices)
Local, state, or federal regulations
Workers' Compensation
Environmental regulations

[open entry box]
OHNSK2_A
240 characters

Q7. As we continue to see new technologies and systems introduced into the workplace, are there emerging areas of support in which you would like your new occupational health nursing professionals to be trained? If yes, please describe:

[open entry box]
OHNEXP_A
240 characters

WHERE HIRE_ERG=1

EXPECTATIONS FOR FUTURE HIRING OF OCCUPATIONAL ERGONOMICS PROFESSIONALS

FUERGQ1

Q1. How many occupational ergonomics professionals do you expect to hire at this location within the next five years? Consider both new positions and positions to replace staff that leave.

_____ 2 Chars

Q2. Of the number you reported in question 1, please indicate the number of these professionals you expect to hire whose highest level of formal education in occupational ergonomics (or a closely related field) is....

Bachelor's degree: _____ 2 Chars FUERGBA
Master's degree: _____ 2 Chars FUERGMA
Doctoral degree: _____ 2 Chars FUERGDR

NOTE: TOTAL REPORTED IN Q2 CANNOT BE GREATER THAN FUERGQ1

FUERGQ3

Q3. How many of these occupational ergonomics professionals will be required to have an active professional certification (e.g., CPE, CHFP), either prior to hiring or shortly afterward?

_____ 2 Chars Maximum value = FUERGQ1

Q4. Given the evolving nature of the field and the venues or contexts in which you see OS&H professionals needed, in which of the following additional areas, if any, would you like for these professionals to be trained?

Mark all that apply

- ☐ Occupational Safety ERG_SAF
- ☐ Industrial Hygiene ERG_IH
- ☐ Occupational Medicine ERG_OM
- ☐ Occupational Health Nursing ERG_OHN
- ☐ Occupational Health Physics ERG_HP
- ☐ Occupational Injury Prevention ERG_IP
- ☐ Occupational Epidemiology ERG_EPI
- ☐ Occupational Health Psychology ERG_OHP
- ☐ Other OS&H areas (please specify below): ERG_OTH

[open entry box] ERG_SPEC *(40 Chars)*

Q5. What are the three most important specialties or technical skills that you will be looking for when hiring occupational ergonomics professionals over the next five years?

Examples include:

Recognition of ergonomic hazards in equipment, manufacturing processes, and production systems
Biomechanics/prevention of work-related musculoskeletal disorders
Cognitive ergonomics / prevention of human error / enhancing human performance reliability
Instrumentation for human measurements
Facility and workstation design
Usability Testing (product design, selection of tools, etc.)
Systems Integration
Ergonomic Job Analysis
Accident/Incident investigation
Anthropometry
Prevention through design / Design reviews

[open entry box]
ERGSK1_A
240 characters

Q6. What are the three most important additional skills or knowledge areas that you will be looking for when hiring occupational ergonomics professionals over the next five years?

Examples include:

Communicating with workers/training skills
Communicating with upper management
Organizational science
Technical writing
Leadership skills
Understanding of workers' jobs
Understanding of our industry (e.g., products, markets, practices)
Local, state, or federal regulations
Workers' Compensation
Environmental regulations

[open entry box]
ERGSK2_A
240 characters

Q7. As we continue to see new technologies and systems introduced into the workplace, are there emerging areas of support in which you would like your new occupational ergonomics professionals to be trained? If yes, please describe:

[open entry box]
ERGEXP_A
240 characters

WHERE HIRE_HP=1

EXPECTATIONS FOR FUTURE HIRING OF OCCUPATIONAL HEALTH PHYSICS PROFESSIONALS

FUHPQ1

Q1. How many occupational health physics professionals do you expect to hire at this location within the next five years? Consider both new positions and positions to replace staff that leave.

_____ 2 Chars

Q2. Of the number you reported in question 1, please indicate the number of these professionals you expect to hire whose highest level of formal education in occupational health physics (or a closely related field) is....

Bachelor's degree: _____ 2 Chars FUHPBA
Master's degree: _____ 2 Chars FUHPMA
Doctoral degree: _____ 2 Chars FUHPDR

NOTE: TOTAL REPORTED IN Q2 CANNOT BE GREATER THAN FUHPQ1

FUHPQ3

Q3. How many of these occupational health physics professionals will be required to have an active professional certification (e.g.,CHP), either prior to hiring or shortly afterward?

_____ 2 Chars Maximum value = FUHPQ1

Q4. Given the evolving nature of the field and the venues or contexts in which you see OS&H professionals needed, in which of the following additional areas, if any, would you like for these professionals to be trained?

Mark all that apply

- ☐ Occupational Safety HP_SAF
- ☐ Industrial Hygiene HP_IH
- ☐ Occupational Medicine HP_OM
- ☐ Occupational Health Nursing HP_OHN
- ☐ Occupational Ergonomics HP_ERG
- ☐ Occupational Injury Prevention HP_IP
- ☐ Occupational Epidemiology HP_EPI
- ☐ Occupational Health Psychology HP_OHP
- ☐ Other OS&H areas (please specify below): HP_OTH

[open entry box]
HP_SPEC
(40 Chars)

Q5. What are the three most important specialties or technical skills that you will be looking for when hiring occupational health physics professionals over the next five years?

Examples include:

Proper selection of measurement instruments
Calibration and maintenance of measurement instruments
Identifying the appropriate regulations and standards for the facility
Evaluating challenges to radioactive material control barriers
Implementing double contingency controls for nuclear criticality safety
Specifying the necessary personal protective equipment and clothing for contamination control
Procedures for handling of radioactively contaminated persons
Conducting audits to determine compliance
Radiation protection records required for a facility
Training as a Radiation Safety Officer

[open entry box]
HPSK1_A
240 characters

Q6. What are the three most important additional skills or knowledge areas that you will be looking for when hiring occupational health physics professionals over the next five years?

Examples include:

Communicating with workers/training skills
Communicating with upper management
Organizational science
Technical writing
Leadership skills
Understanding of workers' jobs
Understanding of our industry (e.g., products, markets, practices)
Local, state, or federal regulations
Workers' Compensation
Environmental regulations

[open entry box]
HPSK2_A
240 characters

Q7. As we continue to see new technologies and systems introduced into the workplace, are there emerging areas of support in which you would like your new occupational health physics professionals to be trained? If yes, please describe:

[open entry box]
HPEXP_A
240 characters

WHERE HIRE_IP=1

EXPECTATIONS FOR FUTURE HIRING OF OCCUPATIONAL INJURY PREVENTION PROFESSIONALS

FUIPQ1

Q1. How many occupational injury prevention professionals do you expect to hire at this location within the next five years? Consider both new positions and positions to replace staff that leave.

_____ 2 Chars

Q2. Of the number you reported in question 1, please indicate the number of these professionals you expect to hire whose highest level of formal education in occupational injury prevention (or a closely related field) is....

Bachelor's degree: _____ 2 Chars FUIPBA
Master's degree: _____ 2 Chars FUIPMA
Doctoral degree: _____ 2 Chars FUIPDR

NOTE: TOTAL REPORTED IN Q2 CANNOT BE GREATER THAN FUIPQ1

FUIPQ3

Q3. How many of these occupational injury prevention professionals will be required to have an active professional certification, either prior to hiring or shortly afterward?

