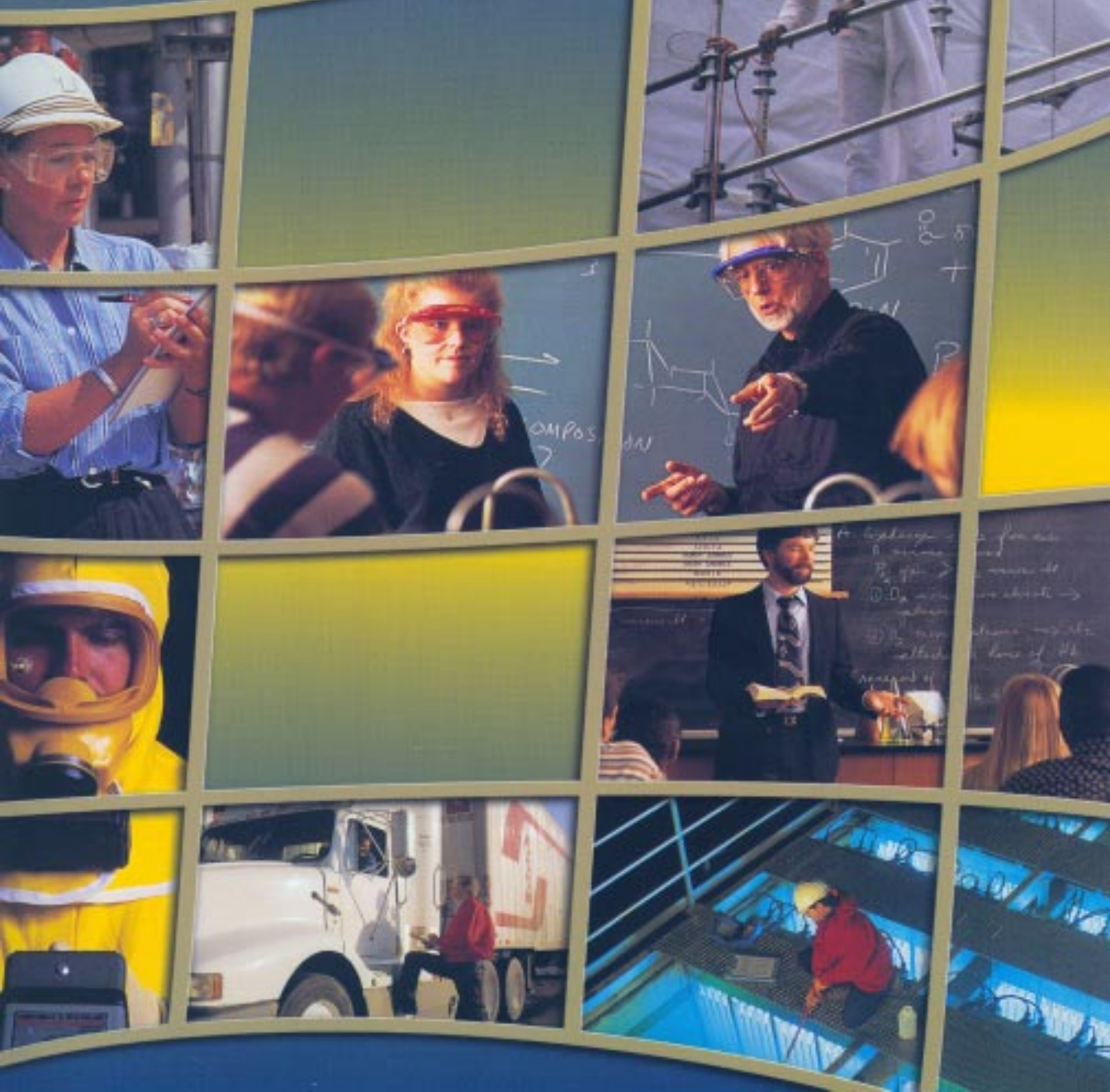


CAREER GUIDE TO THE Safety Profession



Career Guide to the Safety Profession, Second Edition

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Career Guide to the Safety Profession

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Foreword

The *Career Guide to the Safety Profession* provides an overview of the variety of careers available in the safety profession. It also provides guidance in the selection of undergraduate and graduate academic programs, and profiles some safety professionals now employed in both the public and private sectors. The professions described here are critical to the health and safety of all working men and women.

One partner to these professions is the National Institute for Occupational Safety and Health (NIOSH). Part of the Centers for Disease Control and Prevention, NIOSH identifies the causes of work-related diseases and injuries, evaluates the hazards of new technologies and work practices, creates ways to control hazards so that workers are protected, and makes recommendations for occupational safety and health standards. As the Director of NIOSH, every day I see the rewards and challenges of occupational safety and health careers.

In recent decades, a great deal of progress has been made in making workplaces safer. Fatal and disabling injuries have declined substantially. Methods to control many specific hazards have been developed, and some occupational diseases, such as brown lung disease from cotton dust exposure and liver cancer from vinyl chloride exposure, have been nearly eliminated.

But much remains to be done. Workplace injuries and diseases still burden the nation with billions of dollars in workers' compensation and medical care costs, lost productivity and wages. These injuries and illnesses impose pain and suffering on thousands of workers. Furthermore, advancing technologies and processes may bring new hazards to the workplace.

By anticipating and identifying hazards in the workplace—in the tasks, tools, materials, machines, and other aspects of the work environment—safety professionals help assure that men and women go home safe from work. This publication provides students a chance to explore opportunities in vital safety careers.

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Director

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Preface

As we begin the twenty-first century, the safety profession requires highly educated, competent and motivated practitioners. It is estimated that the employment opportunities for safety professionals will continue to be extremely good in the next decade. Today's safety professional serves as a valued member of management, engineering and business teams, often as a leader for projects, initiatives and programs. Job satisfaction in the profession is high. In fact, recent surveys by the American Society of Safety Engineers (ASSE) and the Board of Certified Safety Professionals (BCSP) report a "90% career satisfaction" rate. The various responsibilities which make up the typical daily schedules of safety professionals mean that most are seldom bored—and many times often challenged.

To meet these challenges, safety professionals need a strong academic background. To maintain their competency, safety professionals must continue their professional development throughout their careers. Business, technology and legal changes demand that safety professionals stay abreast of the impacts on professional practice. The clear lines that once separated various safety disciplines in the past have faded as more safety professionals also assume health and environmental responsibilities in business, industry and governmental agencies. Safety professionals with a broad undergraduate background in science, engineering, business, health, education, law, government, and psychology are well prepared to function in today's employment environment.

Achieving a rewarding and successful career in safety is strongly related to education and certification. In a recent survey of Certified Safety Professionals® conducted by the Board of Certified Safety Professionals, 13% of those holding the Certified Safety Professional (CSP®) designation earned over \$100,000 per year. The average pay was about \$75,000 per year. About 45% of the respondents had advanced degrees. Several studies show that those holding the CSP earn about \$15,000 more per year than their non-certified peers.

This guide provides a wealth of information about the various career options available in the safety profession and the educational preparation typically required. We hope that the *Career Guide to the Safety Profession* provides vital information to students considering a rewarding career as a safety professional.

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® "Certified Safety Professional" and "CSP" are certification marks awarded to the Board of Certified Safety Professionals by the U.S. Patent and Trademark Office.

¹ See Page 49 for profiles of BCSP and the ASSE Foundation.

Introduction

As society becomes more complex, there is a constant need for new and advanced goods and services. This, in turn, creates jobs and professions that were unheard of just one generation ago. Because of the very rapid changes in these jobs and professions, it is hard for students to learn about future job opportunities. It is even more difficult to know about the type of preparation that is needed for a particular profession—or the qualities and traits that might help individuals succeed in it.

The purpose of this booklet is to provide in-depth information about the safety profession that should be helpful for students considering a career in this challenging and rewarding field.

For over a century, safety professionals have protected the safety and health of the public by controlling hazards. While these efforts became more sophisticated and widespread during the twentieth century, real progress on a wide front did not occur in the U.S. until after World War II.

In 1970, a major development in safety came about when the U.S. Congress passed the Occupational Safety and Health Act (OSH Act). This legislation was important because it stressed the control of workplace hazards. This, in turn, defined a clear area of practice for the previously loosely organized safety profession. Other legislation passed during

the next twenty years has increased the scope of safety practice into areas of environmental protection, product safety, hazardous materials management and designing safety into vehicles, highways, process plants and buildings.

With the increased emphasis on safety driven by laws, public concern and company values, more colleges today prepare people for careers in safety. The number of people preparing themselves for careers in the safety profession through safety degree programs is increasing. As a result, the safety profession has respect from other established professions such as engineering, medicine and law (all of which had traditionally been involved in hazard control, but had no special training in it).

In the last twenty years, employment in safety has grown dramatically. The period of corporate downsizing in the early 1990's had little impact on professional safety positions. Safety has also become more complex, so that today's safety professionals must have better qualifications. Safety demands the best in all of its practitioners.

The information found in this booklet will explain what the safety profession is about and what to study to become part of it. Hopefully, the information in this booklet will show that there is a place for students in the safety profession.

What is the Safety Profession?

The primary focus for the safety profession is prevention of harm to people, property and the environment. Safety professionals apply principles drawn from such disciplines as engineering, education, psychology, physiology, enforcement, hygiene, health, physics, and management. They use appropriate methods and techniques of loss prevention and loss control. “Safety science” is a twenty-first century term for everything that goes into the prevention of accidents, illnesses, fires, explosions and other events which harm people, property and the environment.

The U.S. has a lot to gain by reducing the number of these preventable events. The National Safety Council estimated that in the U.S., accidents alone cost our nation over \$480.5 billion in 1998. Fire-related losses exceed \$8 billion per year.

Illness caused by exposing people to harmful biological, physical and chemical agents produce great losses each year and accurate estimates of their impact are hard to make. In addition, pollution of all kinds causes damage to all forms of life. This generates skyrocketing cleanup costs and threatens the future habitability of our planet.

The term “safety science” may sound new, but many sources of safety science knowledge are hundreds of years old. All of the following are knowledge areas of safety science:

- **Chemistry** and **biology** provide knowledge about hazardous substances.

- **Physics** tells people about electricity, heat, radiation and other forms of energy that must be controlled to ensure safe use.
- **Ergonomics** helps people understand the performance limits of humans and helps them design tasks, machines, work stations and facilities which improve performance and safety.
- **Psychology** helps people understand human behaviors that can lead to or avoid accidents.
- **Physiology, biomechanics** and **medicine** help people understand the mechanisms of injury and illness and how to prevent them.
- **Engineering, business management, economics**, and even **sociology** and **geology** give people the knowledge necessary to improve safety in our society.

The things that can cause or contribute to accidents, illnesses, fire and explosions, and similar undesired events are called “hazards.” Safety science gives people the ability to identify, evaluate, and control or prevent these hazards. Safety science provides management methods for setting policy and securing funds to operate safety activities in a company.

Hazard control activities go on every day throughout the world. From the careful design and operation of nuclear power generating stations to the elimination of lead-based paints in homes, the efforts to reduce threats to public safety go on nonstop. The application of safety science principles

occurs in many places: in the workplace, in all modes of transportation, in laboratories, schools, and hospitals, at construction sites, on oil drilling rigs at sea, in underground mines, in the busiest cities, in the space program, on farms, and anywhere else where people may be exposed to hazards.

Safety science helps people understand how something can act as a hazard. People must know how and when the hazard can produce harm and the best ways to eliminate or reduce the danger. If a hazard cannot be eliminated, we must know how to minimize exposures to the hazard. This costs money and requires assistance from owners and managers. Safety professionals must know the most cost-effective ways to reduce the risk and how to advise employees and owners. By applying safety science, all of these activities can be effectively carried out. Without safety science, safety professionals rely on guesswork, mythology and superstition.

Safety professionals are the specialists in the fight to control hazards. To be called professionals, they must acquire the essential knowledge of safety science through education and experience so that others can rely on their judgments and recommendations. Top safety professionals demonstrate their competence through professional certification examinations. Regardless of the industry, safety professionals help to achieve safety in the workplace by identifying and analyzing hazards which potentially create injury and illness problems, developing and applying hazard controls, communicating safety and health information, measuring the effectiveness of controls, and performing follow-up evaluations to measure continuing improvement in programs.

