THIRD EDITION

Safety Professional's Reference and Study Guide

W. David Yates

CRC Press
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With enormous gratitude to my wonderful and supportive wife, Sharon, who has been there during the late nights; to our children, Joseph, Jason, Katie, Cody, and Jesse; and to our grandchildren, Jonathon Elisha, Jordan Nicole, Jacob Michael, Bailey Addison, Mason Tanner, Madison Olivia, Jagger, Hattie Grace, Aiden, and Riley. I dedicate this book.

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Contents

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Preface

During the course of my professional career, I have had the opportunity to read and utilize numerous technical resources. As a practicing safety professional in comprehensive practice, I have yet to find a single-source reference that includes the majority of information that I encounter on a daily basis. That is not to say that there are not useful references available. However, it has been my experience that to maintain a library suitable for comprehensive practice becomes very costly and requires a wide variety of topics to get the information that is needed.

The majority of useful references available focus primarily on the practicing industrial hygienist. It is for this reason that I set out to publish this book which is intended to serve several purposes as outlined below:

- To function as a "quick desk reference" for the experienced, practicing safety professional in comprehensive or specialized practice;
- To be utilized by university students at all levels as a useful reference tool to supplement more in-depth textbooks;
- To serve as a primary study resource for those individuals preparing to take the Associate Safety Professional (ASP), Certified Safety Professional (CSP), Occupational Health and Safety Technologist (OHST), and the Construction Health and Safety Technologist (CHST) examinations.

This book serves as a primary study guide for the examinations listed above. It includes such topics as History of the Safety Profession, Regulations, OSHA Record Keeping, Particulates and Gases, Toxicology, Industrial Hygiene, Ventilation, Noise, Biological Hazards, Thermal Stressors, Personal Protective Equipment, Math Review, Statistics for the Safety Professional, Fire Protection and Prevention, Mechanics, Hydrostatics and Hydraulics, Electrical Safety, Engineering Economy, Training, and Worker's Compensation Issues.

From a personal standpoint, I have a copy of the previous edition on my desk and utilize it frequently to assist me in solving day-to-day problems within my facilities. It is my belief that the reader of this book will determine it to be an "invaluable" resource at any level of their professional safety career.

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Author

W. David Yates was born in Morton, Mississippi, and lived most of his childhood in Crystal Springs, Mississippi. He has earned a B.S. degree in Health Care Services from Southern Illinois University, Carbondale, Illinois; an M.S. degree in Hazardous Materials Management from Jackson State University, Jackson, Mississippi; a PhD in Environmental Science from Jackson State University, Jackson, Mississippi; and J.D. from Birmingham School of Law. He served ten years in the United States Navy as a preventive medicine technician. He retired from the United States Army Reserves as an environmental science and preventive medicine Officer, having attained the rank of Colonel. In his civilian career, Dr. Yates has operated his own professional consulting firm, served as the safety and mission assurance manager for Stennis Space Center, Mississippi; the corporate safety director for Bodine Services of the Midwest, Decatur, Illinois; and several safety and security manager positions in mining and manufacturing. Dr. Yates currently serves as the area safety manager for Carmeuse Lime & Stone, Saginaw, Alabama. He is a CSP with the Board of Certified Safety Professionals. Dr. Yates is also a full-time faculty for Columbia Southern University in Environmental Management.

Dr. Yates has extensive knowledge and experience in hazardous materials management, safety programs management, indoor air quality, ventilation, noise, and industrial hygiene sampling and analysis.

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1

The Safety Profession and Preparing for the ASP/CSP Exam

The safety profession has a long and distinguished history tracing back to Hammurabi (ca. 1728–1686 BC), who was the sixth king of Babylon. Hammurabi is best known for his codification of laws, which included some, if not the first, set of worker's compensation laws known. The safety profession has greatly changed since the days of Hammurabi. On December 29, 1970, Public Law 91-596 (The Williams–Steiger Occupational Safety and Health Act of 1970) was signed into law. This legislation focused on controlling workplace hazards and ensuring safe and healthful working conditions for working men and women; by authorizing enforcement of the standards developed under the Act; by assisting and encouraging the States in their efforts to assure safe and healthful working conditions; by providing for research, information, education, and training in the field of occupational safety and health; and for other purposes. Under the Act, the Occupational Safety and Health Administration was created within the Department of Labor. The passage of this legislation highlighted the need for educated and knowledgeable professionals in the area of safety and health. Over the past 39 years, the safety profession has matured, as evidenced by universities offering undergraduate and advanced degrees in safety and health, placement of safety professionals at the highest levels of management, and certification of safety professionals. Today's safety profession requires a broad range of knowledge, including biology, chemistry, mathematics, business, and management. Your decision to become a candidate for the Certified Safety Professional (CSP) designation is an important step in your professional career. This book is written to assist you in achieving that ultimate designation as a safety professional.

Board of Certified Safety Professionals

Note: Information provided in this section is derived from the "Safety Fundamentals Examination Guide, Fifth Edition, April 2008." This information is derived from copyrighted materials that are owned by the Board of Certified Safety Professionals (BCSP).

The BCSP was organized in 1969 as a peer certification board. Its purpose is to certify practitioners in the safety profession. The specific functions of the Board are to

- Evaluate the academic and professional experience qualifications of safety professionals,
- Administer examinations,
- Issue certifications to those professionals who meet the Board's criteria and successfully pass required examinations.

In 1968, the American Society of Safety Engineers studied the issue of certification for safety professionals and recommended the formation of a professional certification program. This recommendation led to establishing BCSP in July 1969. The BCSP governing Board consists of 13 directors who represent the breadth and depth of safety, health, and environmental practice, as well as the public. Six of the directors are nominated to a pool by professional membership organizations affiliated with BCSP. The professional membership organizations currently affiliated with BCSP are the following:

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

BCSP has issued the CSP credential to more than 20,000 people, and more than 11,000 currently maintain their certification.

The CSP credential meets or exceeds the highest national and international accreditation and personnel certification standards for certification bodies. International accreditation is ISO/IEC 17024, and national accreditation is the National Commission for Certifying Agencies.

Definitions

Note: The information throughout this chapter is derived from the "A Complete Guide to Safety Certification," May 2019, or from the "Safety Fundamentals Examination Guide, Fifth Edition, April 2008." This information is derived from copyrighted materials that are owned and copyrighted

by the BCSP. Updates to the policies are current as of December 10, 2019, based on the requirements provided at the Board of Certified Safety Professional's website (www.bcsp.org).

BCSP's certifications are accredited by the American National Standard Institute (ANSI), an independent third-party organization that evaluates certification program and organization requirements on a regular basis.

A *safety professional* is one who applies the expertise gained from a study of safety science, principles, practices, and other subjects from professional safety experience to create or develop procedures, processes, standards, specifications, and systems to achieve optimal control or reduction of the hazards and exposures that may harm people, property, or the environment.

Professional safety experience, as interpreted by BCSP, must be the primary function of a position and account for at least 50% of the position's responsibility. Professional safety experience involves analysis, synthesis, investigation, evaluation, research, planning, design, administration, and consultation to the satisfaction of peers, employers, and clients in the prevention of harm to people, property, and the environment. Professional safety experience differs from nonprofessional experience in the degree of responsible charge and the ability to defend analytical approaches and recommendations for engineering or administrative controls.

A *Certified Safety Professional or CSP* is a safety professional who has met and continues to meet all requirements established by BCSP and is authorized by BCSP to use the CSP title and the CSP credential. Certificants who hold the CSP mostly work in private industry, which could include being a government contractor. A CSP who works in the government sector may work in the military, federal, state, or local agencies. Safety at this level is virtually in every industry, including petroleum exploration, production and refining, manufacturing, construction, health care, and insurance. A CSP's professional time is spent on safety management systems, occupational health and ergonomics, emergency response and preparedness, fire prevention and protection, and security responsibilities. A CSP may also have environmental management system responsibilities, including managing safety, health, and environmental programs that can cover up to 1,000 or more employees.

An *Associate Safety Professional or ASP* is now a full certification offered by the BCSP. It was previously only a temporary credential before becoming a CSP awarded by BCSP. This designation describes an individual who has met the academic requirements for the ASP certification and has passed the Safety Fundamentals Examination, the first of two examinations leading to the CSP credential. ASPs are persons who perform at least 50% of professional-level safety duties, including making worksite assessments to determine risks, potential hazards, and controls; evaluating risks and hazard control measures; investigating incidents; maintaining and evaluating incident and loss records; and preparing emergency response plans. Other duties could include hazard recognition, fire protection, regulatory compliance, health hazard control, ergonomics, hazardous materials management,

environmental protection, training, accident and incident, investigations, advising management, record keeping, emergency response, managing safety programs, product safety, and/or security.