_____ 2 Chars Maximum value =FUIPQ1

Q4. Given the evolving nature of the field and the venues or contexts in which you see OS&H professionals needed, in which of the following additional areas, if any, would you like for these professionals to be trained?

Mark all that apply

- ☐ Occupational Safety IP_SAF
- ☐ Industrial Hygiene IP_IH
- ☐ Occupational Medicine IP_OM
- ☐ Occupational Health Nursing IP_OHN
- ☐ Occupational Health Physics IP_HP
- ☐ Occupational Ergonomics IP_ERG
- ☐ Occupational Epidemiology IP_EPI
- ☐ Occupational Health Psychology IP_OHP
- ☐ Other OS&H areas (please specify below): IP_OTH

[open entry box]
IP_SPEC
(40 Chars)

Q5. What are the three most important specialties or technical skills that you will be looking for when hiring occupational injury prevention professionals over the next five years?

Examples include:

Recognition, evaluation, and prevention of occupational injuries.
Measurement of risk factors for occupational injury
Understanding the influence of occupational injury on disability and return to work
Evaluating environmental, behavioral, and work practice contributors to injury risk
Interpretation and dissemination of research findings to formulate occupational injury prevention programs and policies.
Design and implementation of evidence-based occupational injury prevention approaches
Evaluation of occupational injury prevention strategies
Disaster and emergency management
Identifying and responding to violence in the workplace
Health and productivity management
Wellness and health promotion
Managing treatment and recovery from occupational injury

[open entry box] *IPSK1_A* *240 characters*

Q6. What are the three most important additional skills or knowledge areas that you will be looking for when hiring occupational injury prevention professionals over the next five years?

Examples include:

Communicating with workers/training skills
Communicating with upper management
Organizational science
Technical writing
Leadership skills
Understanding of workers' jobs
Understanding of our industry (e.g., products, markets, practices)
Local, state, or federal regulations
Workers' Compensation
Environmental regulations

[open entry box] *IPSK2_A* *240 characters*

Q7. As we continue to see new technologies and systems introduced into the workplace, are there emerging areas of support in which you would like your new occupational injury prevention professionals to be trained? If yes, please describe:

[open entry box] *IPEXP_A* *240 characters*

WHERE HIRE_EPI=1

EXPECTATIONS FOR FUTURE HIRING OF OCCUPATIONAL EPIDEMIOLOGY PROFESSIONALS

FUEPIQ1

Q1. How many occupational epidemiology professionals do you expect to hire at this location within the next five years? Consider both new positions and positions to replace staff that leave.

_____ 2 Chars

Q2. Of the number you reported in question 1, please indicate the number of these professionals you expect to hire whose highest level of formal education in occupational epidemiology (or a closely related field) is....

Bachelor's degree: _____ 2 Chars FUEPIBA
Master's degree: _____ 2 Chars FUEPIMA
Doctoral degree: _____ 2 Chars FUEPIDR

NOTE: TOTAL REPORTED IN Q2 CANNOT BE GREATER THAN FUEPIQ1

FUEPIQ3

Q3. How many of these occupational epidemiology professionals will be required to have an active professional certification, either prior to hiring or shortly afterward?

_____ 2 Chars Maximum value = FUEPIQ1

Q4. Given the evolving nature of the field and the venues or contexts in which you see OS&H professionals needed, in which of the following additional areas, if any, would you like for these professionals to be trained?

Mark all that apply

- ☐ Occupational Safety EPI_SAF
- ☐ Industrial Hygiene EPI_IH
- ☐ Occupational Medicine EPI_OM
- ☐ Occupational Health Nursing EPI_OHN
- ☐ Occupational Health Physics EPI_HP
- ☐ Occupational Ergonomics EPI_ERG
- ☐ Occupational Injury Prevention EPI_IP
- ☐ Occupational Health Psychology EPI_OHP
- ☐ Other OS&H areas (please specify below): EPI_OTH

[open entry box]
EPI_SPEC
(40 Chars)

Q5. What are the three most important specialties or technical skills that you will be looking for when hiring occupational epidemiology professionals over the next five years?

Examples include:

Characterizing the health of a community
Designing and conducting an epidemiological study
Designing and operating a surveillance system
Selecting and conducting appropriate statistical analyses
Designing and conducting an outbreak or cluster investigation
Interpreting and explaining the implications of epidemiological studies
Translating epidemiological findings into a recommendation for a specific intervention

[open entry box] EPISK1_A *240 characters*

Q6. What are the three most important additional skills or knowledge areas that you will be looking for when hiring occupational epidemiology professionals over the next five years?

Examples include:

Communicating with workers/training skills
Communicating with upper management
Organizational science
Technical writing
Leadership skills
Understanding of workers' jobs
Understanding of our industry (e.g., products, markets, practices)
Local, state, or federal regulations
Workers' Compensation
Environmental regulations

[open entry box] EPISK2_A *240 characters*

Q7. As we continue to see new technologies and systems introduced into the workplace, are there emerging areas of support in which you would like your new occupational epidemiology professionals to be trained? If yes, please describe:

[open entry box] EPIEXP_A *240 characters*

WHERE HIRE_OHP=1

EXPECTATIONS FOR FUTURE HIRING OF OCCUPATIONAL HEALTH PSYCHOLOGY PROFESSIONALS

FUOHPQ1

Q1. How many occupational health psychology professionals do you expect to hire at this location within the next five years? Consider both new positions and positions to replace staff that leave.

_____ 2 Chars

Q2. Of the number you reported in question 1, please indicate the number of these professionals you expect to hire whose highest level of formal education in occupational health psychology (or a closely related field) is....

Bachelor's degree: _____ 2 Chars FUOHPBA
Master's degree: _____ 2 Chars FUOHPMA
Doctoral degree: _____ 2 Chars FUOHPDR

NOTE: TOTAL REPORTED IN Q2 CANNOT BE GREATER THAN FUHPQ1

FUOHPQ3

Q3. How many of these occupational health psychology professionals will be required to have an active professional certification, either prior to hiring or shortly afterward?

_____ 2 Chars Maximum value = FUOHPQ1

Q4. Given the evolving nature of the field and the venues or contexts in which you see OS&H professionals needed, in which of the following additional areas, if any, would you like for these professionals to be trained?

Mark all that apply

- ☐ Occupational Safety OHP_SAF
- ☐ Industrial Hygiene OHP_IH
- ☐ Occupational Medicine OHP_OM
- ☐ Occupational Health Nursing OHP_OHN
- ☐ Occupational Health Physics OHP_HP
- ☐ Occupational Ergonomics OHP_ERG
- ☐ Occupational Injury Prevention OHP_IP
- ☐ Occupational Epidemiology OHP_EPI
- ☐ Other OS&H areas (please specify below): OHP_OTH

[open entry box]
OHP_SPEC
(40 Chars)

Q5. What are the three most important specialties or technical skills that you will be looking for when hiring occupational health psychology professionals over the next five years?