What Safety Professionals Do

Wherever people run the risk of personal injury or illness, they are likely to find safety professionals at work. Safety professionals are people who use a wide variety of management, engineering and scientific skills to prevent human suffering and related losses. Their specific roles and activities vary widely, depending on their education, experience and the types of organizations for whom they work. Safety professionals who have earned doctoral degrees are often found at the college and university level, teaching and doing research, public service and consulting. Most safety professionals, however, have bachelor's or master's degrees. These professionals may be found working for insurance companies, in a variety of industries, for state and federal agencies like the Occupational Safety and Health Administration (OSHA), and in hospitals, schools and nonprofit organizations.

Safety professionals' precise roles and responsibilities depend on the companies or organizations for whom they work. Different industries have different hazards and require unique safety expertise. However, most safety professionals do at least several of the following:

- **Hazard Recognition:** identifying conditions or actions that may cause injury, illness or property damage.
- **Inspections/Audits:** assessing safety and health risks associated with equipment, materials, processes, facilities or abilities.
- **Fire Protection:** reducing fire hazards by inspection, layout of facilities and processes, and design of fire detection and suppression systems.
- **Regulatory Compliance:** ensuring that mandatory safety and health standards are satisfied.
- **Health Hazard Control:** controlling hazards such as noise, chemical exposures, radiation, or biological hazards that can create harm.
- **Ergonomics:** improving the workplace based on an understanding of human physiological and psychological characteristics, abilities and limitations.
- **Hazardous Materials Management:** ensuring that dangerous chemicals and other products are procured, stored, and disposed of in ways that prevent fires, exposure to or harm from these substances.
- **Environmental Protection:** controlling hazards that can lead to undesirable releases of harmful materials into the air, water or soil.
- **Training:** providing employees and managers with the knowledge and skills necessary to recognize hazards and perform their jobs safely and effectively.
- **Accident and Incident Investigations:** determining the facts related to an accident or incident based on witness interviews, site inspections and collection of other evidence.
- **Advising Management:** helping managers establish safety objectives, plan programs to achieve those objectives and integrate safety into the culture of an organization.
- **Record Keeping:** maintaining safety and health information to meet government requirements, as well as to provide data for problem solving and decision-making.

- **Evaluating:** judging the effectiveness of existing safety and health related programs and activities.
- **Emergency Response:** organizing, training and coordinating skilled employees with regard to emergencies such as fires, accidents or other disasters.
- **Managing Safety Programs:** planning, organizing, budgeting and tracking executions of activities to achieve safety objectives in an organization or to implement administrative or technical controls that will eliminate or reduce hazards.

No matter where people work, travel, live or play, conditions exist that can result in personal injury or illness. And wherever the possibility of personal injury or illness exists, they will find safety professionals dedicated to preventing human suffering and related losses.

Successful safety professionals are effective communicators with strong “people skills.” Most people in this profession characteristically possess the desire to help and work with others. The safety professional faces new challenges almost daily. The satisfaction of knowing that people have been protected because harmful accidents and other incidents have been prevented is just one of the many rewards associated with “what safety professionals do.”

Where Safety Professionals Work

Since safety professionals provide technical assistance in identifying, evaluating and controlling hazards, safety professionals work virtually anywhere where people might be exposed to hazards. There are positions for safety professionals in every part of the United States and in other countries.

No matter what a company's business is, its employees can encounter some type of hazard, either at work, getting to and from work or at home or play. Even working at a computer terminal can be hazardous, producing long-term injuries to the hand and wrist, back or other parts of the body. Whether a company does manufacturing, mining, transportation, agriculture, chemicals, fuels production, construction, or provides services, it will always face hazards in some or all of its operations. It is likely that the company would employ or contract with one or more safety professionals.

It is common for companies to employ safety professionals at particular work sites. At corporate offices, safety professionals can coordinate the hazard control activities away from the work sites. Some college graduates in safety begin as Assistant Safety Managers at small plants or company work sites. After a period of training and successful performance, the graduates may advance to Safety Director at a small plant. Later, they may advance to similar positions at larger facilities.

Many companies have combined safety, industrial hygiene, environmental affairs, fire protection and ergonomics into a single department. A safety professional may advance by overseeing the work of all areas in the department.

Many safety professionals aspire to become a Corporate Safety Manager based at the corporate office. There they have broader responsibilities and may have to travel often to visit various work sites. Other safety professionals prefer to remain at one work site where their responsibilities can be just as challenging, but where travel is light.

Figure 1 shows where safety professionals are employed in general. Tables 1 through 5 provide more details about employment for safety professionals.

A growing number of safety professionals who have performed very well in their safety positions are being promoted to other responsible positions which extend beyond safety. For example, they might be placed in charge of a department, unit or the entire operation at a site. Since safety is an important part of all successful operations, safety professionals are being recognized as people who can effectively contribute to other activities within the organization.

Figure 1. Industries in which Safety Professionals Work.
Based on a 1999 BCSP study of over 4,300 CSPs.

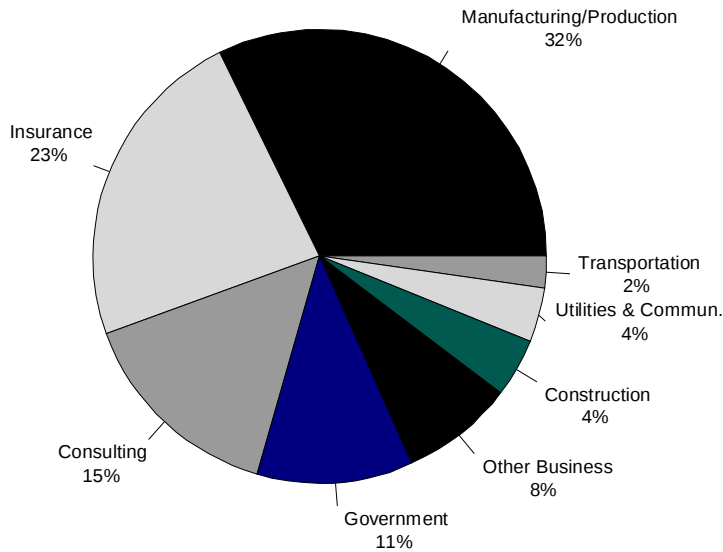


Table 1. Safety Professionals within Manufacturing and Production Industries (32%)

<u>Industry</u>	<u>Percent</u>
Apparel and other finished fabric products	<1
Chemicals and allied products	25
Crude petroleum and natural gas	9
Electrical machinery, equipment, and supplies	10
Fabricated metal products	3
Food products	4
Furniture and fixtures	<1
Leather and leather products	<1
Lumber and wood products	1
Machinery	2
Ordnance	2
Paper and allied products	3
Petroleum refining and related industries	10
Primary metal industries	3
Printing, publishing and allied industries	1
Professional, scientific, and controlling instruments	3
Rubber and plastic products	3
Stone, clay, and glass products	2
Textile mill products	1
Tobacco	1
Transportation equipment	6
Miscellaneous manufacturing	9
Total	100

Table 2. Safety Professionals within Other Businesses (8%)

<u>Industry</u>	<u>Percent</u>
Agricultural, forestry, and fisheries	2
Banking and real estate	1
Educational services (colleges, universities, libraries)	33
Hotels and miscellaneous personal services	5
Medical and health services	12
Mining	11
Nonprofit membership organizations	2
Retail trades	4
Wholesale trades	4
Non-classifiable establishments	24
Total	100

Table 3. Safety Professionals within Government (11%)

<u>Level of Government</u>	<u>Percent</u>
International	1
Federal	72
State	11
Local	16
Total	100

Table 4. Safety Professionals within Utilities and Communication (4%)

<u>Industry</u>	<u>Percent</u>
Utilities	76
Communication	24
Total	100

Table 5. Safety Professionals within Transportation Industries (2%)

<u>Industry</u>	<u>Percent</u>
Air	38
Local, suburban and urban passenger	5
Motor freight transportation and warehousing	14
Railroad	33
Water	10
Total	100

Some safety professionals work for consulting firms that are hired by organizations to provide specialized hazard control services. These services might be provided on a one-time basis, or they might be performed on a regular basis. For example, NASA and other federal government agencies frequently contract with consulting firms for many of their engineering and other technical functions, including safety work. The consultants have offices on site and work side-by-side with federal employees on a long-term basis. Many large corporations are now using contractors in the same way. While some safety consultants provide their services to different clients all over the country, others work mainly in one city, state or area.

A safety professional may work in a large consulting firm with dozens of other consultants. However, many consultants work alone and are self-employed frequently on short-term assignments in their particular specialty.

Safety consulting work covers a wide spectrum of hazard control activities. Some consultants specialize in evaluating and controlling only specific types of hazards. For

example, safety consultants working as industrial hygienists concentrate on health hazards such as vapor, noise, radiation, toxic dusts, gases, or other physical agents. Other safety consultants might specialize in construction hazards, or hazards of boilers, cranes, aircraft or chemical plants. A safety professional who gains a high degree of expertise with specific types of hazards, either through education or experience (and usually both) can have a satisfying and rewarding career as a safety consultant. Those involved in consulting work also need to be able to manage the day-to-day aspects of operating a private business.

Insurance companies often provide consulting services to the policy holders they insure. These safety professionals are known as loss control representatives. They work for an insurance company and visit the facilities of insured policy holders to assist them with hazard recognition, evaluation and control. Many safety professionals begin their careers as loss control representatives.

Because of the tragic losses caused by uncontrolled hazards, federal, state and local government have created laws or regulations regarding how and when hazards are to be controlled. To enforce these laws and regulations, government agencies employ safety professionals as inspectors and accident investigators. They visit sites where uncontrolled hazards are thought to exist. These government-employed safety professionals usually work in one area of the country or within a state. They may also need to visit sites in that area, either on a regular or occasional basis. They provide the information needed to determine if government laws, regulations or standards have been met. From their recommendations, changes can be made to achieve better control of any hazard found to exist.

Employment Outlook for Safety Professionals

The employment outlook for safety professionals is very favorable. Depending on their education, communication skills, experience and professional certifications, safety professionals can expect to have a rewarding career far into the future. Specialists will be needed as advancements in technology, regulations and public expectations increase.

With a bachelor's or master's degree, graduates can expect to find rewarding employment in industrial settings or in the public sector. Individuals may find employment in research laboratories and at colleges and universities, although some of these positions may require doctoral degrees. They may also find a career with federal, state and local safety agencies.

The safety profession includes many new job classifications. For example, the field of ergonomics has grown as injury rates have climbed in meat processing, manufacturing and at computer workstations. Also, there is an increased emphasis on highway and construction safety. All of these areas offer good employment opportunities.

Insurance and worker's compensation costs have escalated over the last two decades and have become economic concerns for many employers. This has led to a growing emphasis on safety for companies and more employment opportunities for safety professionals.

Responsible companies, concerned public and special interest groups have increased protection for our environment. The techniques and principles involved in achieving this are similar to those used in accident prevention. Safety professionals are often assigned responsibilities for environmental affairs. This increases the need for safety professionals in organizations with environmental hazards.

There is increased coverage in the print and broadcast media about hazardous waste spills, accidents, and other events that produce losses which could have been avoided through preventive measures and by better management. The adverse publicity creates opportunities for people trained to develop management systems that prevent losses. For some time, the career opportunities for innovative safety professionals have grown faster than the number of trained and qualified individuals available.

The need for safety professionals has continued to grow in spite of a shrinking manufacturing base. While many non-U.S. countries have safety standards below those found in the United States, responsible companies require their foreign plants to safeguard all employees. Foreign countries are also raising their safety, health and environmental standards. In many cases, international standards now protect workers everywhere.

Employment in the field of safety has continued to grow over the years. This growth has continued, even in bad economic times. There is no reason to believe that the need for more safety professionals will diminish in the near future.

Salaries

Salaries range from lows of about \$30,000 for safety inspectors to highs of \$150,000 for highly qualified individuals in demanding positions. Many recent graduates in the safety sciences receive starting salaries near or above \$40,000 per year.

The top people in the safety profession often earn salaries comparable to top people in law, medicine, engineering and accounting. The positions of those leading loss prevention efforts for large corporations or those managing or owning consulting firms often provide compensation well into six figures.

An average mid-career safety professional with a bachelor's or master's degree can expect to earn between \$60,000 and \$75,000 per year. The Board of Certified Safety Professionals regularly monitors salaries of those safety professionals holding the Certified Safety Professional (CSP) designation. Summary data and details by gender, degree type and level, age, industry, state and other factors are available from BCSP. Professional societies, such as ASSE, conduct salary studies from time to time and publish the results. Contact ASSE to request a copy of the most recent ASSE Salary Survey.