A *Graduate Safety Practitioner or GSP* is a temporary designation awarded by BCSP. This designation describes an individual who has graduated from an independently accredited academic program meeting BCSP's standards. GSPs must sit for and pass the CSP examination within six years of the date the GSP is awarded.

Minimum Qualifications to Sit for the ASP Examination

As already mentioned above, the ASP is now a fully recognized certification/credential offered by the BCSP. The minimum qualifications to sit for the APS examination include academic requirements, professional safety experience requirements, successfully passing the ASP (or obtain a waiver), and ASP examinations. BCSP requires a minimum of a bachelor's degree in any field or an associate in safety, health, or the environment, one year of safety experience, passing the ASP examination, and retaining the certification.

Academic Requirements

Academic requirements to obtain the ASP credential include a bachelor's degree in any field or an associate in safety, health, or the environment. The associate degree must include at least four courses with at least 12 semester hours/18 quarter hours of study in the safety, health, or environmental domains covered in the ASP examination blueprint. The degree(s) must have been awarded from an accredited university or institution. Unaccredited degrees will not be accepted to satisfy the academic requirements.

Professional Safety Experience

The candidate must have a minimum of one year of safety experience where safety is at least 50%, preventative, professional level with breadth and depth of safety duties.

Minimum Qualifications to Sit for the CSP Examination

The minimum qualifications to sit for the CSP examination include academic requirements, professional safety experience requirements, successfully passing the ASP (or obtaining a waiver), and CSP examinations.

BCSP requires a minimum of a bachelor's degree, four years of safety experience, passing the CSP examination, and retaining the certification. To qualify for the CSP examination, a candidate must have already attained one of the following BCSP Qualified Credentials:

- ASP*,
- GSP,
- Transitional Safety Practitioner (TSP)*,
- Certified Industrial Hygienist® (CIH®),
- Chartered Member of the Institution of Occupational Safety and Health (CMIOSH)*,
- Canadian Registered Safety Professional (CRSP)*,
- CP-12 Professional Certificate in Safety and Occupational Health, U.S. Army Combat Readiness Center (ACRC)*,
- Certified Safety Engineer (CSE), as administered by the State Administration of Work Safety (SAWS), People's Republic of China (PRC)*,
- Master in Occupational Safety and Health, International Training Centre of the International Labour Organization (ITC-ILO)*,
- Member in the Institute of Safety Professionals of Nigeria (MISPN)*,
- NEBOSH National or International Diploma in Occupational Health and Safety*,
- Professional Member of the Singapore Institution of Safety Officers (SISO)*,
- Diploma/Certificate in Industrial Safety, as issued by the State Government Departments Boards of Technical Education, Government of India*,

*Note that all education requirements must be met when pursuing the CSP.

Academic Requirements

Academic requirements to obtain the CSP credential include a bachelor's degree or higher in any field. The degree(s) must have been awarded from an accredited university or institution. Unaccredited degrees will not be accepted to satisfy the academic requirements.

Professional Safety Experience Requirements

The candidate must have a minimum of four years of safety experience where safety is at least 50%, preventative, professional level with breadth and depth of safety duties.

ASP/CSP Process

The process for both of the ASP and CSP certifications is very similar. Specific details can be found by visiting the BCSP website, which is located at www.bcsp.org/Portals/0/Assets/DocumentLibrary/BCSP-Complete-Guide.pdf. In general, however, the process is as follows:

- Pick a certification;
- Determine eligibility;
- Submit the appropriate application, along with the fees;
- Purchase the examination;
- Schedule the examination;
- Sit for the examination;
- Maintain certification.

Examination Blueprint

In order to prepare for an examination, one must have a plan. In order to have a plan, the candidate will need to know the materials that are to be tested. The examination blueprints listed below indicate the main topics to be tested for each certification. *Of special note is that CSP10 Examination Blueprint will be effective in the fourth quarter (Q4) of 2019, and as such, is included here.*

Associate Safety Professional Examination Blueprint

The details of this blueprint can be found by visiting the following website: http://bcsp.org/Portals/0/Assets/DocumentLibrary/ASP-Blueprint.pdf

Domain #1—Mathematics (18%)

Topic 1 Chemistry and Industrial Hygiene Calculations
Topic 2 Electrical Calculations
Topic 3 Radiation Calculations
Topic 4 Structural and Mechanical Calculations
Topic 5 Physics Calculations
Topic 6 Financial Principles
Topic 7 Statistics
Topic 8 Performance Metrics and Indicators

Domain #2—Safety Management Systems (23%)

Topic 1 Risk Management and Hazard Control Process
Topic 2 Management Processes
Topic 3 Project Management
Topic 4 System Safety
Topic 5 Fleet Safety
Topic 6 Safety Programs

Domain #3—Ergonomics (13%)

Topic 1 Human Factors
Topic 2 Measurement and Monitoring
Topic 3 Controls

Domain #4—Fire Prevention and Protection (11%)

Topic 1 Fire and Explosion Hazards
Topic 2 Fire Controls
Topic 3 Fire and Emergency Management

Domain #5—Occupational Health (11%)

Topic 1 Biological Hazards and Controls
Topic 2 Chemical Hazards and Controls
Topic 3 Physical Hazards and Controls

Domain #6—Environmental Management (15%)

Topic 1 Environmental Hazards
Topic 2 Engineering Controls
Topic 3 Administrative Controls and Practices
Topic 4 Hazardous Waste Storage and Disposal

Domain #7—Training, Education, and Communication (9%)

Topic 1 Training and Education Methods
Topic 2 Communication and Group Dynamics

Certified Safety Professional (CSP) Examination Blueprint

The details of this blueprint can be found by visiting the following website: http://bcsp.org/Portals/0/Assets/DocumentLibrary/CSP10-Blueprint.pdf

Domain #1—Advanced Sciences and Math (9.95%)

Knowledge of

1. Core concepts in anatomy and physiology,
2. Core concepts in chemistry (e.g., organic chemistry, general chemistry, and biochemistry),
3. Core concepts in physics (e.g., forms of energy, weights, forces, and stresses),
4. Mathematics (e.g., geometry, algebra, trigonometry, finance and accounting, engineering, and economics),
5. Statistics for interpreting data (e.g., mean, median, mode, confidence intervals, probabilities, and Pareto analysis),
6. Core research methodology,
7. Microbiology (e.g., nanotechnology, waterborne pathogens, and blood-borne pathogens).

Domain #2—Management Systems (13.34%)

Knowledge of

1. Benchmarks and performance standards/metrics;
2. How to measure, analyze, and improve organizational culture;
3. Incident investigation techniques and analysis (e.g., causal factors);
4. Management of change techniques (prior, during, and after);
5. System safety analysis techniques (e.g., fault tree analysis, failure modes and effect analysis [FMEA], safety case approach, and risk summation);
6. The elements of business continuity and contingency plans;
7. Types of leading and lagging safety, health, environmental, and security performance indicators;
8. Safety, health, and environmental management and audit systems (e.g., ISO 14000, 45001, 19011, ANSI Z10);
9. Applicable requirements for plans, systems, and policies (e.g., safety, health, environmental, fire, and emergency action);
10. Document retention or management principles (e.g., incident investigation, training records, exposure records, maintenance records, environmental management system, and audit results);

11. Budgeting, finance, and economic analysis techniques and principles (e.g., timelines, budget development, milestones, resourcing, financing risk management options, return on investment, cost/benefit analysis, and role in procurement process);
12. Management leadership techniques (e.g., management theories, leadership theories, motivation, discipline, and communication styles);
13. Project management concepts and techniques (e.g., RACI charts (responsible, accountable, consulted and informed), project timelines, and budgets).

Domain #3—Risk Management (14.49%)

Knowledge of

1. Hazard identification and analysis methods (e.g., job safety analysis, hazard analysis, human performance analysis, and audit and causal analysis),
2. Risk analysis,
3. Risk evaluation (decision making),
4. The risk management process,
5. The costs and benefits of risk assessment process,
6. Insurance/risk transfer principles.