Examples include:

Develop, validate, administer, and interpret psychological tests and organization surveys
Develop, validate, administer, and interpret psychological tests and organization surveys
Develop, lead, and evaluate safety initiatives (e.g., safety management systems, training, safety culture)
Develop, lead, and evaluate health promotion programs
Develop, lead, and evaluate work-family/work-life balance initiatives
Building a business case for workplace safety & health
Health Services and Health and Productivity Management
Human Resource Management and Benefits
Workplace diversity, minority and immigrant workers, health disparities
Changing workforce demographics (e.g., older/younger workers, gender issues)
Individual differences and occupational health
Team/group dynamics and organizational culture/climate
Workplace mistreatment (e.g., violence prevention, harassment, bullying)
Part-time, temporary, and contingent work
Task design and worker health
Mental health at work (e.g., PTSD, substance abuse, depression, well-being, resilience)
Work schedules, sleep, and fatigue
Effects of job and organizational Stress
Organizational Change, downsizing, and reorganization

[open entry box]
OHPSK1_A
240 characters

Q6. What are the three most important additional skills or knowledge areas that you will be looking for when hiring occupational health psychology professionals over the next five years?

Examples include:

Communicating with workers/training skills
Communicating with upper management
Organizational science
Technical writing
Leadership skills
Understanding of workers' jobs
Understanding of our industry (e.g., products, markets, practices)
Local, state, or federal regulations
Workers' Compensation
Environmental regulations

[open entry box]
OHPSK2_A
240 characters

Q7. As we continue to see new technologies and systems introduced into the workplace, are there emerging areas of support in which you would like your new occupational health psychology professionals to be trained? If yes, please describe:

[open entry box] *OHPEXP_A* *240 characters*

WHERE HIRE_OTH=1

EXPECTATIONS FOR FUTURE HIRING OF PROFESSIONALS IN OTHER AREAS OF OCCUPATIONAL SAFETY AND HEALTH

This section will be administered for up to three additional specified areas of OS&H, using information respondent supplied in variables HIRE_OT1, HIRE_OT2, HIRE_OT3 (as applicable)

FUOT1Q1 FUOT2Q1 FUOT3Q1

Q1. How many professionals in [fill from HIREOTH1 / HIREOTH2 / HIREOTH3] do you expect to hire at this location within the next five years? Consider both new positions and positions to replace staff that leave.

_____ 2 Chars

Q2. Of the number you reported in question 1, please indicate the number of these professionals you expect to hire whose highest level of formal education in a relevant field is....

Bachelor's degree: _____ 2 Chars FUOT1BA FUOT2BA FUOT3BA
Master's degree: _____ 2 Chars FUOT1MA FUOT2MA FUOT3MA
Doctoral degree: _____ 2 Chars FUOT1DR FUOT2DR FUOT3DR

NOTE: TOTAL REPORTED IN Q2 CANNOT BE GREATER THAN (FUOT1Q1 FUOT2Q1 FUOT2Q1)

FUOT1Q3 FUOT2Q3 FUOT3Q3

Q3. How many of these professionals in other areas of occupational safety and health will be required to have an active professional certification (e.g., CSP), either prior to hiring or shortly afterward?

_____ 2 Chars Maximum value = (FUOT1Q3 FUOT2Q3 FUOT3Q3)

Q4. Given the evolving nature of the field and the venues or contexts in which you see OS&H professionals needed, in which of the following additional areas, if any, would you like for these professionals to be trained?

Mark all that apply

- ☐ Occupational Safety OT1_SAF OT2_SAF OT3_SAF
- ☐ Industrial Hygiene OT1_IH OT2_IH OT3_IH
- ☐ Occupational Medicine OT1_OM OT2_OM OT3_OM
- ☐ Occupational Health Nursing OT1_OHN OT2_OHN OT3_OHN
- ☐ Occupational Ergonomics OT1_ERG OT2_ERG OT3_ERG
- ☐ Occupational Health Physics OT1_HP OT2_HP OT3_HP
- ☐ Occupational Injury Prevention OT1_IP OT2_IP OT3_IP
- ☐ Occupational Epidemiology OT1_EPI OT2_EPI OT3_EPI
- ☐ Occupational Health Psychology OT1_OHP OT2_OHP OT3_OHP
- ☐ Other OS&H areas (please specify below): OT1_OTH OT2_OTH OT3_OTH

[open entry box] OT1_SPEC OT2_SPEC OT3_SPEC (40 Chars each)

Q5. What are the three <u>most important</u> specialties or technical skills that you will be looking for when hiring professionals in other areas of occupational safety and health over the next five years?

Examples include:

Investigating accidents
Planning for / responding to emergencies
Ergonomics
Fire safety
Electrical safety
Industrial hygiene
Ergonomics
Hazardous materials management
Finding and utilizing sources of safety information
Proper selection of measurement instruments
Calibration and maintenance of measurement instruments

[open entry box] OT1SK1_A 240 characters	*[open entry box]* OT2SK1_A 240 characters	*[open entry box]* OT3SK1_A 240 characters

Q6. What are the three <u>most important</u> additional skills or knowledge areas that you will be looking for when hiring professionals in other areas of occupational safety and health over the next five years?
Examples include:

Communicating with workers/training skills
Communicating with upper management
Organizational science
Technical writing
Leadership skills
Understanding of workers' jobs
Understanding of our industry (e.g., products, markets, practices)
Local, state, or federal regulations
Workers' Compensation
Environmental regulations

[open entry box] OT1SK2_A 240 characters	*[open entry box]* OT2SK2_A 240 characters	*[open entry box]* OT3SK2_A 240 characters

Q7. As we continue to see new technologies and systems introduced into the workplace, are there emerging areas of support in which you would like these new professionals to be trained? If yes, please describe:

[open entry box] *OT1EXP_A* *240 characters each*	*[open entry box]* *OT2EXP_A* *240 characters each*	*[open entry box]* *OT3EXP_A* *240 characters each*

NOTE: ALL RESPONDENTS GET THIS SECTION

ABOUT THIS LOCATION

LOCQ1

Q1. Does this location have a program, process, or system for reducing occupational fatalities, injuries, and illnesses?

- ○ Yes (yes=1, no=2)
- ○ No → Skip to Question 2

LOCQ1A

Q1a. How many persons at this location have key responsibilities for this program, process, or system?

_____ 2 Chars

Q2. In which of the following ways, if any, does your company or organization support occupational safety and health (OS&H) Continuing Education for your employees? *Mark all that apply.*

- ☐ We pay for tuition LOCTUIT
- ☐ We pay for travel LOCTRAV
- ☐ We allow time off for attendance LOCTIME
- ☐ We do not provide any support for OS&H Continuing Education LOCNONE

NOTE: IF LOCNONE IS CHECKED, THEN LOCTUIT, LOCTRAV, AND LOCTIME MUST BE UNCHECKED

LOCQ2A

Q2a. Are there any new occupational safety and health courses or topics that you would like to see introduced in OS&H Continuing Education within the next few years? (yes=1, no=2)

- ○ Yes → Please specify:__TOPICS___60 Chars_____
- ○ No

LOCQ3

Q3. Does this location receive occupational safety and health services from other locations within your organization?