Opportunities for Advancement

A person's ambition, level of education, experience, skills and certifications all affect career paths in safety. As with other professions, when people perform well over

a period of time, they become candidates for positions of greater responsibility. More and more safety professionals have broad education, experience and professional credentials and are well qualified to move into different parts of business organizations. Also, experienced safety professionals usually have little trouble moving from one organization to another.

Some people may seek advanced degrees. Over one third of safety professionals today have advanced degrees in some field. Those with a doctoral degree may find a teaching career to their liking or find opportunities in research on specific safety issues as technical advisors. The National Institute for Occupational Safety and Health (NIOSH) has continuing needs for research on many kinds of workplace hazards.

Safety professionals may also attend professional schools and go into law practice or administration. Safety careers afford an individual experience that is far broader than many others. Safety professionals can, and often do, get involved in many aspects of a business.

Opportunities for Minorities and Other Groups

Minority safety practitioners have been among the ranks of safety professionals since the 1800s, yet their participation was not well recognized until recently. Early examples include Alice Hamilton, MD, who began her research into toxic substances and workplace diseases at the turn of the century. Garret A. Morgan and Andrew J. Beard are early examples of African-Americans whose engineering designs and patents significantly enhanced the safety and health of Americans. Beard, in the late 1800s, invented the automatic linking coupler, which improved a very hazardous job performed by railroad

yard workers. Morgan invented the gas mask used in the early 1900s in underground mines. He also patented the electric traffic signal.

As the safety profession began to gain credibility in the 1970s, there were very few women in the profession. Today, it is estimated from recent studies that about 15% to 20% of those entering the safety profession are women.

The number of women, minorities and people with disabilities who are entering the safety profession is likely to continue growing. Some evidence of this growth can be found in recent studies of minorities graduating with undergraduate degrees in the allied fields of industrial engineering and public health. It is estimated that in the future, about one fourth to one third of all degreed entry-level safety professionals will be from a minority population of the United States.

Careers in safety are available and open to men and women of every racial and ethnic background. Having a physical disability is not a barrier to success in the safety profession. There is a trend toward diversity in the work place.

Under the Americans with Disabilities Act (ADA), employers must provide access to employment for those with disabilities. Not only is the safety profession open to those with disabilities, many safety professionals need to evaluate and control hazards which may impact those with disabilities.

Should I Become a Safety Professional?

When choosing a future profession, what should students look for? Probably all of the following considerations are important: a profession that is respected, one that is associated with important work, one that gives a person a feeling of accomplishment, and one that provides growth and the potential to advance in responsibility. Individuals should also seek a profession where compensation reflects skills and accomplishments. A desirable profession provides stable employment, variety in the daily routine, while keeping interest high and stress low. These are characteristics of an ideal profession. While no profession is ideal for everyone, the safety profession scores very high on nearly all of these factors.

Some students may wonder if they have what it takes to be a successful safety professional. Here are some important things to consider. Are they motivated by a desire to help others? Do they believe that it is important to serve their neighbors and the community? Do they place a high value on health and the quality of life? Such motivation would help them be successful safety professionals, and at the same time, provide a great sense of satisfaction in a job well done.

Successful safety professionals must develop good skills in working with people and communicating with them. Many of these skills are gained during college and after a degree is completed. Safety professionals work with practically everyone in an organization and should feel comfortable in talking and working with people of all ages and backgrounds.

Safety science is challenging, and the college course work can be difficult, but interesting. Students will do quite well if they have good study habits and are willing to work hard. A college degree is essential for most safety professional positions. The more safety science courses students complete, the better prepared they will be for a safety career. The safety professional must understand many technical concepts, so students who like science and mathematics will probably find safety science interesting.

Some students are not especially outstanding in any one particular academic area, but they are excellent organizers. They enjoy planning and carrying out activities of all sorts, and when one event is completed, they are off to start planning the next one. These are interests and skills that can help them become successful managers in an organization. Managers set up programs to achieve agreed-upon objectives and draw together other parts of the organization to work on carrying them out. Many safety professionals hold positions as managers, so planning and organization skills are very important.

Many students entering college are absolutely certain about the career they want to pursue. Many students still are not sure even after they graduate from college. Being uncertain about a career is normal. It is quite common for students to change majors after they are in college.

While some may view the safety profession as being rather specialized, an undergraduate safety curriculum is actually rather broad.

Many colleges have a program that exposes students to a broad range of courses and fields of study. Such a program can help them find those activities and ideas that interest them the most. Undergraduate safety curriculums require a relatively wide assortment of courses. This provides a reasonably good preparation for entering business or industry in any functional area.

Students in safety science complete business courses as well as mathematics and science courses. They take courses in communications and in the use of computers. These are subjects that will have a high value, even if they should later decide to switch majors.

Most safety science curriculums offer internship possibilities so that students can work in a safety-related position before they graduate. This is the ultimate test that aspiring people can use to answer the question, "Should I become a safety professional?"

How to Become a Safety Professional

This section details the stages of education and training necessary to become a safety professional and how to continue practicing to accelerate the rate of success after entering the field.

High School Preparation

Any young person considering a career as a safety professional should take college preparation courses while in high school. Since the safety professional position is interdisciplinary, it is important to have a broad background in science and mathematics, and to develop good communication skills. Safety professionals need knowledge in biology, chemistry and physics. They often use problem-solving skills to identify, analyze, and control hazards, and frequently work with engineering specialists.

Here are some good ways to learn about the safety profession:

- Talk to safety professionals about their work.
- Visit safety professionals at their places of work and see what the job is all about.
- Read about safety problems, accidents or disasters in newspapers and magazines and consider how these events could have been prevented.
- Do a science project on workplace safety or health, consumer product safety, traffic safety, fire protection, or some similar subject.
- Visit industrial plants on field trips and ask questions about safety programs.

There are a limited number of colleges that offer degrees in safety and related specialties. Students may contact the American Society of Safety Engineers for a copy of the brochure, *Directory of College and University Safety and Related Degree Programs*. This regularly updated pamphlet lists colleges that offer degrees in safety and related fields. It tells which safety programs are accredited by a commission of the Accreditation Board for Engineering and Technology (ABET). It is also important to select a college or university which is accredited as a post-secondary educational institution by one of the six regional accrediting bodies recognized by the American Council on Education (ACE).

Directories of college and university programs that are found in bookstores may not list safety degree programs, but might still provide other valuable information about a school. Information about costs, facilities, entrance requirements and other details mentioned in these directories can help students select a school. Students can write to the schools and safety degree programs that interest them. The schools will provide up-to-date information about their requirements, programs and faculty.

Students can talk to their guidance counselors, teachers and others who have been to college for advice in selecting one. They can help students decide whether a community college (two-year programs leading to an associate degree) or a college or university (four-year programs leading to a bachelor's degree) is right for them.

Community and Technical Colleges

A number of community and junior colleges offer an associate degree in safety or a related field. People graduating from these programs are hired for limited positions in safety. They may help manufacturers, construction companies or other industries meet OSHA's hazard control standards.

For some people, two-year degree programs are a good choice. They allow individuals to start working in a field at an earlier stage of education. There is usually a more flexible class schedule for those who work while going to school. These schools usually cost less than four-year colleges and universities. However, a two-year degree may not allow advancement to the more challenging positions in this field.

If students transfer to a four-year safety program, they may not get full credit for associate degree courses. Students should check with the four-year programs they might want to attend later. These programs advise students what courses they require and how much credit they allow. Also, they can advise students about standards they use in accepting transfer students from two-year programs.

Four-Year Colleges and Universities

A number of four-year colleges and universities offer undergraduate degrees in safety. Today, over 90% of those in the safety profession have earned at least a bachelor's degree. About 30% of those entering the field have a bachelor's degree in safety, while many move into safety from other disciplines (engineering, business, physical sciences, etc.) and later pursue safety studies.

A bachelor's degree in safety provides a solid foundation for work as a safety professional. A major in safety typically includes preparatory courses and professional courses outside of the major. To prepare for the safety professional courses, college students are normally required to take courses in mathematics through beginning calculus, statistics, chemistry with laboratory work, physics with laboratory work, human physiology or biology, and introductory courses in business management, engineering mechanics and processes, speech, composition and psychology. Students in safety must also acquire good computer skills, including the ability to use the Internet and important business and safety software packages.

Most preparatory courses are taken during freshmen and sophomore years. Professional courses are usually taken during junior and senior years, along with some electives. Professional safety courses include safety and health program management, design of engineering hazard controls, industrial hygiene and toxicology, fire protection, ergonomics, environmental safety and health, system safety, accident/incident investigation, product safety, construction safety, educational and training methods, assessment of safety performance, and behavioral aspects of safety. Students may also elect to take specialty courses beyond the required courses.

Most safety degree programs offer experiential education courses. These courses provide opportunities for students to work with safety professionals in companies or in positions that offer developmental experience. These internship programs usually involve academic credit and may include pay from the company or organization with whom the student works.

Students seeking to enter safety degree programs should carefully review several schools, their program offerings, entrance requirements and the financial assistance provided. Some programs have enrollment caps and are quite selective in the numbers of students accepted.

Graduate Study in Safety Science

About 40% of today's safety professionals have advanced degrees. Some of those with an advanced degree in safety graduated with a bachelor's degree in a non-safety field. They may use a master's degree in safety to prepare for and enter the safety profession. Some who get their safety preparation at the bachelor's level also pursue graduate study in safety or a safety-related specialty, such as industrial hygiene, environmental science, public health or ergonomics. Some work toward advanced degrees in related fields, such as business and engineering, that will enhance their career opportunities.

Several master's degree programs in safety are accredited by the Related Accreditation Commission of ABET or another of its commissions. Typically, students entering these programs must have completed certain undergraduate safety courses, or they will be required to complete some undergraduate courses to adequately prepare themselves for advanced courses in safety.

Graduate programs can offer different safety specialties besides advanced preparation in safety science. These specialties may be in management, engineering and technology, environmental health, fire protection, ergonomics, industrial hygiene, or other areas of safety science.

A few schools offer doctoral studies in safety science or related subjects such as industrial

hygiene, public health, fire protection engineering, environmental health or environmental studies. Most safety positions do not require a doctoral degree. However, teaching positions at universities and colleges, research positions, and some high-level advisory positions for large employers and government agencies may require a doctoral degree. Doctoral programs, including those in safety, are not accredited because each student has a customized program. Schools are free to develop their own specializations and degree requirements, but most involve some training in research methods and teaching theory.

Financial assistance at the graduate level varies considerably by program. In some programs, nearly all graduate students have teaching or research assistantships with tuition and fee waivers included. Some programs offer scholarships or tuition and fee waiver assistance. Some have work-study programs, or have links with government agencies or companies that allow students to work and attend school at the same time.

Licensing and Certification

Because the work of safety professionals has a direct impact on public safety and health, government organizations, employers and those awarding contracts are concerned that safety professionals be fully qualified and competent to do their jobs. Safety professionals may therefore need other credentials in addition to their educational degree. These credentials might include licenses, registration and professional certification. To date, no state requires safety professionals to be licensed in order to practice. However, some states require fire protection engineers to be registered.

The safety profession has established its own professional certification program to provide

some means for assessing professional competency. The Board of Certified Safety Professionals, established in 1969, sets competency standards for professional safety practice, evaluates candidates' qualifications, tests their knowledge through examinations and offers the Certified Safety Professional® (CSP®) designation to those who meet all requirements.

It is preferred that applicants meet the model academic requirement (a bachelor's degree in safety from an ABET-accredited program) and pass a two-level examination to receive the CSP. Candidates must have at least an associate's degree in safety or a bachelor's degree in any field. In addition, candidates not meeting the model education requirement must have more than the minimum of four years of professional safety experience.

The first examination toward the CSP (Safety Fundamentals) is designed to test basic knowledge appropriate to professional safety practice. Students graduating from accredited four-year safety degree programs are permitted to take this examination during their last semester. The second examination (Comprehensive Practice) focuses on applications of typical professional practice.

Those holding the CSP designation must be recertified every five years, either through re-examination or by meeting standards for continuing education and professional practice. These standards encourage the safety professional to be active in the profession and to maintain the necessary professional skills to practice effectively.