Domain #4—Advanced Application of Key Safety Concepts (14.69%)

Knowledge of

1. Principles of safety through design and inherently safer designs (e.g., designing out hazards during design phase, avoidance, elimination, and substitution);
2. Engineering controls (e.g., ventilation, guarding, isolation, and active vs. passive);
3. Administrative controls (e.g., job rotation, training, procedures, and safety policies and practices);
4. Personal protective equipment;
5. Chemical process safety management (e.g., pressure relief systems, chemical compatibility, management of change, materials of construction, and process flow diagrams);
6. Redundancy systems (e.g., energy isolation and ventilation);
7. Common workplace hazards (e.g., electrical, falls, same-level falls, confined spaces, lockout/tagout, working around water, caught in,

struck by, excavation, welding, hot work, cold and heat stress, combustibles, laser, and others);

8. Facility life safety features (e.g., public space safety, floor loading, and occupancy loads);
9. Fleet safety principles (e.g., driver and equipment safety, maintenance, surveillance equipment, global positioning system monitoring, telematics, hybrid vehicles, fuel systems, driving under the influence, and fatigue);
10. Transportation safety principles (e.g., air, rail, and marine);
11. Materials handling (e.g., forklifts, cranes, hand trucks, person lifts, hoists, rigging, manual, and drones);
12. Foreign material exclusion (FME) and foreign object damage (FOD);
13. Hazardous materials management (e.g., Globally Harmonized System [GHS] labels, storage and handling, policy, and security);
14. Multi-employee worksite issues (e.g., contractors and temporary or seasonal employees);
15. Sources of information on hazards and risk management options (e.g., subject matter experts, relevant best practices, published literature, and Safety Data Sheets [SDS]);
16. The safety design criteria for workplace facilities, machines, and practices (e.g., Underwriter's Laboratories [UL], National Fire Protection Association [NFPA], National Institute of Occupational Safety and Health [NIOSH], Factory Mutual [FM], and Internal ISO);
17. Tools, machines, practices, and equipment safety (e.g., hand tools, ladders, grinders, hydraulics, and robotics);
18. Workplace hazards (e.g., nanoparticles, combustible dust, heat systems, high pressure, radiation, silica dust, powder and spray applications, blasting, and molten metals);
19. Human performance.

Domain #5—Emergency Preparedness, Fire Prevention, and Security (10.59%)

Knowledge of

1. Emergency/crisis/disaster response planning/business continuity (e.g., nuclear incidents, natural disasters, terrorist attacks, chemical spills, fires, active violent attacks, and public utilities);
2. Fire prevention, protection, and suppression systems;

3. The transportation and security of hazardous materials;
4. Workplace violence and prevention techniques (violence on employees).

Domain #6—Occupational Health and Ergonomics (12.05%)

Knowledge of

1. Advanced toxicology principles (e.g., symptoms of an exposure, LD50, mutagens, teratogens, and ototoxins);
2. Carcinogens;
3. Ergonomics and human factors principles (e.g., visual acuity, body mechanics, lifting, vibration, anthropometrics, and fatigue management);
4. How to recognize occupational exposures (e.g., hazardous chemicals, radiation, noise, biological agents, heat/cold, infectious diseases, nanoparticles, and indoor air quality);
5. How to evaluate occupational exposures (e.g., hazardous chemicals, radiation, noise, biological agents, heat/cold, infectious diseases, ventilation, nanoparticles, and indoor air quality), including techniques for measurement, sampling, and analysis;
6. How to control occupational exposures (e.g., hazardous chemicals, radiation, noise, biological agents, heat/cold, ventilation, nanoparticles, infectious diseases, and indoor air quality);
7. Employee substance abuse;
8. The fundamentals of epidemiology;
9. Occupational exposure limits (e.g., hazardous chemicals, radiation, noise, biological agents, and heat).

Domain #7—Environmental Management Systems (7.38%)

Knowledge of

1. Environmental protection and pollution prevention methods (e.g., air, water, soil, containment, soil vapor intrusion, and waste streams);
2. How released hazardous materials migrate/interact through the air, surface water, soil, and water table;
3. Sustainability principles;
4. Wastewater treatment plants, onsite wastewater treatment plants, and public water systems;
5. Registration, evaluation, authorization, and restriction of chemicals (REACH) and restriction of hazardous substances (RoHS).

Domain #8—Training and Education (10.18%)

Knowledge of

1. Education and training methods and techniques (e.g., classroom, online, computer based, artificial intelligence (AI), and on-the-job training);
2. Training, qualification, and competency requirements;
3. Methods for determining the effectiveness of training programs (e.g., determine if trainees are applying training on the job);
4. Effective presentation techniques.

Domain #9—Law and Ethics (7.33%)

Knowledge of

1. Legal issues (e.g., tort, negligence, civil, criminal, contracts, and disability terminology),
2. Protection of confidential information (e.g., privacy, trade secrets, personally identifiable information, and General Data Protection Regulation [GDPR]),
3. Standards development processes,
4. The ethics related to conducting professional practice (e.g., audits, record keeping, sampling, and standard writing),
5. The relationship between labor and management,
6. BCSP Code of Ethics,
7. Workers' compensation (e.g., injured worker's compensation).

Preparing for the ASP/CSP Examinations

Now that you understand the process of qualifying for the examination and the information that you will be tested on; you will need to develop a plan of action to prepare to take the examinations. The methods and techniques used for preparing for the examination(s) is an individual decision. The methods listed in this chapter have been developed over the years and have been determined to be highly successful. There are no shortcuts to preparing for these examinations. Preparation for this examination started in elementary and high school, by taking the required courses in math, science, economics, and business. With this being said, this chapter will guide

you through some time-proven methods and techniques that will assist you in successfully passing the examinations and obtaining the professional designations.

Knowing Your Strengths and Weaknesses

One of your first steps in preparing for the ASP/CSP examinations is to determine where your strengths and weaknesses are. This can be achieved in a number of fashions. One way is to do a self-evaluation, by rating yourself on how well you know each subject area listed in the domains. Simply look at the domains and individual topics or tasks and rate yourself on how well you are familiar with the topic or task. A second method of determining how well you know the topic is to take a self-assessment examination. These self-assessment examinations can be purchased from BSCP for approximately $95.00 each. They are useful in determining your initial status and for studying for the examination. A rating form to assist you in rating yourself is available on the BCSP website by downloading the examination guides. There is no cost for this document.

Developing an Examination Preparation Plan

Based on the results of your self-evaluation, the next step is to develop a plan to prepare for the examination. There is no set period to prepare for the examination. The time required to prepare is strictly a personal decision. Personal experience has shown that the average person with a solid background in mathematics (trigonometry and algebra), basic physics, chemistry, and business will require an average of 6 months to prepare. As stated in "Knowing Your Strengths and Weaknesses" section, the first step is to determine your strengths and weaknesses. One of the easiest things to do, and probably one of the worst mistakes made when preparing for an examination, is to spend a lot of time studying those topics that you are strongest in. Let's face it. It's the easy thing to do. However, it will not serve you well to spend most of your time doing this. Preparing for the examination is hard work. Focus on those areas that you are weakest in.

Use the self-assessment and evaluation to develop your study plan. Determine how much time you will need to study each topic, and develop a schedule to help you meet these goals. Stick to the schedule, as best as you can. Cramming a lot of information at the last minute may work for a few individuals, but for the majority of people, this method does not work. When studying a particular topic, don't just rely on remembering details of the subject. Try to gain a solid understanding of each topic. The examination questions will not be questions directly from the recommended resources. They are designed to test your overall knowledge and understanding.

References and Resources

This book is designed to cover the majority of topics listed on the examination, focusing primarily on the examination reference sheet and the equations. A list of other references is available on the BCSP website, should you need more in-depth knowledge of a particular subject. A number of professional organizations and private companies offer ASP/CSP review courses and materials. These courses can be helpful but should not be considered to be all-inclusive or to provide you with a complete set of knowledge of the requirements of the ASP/CSP skill set in a week's time. If you are going to spend the time and money to attend one of these courses, it is my recommendation that you do it early on in your preparation. This allows you to review and modify your preparation plans. There are study materials offered by the American Society of Safety Engineers, SPAN International, and DataChem Software, Inc., in the form of study books and compact disks with example tests. These materials average approximately $400–$650 each. As you can see, a person preparing for the examinations has a lot of options. All of these are viable options. You must determine what works best for you, as an individual, before proceeding.