- ○ Yes (yes=1, no=2, 3= no other locations)
- ○ No → Skip to Question 4
- ○ We have no other locations→ Skip to Question 4

Note: Q3A to be grayed out unless LOCQ3=1

Q3a. In which of the following areas does this location receive services from other locations of your organization?

- ☐ Occupational Safety LOC_SAF
- ☐ Industrial Hygiene LOC_IH
- ☐ Occupational Medicine LOC_OM
- ☐ Occupational Health Nursing LOC_OHN
- ☐ Occupational Ergonomics LOC_ERG
- ☐ Occupational Health Physics LOC_HP
- ☐ Occupational Injury Prevention LOC_IP
- ☐ Occupational Epidemiology LOC_EPI
- ☐ Occupational Health Psychology LOC_OHP
- ☐ Other OS&H areas (please specify): LOC_OTH

_____LOCSPEC_____40 Chars___

Q3b. Within each OS&H area you marked above, approximately what percent of the activity at this location is performed by the services you obtain from other locations of your organization? [**NOTE:** SCREEN TO SHOW OS&H FIELDS MARKED IN Q3a. OTHERS TO BE GRAYED OUT] [3 Chars each; Maximum value: 100]

Occupational Safety _____ Percent PERC_SAF
Industrial Hygiene _____ Percent PERC_IH
Occupational Medicine _____ Percent PERC_OM
Occupational Health Nursing _____ Percent PERC_OHN
Occupational Ergonomics _____ Percent PERC_ERG
Occupational Health Physics _____ Percent PERC_HP
Occupational Injury Prevention _____ Percent PERC_IP
Occupational Epidemiology _____ Percent PERC_EPI
Occupational Health Psychology _____ Percent PERC_OHP
__[FILL FROM LOCSPEC IN Q3A] _____ Percent PERC_OTH

LOCQ4

Q4. Does this location receive occupational safety and health services from contractors or consultants?

- ○ Yes (yes=1, no=2)
- ○ No → Skip to Question 5

Note: Q4A to be grayed out unless LOCQ4=1

Q4a. In which of the following areas does this location receive services from contractors or consultants?

- ☐ Occupational Safety OUT_SAF
- ☐ Industrial Hygiene OUT_IH
- ☐ Occupational Medicine OUT_OM
- ☐ Occupational Health Nursing OUT_OHN
- ☐ Occupational Ergonomics OUT_ERG
- ☐ Occupational Health Physics OUT_HP
- ☐ Occupational Injury Prevention OUT_IP
- ☐ Occupational Epidemiology OUT_EPI
- ☐ Occupational Health Psychology OUT_OHP
- ☐ Other OS&H areas (please specify): OUT_OTH

_____OUTSPEC_____40 Chars___

Q4b. Within each OS&H area you marked above, approximately what percent of the activity at this location is performed by contractors or consultants? [**NOTE:** SCREEN TO SHOW OS&H FIELDS MARKED IN Q4a. OTHERS TO BE GRAYED OUT]

[3 Chars each; Maximum value: 100]

Occupational Safety _____ Percent OUPR_SAF
Industrial Hygiene _____ Percent OUPR_IH
Occupational Medicine _____ Percent OUPR_OM
Occupational Health Nursing _____ Percent OUPR_OHN
Occupational Ergonomics _____ Percent OUPR_ERG
Occupational Health Physics _____ Percent OUPR_HP
Occupational Injury Prevention _____ Percent OUPR_IP
Occupational Epidemiology _____ Percent OUPR_EPI
Occupational Health Psychology _____ Percent OUPR_OHP
__[FILL FROM OUTCSPEC IN Q4A] _____ Percent OUPR_OTH

Q4c. How many occupational safety and health activity contractors and consultants worked at this location at least half-time (20 or more hours per week) at the end of (MONTH), 2010? [SCREEN WILL SHOW OS&H FIELDS MARKED IN Q4a]

[3 Chars each]

Occupational Safety _____ HOW_SAF
Industrial Hygiene _____ HOW_IH
Occupational Medicine _____ HOW_OM
Occupational Health Nursing _____ HOW_OHN
Occupational Ergonomics _____ HOW_ERG
Occupational Health Physics _____ HOW_HP
Occupational Injury Prevention _____ HOW_IP
Occupational Epidemiology _____ HOW_EPI
Occupational Health Psychology _____ HOW_OHP
__[FILL FROM OUTCSPEC IN Q4A] _____ HOW_OTH

NOTE: GRAY OUT Q5 UNLESS TWO OR MORE OF THE FOLLOWING VARIABLES=1:

HIRE_SAF, HIRE_IH, HIRE_OHN, HIRE_OM, HIRE_ERG, HIRE_HP HIRE_IP, HIRE_EPI, HIRE_OHP, HIRE_OTH

.

Q5. Earlier you told us that this location expects to hire professional staff over the next five years in the OS&H fields shown below. Please rank the priority that you expect this location to give each OS&H area with respect to future hiring. Enter a "1" for your first priority, "2" for the second priority, etc.

[NOTE: SCREEN TO SHOW ONLY FIELDS CONSISTENT WITH VARIABLES IN BOX ABOVE (THOSE CODED 1). OTHERS TO BE GRAYED OUT]

	[1 Char each]	
Occupational Safety	____	PRY_SAF
Industrial Hygiene	____	PRY_IH
Occupational Medicine	____	PRY_OM
Occupational Health Nursing	____	PRY_OHN
Occupational Ergonomics	____	PRY_ERG
Occupational Health Physics	____	PRY_HP
Occupational Injury Prevention	____	PRY_IP
Occupational Epidemiology	____	PRY_EPI
Occupational Health Psychology	____	PRY_OHP
__[FILL FROM HIREOTH1] _	____	PRY_OTH1
__[FILL FROM HIREOTH2] _	____	PRY_OTH2
__[FILL FROM HIREOTH3] _	____	PRY_OTH3

Q6. Over the past 2 years, how much difficulty has this location experienced in recruiting and hiring qualified persons in each job category below?

(Have not tried to hire =1, No difficulty=2, Some difficulty=3, A lot of difficulty =4, We were unable to hire =5)

	Have not tried to hire persons in this category	No difficulty	Some difficulty	A lot of difficulty	We were unable to hire qualified persons
DIFF_SAF Occupational Safety	☐	☐	☐	☐	☐
DIFF_IH Industrial Hygiene	☐	☐	☐	☐	☐
DIFF_OM Occupational Medicine	☐	☐	☐	☐	☐
DIFF_OHN Occupational Health Nursing	☐	☐	☐	☐	☐
DIFF_ERG Occupational Ergonomics	☐	☐	☐	☐	☐
DIFF_HP Occupational Health Physics	☐	☐	☐	☐	☐
DIFF_IP Occupational Injury Prevention	☐	☐	☐	☐	☐
DIFF_EPI Occupational Epidemiology	☐	☐	☐	☐	☐
DIFF_OHP Occupational Health Psychology	☐	☐	☐	☐	☐
Other OS&H areas (please specify) DIFF_OT1 __DIFOT1SP_30 Chars_	☐	☐	☐	☐	☐
DIFF_OT2 __DIFOT2SP_30 Chars_	☐	☐	☐	☐	☐
DIFF_OT3 __DIFOT3SP_30 Chars_	☐	☐	☐	☐	☐

LOCQ7

Q7. This survey has asked only about professional staff in occupational safety and health who hold a bachelor's degree or higher in a relevant field. Does this location have additional staff whose main job duties are in occupational safety and health (for example, technicians with an associate's degree, persons whose training was obtained from short courses or "on the job")? (yes=1, no=2)

- ○ Yes → How many? _____ LOCQ7HOW 2 Chars
- ○ No

Q8. Trends Observed: We would like to know your views of how the occupational safety and health professions have been changing. What are the most important trends that you have been seeing?