Today, professional certification through the CSP has become important to safety professionals. A majority of employers prefer or require applicants for safety positions to hold the CSP, particularly for mid-career or senior positions. On average, CSPs earn about \$15,000 more per year than their peers

without certification. Over the last decade, the rate of pay increase was higher for those holding the CSP than for those without.

More and more government laws, regulations and standards include the CSP. Contracts involving construction and other services often include requirements that contractors employ safety professionals with the CSP certification. While there are many titles and designations in safety, industrial hygiene, environmental practice and ergonomics in the United States only a few are accredited by national organizations which set standards for voluntary, peer certifications. The CSP designation is accredited by two national organizations: National Commission for Certifying Agencies (NCCA) and Council of Engineering and Scientific Speciality Boards (CESB). Many employers and government agencies use the national accreditations as a standard for employment and contracts.

OHST and CHST certifications can serve as stepping stones to the CSP (see more information about these certifications on Page 50 or at www.cchest.org).

Professional Societies

A good way to stay current in safety is to belong to a professional society. Such organizations have journals, conferences, symposiums and continuing education courses, while some may have local chapters. Some societies, such as the American Society of Safety Engineers, have student sections at schools offering safety degrees. These sections have activities to help students learn about the safety profession. Some activities in local chapters create opportunities to meet practicing safety professionals. These contacts often lead to internships and permanent jobs. At a minimum, these contacts offer insight into current practice or the ability to visit safety professionals in their job settings.

Areas Where Safety Professionals Can Specialize

Safety professionals work in many different industries, job settings and specialties. The summaries below give examples for many of them.

Industrial Safety

Many safety professionals work in manufacturing and production operations to help ensure that working conditions and work methods are safe and healthful for employees. Nearly every large plant or industrial facility employs at least one full-time safety professional. Once safety professionals recognize hazards, they evaluate them, develop recommendations for controlling them and advise members of the management team. They also must be able to advise management about the best means for complying with regulations.

Industrial safety professionals must observe work activities and identify hazards in a wide variety of operations, such as lifting, working in high places, handling chemicals, operating machinery, storing explosives, excavating and repairing or maintaining equipment. They try to formulate plans and programs to prevent these hazards from happening. Industrial safety professionals must know health, safety and fire protection regulations which apply to any operations.

They must prepare recommendations and advise managers about the best means for complying with standards, reducing hazards and making production activities safer. Industrial safety professionals need to be

good communicators, since they often interact with employees, supervisors and managers when checking for hazards or working on options to control them. They often enlist employee participation in these activities. Frequently, they seek to persuade managers and employees to change operations or procedures and to spend money to make people safer.

In addition, to be effective, the industrial safety professional must be a part of the management team which improves productivity at the facility.

Industrial Hygiene

Industrial hygienists specialize in workers' exposure to chemical and physical hazards created by industrial processes. For example, they might evaluate exposure to airborne lead created by a battery manufacturing process, or they might measure the exposure to noise produced by a rip saw in a furniture manufacturing shop.

Most safety professionals have some responsibilities in their practice for industrial hygiene that may not make them a specialist.

An industrial hygienist is trained to recognize health hazards, to evaluate their extent and to control them if an overexposure exists. An industrial hygienist evaluates hazards by studying the process, measuring the exposure and comparing samples to acceptable exposure levels.

The control of overexposure might involve changing the process to eliminate the hazard, substituting a less hazardous material, isolating the process or the worker, ventilating the process, or providing personal protection (for example, gloves and respirators) to the worker.

Industrial hygienists generally have an undergraduate degree in engineering or the physical, chemical, biological or safety sciences. Most industrial hygienists have a master's degree in industrial hygiene. They most often work for industries, government agencies and environmental consulting firms. A few industrial hygienists work in academic settings as teachers and researchers. Working in this setting generally requires a doctoral degree.

Industrial hygienists do not generally need to be licensed to pursue their profession. However, most industrial hygiene specialists hold the Certified Industrial Hygiene (CIH) certification. This requires at least five years of relevant experience before the successful completion of two examinations. CIHs must maintain their certification annually by attending professional meetings, further education or other similar professional development activities.

Environmental Safety

Protecting the environment in the U.S. is a massive effort being conducted on several fronts. Businesses of all sorts are trying to either eliminate the release of materials that can harm the public or damage the environment, or recover and recycle excess materials for environmental conservation. Another effort is being made all across America to clean up waste sites where toxic substances were spilled or have been dumped in the past. These efforts require the control of environmental safety and health hazards.

Environmental safety work requires extensive knowledge of OSHA standards, other government or client safety regulations, and an understanding of hazards and controls (that is, construction, ergonomics, fire protection, industrial safety, industrial hygiene and environmental health). In addition, environmental safety requires a working knowledge of environmental laws and regulations, such as the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA), the Toxic Substances Control Act (TSCA) and others. Environmental safety professionals can gain this knowledge from undergraduate or graduate studies, extensive on-site experience, or a combination of both.

There are three general areas where the environmental safety professional can pursue career opportunities:

- **Industrial/Government Sector:** People can serve as environmental safety professionals for a specific facility or organization involved with OSHA, Department of Transportation (DOT), and Environmental Protection Agency (EPA) compliance, and state health and safety and environmental regulations. Additional duties may include overseeing the health and safety of on-site contractors.
- **Consulting:** People can work for design engineering firms and perform health and safety functions for their government or industrial projects. They can sell health and safety services to outside clients, including the private and public sector. Additional health and safety responsibilities may involve overseeing the health and safety of contractors when an engineering firm is providing construction management or engineering services to a client.

- **Contracting:** This role involves being employed by and providing in-house health and safety services to remediation contractors who actually clean up hazardous waste sites. Working in this arena requires an extensive construction background, since it involves hazardous waste activities coupled with heavy construction work.

In all three situations, it is desirable for the environmental safety professional to pursue professional certifications, specifically the Certified Industrial Hygienist (CIH) and the Certified Safety Professional (CSP). Many government and private sector remediation projects require that the person administering the health and safety program be certified as a CIH or a CSP. Consulting firms also value certifications because it makes the individual, and hence the firm, more attractive when selling services.

It is desirable to have these certifications in any situation where an organization is overseeing contractors and the project specifications require contractors to have certified personnel. Although not always required, it adds credibility if the primary contractor also employs certified personnel.

Environmental safety specialists need comprehensive knowledge of safety, industrial hygiene and environmental areas. With this wide range of knowledge, they can pursue a career in other health and safety specialties.

Fire Protection Engineering

Fire protection engineering is one of many interesting and challenging professional safety specialty areas. These safety specialists use the basic tools of engineering and science to help protect people, property and operations from fire and explosions.

Employers and personnel recruiters consistently report good job opportunities with competitive starting salaries for fire protection engineers.

Fire protection engineers can be called on to provide a broad range of services. Some perform fire safety evaluations of buildings and industrial complexes to determine the risk of fire losses and how best to prevent them. Others design systems that automatically detect and suppress fires and explosions, as well as fire alarm, smoke control, emergency lighting, communication and exit systems. Fire protection engineers perform research on materials and consumer products, or do computer modeling of fire and smoke behavior. Others investigate fires or explosions that have occurred, prepare technical reports or provide expert courtroom testimony in legal cases.

Fire protection engineers work at the nerve centers of large corporations. They oversee the design and operational fire safety of complex manufacturing facilities in multinational business networks. They also work for insurance companies, surveying major facilities and performing research, testing and analysis.

Fire protection engineers can be found at all levels of government, including civilian and military agencies, local fire departments, building code departments and state fire marshal offices. They work for architectural and engineering firms and specialty consulting groups. Interesting jobs are available in trade associations, testing laboratories and at colleges and universities.

Thanks to the extensive fire research done in recent decades, fire protection engineering is making the transition from being based only on practical experience to an exciting engineering discipline that incorporates state-of-the-art science and computer capabilities.

A few universities offer fire protection or fire protection engineering degree programs at the bachelor's, master's and doctoral levels. To obtain information on fire protection careers, students may contact the Society of Fire Protection Engineers. (See Resources, page 45.)

Ergonomics

Ergonomics is the science of fitting the job to the person. Most safety professionals must deal with ergonomics in general safety practice. Ergonomics can be a specialty as well. Ergonomists (also called human factors engineers) specialize in the relationships between people and their work. They design the work environment (such as facilities, machines, furniture, equipment, workstations, tools and work methods) to match job demands with workers' capabilities, limitations and expectations. A fundamental principle of ergonomics is to design equipment and jobs to prevent errors, accidents, injuries or harm.

Ergonomists work on a wide variety of safety and health hazards. Many ergonomists deal with the physical aspects of work, such as:

- Designing lifting tasks to reduce the risk of back injuries.
- Designing machines and equipment to reduce the force, frequency and flexion of repeated tasks that eventually injure joints, muscles and nerves. An example is designing machine guards that protect workers while still allowing smooth, efficient motion.
- Designing chairs that promote comfortable and healthy work postures.
- Designing work-rest schedules on physically demanding jobs to prevent excessive fatigue.

Ergonomists who specialize in solving these problems usually have a strong background

in engineering, with additional course work in physiology, anatomy and biomechanics.

Other ergonomists focus on the psychological and mental aspects of work such as:

- Designing effective warning labels to promote the safe operation of machines and tools.
- Designing displays (gauges, dials, alarms, etc.) and controls (buttons, knobs, steering wheels, etc.) for vehicles and other complex machines to reduce the chance of operator error and accidents.
- Designing training aids (instruction books, videos, simulators, etc.) to teach workers the proper and safe way to perform their jobs.

These ergonomists usually have a strong background in psychology with additional training in engineering or design.

Most ergonomists have at least a master's degree, since there are few undergraduate programs in ergonomics. Typically, ergonomists have undergraduate degrees in engineering or psychology before pursuing specialization in ergonomics at the graduate level. However, students with undergraduate training in safety sciences can also be considered for graduate training in ergonomics.

Career opportunities exist in industry (product design, work process and methods design), government (OSHA compliance officers), insurance companies (loss control representatives), private consulting and academic settings (research and teaching).

System Safety

System safety specialists typically work with major new technological programs.

Aerospace, military, medical, scientifically advanced projects and high-tech industries have relied on the system safety specialist to develop concepts, designs and products that have a high reliability of operation and low level of risk.

Have you ever marveled at the complexity of the space shuttle? Have you read about the complexity of software that manages the controls in today's aircraft and guides a plane safely through the skies? Have you ever thought about the management of materials flowing through chemical plants and the range of temperatures, pressures and chemical steps they experience while achieving the desired material? Each of these devices and processes works due to a high degree of reliability. In each case, system safety specialists reviewed the concept, design and construction of these magnificent machines and processes to ensure that they work correctly every time, without harm to users, operators or the equipment itself.

System safety is an analytical field, born of a high-tech need to develop quality products that have a minimum potential for failure. The system safety specialist reviews the design concept to identify the hazards associated with a human or machine failure. During design, the specialist (sometimes referred to as a system safety engineer) prescribes modifications to the design, or identifies the need to install redundant or backup systems to ensure reliability during operation. During testing, system safety specialists observe tests-in-progress or test results to see firsthand how a system interfaces with its environment. In recent years, this specialist has also been called on to ensure that safe decommissioning of outmoded systems occurs. Today they also analyze software for potential faults which can cause harm to people or the systems. Some specialize in analyzing electrical

circuits and electrical systems and equipment for harmful events. Some work mainly with mechanical equipment and powered systems. Others work with chemical process plants to ensure that failures do not cause fire, explosions or releases of hazardous materials into the community.

The system safety specialist uses a variety of tools to identify possible system faults or other hazards that may lead to the failure of a product during its use. These traditional analytical tools consist of preliminary hazard analyses (PHA), failure mode and effects analyses (FMEA) and fault tree analysis (FTA). Newer tools, such as hazard and operability studies (HAZOPS), have been developed to meet the demands of new applications such as chemical processes and industrial manufacturing methods.

If you enjoy asking "who, what, when, where, why, how, and if," you may have an aptitude for system safety work.

You will also need a technical background that is either general or involves special areas of knowledge, such as mechanical equipment, electrical equipment and electronics, computer hardware and software, chemical processes, management methods and procedures, maintenance, etc. System safety specialists combine knowledge of the systems and knowledge of analytical methods with hazard recognition, evaluation and control knowledge.