Test-Taking Strategy

Both the Safety Fundamental Examination and the Comprehensive Practice Examination contain 200 questions each. Each question is multiple-choice, with four possible answers. Only one answer is correct. Each item is independent and does not rely on the correct answer to any other item. Data necessary to answer items are included in the item or in a scenario shared by several items. Your score is based on the number of scored items you correctly answer. There are no penalties assigned for wrong answers. Therefore, it is to your advantage to answer all of the questions, even if you are guessing on some. However, only correct answers count toward reaching the passing score.

In order for you to improve your chances of passing the examination, develop a strategy for actually taking the examination. It is helpful to understand an item (question) construction. A four-choice, objectively scored examination item contains an item stem and four possible answers. The premise, or lead-in statement or question, is called the stem. One of the choices is correct, and three are not. As mentioned previously, there are no penalties for incorrect answers, so for some items, you may have to guess. If you do not know the answer to an item or are not sure about it, you should guess intelligently. Look for choices that you know are incorrect or do not

appear as plausible as others. Choose your answer from among the remaining choices. This increases your chance of selecting a correct answer. Above all else, read the items carefully. Consider the item from the viewpoint of an examination item writer. Look for the item focus. Each item evaluates some subject or area of knowledge. Try to identify what knowledge the item is trying to test. Avoid reading things into an item. The item can only test on the information actually included. Recognize that the stems for some items may include information that is not needed for correctly answering them. Next, consider the context of the item. Often an item is framed around a particular industry or situation. Even if you do not work in that industry or have not experienced a particular situation, the item may be testing knowledge that you have. Avoid dismissing an item because of the context or the industry in which it is framed.

Use your examination time wisely. When taking your examination, complete those items first that you know or can answer quickly. Then, go back to items that were difficult for you or required considerable time to read, analyze, or compute. This approach allows you to build your score as quickly as possible. You may want to go back over skipped or marked items several times. Complete the skipped items. After you have gone through the examination once, or if you are running out of time, look for items that you have not answered. Select an answer for any skipped or incomplete item. By chance alone, you can get one of every four correct. Many times, a later item may contain the answer or at least a trigger to allow you to answer some previous questions.

Go back to troublesome items. It is a good idea to mark items that you are not sure about or items that are difficult for you. After you have worked through the entire examination, go back to marked items. Reread the items, and study the choices again. You may recall some knowledge or information that you had not considered earlier and be able to answer the item correctly. You may also be able to eliminate a choice that is not correct and increase your chance of guessing the answer.

One of the single most important items allowed in the examination room is a calculator. It is recommended that you bring two in case the battery in one is used up. In the latest version of the BCSP guidelines, you are authorized to bring any of the following types of calculators:

- Casio models (FX-115, FX-250, FX-260, FX-300),
- Hewlett-Packard models (HP 9, HP10, HP12, HP30),
- Texas Instruments models (TI30, TI-34, TI-35, TI36).

Spend time practicing with the calculator before the examination. Practicing helps with time management and allows you to become familiar with the specific functions, capabilities, and shortcuts of the calculator.

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Regulations

Occupational Safety and Health Act

The Occupational Safety and Health Act (Public Law 91-596) was passed into law on December 29, 1970. It may also be referred to as the Williams–Steiger Occupational Safety and Health Act of 1970. The purpose of the law is "to assure safe and healthful working conditions for working men and women; by authorizing enforcement of the standards developed under the Act; by assisting and encouraging the states in their efforts to assure safe and healthful working condition; by providing for research, information, education, and training in the field of occupational safety and health; and for other purposes." The Occupational Safety and Health Administration (OSHA) was created within the Department of Labor. The primary responsibilities assigned to OSHA under the Act are as follows:

- Encourage employers and employees to reduce workplace hazards and to implement new or improve existing safety and health standards;
- Provide for research in occupational safety and health, and develop innovative ways of dealing with occupational safety and health problems;
- Establish "separate but dependent responsibilities and rights" for employers and employees for the achievement of better safety and health conditions;
- Maintain a reporting and record-keeping system to monitor job-related injuries and illnesses; establish training programs to increase the number of competent occupational safety and health personnel;
- Develop mandatory job safety and health standards, and enforce them effectively.

Who Is Covered under the Occupational Safety and Health Act?

Basically, all private sector employers with one or more workers in all 50 states and U.S. territories are governed under the OSH Act. OSHA regulations do not apply to all employers in the public sector (municipal, county, state, or federal government agencies), self-employed individuals, family members operating a farm, or domestic household workers.

Horizontal and Vertical Standards

Standards are referred to as either horizontal or vertical. *Horizontal standards* are those standards that apply to all industries and employers. For example, fire prevention and protection standards are horizontal standards. *Vertical standards* are those standards that apply only to particular industries and employers. Standards that apply only to the construction industry are an example of vertical standards.

General Duty Clause

Each standard promulgated by OSHA cannot cover every specific detail. Therefore, OSHA has implemented a "general duty clause" into the regulations. The General Duty Clause states that an employer shall furnish "a place of employment which is free from recognized hazards that are causing or are likely to cause death or serious physical harm to its employees." Where there is no specific standard, OSHA will use the general duty clause for the issuance of citations and fines.

The general duty clause can be found in Section 5 (a)(1) of the Occupational Safety and Health Act of 1970.

Employer Rights and Responsibilities

Besides meeting the intent of the general duty clause, the employer must

- Examine workplace conditions to make sure they comply with applicable standards;

- Minimize or reduce hazards;
- Use color codes, poster, labels, or signs when needed to warn employees of potential hazards;
- Provide training required by applicable OSHA standards;
- Keep OSHA-required records;
- Provide access to employee medical records and exposure records to employees or their authorized representatives.

Employee Rights and Responsibilities

OSHA requires workers to comply with all safety and health standards that apply to their actions on the job. Employees should

- Read the OSHA poster;
- Follow the employer's safety and health rules, and wear or use all required gear and equipment;
- Follow safe work practices for your job, as directed by your employer;
- Report hazardous conditions to a supervisor or safety committee;
- Report hazardous conditions to OSHA, if employers do not fix them;
- Expect safety and health on the job without fear of reprisal.

Communications and Correspondence with OSHA

There are two trains of thought among safety professionals when communicating and dealing with OSHA. The first train of thought is the belief that OSHA is the enemy and any communication or correspondence with them will result in a negative way for the company. The second thought is that OSHA has a purpose to protect the health and safety of employees and also serve as a valuable resource and partner for American businesses. The large majority of OSHA personnel are experienced and knowledgeable professionals and can serve as a useful resource in making decisions and often have ideas that you may not have thought of when trying to solve a particular problem within your facility or operation. With this being said, I would urge caution in providing information on an official basis. The safety professional must remember that a large portion of OSHA's responsibility lies in enforcing the regulations. Therefore, information provided to them can be used to levy penalties against your organization. When confronted

on an official basis with a potential citation or penalty, it is best to provide only those specific documents that are requested. This, of course, is only a personal opinion, based on my experiences.

OSHA Inspections and Process

Whenever an OSHA inspection occurs, the employer must

- Be advised by the compliance officer of the reason for the inspection,
- Require identification of the OSHA compliance officer,
- Accompany the compliance officer on the inspection,
- Be assured of the confidentiality of any trade secrets observed by an OSHA compliance officer during an inspection.

Under the OSH Act, OSHA is authorized to conduct workplace inspections during normal operating hours. Inspections are based on the following priorities:

- Imminent danger situations,
- Catastrophes and fatal accidents,
- Employee complaints,
- Programmed high-hazard inspections,
- Follow-up inspections.

The inspection process starts even before the compliance officer visits your site. The compliance officer will prepare himself or herself by becoming familiar with your particular industry and business through research. He or she will be familiar with the potential hazards and processes involved with your particular business. Once on site, the compliance officer begins by presenting his or her credentials. *Note: The compliance officer has the right, under the law, for timely admission to the facility. Any unnecessary delay or refusal of admittance may prompt the compliance officer to obtain a warrant for inspection purposes.* Once the authorized credentials have been presented, the compliance officer will hold an opening conference. In the opening conference, the compliance officer will explain the purpose of the visit, how your particular facility was selected for inspection, the scope of the inspection, and the standards that will apply. The compliance officer will ask the employer to select an employer representative to accompany him or her on the inspection. The compliance officer also gives an authorized employee representative the

opportunity to attend the opening conference and accompany the compliance officer during the inspection. The Act does not require an employee representative to accompany the compliance officer. After the opening conference, the compliance officer conducts a walkthrough inspection of the facility. During the walkthrough inspection, the compliance officer determines which route to take and to which employees he or she will talk with. The compliance officer may review records, collect air samples, measure noise readings, or photograph and videotape certain areas. Once the compliance officer has completed the walkthrough inspection, he or she will hold a closing conference. During the closing conference, the compliance officer gives the employer and all other interested parties a copy of the Employer Rights and Responsibilities Following an OSHA Inspection (OSHA 3000) for their review and discussion. The compliance officer discusses with the employer all unsafe or unhealthful conditions observed during the inspection and indicates the violations for which he or she may recommend a citation and a proposed penalty. At this time, the compliance officer will also inform the employer of the appeal process.