[open entry box]
TRENDS_A
[60 Chars each]

Q9. Changes Needed: What important changes would you like to see the occupational safety and health professions make over the next 5 to 10 years?

[open entry box]
CHANGE_A
[60 Chars each]

Appendix B

OS&H Workforce Assessment
Provider Survey Instrument

Thank you for your willingness to help us in this important project designed to determine critical training needs for future professionals in occupational safety and health.

If there is someone else in your organization who would be a more knowledgeable respondent for this survey, we ask that you forward the letter or email containing the User ID and password to that individual.

If more than one individual is needed to complete the survey, we ask that you work together in to provide information that is as complete as possible.

If you have any questions, please contact Westat toll-free at 1-xxx-xxx-xxxx (or by email: xxxxxx@Westat.com).

Overview

This page provides information about: (*each of these bullets will be bookmarked to the relevant section below*)

- How to navigate through the survey
- When are your answers saved
- How to clear your answers
- How to print the survey and/or your responses
- The three ways to leave the survey: Exit, Timeout, and Submit
- Where you can get help if you have additional questions

How to navigate through the survey

Each page of the survey has two buttons that allow you move forward and backward through the pages of the survey. They are the "Previous Page" and "Next Page" buttons. On most pages, these buttons appear at both the top and the button of the page. You can change your responses as often as you like, and you can revisit sections of the survey as often as you like.

When are your answers saved?

Your answers are saved each time you move to a new page, go back to an earlier page, or exit the survey by clicking on "Save & Exit". If you click on the X in your browser window to exit the survey, your responses on the current page will not be saved. If you need to leave the survey before you have completed it, always click on the "Save & Exit" button that appears on each page of the survey.

The three ways to leave the survey: Exit, Timeout, and Submit

Exit

You do not have to complete the survey in one sitting. If you wish to exit the survey to return at a later time, all you have to do is click on the "Save & Exit" button and all your responses will be saved. However, your survey will not be considered complete until you "submit" it (see Submit section below).

Timeout

After 25 minutes of inactivity (that is, you haven't interacted with the survey in 25 minutes), you will be given a "timeout" warning. After you get this warning, you'll have 5 minutes to resume activity or you will be timed out. If you are timed out, new or changed responses to the questions on your current page will not be saved.

Submit

After you have navigated through the last section of the survey, you will be taken to a Finish page. If you have left any questions blank, you will be notified of this and you will be given the opportunity to go back and fill in missing answers. If you are satisfied that you are done with the survey, you will be instructed to click on the "Submit Survey" button, and this will complete your participation. Once you have clicked on this button, your survey is considered complete and you will not be able to access the survey online again.

How to print the survey and/or your responses

There are two ways to print the survey and/or your responses. To print the entire survey, including any answers you might have already entered, click on the "Print" button which appears at both the top and the button of most pages. To print just the page you are on, please use your browser's print button.

Where you can get help if you have additional questions

If you have any questions, please email us at xxxxxxx@westat.com. You can also call us toll-free at 1-xxx-xxx-xxxx.

NOTE: Occupational Medicine Program began with Page 9. All others began with this page.

It is our understanding that your program currently offers a degree or concentration in [OSH AREA].

We have a short series of questions about this program, and your expectations for the future.

For purposes of this survey, please consider your program to consist of all of the training offered within (OSH AREA), including

- Training at both the undergraduate and graduate levels;
- Training funded by NIOSH (if applicable), as well as training not funded by NIOSH;
- Both traditional classroom-based training and online-based training.

Q1. Which of the following educational levels does your program offer for (OSH AREA)?
Mark all that apply

☐ Bachelor's degree Q1BAC =1 if checked
☐ Master's degree Q1MAS =1 if checked
☐ Doctoral degree Q1DOC =1 if checked

Q2. How many students do you expect will graduate from your program in 2011 with a:

[**NOTE**: Screen will show only the degrees marked above; others grayed out]

a. Bachelor's degree/concentration in (OSH AREA)? ____ Q2BAC (2 CHARS)
b. Master's degree/concentration in (OSH AREA)? ____ Q2MAS (2 CHARS)
c. Doctoral degree/concentration in (OSH AREA)? ____ Q2DOC (2 CHARS)

Q3. How many students, in total, do you expect will graduate from your program in the next five years (2011 to 2015) with a:

[**NOTE**: Screen will show only the degrees marked above; others grayed out]

Total Over

a. Bachelor's degree/concentration in (OSH AREA)? ____ Q2BAC (3 CHARS)
b. Master's degree/concentration in (OSH AREA)? ____ Q3MAS (3 CHARS)
c. Doctoral degree/concentration in (OSH AREA)? ____ Q3DOC (3 CHARS)

Q4

Q4. Over the last 5 years, has the number of students entering your program to earn degrees in (OSH AREA) increased, decreased, or remained about the same?

- ○ Increased =1 → Q4b
- ○ Decreased =2 → Q4b.
- ○ Remained about the same =3

Q4b. By approximately what percent, cumulatively, over 5 years? _____
Q4B (3 CHARS; ALLOW 0 TO 100)

Q5

Q5. Over the last 5 years, has the quality (e.g., test scores, motivation, dedication) of students applying to your program to earn degrees in (OSH AREA) increased, decreased, or remained about the same?

- ○ Increased =1
- ○ Decreased =2
- ○ Remained about the same =3

Q6. What obstacles (if any) exist at your institution for the typical student who may wish to study (OSH AREA)?

Check all that apply **(NOTE:** If first choice is checked, then others must be grayed out)

- ☐ No obstacles Q6NONE =1 if checked
- ☐ Financial Q6FINAN =1 if checked
- ☐ Job prospects Q6PROSP =1 if checked
- ☐ Lack of knowledge of the program Q6KNOW =1 if checked
- ☐ Program rigor Q6RIGOR =1 if checked
- ☐ Other obstacles Q6OTHER =1 (Please specify): _____ Q6SPEC (60 CHARS)

Q7A

Q7a [NOTE: ASK ONLY IF BACHELOR'S MARKED IN QUESTION 1] Approximately what percent of graduates obtain a job in (OSH AREA) within two years of leaving your program with a Bachelor's degree in (OSH AREA)?