The system safety specialist will be in demand in the foreseeable future to protect employees and the public, the environment and the organization's investment in equipment, processes and facilities. This specialist will have opportunities to advance through technical or management career ladders.

Risk Management

Organizations of all kinds must minimize the adverse effects of accidental losses at the most reasonable cost. To do this, they rely on the knowledge and services of risk managers. Virtually all large organizations, and many smaller ones, maintain a risk management department to reduce the likelihood and size of losses (known as risk control) and to pay for those losses that cannot be prevented (also known as risk finance). Risk management is an integral part of modern organizational management. By protecting a company against loss, the risk manager helps it to boost its operating efficiency and meet its strategic goals.

Risk managers are employed by industrial, service, non-profit and public sector organizations. For example, they serve airlines, banks, chemical and other manufacturers, government agencies, municipalities, retailers, hospitals, school districts and universities.

As organizations differ, so do the types of risks and losses they may encounter. For example, in addition to protecting people, physical premises, and inventory, a retail store risk manager seeks to minimize shoplifting and vandalism. A factory using hazardous equipment or substances is concerned with employee safety and health. It may issue protective clothing and equipment and provide specialized training to employees.

The basic skills required of the risk manager include communications, analysis and problem solving, management and leadership. First and foremost, risk managers must be good communicators. They must be capable of coordinating and interacting with other departments. The position requires regular contact with such departments as

auditing, engineering, finance, human resources, legal, research and development, safety and security.

Risk management also involves working with external sources, such as attorneys, brokers, consultants, insurance agents, insurers and other service providers. In addition to understanding these varied specialties, the risk manager must master the complexities of the organization's own operations.

A sound knowledge of insurance fundamentals and risk financing mechanisms is also essential. The risk manager must know which potential losses can be retained through some form of self-insurance and which risks need to be insured, for how much and with which vendor. They recognize whether claims are being handled properly or not, and if appropriate insurance coverage is available.

The risk manager must also thoroughly grasp loss control issues such as employee health, worker and product safety, property safeguards, fire prevention and environmental protection. The risk manager must be able to manage time and people skillfully by setting goals, planning strategies, delegating tasks and forecasting and measuring results.

For a career in risk management, a bachelor's degree with a broad business background is recommended. A major in risk management or insurance is highly desirable. Many additional fields of study are also appropriate, including safety and health, accounting, economics, engineering, finance, law, management and political science. In addition, many firms require candidates to have a master's degree in business administration (MBA) and to earn an Associate in Risk Management (ARM) or other insurance or risk designation.

Risk managers work for corporations, service providers, government administrations and numerous other public and private organizations. Some risk managers join insurance companies, insurance brokerage firms or consulting firms that provide risk management services to clients. The structure of risk management departments varies with the nature and size of the organization.

Loss Control

Loss control is a term used in the insurance industry. Insurance companies selling workers' compensation, property and other forms of business insurance often help their clients prevent incidents and accidents that lead to insurance claims.

Each insurance company develops its own safety consulting services around the kinds of businesses that it insures. Loss control representatives provide safety consulting service to policyholders. The emphasis of this consulting service is preventing injuries, illnesses and property losses and thus reducing costs, a benefit to both the policyholder and the insurance company. Consulting strategies typically include identifying and evaluating hazardous exposures, developing plans to control them and providing follow-up services.

To identify accident exposures, loss control representatives analyze accidents or near accidents or conduct walk-through surveys of work sites to identify potential hazard exposures. The loss control representative then evaluates the exposures and develops recommendations to eliminate or reduce them. Once these recommendations are implemented, the loss control representative follows up to evaluate how effective they are and to determine if more changes might be needed to reduce the exposure even more.

Loss control representatives provide other consulting activities, such as safety training, industrial hygiene services, safety program development and evaluation, ergonomics, construction safety, product safety, environmental safety, fleet safety, fire inspections and accident investigations. Some loss control representatives specialize in one of these areas.

Another responsibility of loss control representatives is to assist the insurance company's underwriting department in evaluating the desirability of policyholders for specific types of insurance coverage. This responsibility involves a continual evaluation of the policyholder's accident rates and exposures, as well as their efforts to reduce the problems identified.

As a rule, loss control representatives travel extensively to visit their clients' worksites. They usually have wide latitude to structure their own travel and work schedules and to do much of their report writing at home. Because clients may be involved in an extremely wide range of business activities, loss control representatives become familiar with many different kinds of businesses and their associated hazards. The opportunity to specialize in a variety of safety activities, as well as to obtain experience in several types of industries, makes loss control a very rewarding career for many safety professionals.

A growing trend among large companies is to be self-insured. In essence, they operate their own insurance in accordance with state laws where it is permitted. As a result, there has been some decline in loss control positions among business insurance companies. Some positions have shifted to the self-insured organizational unit within the large companies.

Chemical Process Safety

Many of the modern materials and essential products we take for granted everyday are made possible by the chemical industry. Fuels, food ingredients, pharmaceuticals, textiles, paper products, plastics and industrial chemicals are some chemical industry products. Each chemical product involves a very different chemical process, which is one of the reasons why the chemical industry is very dynamic. Each process has its own starting materials, processing equipment and operating temperatures and pressures—because of this, each process has a unique set of hazards.

While manufacturing chemical products, it is the responsibility of the chemical manufacturer to maintain a safe working environment for employees and a safe environment for the people and communities surrounding their plants. The chemical process safety professional plays a key role in this responsibility.

Chemical process safety involves analyzing chemical processes to identify the potential for accidents. This is done so that chemical companies can act to prevent these accidents. And if they should happen, the companies are better prepared to handle the consequences.

This discipline can be broken into four general areas: assessment, technical support, training and management. It is the job of chemical process safety professionals to assess a chemical process in order to identify potential hazards. They also provide technical support to those who design new processes, and those who operate existing processes, so that they can be aware of process hazards and take steps to prevent chemical accidents from occurring. Chemical process safety also involves training employees who work with

the processes on how to recognize chemical hazards, and prevent or respond to accidents.

These safety professionals may also become involved in process safety management. This means that they coordinate a company's safety efforts and work with other managers to help chemical process safety become more efficient and effective.

Chemical process safety is still a fairly new field. Its modern version began in the early 1970s. It gained momentum in 1984 after a chemical process disaster in Bhopal, India resulted in the death of thousands of citizens.

Because this profession is so new, practitioners entering the field still have an opportunity to truly impact and shape the future of the discipline. Much progress has been made within the last few years, but much more progress will occur in the near future. Students entering the field now can be a part of this development.

Chemical process safety benefits industry by preventing the types of accidents that otherwise make the headlines and damage the environment, destroy chemical processing plants, and cause serious injuries to employees. Chemical process safety benefits society by reducing the possibility of hazardous chemical releases upon communities or the environment. It also helps the chemical industry to find ways to safely manufacture the products that are in demand by modern society.

In summary, chemical process safety is a good career area to consider because it provides many benefits to industry and to society and offers many job opportunities, both technical and managerial. It also will be rewarding to the person who chooses to enter this safety-related specialty.

Construction Safety

Construction sites are as different from one another as are people. They vary in size from small road repair jobs and building renovations to the construction of huge skyscrapers, enormous bridges and massive power plants. But, they have at least one thing in common: large pieces of equipment, tons of structural materials and dangerous heights which create safety and health hazards that can take a life in the blink of an eye. They also require the presence of construction workers, whose health and well-being depend on the effectiveness of hazard control programs designed by construction safety professionals.

Construction safety professionals recognize and control a wide variety of safety, health and fire hazards in unique and ever-changing work environments. The need for construction safety professionals continues to expand since construction is one of the most hazardous industries.

A construction safety practitioner could be employed by a medium to large construction company, a contractor trade organization, an organized labor group, a government agency, an insurance company, an engineering firm or a consulting firm.

An undergraduate degree in safety combined with general construction management courses or construction experience will help individuals begin a career in this specialty. Working for a large construction company will generally require periodic relocation or frequent travel to project sites. Many large construction companies also operate outside the U.S. With the expansion of the global construction market, the need for construction safety professionals at sites outside the U.S. will increase.

Eight-hour days are normal for safety professionals employed in the construction industry. But weather conditions, performance and completion deadlines frequently dictate extended work hours.

A large construction workplace is typically supervised by a management/engineering company that employs a general contractor (GC) to erect, renovate or demolish a structure. The GC then employs and schedules the necessary specialty contractors, such as excavation, steel erection, masonry, mechanicals, roofing, carpentry, painters and others, to perform specified tasks. Large projects could have ten or more sub-contractors working at one site at the same time.

Because construction site organizations vary, a construction safety professional must possess the ability to communicate effectively within an organization having a variety of management styles and a diverse work force.

Construction methods, equipment, working conditions and materials continually change on a construction site. Through weekly or monthly work planning sessions and continuous monitoring of job sites and work groups, safety professionals can identify hazards early and ensure that controls for them are in place as each kind of work begins.

If you enjoy fast-paced activities, constant daily challenges outdoors, hands-on working conditions, and minimal time working at a desk, you are likely to enjoy working in construction safety. If you can work effectively with a variety of tradespeople, you will appreciate the financial and personal rewards associated with good hard work and will do well as a safety professional in the construction industry.

Institutional Safety Management

A career in institutional safety can present a variety of exciting and rewarding challenges. Institutional safety typically encompasses hazard control in organizations such as hospitals, correctional facilities (prisons and jails), research facilities or schools at all levels.

Hospitals, correctional facilities and universities are typically large employers and are often part of large organizations. This presents the trained safety professional with the opportunity for career enhancement and growth.

Hospitals and nursing homes face a wide range of government and industry regulations. For example, the Joint Commission on Accreditation of Healthcare Organizations has numerous self-regulating standards, including safety standards, for the industry. National fire and building codes for hospitals and nursing homes have many safety provisions and become law when adopted by federal, state and local government. In addition, OSHA and EPA regulations affect this industry, as well.

The hospital safety professional also has the unique opportunity to work with people from diverse backgrounds and interests. A hospital provides a wide array of experience, from the surgeon who is concerned about exposing employees to an infectious plume during laser surgery and the nursing supervisor attempting to prevent back injuries while handling patients, to the laboratory technicians seeking to control the emission of chemicals used in preparing tissue samples. The hospital safety professional must constantly assess the environment, seeking methods to minimize hazards that could result in injury or loss.

Colleges and universities have safety professionals who help protect students, faculty and staff from harm during laboratory classes and research projects. They manage risks for maintenance, food service and office employees. They handle the disposal of chemicals and other hazardous materials used in laboratory work or in maintenance of building and grounds. They deal with campus traffic safety and other risks.

One of the major concerns for the institutional safety professional is fire prevention and suppression. Whether it's a hospital, where many of the patients are unable to walk, a university dormitory, or a correctional facility, where the inmates' safety has to be balanced against the need for confinement, the safety professional must continually assess the environment, and look for ways to prevent fires.

Many institutions maintain state-of-the-art fire detection and suppression systems, which the safety professional will help to design and maintain. Employees must also be highly trained in procedures for suppressing fires, and recovering from them, all the while minimizing any possible disruptions to service.

Institutional safety professionals must have a true generalist's background, with training in industrial safety, fire safety, industrial hygiene, chemical safety, radiation safety and ergonomics. Employers are looking for candidates who have attained a minimum of a bachelor's in safety. Employers are also increasingly seeking Certified Safety Professionals (CSPs).

The long-term outlook for professionals specializing in institutional safety looks promising. With the onset of managed care and competition in health care, hospital administrators are realizing that to succeed,

they must manage extremely efficient operations. Safety has been integrated as a key management strategy aimed at reducing losses and claims. As a result, the safety professional has been teamed with other key hospital administrators whose function is to manage risk. Safety professionals are also moving into management roles in correctional facilities and universities as these organizations seek to control their risks more effectively.

Transportation Safety

Safety professionals play an important role in the safety of all forms of transportation: railroads, auto, trucking, aviation, maritime shipping and oil and gas pipelines. There are safety professionals working for companies and government agencies associated with each transportation mode. Some work with designers of vehicles, highways and the transportation systems themselves. A degree in civil or mechanical engineering is most useful in this role. A few work in research and studies of accidents and injuries related to transportation.