OSHA Citations

After the compliance officer files his or her report with the Area Director, it is the Area Director who determines whether he or she will issue a citation or propose penalties. The Area Director will send all citations via certified mail. Once the employer has received the citation, they must post the citation *for 3* days or until the violation has been abated, *whichever is longer.*

OSHA Citation Penalties

The categories of violations that are cited and the penalties that may be proposed are as follows:

Other-than-serious violation: A violation that has a direct relationship to job safety and health but probably would not cause death or serious physical harm. OSHA may assess a penalty from $0 to $13,206 for each violation. The agency may adjust a penalty for an other-than-serious violation downward by as much as 95%, depending on the employer's good faith, history of previous violations, and size of business.

Serious violation: A violation where there is a substantial probability that death or serious physical harm could result. OSHA assesses the penalty for a serious violation from $947 to $13,206 for each violation. OSHA may adjust a penalty for a serious violation downward on the basis of the employer's good faith, history of previous violations, and size of business.

Willful violation: A violation that the employer intentionally and knowingly commits. The employer is aware that a hazardous condition exists, knows that the condition violates a standard or other obligation of the Act, and makes no reasonable effort to eliminate it. OSHA may propose penalties from $9,472 to $132,598 for each willful violation.

Repeated violation: A violation of any standard, regulation, rule, or order where, upon reinspection, a substantially similar violation is found and the original citation has become a final order. Violations can bring a fine from $9,472 to $132,598 for each repeated violation.

Failure to abate violation: Failure to correct a prior violation may bring a civil penalty of $13,260 for each day that the violation continues beyond the prescribed abatement date.

Potential other penalties: Additional violations for which OSHA may issue citations and proposed penalties are as follows:

- Falsifying records, reports, or applications can, upon conviction, bring a criminal fine of $10,000 or up to 6 months in jail, or both;
- Violating posting requirements may bring a civil penalty of $7,000;
- Assaulting a compliance officer or otherwise resisting, opposing, intimidating, or interfering with a compliance officer in the performance of his or her duties is a criminal offense and is subject to a fine of not more than $5,000 and imprisonment for not more than 3 years.

Note 1: Citations and penalty procedures may differ slightly in states with their own occupational safety and health programs.

Note 2: In the future, the Department of Labor is required to adjust minimum OSHA penalties for inflation by January 15 of each New Year.

Adjustment of Penalties for Good Faith

OSHA has a policy of reducing penalties for small employers and those acting in good faith. For serious violations, OSHA may also reduce the proposed penalty based on the gravity of the alleged violation. No good

faith adjustment will be made for alleged willful violations. (www.osha.gov/OshDoc/data_General_Facts/factsheet-inspections.pdf)

Appeals

Once a citation or non-citation is issued, an employee or an employer may appeal the decision by the Area Director. The appeals process is different for the employer than it is for the employee.

Employee Appeals

If an employee complaint initiates an inspection, the employee or authorized employee representative may request an informal review of any decision not to issue a citation. Employees may not contest citations, amendments to citations, proposed penalties, or lack of penalties. They may, however, contest the time allowed for abatement of a hazardous condition. They also may request an employer's "Petition for Modification of Abatement," which requests an extension of the proposed abatement period. Employees must contest the petition within 10 working days of its posting or within 10 working days after an authorized employee receives a copy. Employees may request an informal conference with OSHA to discuss any issues raised by an inspection, citation, notice of proposed penalty, or employer's notice of intention to contest.

Employer Appeals

Within 15 working days of receiving a citation, an employer who wishes to contest must submit a written objection to OSHA. The OSHA Area Director forwards the objection to the Occupational Safety and Health Review Commission (OSHRC), which operates independently of OSHA. The OSHRC is a commission of three member administrative law judges appointed by the President of the United States, with the consent of congress. Each judge appointed serves a term of 6 years. Initial appointments were 2 years for the first judge, 4 years for the second judge, and 6 years for the third judge. Each succeeding judge is appointed for a term of 6 years. This provides some administrative consistency within the commission.

When issued a citation and notice of proposed penalty, an employer may request an informal meeting with OSHA's Area Director to discuss the case. OSHA encourages employers to have informal conferences with the Area Director if the employer has issues arising from the inspection that he or she wishes to discuss or provide additional information. The Area Director is authorized to enter into settlement agreements that revise citations and

penalties to avoid prolonged legal disputes and result in speedier hazard abatement. (Alleged violation contested before OSHRC does not need to be corrected until the contest is ruled upon by OSHRC.)

Petition for Modification of Abatement

After receiving a citation, the employer must correct the cited hazard by the abatement date unless he or she contests the citation or abatement date. Factors beyond the employer's control, however, may prevent the completion of corrections by that date. In such a situation, the employer who has made a good-faith effort to comply may file a petition to modify the abatement date.

The written petition must specify the steps taken to achieve compliance, the additional time needed to comply, the reasons additional time is needed, and interim steps taken to safeguard employees against the cited hazard during the intervening period. The employer must certify that he or she posted a copy of the petition in a conspicuous place at or near each place where a violation occurred and that the employee representative received a copy of the petition.

Notice of Contest

If the employer decides to contest either the citation, the abatement period, or the proposed penalty, he or she has *15 working days* from the time the citation and proposed penalty are received to notify the OSHA Area Director in writing. Failure to do so results in the citation and proposed penalty becoming a final order of the OSHRC without further appeal. An orally expressed disagreement will not suffice. This written notification is called a "Notice of Contest."

Although there is no specific format for the Notice of Contest, it must clearly identify the employer's basis for filing—the citation, notice of proposed penalty, abatement period, or notification of failure to correct violations.

The employer must give a copy of the Notice of Contest to the employees' authorized representative. If any affected employees are not represented by a recognized bargaining agent, the employer must post a copy of the notice in a prominent location in the workplace or give it personally to each unrepresented employee.

Review Procedure

If the employer files a written Notice of Contest within the required 15 working days, the OSHA Area Director forwards the case to OSHRC. The commission is an independent agency not associated with OSHA or the Department of Labor. The commission assigns the case to an administrative law judge.

OSHRC may schedule a hearing at a public place near the employer's workplace. The employer and the employee have the right to participate in the hearing; the OSHRC does not require them to be represented by attorneys. Once the administrative law judge has ruled, any party to the case may request a further review by OSHRC. Any of the three OSHRC commissioners may also, at his or her own motion, bring a case before the commission for review. Employers and other parties may appeal commission ruling to the appropriate U.S. Court of Appeals.

Note: The sections included above from OSHA Inspection Process through Review Procedure were taken from an OSHA web pamphlet (OSHA 2098 Rev. 2002) that requires no copyright permissions because it is in the public domain. However, it is the author's preference to give credit for work that is not his own.

States with their own occupational safety and health programs have a state system for review and appeal of citations, penalties, and abatement periods. The procedures are generally similar to federal OSHAs, but a state review board or equivalent authority hears cases.

Hazard Communication Standard (29 CFR 1910.1200)

Note: This standard has undergone tremendous changes since the initial publication of this book. Therefore, at the end of this chapter, I have elected to republish OSHA's Comparison of Hazard Communication Requirements between OSHA Hazard Communication Standard 29 CFR 1910.1200 (HCS) and Globally Harmonized System (GHS).

Purpose

This standard is still known as the HCS, but is unofficially known as GHS. However, it has undergone significant changes in the last few years. The purpose of this section is to ensure that the hazards of all chemicals produced or imported are classified and that information concerning the classified hazards is transmitted to employers and employees. The requirements of this

section are intended to be consistent with the provisions of the *United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS), Revision* 3. The transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, safety data sheets (SDSs), and employee training.