_____ percent (3 CHARS; ALLOW 0 TO 100)

Q7B

Q7b [ASK IF MASTER'S OR HIGHER DEGREE MARKED IN QUESTION 1] Approximately what percent of graduates obtain a job in (OSH AREA) within two years of leaving your program with a Master's or higher degree in (OSH AREA)?

_____ percent (3 CHARS; ALLOW 0 TO 100)

Q7c Thinking about your program graduates who have obtained jobs over the last few years, approximately what percent of your graduates have gone to work within the following economic sectors?

(FOR ALL VARIABLES: 3 CHARS; ALLOW 0 TO 100)

Government:	_____ %	Q7CGOV
OS&H Consulting Services:	_____ %	Q7CCON
Manufacturing:	_____ %	Q7CMAN
Mining:	_____%	Q7CMIN
Construction:	_____ %	Q7CCNST
Transportation, Warehousing, Utilities:	_____%	Q7CTRAN
Agriculture, Forestry & Fishing:	_____ %	Q7CAGR
Health Care & Social Services:	_____ %	Q7CHLTH
Wholesale or Retail trade	_____%	Q7CTRAD
Educational Services:	_____%	Q7CEDUC
Other sectors:	_____%	Q7COTH
TOTAL	**100** %	

Q8

Q8. Over the last 5 years, has the level of general (recurring) funding from your university/college for training in (OSH AREA) increased, decreased, or remained about the same?

- ○ Increased =1
- ○ Decreased =2
- ○ Remained about the same =3

Q9

Q9. Over the last 5 years, has your program received funding from any source outside the university for the support of students in (OSH AREA)? (Yes=1, No=2)

- ○ Yes → Please list the major sources of this funding:_____ Q9SOURC (60CHARS)
- ○ No → Skip to Q11

Q10

Q10. Over the last 5 years, has the level of funding from outside sources for the support of students in (OSH AREA) increased, decreased, or remained about the same?

- ○ Increased =1
- ○ Decreased =2
- ○ Remained about the same =3

Q11. How many faculty members trained in (OSH AREA) or a related area does your program currently employ?

Full-time faculty:	_____	Q11FULL (2 CHARS; ALLOW 0-25)
Part-time/adjunct faculty:	_____	Q11PART (2 CHARS; ALLOW 0-25)

Q12

Q12. How many full-time faculty members trained in (OSH AREA) or a related area do you expect your program will hire over the next 5 years?

_____ (2 CHARS; ALLOW 0-25)

Q13

Q13. How many full-time faculty members trained in (OSH AREA) or a related area do you expect will retire or leave the profession over the next 5 years?

_____ (2 CHARS; ALLOW 0-25)

Q14

Q14. Does your program in (OSH AREA) offer students an internship or other practice experience?

- ○ Yes =1
- ○ No =2

NOTE: SKIP TO THE ACCREDITATION SECTION ON PAGE 12

NOTE: QUESTIONS SPECIFIC TO OCCUPATIONAL MEDICINE PROGRAMS

It is our understanding that your program currently offers a degree or concentration in Occupational Medicine.

We have a short series of questions about this program, and your expectations for the future.

For purposes of this survey, please consider your program to consist of all of the training offered within (OSH AREA), including

- Training funded by NIOSH (if applicable), as well as training not funded by NIOSH;
- Both traditional classroom-based training and online-based training.

OMQ1

Q1. How many students do you expect will complete your Occupational Medicine program in 2011?

_____ (2 CHARS; ALLOW 0-99)

OMQ2

Q2. How many students, in total, do you expect will complete your program in the next five years (2011 to 2015)?

_____ TOTAL OVER 5 YEARS (3 CHARS; ALLOW 0-500)

OMQ3

Q3. Over the last 5 years, has the number of students entering your Occupational Medicine program increased, decreased, or remained about the same?

- ○ Increased =1 → Q3b
- ○ Decreased =2 → Q3b.
- ○ Remained about the same =3

Q3b. By approximately what percent, cumulatively, over 5 years? _____ **OMQ3B** (3 CHARS; ALLOW 0 TO 100)

OMQ4

Q4. Over the last 5 years, has the quality (e.g., test scores, motivation, dedication) of students applying to your Occupational Medicine program increased, decreased, or remained about the same?

- ○ Increased =1
- ○ Decreased =2
- ○ Remained about the same =3

Q5. What obstacles (if any) exist at your institution for the typical student who may wish to study Occupational Medicine? *Check all that apply*

(NOTE: If first choice is checked, then others must be grayed out)

- ☐ No obstacles Q5NONE =1 if checked
- ☐ Financial Q5FINAN =1 if checked
- ☐ Job prospects Q5PROSP =1 if checked
- ☐ Lack of knowledge of the program Q5KNOW =1 if checked
- ☐ Program rigor Q5RIGOR =1 if checked
- ☐ Other obstacles Q5OTHER =1 (Please specify): _____ Q5SPEC (60 CHARS)

OMQ6A

Q6a. Approximately what percent of graduates obtain board certification in Occupational Medicine after leaving your program?

_____ percent (3 CHARS; ALLOW 0 TO 100)

OMQ6B

Q6b. Approximately what percent of graduates obtain a job in Occupational Medicine within two years of leaving your program?

_____ percent (3 CHARS; ALLOW 0 TO 100)

Q6c Thinking about the last few years, approximately what percent of your graduates have obtained jobs within the following economic sectors?

(FOR ALL VARIABLES: 3 CHARS; ALLOW 0 TO 100)

Government:	_____ % OMCGOV
OS&H Consulting Services:	_____ % OMCCON
Manufacturing:	_____ % OMCMAN
Mining:	_____% OMCMIN
Construction:	_____ % OMCCNST
Transportation, Warehousing, Utilities:	_____% OMCTRAN
Agriculture, Forestry & Fishing:	_____ % OMCAGR
Health Care & Social Services:	_____ % OMCHLTH
Wholesale or Retail trade	_____% OMCTRAD
Educational Services:	_____% OMCEDUC
Other sectors:	_____% OMCOTH
TOTAL	**100** %

OMQ7

Q7. Over the last 5 years, has the level of general (recurring) funding from your university/college for training in Occupational Medicine increased, decreased, or remained about the same?

- ○ Increased =1
- ○ Decreased =2
- ○ Remained about the same =3

OMQ8

Q8. Over the last 5 years, has your program received funding from any source outside the university for the support of students in Occupational Medicine? (Yes=1, No=2)

- ○ Yes → Please list the major sources of this funding:_____ OMQ8SOURC (60CHARS)
- ○ No → Skip to Q10

OMQ9

Q9. Over the last 5 years, has the level of funding from outside sources for the support of students in Occupational Medicine increased, decreased, or remained about the same?

- ○ Increased =1
- ○ Decreased =2
- ○ Remained about the same =3

Q10. How many faculty members trained in Occupational Medicine or a related area does your program currently employ?

Full-time faculty: _____ OMQ10FUL (2 CHARS; ALLOW 0-25)
Part-time/adjunct faculty: _____ OMQ10PAR (2 CHARS; ALLOW 0-25)

OMQ11

Q11. How many full-time faculty members trained in Occupational Medicine or a related area do you expect your program will hire over the next 5 years?