Some of the federal agencies involved in transportation safety include: National Highway Traffic Safety Administration (auto), Federal Highway Administration (highways and trucking), Federal Aviation Administration (aviation), Federal Railroad Administration (rail systems), U.S. Coast Guard (maritime) and Research and Special Programs Administration (pipelines). These and other agencies are part of the U.S. Department of Transportation (DOT). A separate agency, the National Transportation Safety Board (NTSB) investigates major transportation accidents and makes recommendations for preventing transportation accidents. NTSB safety specialists have advanced training in accident investigation.

The majority of safety professionals involved in transportation safety work for private companies, such as airlines, railroads, large trucking firms or oil and gas pipeline companies.

Safety Research & Risk Assessment

As with any discipline, the body of knowledge that guides the science and practice of safety continues to grow. Much of what is regarded as good theory and practice was discovered by practitioners through trial and error, or was simply borrowed from related disciplines. Relying on these traditional methods is changing, because more people are entering the profession with formal academic training.

Undergraduate and graduate educations are exposing professionals to the subtleties of research questions and methodology. This heightened awareness, in turn, produces a demand for better research-based knowledge as these educated professionals go about their duties. The demand for more sophisticated research is being met by several different groups of researchers.

Much research is performed by government agencies such as the National Institute for Occupational Safety and Health (NIOSH) or the Environmental Protection Agency (EPA). These agencies, as well as other organizations, also fund research projects that are carried out at universities and private research organizations. For example, the American Society of Safety Engineers Foundation is one professional organization that sponsors safety research projects. Large companies often fund research which benefits their own safety functions, products or services.

Actual research topics can fall into several broad areas. Much research is performed in technical areas, such as the design and reliability of safety equipment, ergonomics or fire safety. Other research promotes the understanding of management theory and practices applied to safety. A third area of research is in the decision sciences, where questions involving risk assessment and policy analysis techniques are explored. Another area of study involves how well hazard controls work.

Those interested in pursuing a career in safety research will need a strong academic background (master's or doctorate degree) combined with practical experience in safety. Research specialists usually work for government agencies with a research responsibility, at large universities or in company sponsored laboratories. There are also a few industry sponsored laboratories, such as Underwriters Laboratories (UL), Factory Mutual (FM), the Insurance Institute for Highway Safety and the Liberty Mutual Insurance Research Center.

Profiles of Safety Professionals

This section contains career summaries of selected individuals in the safety profession. The profiles provide a cross section of career options and illustrate advancement opportunities. The profiles represent three groups: early career level (people in their first

decade of practice), mid-career level (10 to 15 years of practice), and senior career level (20 or more years of practice). Some also represent specialty practice areas discussed in the previous section.

EARLY CAREER LEVEL

Melba Jo Gaither

Ms. Gaither became interested in safety through her past employment and prior military service. Safety duties were part of her job responsibilities. She found a safety degree program at a school near her home.

She feels that keys to her success are a willingness to learn as much as possible, learning how to use reference materials to find answers, networking with other safety professionals, learning how to work with others and gaining insights into safety practice. Other keys are developing self confidence and being able to communicate with employers whose workplaces she must inspect and gaining their respect.

Ms. Gaither finds the comradeship of co-workers is rewarding along with an ever changing career that does not allow one to get bored.

Degrees:

- BS, Occupational Health and Safety, 1999, Southeastern Oklahoma State

University, Durant, OK

- ASSE Foundation scholarship recipient

Time in Safety Profession:

Less than one year

Current Position:

Occupational Health and Safety Compliance Officer, U.S. Department of Labor, Occupational Safety and Health Administration

Memberships:

- American Society of Safety Engineers

Certifications:

Working toward Certified Safety Professional

David T. Hart

Mr. Hart learned about the safety profession from his father, who is in this career field and has safety, health and environmental responsibility for a manufacturing company. Also, he lived in Murray, KY, and became acquainted with the safety degree programs at Murray State University.

During his academic training, Mr. Hart completed internships to gain experience and became involved in professional activities through the student section of ASSE at

Murray State, where he served as the president of the section. He also worked part-time in safety while in graduate school.

In an internship with the Boilermaker's Union, he gained experience in construction safety through travel to 25 construction sites. He trained union crafts persons in basic hazard recognition in construction. During graduate school he worked part-time in safety for his current employer through a co-op position. Experience in both of these positions, combined with his academic preparation, developed professional safety job skills and provided leverage in gaining his current position. After completing his master's degree, he worked for two years as a Process Safety Management Coordinator for a chemical manufacturing company before gaining his current position. In his current position, Mr. Hart is responsible for emergency planning and response, fire protection, industrial hygiene, security and training. He will soon oversee the work of four safety officers and the plant fire and rescue department.

Mr. Hart feels the keys to his success have been involvement in ASSE, gaining experience through co-op and intern programs, and working harder than others.

He feels that the most rewarding aspects of his career have been having responsibility to his employer and the community, working with all levels of people, and good pay and benefits.

His advises that the factors leading to success include getting a good education (also an advanced degree), pursuing CSP and CIH certifications, working for a quality organization, acquiring patience and developing leadership skills through professional society activities and training.

Degrees:

- BS, Occupational Safety and Health, May 1997
- MS, Occupational Safety and Health (Industrial Hygiene emphasis), 1998, Murray State University, Murray, KY

Time in Safety Profession:

Two years

Current Position:

Safety Supervisor, Air Products and Chemicals, Inc.

Memberships:

- American Society of Safety Engineers

Certifications:

- Emergency Medical Technician
- Red Cross CPR/First Aid

Rebecca (St. Clair) Wagner

Ms. Wagner found out about safety as a program of study and career choice from friends who were about to graduate with a degree in safety science. After trying a course in safety and enjoying it, she chose safety science as her major.

During her studies, Ms. Wagner completed cooperative work at the Johns Hopkins University Applied Physics Laboratory and later had an internship there. After graduation, she began working in her current position at Towson University. She is also pursuing a master's degree at the University of Maryland.

She feels the keys to her success were studying under knowledgeable and experienced faculty, gaining job experience prior to graduation, and developing a professional network through her participation in ASSE.

She recommends trying out the safety field. She finds the career opportunities to be diverse and the work satisfying and rewarding.

Degrees:

- BS, Safety Science, Indiana University of Pennsylvania, Indiana, PA
- ASSE Foundation Scholarship Recipient

Time in Safety Profession:

Two years

Current Position:

Environmental Safety Manager, Towson University

Memberships:

- American Society of Safety Engineers (Initially a student member and currently a professional member in a local chapter)

Certifications:

Preparing for the Certified Safety Professional

Sunshyne Chapman

Ms. Chapman's mother, who had taken safety courses, encouraged her to try a safety program.

Ms. Chapman completed an internship with the Oklahoma Department of Labor which led to her current position. In voluntary professional activities, she has served on the Oklahoma Governor's Safety and Health Conference Committee for two years.

She attributes her success to working hard and learning from others. She recommends developing interactive skills with people and developing a desire to make safety a lifestyle.

Degrees:

- BS, Industrial Safety, 1999
- MEd, Industrial Safety, 2000, University of Central Oklahoma, Edmon, OK
- ASSE Foundation Scholarship Recipient (Multiple scholarships)
- Carl Albert Fellowship

Time in Safety Profession:

One year

Current Position:

Safety Coordinator, Oklahoma Department of Labor

Memberships:

- American Society of Safety Engineers
- Oklahoma Safety Council

Certifications:

None

Matthew Looker

Mr. Looker found out about the safety profession while in high school. He started college as a civil engineering major, but changed schools and chose a major in safety engineering technology.

Prior to his current position, he worked as an Environmental, Occupational Safety & Health Specialist at George Washington University. Mr. Looker believes a diverse educational background in all areas of safety and early work experience are keys to his success. He finds rewarding the daily application of safety into company operations and the reduction of injury rates and costs. He recommends having a diverse background in order to be able to wear the many different hats in a safety position.

Degrees:

- BS, Safety Engineering Technology, Fairmont State College, Fairmont, WV

Time in Safety Profession:

Three years

Current Position:

Occupational Safety & Health Specialist, COMAIR, Delta Connection Airline

Memberships:

- American Society of Safety Engineers (Served as an officer of the Fairmont State College student section)

Certifications:

Preparing for the Certified Safety Professional

MID-CAREER LEVEL

Jonathan A. Jacobi

Mr. Jacobi first learned about the safety profession from a neighbor's friend, who was a fire protection engineer and expressed great personal satisfaction with his career. He located a degree program near his home at Murray State University and entered that program.

The first job for Mr. Jacobi was in a safety consulting firm which provided strong mentoring and many learning opportunities in a variety of work environments, such as nuclear, automotive and semiconductor industries. After returning to school and completing a master's degree, he accepted his current position.

He feels that a strong work ethic was a primary factor in his success. In addition, part-time safety jobs provided work experience and extracurricular activities and achieving professional credentials increased his employment opportunities.

The most rewarding aspects for Mr. Jacobi include recognition for work well done, respect of peers, compensation appropriate to increasing responsibility, and knowing that he has the appreciation of employees he protects.

He would advise looking past the short-term rewards of a position and focusing on those factors which keep you coming back to your job.

Degrees:

- BS, Occupational Safety & Health, 1994
- MS, Occupational Safety & Health, 1998, Murray State University, Murray, KY
- Rho Sigma Kappa Honor Society

Time in Safety Profession:

Six years

Current Position:

Safety Engineer, Philip Morris USA

Memberships:

- American Society of Safety Engineers (Student section and professional member in local chapter)
- Semiconductor Safety Association (Student chapter)

Certifications:

- Certified Safety Professional
- Construction Health and Safety Technician

Denise R. Dittmore

Ms. Dittmore entered college as a communications major and learned about the safety degree program from friends already in the program. She was attracted to the safety field by the professional success of former students. While completing her undergraduate degree in safety, she held a position as safety coordinator at a local retail store. Later, while completing her degree, she completed an internship at SmithKline Beecham Pharmaceuticals. This led to a position with the same company as a Health, Safety and Environmental Affairs Technician following graduation. After two years, she returned to school to complete her master's degree in safety sciences. Then she accepted her current position. In addition, she has served as a part-time instructor in safety at Millersville University.

Her overall goal is to become a safety educator at a university offering a safety degree. While in her current position, she is pursuing a doctoral degree that will qualify her as a safety educator.

She attributes her success to the dedication and devotion of her college professors, particularly during her undergraduate work

at Millersville University, and the mentoring they provided.

Learning that co-workers have made lifestyle changes that improve their health and well-being on and off the job is the most rewarding aspect of her job. She advises safety professionals to remain strong and determined in pursuing safety goals for those co-workers and employees served and remaining ethical in professional practice.

Degrees:

- BS, Occupational Safety & Hygiene Management, 1996, Millersville University, Millersville, PA
- MS, Safety Sciences, 1998, Indiana University of Pennsylvania, Indiana, PA
- Currently pursuing an Ed.D. in Higher Education, Widener University, Chester, PA
- ASSE Foundation Scholarship Recipient (Several scholarships)
- Rho Sigma Kappa Honor Society

Time in Safety Profession:

Five years

Current Position:

Environmental, Health and Safety Specialist and Compliance Training Manager, SYNTHES (USA)

Memberships:

- American Society of Safety Engineers
- American Conference of Governmental Industrial Hygienists
- International Facility Management Association
- National Association for Female Executives

Certifications:

Pursuing the Certified Safety Professional

Carl Heinlein

Mr. Heinlein became interested in the safety profession through friends who had gained

success in safety. While in school, he had an internship with a local hospital, where he taught CPR and first aid. Later he interned with the National Institute for Occupational Safety and Health. He was initially employed as a Safety Specialist for Federal Express. Then he became the Associate Director of Safety and Health Services for the Association of General Contractors of America. After three years, he became their Director of Safety and Health Services and held that position until accepting his current position.

He feels that the keys to his success are surrounding himself with proven professionals, being willing to learn, staying active in professional safety organizations and reminding himself daily that “I have the best job in the country.” Mr. Heinlein finds rewarding the ability to help people go home safely to their loved ones at the end of each day.

Advice for success as a safety professional from Mr. Heinlein includes getting involved with your professional and industry organizations, ask questions, be a good listener, strive to be the best, surround yourself with positive people and network, network, network.