Scope and Application

This standard requires chemical manufacturers or importers to classify the hazards of chemicals that they produce or import and all employers to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, SDSs, and information and training. In addition, this standard requires distributors to transmit the required information to employers. (Employers who do not produce or import chemicals need only focus on those parts of the rule that deal with establishing a workplace program and communicating information to their workers.)

This standard applies to any chemical that is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.

Written Hazard Communication Standard

Employers are required to develop, implement, and maintain at each workplace a written hazard communication program that at least describes how the program will be managed and operated, including the requirements for labeling and other forms of warning, SDSs, and employee information and training, and how these requirements will be met, which also includes the following:

- A list of the hazardous chemicals known to be present using a product identifier that is referenced on the appropriate SDS (the list may be compiled for the workplace as a whole or for individual work areas);
- The methods the employer will use to inform employees of the hazards of nonroutine tasks (e.g., the cleaning of reactor vessels) and the hazards associated with chemicals contained in unlabeled pipes in their work areas;
- *Multiemployer workplaces.* Employers who produce, use, or store hazardous chemicals at a workplace in such a way that the employees of

other employers may be exposed shall additionally ensure that the hazard communication programs developed and implemented are transmitted to those employees and employers.

Label and Other Forms of Warning

The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged, or marked. Hazards not otherwise classified do not have to be addressed on the container. Where the chemical manufacturer or importer is required to label, tag, or mark, the following shall be provided:

- Product identifier;
- Signal word;
- Hazard statement(s);
- Pictogram(s);
- Precautionary statement(s);
- Name, address, and telephone number of the chemical manufacturer or other responsible party.

Safety Data Sheets

Chemical manufacturers and importers shall obtain or develop an SDS for each hazardous chemical they produce or import. Employers shall have an SDS in the workplace for each hazardous chemical that they use. The chemical manufacturer or importer preparing the SDS shall ensure that it is in English (although the employer may maintain copies in other languages as well) and includes at least the following section numbers and headings, and associated information under each heading, in the order listed below: (See Appendix D to 29 CFR 1910.1200—Safety Data Sheets, for the specific content of each section of the SDS.)

- Section 1: Identification,
- Section 2: Hazard identification,
- Section 3: Composition/information on ingredients,
- Section 4: First-aid measures,

- Section 5: Fire-fighting measures,
- Section 6: Accidental release measures,
- Section 7: Handling and storage,
- Section 8: Exposure controls/personal protection,
- Section 9: Physical and chemical properties,
- Section 10: Stability and reactivity information,
- Section 11: Toxicological information.

Note 1: Tobe consistent with the GHS, an SDS must also include the following headings in this order:

- Section 12: Ecological information,
- Section 13: Disposal considerations,
- Section 14: Transport information,
- Section 15: Regulatory information.

Employee Information and Training

Employee training and information is at the core of this standard. Employers shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment and whenever a new physical or health hazard the employees have not previously been trained about is introduced into their work area. Information and training may be designed to cover categories of hazards or specific chemicals. Chemical-specific information must always be available through labels and material SDSs (MSDSs).

Training

Employee training shall include at least the following information:

- Methods and observations that may be used to detect the presence or release of hazardous chemicals in the work area;
- The physical and health hazards of the chemicals in the work area;
- The measure employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals;

- The details of the hazard communication program developed by the employer, including the explanation of the labeling system and the MSDS, and how employees can obtain and use the appropriate hazard information.

Blood-Borne Pathogens Standard (29 CFR 1910.1030)

Scope, Application, and Definitions

The information provided in this standard applies to all occupation exposure to blood or other potentially infectious materials present in the workplace. Definitions within this standard are as follows:

Blood means human blood, human blood components, and products made from human blood.

Blood-borne pathogens means pathogenic microorganisms that are present in human blood and cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).

Other potentially infectious materials means the following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids or any unfixed tissue or organ from a human.

Exposure Control Plan

Each employer having an employee (or employees) with occupational exposure or potential exposure to blood-borne pathogens shall establish a written Exposure Control Plan designed to eliminate or minimize employee exposure. The Exposure Control Plan shall contain at least the following information:

- The exposure determination;
- The schedule and method of implementation for methods of compliance, HIV and HBV research laboratories and production facilities, hepatitis B vaccination and postexposure evaluation and follow-up, communication of hazards to employees, and record keeping.

The Exposure Control Plan shall be reviewed and updated at least annually and whenever necessary to reflect new or modified tasks and procedures that affect occupational exposure and to reflect new or revised employee positions with occupational exposure.

Hepatitis B Vaccination and Postexposure Follow-Up

The employer shall make available the hepatitis B vaccine and vaccination series to all employees who have occupational exposure and postexposure evaluation and follow-up to all employees who have had an exposure incident. Should an employee refuse to take the hepatitis B vaccine, the employer is required to obtain a written statement of his or her refusal.

Communication of Hazards

Labels and signs shall be affixed to containers of regulated waste; refrigerators and freezers containing blood or other potentially infectious materials; and other containers used to store, transport, or ship blood or other potentially infectious materials.

Record Keeping

Medical Records

The employer shall establish and maintain an accurate record for each employee with occupational exposure. This record shall include the following:

- The name and social security number of the employee;
- A copy of the employee's hepatitis B vaccination status, including the dates of all the hepatitis B vaccinations and any medical records relative to the employee's ability to receive vaccination;
- A copy of all results of examinations, medical testing, and follow-up procedures;
- The employer's copy of the health care professional's written opinion;
- A copy of the information provided to the health care professional.

The employer shall ensure that employee medical records and information are maintained in the strictest of confidence. The information contained in the medical records may not be disclosed or reported without the employee's express written consent, except as required by this standard. The employer shall maintain the records required under this standard for at least the duration of employment plus 30 years.

Training Records

Training records shall include the following information:

- The dates of the training sessions,
- The contents or a summary of the training sessions,
- The names and qualification of persons conducting the training,
- The names and job titles of all persons attending the training sessions.

Training records shall be maintained for 3 years from the date on which the training occurred.

Control of Hazardous Energy Standard (29 CFR 1910.147)

Scope, Application, and Purpose

This standard covers the servicing and maintenance of machines and equipment in which the unexpected energization or start-up of the machines or equipment or the release of stored energy could cause injury to employees. This standard establishes minimum performance requirements for the control of such hazardous energy. This standard applies to the control of energy during servicing or maintenance of machines and equipment.

Definitions

Affected employee. An employee whose job requires him or her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him or her to work in an area in which such servicing or maintenance is being performed.

Authorized employee. A person who locks or tags out machines or equipment in order to perform servicing or maintenance on a machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered by this standard.

Capable of being locked out. An energy-isolating device capable of being locked out if it has a hasp or other means of attachment to which a lock can be affixed or it has a locking mechanism built into it. Other energy-isolating devices are capable of being locked out, if lockout

can be achieved without the need to dismantle, rebuild, or replace the energy-isolating device or permanently alter its energy control capability.

Energized. Connected to an energy source or containing a residual or stored energy.

Energy-isolating device. A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: a manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected for all ungrounded supply conductors, and, in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches, and other control circuit-type devices are not energy-isolating devices.

Energy source. Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.

Hot tap. A procedure used in the repair, maintenance, and services activities that involves welding on a piece of equipment under pressure, in order to install connections or appurtenances.

Lockout. The placement of a lockout device on an energy-isolating device, in accordance with the established procedure, ensuring that the energy-isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

Lockout device. A device that utilizes a positive means, such as a lock, either key or combination type, to hold an energy-isolating device in a safe position and prevent the energizing of a machine or equipment.

Normal production operations. The utilization of a machine or equipment to perform its intended production function.

Servicing or maintenance. Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining or servicing machines or equipment.

Setting up. Any work performed to prepare a machine or equipment to perform its normal production operation.

Tagout. The placement of a tagout device on an energy-isolating device, in accordance with the established procedure, to indicate that the energy-isolating device and the equipment being controlled may not be operated until the tagout device is removed.

Tagout device. A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy-isolating device in accordance with established procedure, to indicate that the energy-isolating device and the equipment being controlled may not be operated until the tagout device is removed.

Energy Control Program

The employer shall establish a program consisting of energy control procedures, employee training, and periodic inspections to ensure that before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, start-up, or release of stored energy could occur and cause injury, the machine or equipment shall be isolated from the energy source and rendered inoperative.