_____ (2 CHARS; ALLOW 0-25)

OMQ12

Q12. How many full-time faculty members trained in Occupational Medicine or a related area do you expect will retire or leave the profession over the next 5 years?

_____ (2 CHARS; ALLOW 0-25)

NOTE: OCCUPATIONAL MEDICINE PROGRAMS WILL SKIP TO THE CONTINUING EDUCATION SECTION ON THE LAST PAGE

Accreditation

NOTE: OCCUPATIONAL MEDICINE PROGRAMS WILL NOT BE ASKED THIS SECTION

ACQ1

Q1. Is any of your program's training in (OSH AREA) accredited? If so, please indicate by whom:

(Yes=1, Some=2, No=3)	By whom?
○ Yes, all of this training is accredited →	
○ Some of the training is accredited →	_____
○ No, none of this training is accredited	ACWHOM (60 CHARS)

NOTE: IF Q2 INDICATES THAT AT LEAST SOME TRAINING FOR OSH AREA HAS RECEIVED PROGRAM-SPECIFIC ACCREDITATION (CODE 1 OR 2), THEN RESPONDENT WILL BE SKIPPED TO CONTINUING EDUCATION SECTION ON NEXT PAGE

Q2. What are the reasons why you have not obtained program-specific accreditation in (OSH AREA)?

Mark all that apply

- ☐ It is too expensive ACQ2EXP
- ☐ It requires too much work ACQ2WORK
- ☐ It offers too little value ACQ2VAL
- ☐ There is no accreditation organization for (OSH AREA) ACQ2NONE
- ☐ Other reason (please specify):_____
  ACQ2OTH ACQ2SPEC (80 CHARS)

Continuing Education

CEQ1
Q1. Does your program offer Continuing Education courses on topics related to (OSH AREA):

- ○ Yes =1
- ○ No =2 (SKIP TO END BELOW)

CEQ2
Q2. How many people do you anticipate will take Continuing Education courses offered by your program during 2011 on topics related to (OSH AREA)?

_____ (3 CHARS; ALLOW 0-999)

CEQ3
Q3. Over the last 5 years, has the number of attendees in your Continuing Education courses in these areas increased, decreased, or remained about the same?

- ○ Increased =1
- ○ Decreased =2
- ○ Remained about the same =3
- ○ Our CE courses in this area are too new =4

CEQ4
Q4. Trends Observed: We would like to know about important trends you have noticed in Continuing Education (with respect to needs, format, offerings, locations, etc.). What are the most important trends that you have seen?

_____ (160 CHARS)

CEQ5
Q5. Changes Anticipated: What important changes do you anticipate making in your Continuing Education program over the next 5 to 10 years?

_____ (160 CHARS)

END

Thank you for your responses to this survey. We have only two more questions for you…

TRENDS
Q1. Trends Observed: We would like to know how the occupational safety and health professions have been changing. What are the most important trends that you have seen?

_____ (240 CHARS)

CHANGES
Q2. Changes Needed: What important changes do you anticipate making in your occupational safety and health training programs over the next 5 to 10 years?

_____ (240 CHARS)

Appendix C

OS&H Workforce Assessment
Employer Survey Screening Instrument

NIOSH Workforce Assessment
Employer Survey Establishment Screener ()

Hello, my name is _____, and I'm calling on behalf of the National Institute for Occupational Safety and Health, an agency of the U.S. Centers for Disease Control and Prevention.

Q1. Have I reached (SAMPLED ESTABLISHMENT)?

YES (PRIMARY NAME MATCH)..... 1 (Q4)
YES (SECONDARY NAME MATCH)..... 2 (Q4)
ESTABLISHMENT CHANGED NAME..... 3
NO, ANOTHER ESTABLISHMENT..... 4
RESIDENCE ONLY..... 5 (Q4)

Q2. What is the name of your business (or organization)? [VERIFY SPELLING OF BUSINESS NAME.]

NAME: _____
RESIDENCE ONLY..... 5 (Q4)

Q3. In this (business/organization) the same as (SAMPLED ESTABLISHMENT)? [IF NECESSARY: Do you consider it the same (business/organization)?]

YES..... 1
NO..... 2

[IF ESTABLISHMENT NAME CHANGED AND ESTABLISHMENT IS THE SAME AS SAMPLED ESTABLISHMENT (Q1 = 3 AND Q3 = 1) RECORD NAME]

NEW ESTABLISHMENT NAME: _____

Q4. Are you located at (SAMPLED ESTABLISHMENT ADDRESS)?

YES..... 1
NO..... 2

[IF THIS IS A RESIDENCE OR ORGANIZATION OTHER THAN SAMPLED ESTABLISHMENT, ASK Q5. IF SAMPLED ESTABLISHMENT BUT DIFFERENT ADDRESS, SKIP TO Q6. OTHERWISE, SKIP TO Q9]

Q5. Do you know what happened to (NAME OF SAMPLED ESTABLISHMENT)?

YES, IT CLOSED/OUT OF BUSINESS 1 (END)
YES, IT MOVED 2 (Q8))
YES, SOMETHING ELSE 4 (Q8)
NO/DON'T KNOW 3 (END)

Q6. Does (SAMPLED ESTABLISHMENT) have an office at (SAMPLED ADDRESS)?

YES 1
NO ..... 2 (Q8))

Q7. Can you give me the telephone number for (SAMPLED ESTABLISHMENT) for that location?

Q8. Do you know the phone number or address of (SAMPLED ESTABLISHMENT)?

[VERIFY PHONE NUMBER AND SPELLING OF ADDRESS.]

PHONE NUMBER: (_____)_____

ADDRESS: _____ (END)

Q9. Can I please speak with someone who can who can tell us if there are any people at this location whose jobs specialize in worker safety and health? [IF NEEDED: This might be someone in your Human Resources department or an office manager]

Can you please connect me with this person?

YES 1
NO ..... 2 (END)

Q10. **(Hello, my name is _____, and I'm calling on behalf of the National Institute for Occupational Safety and Health, an agency of the U.S. Centers for Disease Control and Prevention. We are preparing for an important nationwide study regarding the occupational safety and health workforce.) Are there any people at this location, (SAMPLED STREET ADDRESS), whose jobs specialize in worker safety and health?**

(IF NECESSARY: We mean people whose jobs involve protecting workers from things such as workplace injuries, occupational diseases, exposure to harmful chemicals or radiation, or that help workers recover from such events. These could be safety professionals, industrial hygienists, occupational health nurses and physicians, ergonomists, health physicists, and so on.)