Degrees:

- BS, Business Administration, 1989
- MS, Safety and Environmental Management, 1992, West Virginia University, Morgantown, WV

Time in Safety Profession:

Seven years

Current Position:

Director of Construction Services, FDR & Associates

Memberships:

- American Society of Safety Engineers (Student chapter officer, currently involved in government affairs in local

chapter and in the Construction Practice Specialty)

- National Safety Council (Transportation Division & Construction Division)
- National Safety Management Society

Certifications:

- Certified Safety Professional
- Occupational Health and Safety Technologist
- Working toward the Associate in Risk Management

Christopher A. Janicak

Dr. Janicak learned about public safety from volunteer work for a local police department while in high school. After enrolling at the University of Illinois, he learned of the safety and health degree program from another student and the university catalog and eventually switched majors.

After completing his master's degree, Dr. Janicak worked as a loss control consultant for an insurance company. Then, for several years, he was the safety coordinator of three suburban park districts near Chicago. He then began teaching in a safety degree program at Southeastern Oklahoma State University, followed by a similar position at Illinois State University. He advanced in responsibility to his current position.

Dr. Janicak claims the keys to his success are working hard, keeping current with the safety profession and developing skills in teaching and research. His professional rewards come from students who report that he influenced their lives and from research results that improve the lives of others.

He recommends that someone in the safety profession must be prepared for a lifelong learning experience and a profession that brings different challenges each day. He notes that what you get out of a career is largely a result of what you put into it.

Degrees:

- BS, Health and Safety Studies, 1985, University of Illinois, Urbana, IL
- MS, Industrial Technology, Industrial Safety Concentration, 1986, Illinois State University, Normal, IL
- Ph.D. in Research Methodology, 1993, Loyola University of Chicago, Chicago, IL

Time in Safety Profession:

Fourteen years

Current Position:

Associate Professor and Director of the Safety Degree Program, Illinois State University

Memberships:

- American Society of Safety Engineers (Held many offices in local chapter and served on national committees)
- Safety and Health Educators Group (Membership chair)

Certifications:

- Certified Safety Professional
- Associate in Risk Management

David de Vries

Mr. de Vries became interested in safety after witnessing serious accidents in a printing plant where he worked after completing high school. He learned about the safety field through a chance reading of a long-standing reference, *Accident Prevention Manual*, and then learning about the Illinois Institute of Technology program.

After receiving his bachelor's degree, he worked as an engineer investigating fires and explosions. He progressed to a more senior role which involved designing fire protection systems and evaluating buildings and other facilities for compliance with fire and related safety codes and standards. Then he became a project director and provided consulting services related to fire and safety codes and standards development. In his current position, Mr. de Vries manages standards

development for ASSE and coordinates the activities of twelve professional safety practice specialties.

The keys to success as seen by Mr. de Vries include having a solid education, achieving his engineering license and professional safety certification. He is personally rewarded by having developed and maintained standards which protect people in workplaces and buildings throughout the United States and in foreign countries. His advice for success in safety is to pursue it with a passion and you will grow as a person and a professional.

Degrees:

- BS, Fire Protection and Safety Engineering, 1985, Illinois Institute of Technology, Chicago, IL

Time in Safety Profession:

Fifteen years

Current Position:

Director, Practices and Standards,
American Society of Safety Engineers

Memberships:

- American Society of Safety Engineers
- National Fire Protection Association
- Society of Fire Protection Engineers
- American Society of Heating, Refrigeration and Air Conditioning Engineers
- Various standards writing committees

Certifications:

- Licensed Professional Engineer (Illinois)
- Certified Safety Professional

Philip Jacobs

Mr. Jacobs developed a personal interest in safety and worked as a consultant for about 12 years. Along the way, he returned to college to pursue his interest in safety through a master's program. Then he accepted his current position in ergonomics, a newer area of safety practice of special interest to Mr.

Jacobs. There were few jobs in ergonomics early in his career.

He feels that the keys to his success were professional training and continuing education and advises that academic and professional preparation is a must.

Degrees:

- Bachelor of General Studies, 1980
- MS, Occupational Health and Safety Engineering, 1987, University of Michigan, Ann Arbor, MI
- Pursuing a Master of Public Health in Injury Epidemiology, University of Minnesota, St. Paul, MN

Time in Safety Profession:

Fifteen years

Current Position:

Senior Ergonomist, 3M Corporation, St. Paul, MN

Memberships:

- American Society of Safety Engineers
- Human Factors and Ergonomics Society (local chapter offices)

Certifications:

- Certified Safety Professional

SENIOR CAREER LEVEL

Scott Nikodym

Mr. Nikodym became interested in safety through an acquaintance while completing his bachelor's degree. He applied for admission to the master's program and received a federal grant to cover expenses. He began his career working as an associate safety engineer for a company which manufactured fuel tanks for the space shuttle. He initially performed industrial hygiene work for manufacturing operations and then moved into safety training, occupational safety, radiation protection and other responsibilities that provided a broad learning base. His career progressed through the ups

and downs of aerospace contract work, but placed him in high technology environments, such as space shuttle launch facilities and systems, aviation electronics manufacturing, development of global positioning systems, cutting edge research in robotics, automation, information technology, environmental and sensing science, and aircraft and space research. His assignments involved industrial hygiene and occupational safety work, systems safety analysis, development of safety management software, and safety support for aviation and aerospace test and maintenance program staff. Most positions involved roles as a safety engineer with progressively higher levels of responsibility.

Mr. Nikodym feels that keys to his success included a solid educational background, working in job settings that offered opportunities to learn, having mentors who helped him progress, treating people well, learning from mistakes and applying the lessons learned, maintaining an interest in technology and being persistent through difficult situations.

He feels that the most rewarding aspects of his career involved making recommendations that he later learned prevented injuries and death for people he knew, having the opportunity to work in unique job environments that are highly technical in nature and continually learning how things work.

Mr. Nikodym offers two words of advice. First, you will feel a great deal of satisfaction from preventing harm. Second, take advantage of the opportunities that surround you and you will be surprised at what you can accomplish and to where those opportunities lead.

Degrees:

- Bachelor of Biology, 1979

- Master of Industrial Safety, 1980, University of Minnesota - Duluth

Time in Safety Profession:

20 years

Current Position:

Safety and Quality Assurance Manager, Sverdrup Technology, Inc., Aerospace Testing and Facility Operations and Maintenance Group

Memberships:

- American Society of Safety Engineers

Certifications:

- Certified Safety Professional

Henry J. Smahlik

Mr. Smahlik started college with a major in electrical engineering. He found that his interest in human interaction was missing from that major. One day while reading a bulletin board in an engineering building, he became engaged in conversation with a professor about safety and a career in safety. It seemed to add the human interactivity component he sought. He changed majors and started on a new career path.

Mr. Smahlik's first job was in the Texas oilfield as a field safety engineer. He found he could make a difference by preventing accidents and saving his employer money. His responsibility grew and broadened to include industrial hygiene and environmental services. As a result he became more valuable to his employer. His career advanced to positions with several companies as Director of Safety and Health and Vice-President and Director of Safety and Health.

He identifies four keys to his success: *flexibility* by being able to apply safety, industrial hygiene and environmental perspectives to a safety problem; *communication* of complex problems to management and other levels of a company; *integrity* in personal and business relations; and *sincerity* in dealing with human lives.

Mr. Smahlik's greatest job satisfaction comes from being able to identify a problem, following it through to solution and receiving thanks from professional peers and co-workers for making their lives better.

His advice for someone entering the safety field is: "If you want to make a difference in people's lives, you will like the safety profession and if you do not like to deal with humans daily, don't get into the safety profession."

Degrees:

- BS, Industrial Technology, 1973
- MS, Industrial Hygiene, 1975, Texas A&M University, College Station, TX

Time in Safety Profession:

25 years

Current Position:

Manager, Industrial Hygiene and Environmental Consulting, Vallen Knowledge Systems

Memberships:

- American Industrial Hygiene Association (Officer of a national committee on personal protective equipment)

Certifications:

- Certified Safety Professional
- Certified Industrial Hygienist

Frank H. Perry

Mr. Perry entered college as an electrical engineering major. He became interested in a new program in safety that was being organized in industrial technology and changed his major.

He began his career as a safety engineer for Dresser Petroleum & Minerals Group in Texas. He left the safety field for a few years to become a policeman. He soon returned to a safety engineering position and progressed in responsibility with a job change to

Cameron Iron Works, Inc. Since working for Cameron, he has been promoted progressively to Supervisor of Safety and Health, to other positions, Corporate Manager of Health, Safety & Environmental Services and now his current position.

Mr. Perry attributes much of his success to two individuals, the professor who got him into the safety career path and his first supervisor who got him involved in professional activities with the American Society of Safety Engineers.

The greatest rewards for Mr. Perry come from the variety of daily challenges which have a clear goal of sending employees home safely each day. He finds the true challenge in interacting with employees and employers in the ever changing approaches one takes in meeting that goal.

His advice to those entering the safety field is to be flexible, because the successful safety professional must be able to adjust to the changing global business climate without compromising one's principles or work ethics.

Degrees:

- BS, Industrial Technology, 1970, Texas A&M University, College Station, TX

Time in Safety Profession:

27 years

Current Position:

Director of Health, Safety & Environmental, Cameron, a Division of Cooper Cameron Corporation

Memberships:

- American Society of Safety Engineers (Served in many capacities at the local, regional and national level, including Society President)

Certifications:

- Certified Safety Professional
- Registered Professional Engineer (Massachusetts)

Carmen W. Daecher

Mr. Daecher became interested in safety while in college, especially in highway and driving safety that was part of his transportation engineering training. Early in his career he was a transportation planner for a city, focusing on street design and traffic controls to help create safe streets. Then, he moved into consulting in highway and driving safety. For a while he was the manager of a civic center/exhibition center in Cleveland, OH, where he became involved in workplace and event safety. For several years he worked for an insurance company, mainly involved in safety of truck and bus fleets. For most of the last decade, he has done consulting work in transportation safety, commercial vehicle safety, and workplace safety. Part of his work is reconstructing accidents and providing legal testimony relating to vehicle and highway accidents.

Mr. Daecher feels that keys to his success are understanding the role of safety in organizational and human behavior, keeping up with new methods, technologies and processes related to safety, developing good communication skills with employees and top management, and understanding business practices and financial aspects of safety management.

The most rewarding aspects of his safety practice are seeing efforts pay off, working with people and organizations and never having two identical situations. He recommends that being persistent in motivating people to think and act differently will help you be a successful safety professional.

Degrees:

- BA, Economics, 1970, Franklin & Marshall College, Lancaster, PA
- MS, Transportation Engineering, 1974,

Villanova University, Philadelphia, PA

- Pursuing Masters in Business Administration
- Tau Beta Pi—National Engineering Honor Society

Time in Safety Profession:

30 years

Current Position:

President and Transportation Specialist,
The Daecher Consulting Group, Inc.

Memberships:

- American Society of Safety Engineers (Served as Administrator of the Transportation Practice Specialty and in other roles)
- Institute of Transportation Engineers
- Other national transportation committees and organizations

Certifications:

- Accredited Accident Reconstructionist

Emory E. Knowles

Mr. Knowles found out about the safety field through a newspaper advertisement placed by the Catonsville Community College. While working for a small chemical company, he found that employees did not know how to select and use personal protective equipment and did not understand chemical hazards. He started a safety training program and his part-time activity grew into a full-time safety position.

His safety responsibilities grew progressively. At the chemical company, he advanced to a supervisor and then a manager position because of his safety work. He then took a position with Westinghouse as a safety engineer. With additional professional certifications and advanced degrees, he was promoted to Assistant Manager and then Manager of Industrial Hygiene and Safety for his business unit. He now has both a U.S. and foreign responsibility for the business unit.

Mr. Knowles credits early safety instructors with guidance and encouragement to keep his career goals alive. He feels that his experience in professional society activities helped him to grow and learn how to manage and lead. He feels that his professional certifications and advanced education have given him an edge in his career.

His greatest reward from his career is the internal peace from having been able to accomplish good with his life. He advises those entering the safety profession to strive for certification and to never, never stop learning.

Degrees:

- BA, Biology, 1968, University of Steubenville
- MS, Microbiology, 1974, West Virginia University, Morgantown, WV
- Certificate in Occupational Safety and Health, 1982, Catonsville Community College, OH
- MS, Safety Sciences, 1991, Indiana University of Pennsylvania, Indiana, PA

Time in Safety Profession:

21 years

Current Position:

Manager, Industrial Hygiene and Safety,
Electronic Sensors and Systems Sector,
Northrop Grumman Corporation

Memberships:

- American Society of Safety Engineers (Held local and regional offices and now is involved in national governmental affairs committees)

Certifications:

- Certified Safety Professional
- Certified Industrial Hygienist

Robert DeSiervo

After graduating from college with a degree in history, Mr. DeSiervo had difficulty finding a job, especially with the country in

a recession. While interviewing with a safety director, Mr. DeSiervo's early courses in science and an interest in continuing to learn opened the door to his first safety position. His early struggles in the position led him to enroll in a master's degree program in safety and health.