Periodic Inspection

The employer shall conduct a periodic inspection of the energy control procedure at least annually to ensure that the procedure and the requirements of this standard are being followed. The periodic inspection shall be performed by an authorized employee other than the one(s) utilizing the energy control procedure being inspected. The periodic inspection shall be conducted to correct any deviations or inadequacies identified. The employer shall certify that the periodic inspections have been performed. The certification shall identify the machine or equipment on which the energy control procedure was being utilized, the date of the inspection, the employees included in the inspection, and the person performing the inspection.

Training and Communication

The employer shall provide training to ensure that the purpose and function of the energy control program are understood by employees and that the knowledge and skills required for the safe application, usage, and removal of the energy controls are acquired by employees. The training shall include the following:

- Recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control;
- Purpose and use of the energy control procedure;
- Prohibition relating to attempts to restart or reenergize machines or pieces of equipment that are locked or tagged out.

Retraining shall be provided for all authorized and affected employees whenever there is a change in their job assignments, a change in machines, equipment, or processes that present a new hazard, or when there is a change in the energy control procedures. Additional retraining shall also be conducted whenever a periodic inspection reveals inadequacies in the program or procedures. The employer shall certify that employee training has been accomplished and is being kept up to date. The certification shall contain each employee's name and dates of training.

Confined Space Entry Standard (29 CFR 1910.146)

Scope and Application

This standard contains requirements for practices and procedures to protect employees in general industry from the hazards of entry into permit-required confined spaces. This standard does not apply to agriculture, construction, or shipyard employment.

Definitions

Acceptable entry conditions means the conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.

Attendant means an individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit space program.

Authorized entrant means an employee who is authorized by the employer to enter a permit space.

Confined space means a space that (1) is large enough and so configured that an employee can bodily enter and perform assigned work, (2) has limited or restricted means for entry or exit, and (3) is not designed for continuous employee occupancy.

Engulfment means the surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.

Entry means the action by which a person passes through an opening into a permit-required confined space.

Entry permit means the written or printed document that is provided by the employer to allow and control entry into a permit space and that contains the information required in the standard.

Entry supervisor means the person responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required in the standard.

Hazardous atmosphere means an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue, injury, or acute illness.

Immediately dangerous to life or health means any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space.

Isolation means the process by which a permit space is removed from service and completely protected against the release of energy and material into the space.

Oxygen-deficient atmosphere means an atmosphere containing less than 19.5% oxygen by volume.

Oxygen-enriched atmosphere means an atmosphere containing more than 23.5% oxygen by volume.

Permit-required confined space means a confined space that has one or more of the following characteristics: (1) contains or has a potential to contain a hazardous atmosphere, (2) contains a material that has the potential for engulfing an entrant, (3) has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section, or (4) contains any other recognized serious safety or health hazard.

Rescue service means the personnel designated to rescue employees from permit spaces.

General Requirements

The employer shall evaluate the workplace to determine if any spaces are permit-required confined spaces. If the workplace contains permit spaces, the employer shall inform exposed employees by posting danger signs, or by any other equally effective means, of the existence and location of and the danger posed by the permit spaces.

Confined Space Entry Program

If the employer decides that its employees will enter permit spaces, the employer shall develop and implement a written permit space program that complies with this standard. The written program shall be available for inspection by employees and their authorized representatives.

Under the confined space entry program, the employer shall

- Implement the measures necessary to prevent unauthorized entry;
- Identify and evaluate the hazards of permit spaces before the employee enters them;
- Develop and implement the means, procedures, and practices necessary for safe permit space entry operations.

Entry Permits

The entry permit that documents compliance with this standard and authorizes entry to a permit space shall include the following:

- The permit space to be entered,
- Purpose of the entry,
- Date and the authorized duration of the entry permit,
- Authorized entrants by name,
- Attendant name,
- Entry supervisor (by name),
- Measures to isolate the permit space and to eliminate or control permit space hazards before entry.

Employees must have the opportunity to observe the monitoring under this standard.

Training

The employer shall provide training so that all employees whose work is regulated by this standard acquire the understanding, knowledge, and skills necessary for the safe performance of their duties. Training shall be provided to each affected employee before the employee is first assigned duties under this standard. Whenever there is a change in assigned duties, the employer determines that there is a discrepancy in the program, or there is a change in permit space operations that present a hazard about which an employee has not previously been trained, and thus, additional training is required. The employer shall certify that the training required has been accomplished. The certification shall contain each employee's name, the signatures or initial of the trainers, and the dates of training. The certification shall be available for inspection by employees and their authorized representatives.

Personal Protective Equipment (29 CFR 1910.132)

Application

Protective equipment covered in this standard includes personal protective equipment (PPE) for eyes, face, head, and extremities; protective clothing; respiratory devices; and protective shield and barriers, which shall be provided, used, and maintained in a sanitary and reliable condition wherever it is necessary by reason of hazards of processes or environment, chemical hazards, radiological hazards, or mechanical irritants encountered in a

manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation, or physical contact.

Note: OSHA's Final PPE Rule, which was effective on February 13, 2008, requires employers to provide PPE, at no cost to the employees. The Final Rule does not require an employer to provide normal safety boots or shoes, but does require the employer to provide specialty boots.

Employee-Owned Equipment

Where employees provide their own protective equipment (of their own choice), the employer shall be responsible to assure its adequacy, including proper maintenance and sanitation of such equipment.

Hazard Assessment and Equipment Selection

The employer shall assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of PPE. If such hazards are present, or likely to be present, the employer shall (1) select and have each affected employee use the types of PPE that will protect the affected employee from the hazards identified in the hazard assessment, (2) communicate selection decisions to each affected employee, and (3) select PPE that properly fits each affected employee. The employer shall verify that the required workplace hazard assessment has been performed through a written certification that identifies the workplace evaluated; the person certifying that the evaluation has been performed; the date(s) of the hazard assessment; and which determines the document as a certification of the hazard assessment.

Training

The employer shall provide training to each employee who is required under this standard to use PPE. Each employee shall be trained to know at least the following:

- When PPE is necessary;
- What PPE is necessary;
- How to properly don, doff, adjust, and wear PPE;
- Limitations of the PPE;
- Proper care, maintenance and useful life, and disposal of the PPE.

Each affected employee shall demonstrate an understanding of the training and the ability to use PPE properly, before being allowed to perform work requiring the use of PPE. When the employer has reason to believe that any affected employee who has already been trained does not have the understanding and skill required, the employer shall retrain each such employee.

Respiratory Protection Standard (29 CFR 1910.134)

Purpose

The purpose of the Respiratory Protection Standard is to control those occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors. This shall be accomplished as far as feasible by accepted engineering control measures. When effective engineering control measures are not feasible, or while they are being instituted, appropriate respirators shall be used.

Respirators shall be provided by the employer when such equipment is necessary to protect the health of the employee. The employer shall provide the respirators that are applicable and suitable for the purpose intended. The employer shall be responsible for the establishment and maintenance of a respiratory protection program, which shall include the requirements of this standard.

Definitions

Air-purifying respirator means a respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

Assigned protection factor means the protection factor assigned to the respirator type.

Atmosphere-supplying respirator means a respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere and includes supplied-air respirators and self-contained breathing apparatus units.

Fit test means the use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual.

Powered air-purifying respirator means an air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

Qualitative fit test means a pass/fail test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

Quantitative fit test means an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

Self-contained breathing apparatus means an atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

Supplied-air respirator or airline respirator means an atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

Respiratory Protection Program

This standard requires the employer to develop and implement a written respiratory protection program with required worksite-specific procedures and elements for required respirator use. The program must be administered by a suitably trained program administrator. In addition, certain program elements may be required for voluntary use to prevent the potential hazards associated with the use of the respirator. The employer shall include in the written program the following information:

- Procedures for selecting respirators for use in the workplace;
- Medical evaluations of employees required to use respirators;
- Fit testing procedures;
- Procedures for proper use of respirators;
- Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and otherwise maintaining respirators;
- Procedures to ensure adequate air quality, quantity, and flow of breathing air for atmosphere-supplying respirators;
- Training required for respirator usage;
- Procedures for evaluating the effectiveness of the program.

Training and Information

This standard requires the employer to provide effective training to employees who are required to use respirators. The training must be comprehensive, must be understandable, and must recur annually, and more often, if necessary. Training must ensure that each employee can demonstrate knowledge and understanding of the topic, and include the following:

- Why respirator protection is necessary and how improper wearing or use can compromise the protection received;
- Limitations and capabilities of the respirator and cartridge (filter);
- Inspection and maintenance procedures;
- Cleaning, disinfecting, and storage procedures;
- Proper wear of the respirator.