YES 1
NO ..... 2 (END)

Q11. **This is a web survey that can be filled out on-line. We would like to send some information to the person most knowledgeable about the safety and health activities for (SAMPLED BUSINESS) at (SAMPLED ADDRESS). Could I please have the name, telephone number, and email address of this person?**

. **[IF MORE THAN ONE KNOWLEDGEABLE PERSON:** I understand there may be more than one person or department involved, and the survey will allow for them to consult with each other. Right now, I would just like the name of the one person you think would be best for us to start with.**]**

[VERIFY SPELLING OF NAME, PHONE NUMBER, AND EMAIL ADDRESS]

NAME: _____

PHONE NUMBER: (_____)_____

ADDRESS: _____

EMAIL: _____(END)

Appendix D

OS&H Workforce Assessment
Employer Survey Recruiting Materials

DEPARTMENT OF HEALTH & HUMAN SERVICES PUBLIC HEALTH SERVICE

Centers for Disease Control and Prevention (CDC)
National Institute for Occupational Safety and Health (NIOSH)
Patriots Plaza 1, 395 E. St. SW, Room 9200
Washington DC, 20201
PHONE: (202) 245-0625 FAX: (202) 245-0664

BARCODE»
«FirstName_» «Middlename_»«Lastname_» «Suffix_»
«Title_»
«Name_»
«Street1_»
«Street2_»
«Street3_»
«City_», «State_» «Zip_»-«Zip4_»

Dear Sir or Madam:

I am writing to encourage your participation in a major study being conducted by the National Institute for Occupational Safety and Health (NIOSH). NIOSH is a national source of competitive funding for programs that educate and train professionals devoted to protecting the safety and health of the American worker. This study will help NIOSH determine its future funding priorities by answering the following questions:

a) What is the current state of the occupational safety and health professional workforce? What are the training needs of these professionals?

b) What are employer expectations for hiring occupational safety and health professionals in the coming years? What credentials and skills do employers desire in these professionals?

Your establishment was selected for this study by means of a scientific process designed to yield a sample of employers that is representative of employers across the nation.

Participating in the study is easy. Simply go to the following website (https://www.OSHSurvey.org) and enter your Survey PIN Number provided below:

Survey PIN Number: <<PIN>>

If desired, you will be able to save your answers and return to the study website at a later time.

The data for this study is being collected for NIOSH by Westat, a research company in Rockville, Maryland. Westat is required to protect the privacy of all information collected. Under no circumstances will information held by NIOSH and Westat be released in a form that allows for the identification of individual establishments or employees.

Your participation in this study is voluntary. However, the validity of the study results depends on a high response rate, so we hope that you will respond completely and accurately to the study questions.

Thank you in advance for your participation. If you have any questions about the study, please call Westat toll-free at 1-888-248-8330.

Sincerely,

John Howard, Director

DEPARTMENT OF HEALTH & HUMAN SERVICES PUBLIC HEALTH SERVICE

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National Institute for Occupational Safety and Health (NIOSH)
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ASSE

The Joint Commission

CPWR THE CENTER FOR CONSTRUCTION RESEARCH AND TRAINING

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KAISER PERMANENTE

Also supporting this assessment are:

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Deep South Center for Occupational Health and Safety
Heartland Center for Occupational Health & Safety
Harvard Education and Research Center
Illinois Education and Research Center
Johns Hopkins Education and Research Center
Michigan Education and Research Center
Midwest Center for Occupational Health and Safety
Mountain and Plains Education and Research Center
New York/New Jersey Education and Research Center
North Carolina Occupational Safety and Health Education and Research Center
Northern California Education and Research Center
Northwest Center for Occupational Health and Safety
Mountain and Plains Education and Research Center
Rocky Mountain Center for Occupational and Environmental Health
Southern California Education and Research Center
Southwest Center for Occupational and Environmental Health
Sunshine Education and Research Center
University of Cincinnati Education and Research Center

Appendix E

OS&H Workforce Assessment
Provider Survey Recruiting Materials

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a) What are employer expectations for hiring occupational safety and health professionals in the coming years? What credentials and skills do employers desire in these professionals?

b) How many and what types of occupational safety and health professionals do academic institutions expect to produce in the coming years?

The first objective is being met through a survey of a nationwide sample of employers. The second objective is being met through a survey of education and training programs such as yours that produce professionals in fields related to occupational safety and health. We are attempting to survey all such programs in the nation.

Participating in the study is easy. Simply go to the following website (https://www.OSHProgramsurvey.org) and enter your Survey PIN Number provided below:

Survey PIN Number: «Pin»

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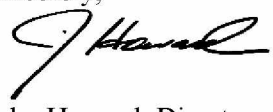
Thank you in advance for your participation. If you have any questions about the study, please call Westat toll-free at 1-888-562-2869.

Sincerely,



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It is our understanding that you oversee multiple education and training programs in occupational safety and health disciplines. We ask for your assistance in completing a survey for **each** program. Participating in the study is easy. Simply go to the following website (https://www.OSHProgramsurvey.org) and enter the Survey PIN Numbers provided below:

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Program in: «P_Discipline2»	**Survey PIN Number:** «Pin2»
Program in: «P_Discipline3»	**Survey PIN Number:** «Pin3»
Program in: «P_Discipline4»	**Survey PIN Number:** «Pin4»

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KAISER PERMANENTE

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Michigan Education and Research Center
Midwest Center for Occupational Health and Safety
Mountain and Plains Education and Research Center
New York/New Jersey Education and Research Center
North Carolina Occupational Safety and Health Education and Research Center
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Mountain and Plains Education and Research Center
Rocky Mountain Center for Occupational and Environmental Health
Southern California Education and Research Center
Southwest Center for Occupational and Environmental Health
Sunshine Education and Research Center
University of Cincinnati Education and Research Center

Appendix F

Model Estimates of Current Workforce of OS&H Professionals in Establishments With Less Than 100 Employees

Appendix F. Model estimates of current workforce of OS&H professionals in establishments with less than 100 employees

Specialties	Industries where the establishments with 100+ employees sampled: Establishments with less than 100 employees, Model 1 estimate	Industries where the establishments with 100+ employees sampled: Establishments with less than 100 employees, Model 2 estimate	Industries where the establishments with 100+ employees sampled: Establishments with 100+ employees, Sample estimate	Other Industries, Sample estimate	Total, Sample estimate	Sample Plus, Model 1 estimate	Sample Plus, Model 2 estimate	Percent increase over the total sample estimate, Model 1	Percent increase over the total sample estimate, Model 2
Occupational Safety	4,008	3,595	7,459	21,264	28,722	32,731	32,318	14.0	12.5
Industrial Hygiene	85	169	1,612	5,736	7,348	7,433	7,517	1.2	2.3
Occ Medicine	5	17	689	766	1,455	1,461	1,472	0.4	1.1
Occ Health Nursing	316	332	3,204	1,293	4,498	4,814	4,829	7.0	7.4
Occ Ergonomics	5	2	292	540	831	836	833	0.6	0.3
Occ Health Physics	222	125	880	425	1,305	1,527	1,430	17.0	9.6
Occ Injury Prevention	2	7	350	898	1,249	1,251	1,255	0.2	0.5
Occ Epidemiology	0	0	122	10	132	132	132	0.1	0.1
Occ Health Psychology	0	0	0	22	22	22	22	0.0	0.0
Sums	4,644	4,246	14,609	30,954	45,562	50,206	49,809		

Notes:

Model 1 is a single equation model for each specialty and used the 4-digit NAICS and number of employees as predictors.

Model 2 used a simultaneous equation system, including the number of OSH professionals by specialty as endogenous variables in addition to the 4-digit NAICS and number of employees as exogenous variables.