After changing to a more challenging loss control position with an insurance company, he found out he needed to know more about insurance. He prepared for and achieved the Associate in Risk Management designation. His career led him through several positions that offered additional responsibility and experience in running a loss control operation. At times he traveled about 80% of the time. The jobs included operating his own consulting business and having to learn to market his business to keep work lined up.

He is now back with his first employer in a much more responsible position. In addition, he has recently taught an occupational safety and health course at a local college.

Over the years, Mr. DeSiervo has been active in the American Society of Safety Engineers at the local, regional and national level and in a local safety organization. He feels that these experiences have given him the opportunity to expand professionally, to network with many others in the safety profession, and to develop speaking and negotiating skills.

He feels that a key to his success is learning to understand business concepts, such as profit, revenue and income, and employee behavior, values and attitudes.

While Mr. DeSiervo finds rewards in the professional impact he has had in getting a number of companies to commit to safety throughout their operations, his greatest reward comes from working with employees

and receiving their gratitude when they learn to do their job safely while improving their performance.

Mr. DeSiervo recommends getting formal education in safety and health and achieving recognized certifications. He also advises not to take things personally when professional advice is not heeded, but to be persistent in your convictions.

Degrees:

- BA, History, 1975, Fordham University
- MA, Occupational Safety and Health, 1980, New York University, New York City

Time in Safety Profession:

25 years

Current Position:

Director of Safety and Health, FOJP
Service Corp

Memberships:

- American Society of Safety Engineers
(Held local, regional and national offices)

Certifications:

- Certified Safety Professional

Resources

Those seeking more information about the safety profession and the nature of work done by safety professionals may obtain additional help from the sources below.

Organizations

American Society of Safety Engineers

www.asse.org

1800 East Oakton Street
Des Plaines, IL 60018-2187
847-699-2929

Founded in 1911, ASSE is the world's oldest and largest professional safety organization. Its 33,000 members manage, supervise and consult on safety, health and environmental issues in industry, insurance, government and education. ASSE has 12 divisions and 148 chapters in the United States and abroad. It also has 64 student sections.

ASSE supports the education of future safety professionals through scholarships and by developing academic guidelines for university curriculums. It has been active in the accreditation of academic programs in safety. It sponsors student sections on dozens of campuses where safety-related academic programs exist, and encourages excellence in student activities with its student honors and awards.

American Industrial Hygiene Association

www.aiha.org

2700 Prosperity Avenue, Suite 250
Fairfax, VA 22031
703-849-8888

AIHA is the essential source for information on occupational and environmental health and safety issues. Founded in 1939, AIHA is an organization of more than 11,500 professional members dedicated to the anticipation, recognition, evaluation, and control of environmental factors arising in or from the workplace that may result in injury, illness, impairment, or affect the well-being of workers and members of the community.

Society of Fire Protection Engineers

www.sfpe.org

7315 Wisconsin Avenue
Suite 1225W
Bethesda, MD 20814
301-718-2910

The Society of Fire Protection Engineers was established in 1950 and incorporated as an independent organization in 1971. It is the professional society representing those practicing in the field of fire protection engineering. The Society has approximately 4,100 members in the United States and abroad, and 51 regional chapters, 10 of which are outside the U.S.

System Safety Society

www.system-safety.org

P.O. Box 70

Unionville, VA 22567-0070

540-854-8630

540-854-4561 (fax)

syssafe@ns.gemlink.com (email)

The System Safety Society was organized in 1962 and incorporated in 1973 as an entity that promotes education and enhancement of the system safety discipline. System safety is an engineering and management discipline that emphasizes preventing accidents rather than reacting to them. In general, it does so by identifying, evaluating, analyzing, and controlling hazards throughout the life cycle of a system. The discipline is an outgrowth of the aerospace industry and was first applied to missile systems and the Apollo Program to land a man on the moon. Currently, system safety practitioners are contributing to safety in industry, government, and academia throughout the world.

The Society's objectives are to:

- Advance the System Safety state-of-the-art.
- Contribute to an understanding of System Safety and its applications.
- Disseminate newly developed knowledge about System Safety.
- Further professional development.
- Improve public perception of hazards and the System Safety discipline.
- Improve communications between the System Safety discipline and other professional groups.
- Establish standards for the System Safety discipline.
- Assist federal, state, and local government bodies concerned with safety.
- Establish standards for System Safety educational programs.

The System Safety Society publishes the *Journal of the System Safety Society* and texts, which include the *System Safety Analysis Handbook*. The Society also honors its own members annually for various achievements and provides a vast networking opportunity for members to solve problems and identify job opportunities.

The Society is a worldwide organization with members from more than 20 countries outside the U.S. Each year the Society sponsors an International System Safety Conference and exhibition, which is attended by hundreds of safety professionals and others.

National Safety Council

www.nsc.org

1121 Spring Lake Drive

Itasca, IL 60143-3201

630-285-1121

Founded in 1913, the National Safety Council has served as the premier source of safety and health information in the United States. The Council started in the workplace—in factories, warehouses, construction sites—making businesses aware of ways to prevent unintentional injuries on the job. Subsequently, its efforts were expanded to include highway, community and recreation safety. Its mission now encompasses all major causes of preventable injuries and deaths, including occupational and environmental health and general wellness. Along with its national responsibilities, the Council carries out its mission on the community level through a network of more than 60 local Chapters. The Council and its Chapters are committed to promoting safety and health in all walks of life, 24 hours a day.

American Conference of Governmental Industrial Hygienists

www.acgih.org

1330 Kemper Meadow Drive, Suite 600
Cincinnati, OH 45250
513-742-2020

For over 60 years, ACGIH has been a special organization for special people. From an initially limited membership base to the all-encompassing categories of today, ACGIH has grown and expanded without losing sight of its original goal: "To encourage the interchange of experience among industrial hygiene workers and to collect and make accessible such information and data as might be of aid to them in the proper fulfillment of their duties."

ACGIH is noted for its publication of allowable exposure standards for chemical and physical agents and for establishing methods for measuring environments for contaminants of various kinds.

Others

There are a number of other organizations with members who are involved in varying degrees of hazard recognition, evaluation and control. The list below provides names and web addresses.

American Society of Mechanical Engineers
(ASME) **www.asme.org**

American Institute of Chemical Engineers
(AIChE) **www.aiche.org**

Institute of Industrial Engineers
(IIE) **www.iienet.org**

Risk and Insurance Management Society
(RIMS) **www.rims.org**

American Chemical Society
(ACS) **www.acs.org**

Human Factors and Ergonomics Society
(HFES) **www.hfes.org**

Honor Societies

Rho Sigma Kappa

Rho Sigma Kappa is an honor society established to:

- Honor and recognize those students who distinguish themselves through achievement and exemplary character.
- Foster scholarship and promote student leadership.
- Contribute to the advancement of professionalism in safety.

This honor society may be established at four-year universities that offer safety-related bachelor's degrees. The society chapter is a student-run organization that gives students the opportunity to gain important organizational and leadership experience. Each chapter of the society must establish its own annual objectives, but all society activities must support the academic program and must seek to serve the student majors in safety.

Rho Sigma Kappa selects graduate students and safety professionals practicing in the discipline to be members. However, most of those inducted into this honorary organization are undergraduate students. Normally, students can become eligible for selection to Rho Sigma Kappa during their junior year, but there is a minimum number of credit hours (of safety courses) that must be completed and a minimum grade point average (GPA) to be earned in safety courses in order to qualify for consideration. The overall GPA requirement for candidacy is usually set so that less than 20% of all students in the safety-related major at a given

institution will be eligible for selection in any given term.

For more information about Rho Sigma Kappa, please contact:

President, Rho Sigma Kappa
c/o Safety Sciences Department
Indiana University of Pennsylvania
Indiana, PA 15705
412-357-3018

Salamander Honor Society

The Salamander Honor Society is an honor society for fire protection engineering. More information about this society can be obtained by contacting:

Society of Fire Protection Engineers
7315 Wisconsin Avenue
Suite 1225W
Bethesda, MD 20814
301-718-2910

Publishers of the *Career Guide to the Safety Profession*

American Society of Safety Engineers Foundation

(www.asse.org/foundat.htm)

To support the advancement of the safety profession and to protect the safety and health of all Americans.

Recognizing growth in the profession, as well as a need for even more comprehensive services, the ASSE Board of Directors chartered the ASSE Foundation in 1990. Designed to provide professional development and financial resources to qualified individuals and non-profit organizations, the Foundation seeks to advance safety and health development, research and education in the public interest.

ASSE supports the education of future safety professionals through scholarships and by developing academic guidelines for university curriculums. It has been active in the accreditation of academic programs in safety. It sponsors student sections on dozens of campuses where safety-related academic exist, and encourages excellence in student activities with its student honors and awards.

The ASSE Foundation receives contributions from corporations, individual members, ASSE Chapters, Regions and Practice Specialties interested in supporting the safety profession.

The Foundation currently supports four key projects:

- Student and faculty scholarships, internships, fellowships and other forms of assistance,
- Safety research emphasizing the applied aspects of current study in the field,
- Development of self-study programs, including correspondence courses addressing the domains within CSP examinations and approved for college credit by the American Council on Education (ACE), and
- Expanded accreditation of college-level curriculums in safety and health.

**Board of Certified Safety
Professionals**
(www.bccsp.org)

**Advancing the Safety, Health and
Environmental Professional Since 1969**

The Board of Certified Safety Professionals (BCSP) is a not-for-profit organization established in 1969 and devoted solely to setting standards for safety professionals and evaluating individuals against those standards. It grew out of a study by the American Society of Safety Engineers. BCSP is not a membership organization. BCSP sets academic standards and experience standards, examinations which test knowledge of professional safety practice, and standards which require individuals to keep current with professional practice. Individuals who meet initial and continuing requirements may use the certification titles awarded by BCSP. Participation in BCSP certifications is voluntary.

The Certified Safety Professional® (CSP®) is BCSP's main certification. Candidates who meet some requirements toward the CSP receive the title Associate Safety Professional (ASP), which can be held for a limited period of time. An applicant for the CSP must have an acceptable degree (the minimum is an associate degree in safety or a bachelor's degree in any field). An applicant must also present at least four years of professional safety experience and pass two examinations: Safety Fundamentals and Comprehensive Practice. Those holding the CSP must recertify every five years through continuing education, retaking the Comprehensive Practice Examination or other professional development activities.

Currently, about 10,000 individuals hold the CSP and about 5,000 are in the process of achieving the CSP. The CSP is nationally accredited by the National Commission for Certifying Agencies (NCCA) and the Council of Engineering and Scientific Specialty Boards (CESB). Both organizations set national standards for peer certifications. The CSP is recognized by many employers and federal, state and local government agencies in job positions and qualifications for certain safety functions and in contracts.

BCSP is independent of, but sponsored by the following societies and organizations:

- American Society of Safety Engineers
- American Industrial Hygiene Association
- System Safety Society
- Society of Fire Protection Engineers
- National Safety Council
- Institute of Industrial Engineers

BCSP operates jointly with the American Board of Industrial Hygiene certifications for safety and health technologists, technicians, supervisors and workers through the Council on Certification of Health, Environmental and Safety Technologists (CCHST). This organization currently offers the following certifications:

- Occupational Health and Safety Technologist (OHST)
- Construction Health and Safety Technician (CHST)
- Safety Trained Supervisor (STS) in Construction

Contributors

The American Society of Safety Engineers Foundation, together with the Board of Certified Safety Professionals, is honored to dedicate the *Career Guide to the Safety Profession* to Robert E. McClay, CSP. Professor McClay is a past director of the Board of Certified Safety Professionals and a past chairman of ASSE's Technical Publications Advisory Committee. While chairman, he initiated and developed, with others, the First Edition of the *Career Guide*, which was published jointly by the ASSE Foundation and the Board of Certified Safety Professionals in 1997. Mr. McClay is Safety Consultant at the Center for Applied Technology at East Carolina University. He currently serves as a member of ASSE's Council on Professional Development, as well as other academic and educational entities of the Society.

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