Retraining shall be administered annually, or when a new process or procedure is implemented that the employee has not been previously trained.

Fall Protection Standard (29 CFR 1926.500–503) (Subpart M)

Scope and Application

This standard sets forth the requirements and criteria for fall protection in construction work areas covered by this standard. Exception: The provisions of this standard do not apply when employees are making inspection, investigation, or assessment of workplace conditions prior to the actual start of construction work or after all construction work has been completed.

Definitions

Anchorage means a secure point of attachment for lifelines, lanyards, or deceleration devices. Anchorage points must be rated to 5,000 lb per person attached.

Body harness means straps that may be secured about the employee in a manner that will distribute the fall arrest forces over at least the thighs, pelvis, waist, chest, and shoulders with means for attaching it to other components of a personal fall arrest system.

Connector means a device that is used to couple parts of the personal fall arrest system and positioning device systems together.

Controlled access zone means an area in which certain work may take place without the use of guardrail systems, personal fall arrest systems, or safety net systems and access to the zone is controlled.

Deceleration device means any mechanism, such as a rope grab, rip-stitch lanyard, specially woven lanyard, tearing or deforming lanyards, and automatic self-retracting lifelines/lanyards, that serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limit the energy imposed on an employee during a fall arrest.

Deceleration distance means the additional vertical distance a falling employee travels, excluding lifeline elongation and free fall distance, before stopping, from the point at which the deceleration device begins to operate.

Free fall means the act of falling before a personal fall arrest system begins to apply force to arrest the fall.

Guardrail system means a barrier erected to prevent employees from falling to lower levels.

Lanyard means a flexible line of rope, wire rope, or strap that generally has a connector at each end for connecting the body harness to a deceleration device, lifeline, or anchorage.

Leading edge means the edge of a floor, roof, or formwork for a floor or other walking/working surface that changes location as additional floor,

roof, decking, or formwork sections are placed, formed, or constructed. A leading edge is considered to be an "unprotected side and edge" during periods when it is not actively and continuously under construction.

Lifeline means a component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.

Personal fall arrest system means a system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, and body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these.

Walking/working surface means any surface, whether horizontal or vertical, on which an employee walks or works, including, but not limited to, floors, roofs, ramps, bridges, runways, formwork, and concrete reinforcing steel, but not including ladders, vehicles, or trailers, on which employees must be located in order to perform their duties.

Duty to Have Fall Protection

The employer shall determine if the walking/working surfaces on which its employees are to work have the strength and structural integrity to support employees safely. Employees shall be allowed to work on those surfaces only when the surfaces have the requisite strength and structural integrity.

Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 6 ft or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest system.

Training

The employer shall provide a training program for each employee who might be exposed to fall hazards. The program shall enable each employee to recognize the hazards of falling and shall train each employee in the procedures to be followed in order to minimize these hazards. The employer shall assure that each employee has been trained, as necessary, by a competent person qualified to teach the following information:

- Nature of fall hazards in the work area;
- Correct procedures for erecting, maintaining, disassembling, and inspecting fall protection systems to be used;
- Use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, controlled access zones, and other protection to be used;

- The role of each employee in the safety monitoring system in which this system is used;
- The limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs;
- Correct procedures for the handling and storage of equipment and materials and the erection of overhead protection;
- The role of employers in fall protection plans;
- The specific requirements of the standard.

The employer shall verify compliance with the standard by preparing a written certification record. The written certification record shall contain the name or other identity of the employee trained, the date(s) of the training, and the signature of the person who conducted the training or the signature of the employer. The latest training certificate shall be maintained. When the employer has reason to believe that any affected employee who has already been trained does not have the understanding and skill required to work safely, the employer shall retrain each such employee or whenever new equipment or systems are installed.

Record Keeping

OSHA 300, 300-A, AND 301 FORMS (29 CFR 1904.29)

Employers must use OSHA 300, 300-A, and 301 forms, or equivalent forms, for recordable injuries and illnesses. The OSHA 300 form is called the Log of Work-Related Injuries and Illnesses, the OSHA 300-A form is the Summary of Work-Related Injuries and Illnesses, and the OSHA 301 form is called the Injury and Illness Incident Report.

How Quickly Must Each Injury or Illness Be Recorded?

An employer must enter each recordable injury or illness on the 300 and 301 incident report with *seven calendar days* of receiving information that a recordable injury or illness has occurred.

How are "privacy cases" listed on the forms?

The following cases are considered to be privacy cases, and therefore, the employee's name is not entered on the OSHA 300 form. Instead, enter "PRIVACY CASE" in place of the employee's name.

- An injury or illness to an intimate body part or the reproductive system;
- An injury or illness resulting from a sexual assault;
- Mental illnesses;

- HIV infection, hepatitis, or tuberculosis;
- Needlestick injuries and cuts from sharp objects that are contaminated with another person's blood or other potentially infectious materials;
- Other illnesses if the employee voluntarily requests that his or her name not be entered on the log.

Annual Summary

An annual summary is created on the OSHA 300 log and is certified by a company owner or designated representative. The OSHA 300-A form is signed by a company owner or designated representative and posted in a conspicuous location no later than February 1 of the year following the year covered by the records. The OSHA 300-A form shall remain posted until April 30th of the year following the year covered by the records. OSHA 300 logs (and separate privacy case files, if required) shall be maintained for a period of 5 years following the end of the calendar year that these records cover.

Providing Records to Government Representatives

When an authorized government representative asks for the records you keep under 1904, you must provide copies of the records within four business hours. Authorized government representatives under this standard include

- A representative of the Secretary of Labor,
- A representative of the Secretary of Health and Human Services,
- A representative of a state agency responsible for administering a state plan approved under the Act.

Reporting Serious Incidents or Fatalities (29 CFR 1904.39)

OSHA requires an employer to notify them within eight h after the death of any employee from a work-related incident. OSHA also requires that employer report hospitalizations, amputations or loss of an eye of employees with 24 h. This reporting must be orally by telephone or in person to the Area Office of the OSHA nearest the location of the incident. The toll free number to report this is 1-800-321-6742. The incident may also report any of these via electronic submissions at www.osha.gov. One exception to this is a fatality or hospitalizations resulting from a motor vehicle accident occurring on a public road. These do not have to be reported. However, if the fatality, in-patient hospitalization, amputation, or loss of eye occurred in a construction work zone, you must report the incident to OSHA.

Determining Recordable Injuries or Illnesses

In general, an employer must consider an injury or illness to be recordable, if it results in any of the following:

- Death,
- Days away from work,
- Restricted work or transfer to another job,
- Medical treatment beyond first aid,
- Loss of consciousness,
- Injury or illness diagnosed by a physician or other licensed health care professional.

Note: Determining whether an injury or illness is work related may appear simple on the surface. However, this is not always the case. In the case where an employer believes that the injury or illness is personal and not work related, he or she must record the injury or illness on the OSHA 300 and 300 forms, until such time as it is definitively determined to be nonwork related.

Calculating Total Recordable Incident Rates (TRIR)

To calculate a company's total recordable incident rate (TRIR), use the following equation:

$$\text{TRIR} = \frac{\text{No. of injury or illness cases} \times 200{,}000}{\text{Total number of hours worked}}.$$

Example

A company has two recordable injury cases and 1 day away or restricted case for a total of three cases. The company has worked a total of 278,942 h for the year. Calculate the TRIR for this company.

$$\text{TRIR} = \frac{3 \times 200{,}000}{278{,}942\ \text{h}}$$

$$\text{TRIR} = \frac{600{,}000}{278{,}942}$$

$$\text{TRIR} = 2.15$$

The company's TRIR for the year is 2.15. This rate can be compared to the Bureau of Labor and Statistics average rating for your particular

Standard Industry Code category. The constant of 200,000 is based on 100 employees working 2,000 h/year. Therefore, this rate is stating that for every 100 employees, 2.15 of them have sustained an injury or illness as a result of a work-related accident.

Calculating Days Away, Restricted, or Transfer Rates

To calculate the days away, restricted, or transfer (DART) rate, use only those injury cases (included in the TRIR) that resulted in days away, restricted, or transfer from job. The equation is as follows:

$$\text{DART} = \frac{\text{No. of DART cases} \times 200,000}{\text{Total number of hours worked}}$$

Example

As in the previous example, use 1 DART case and 278,942 total hours work to calculate the DART rate.

$$\text{DART} = \frac{1\,\text{case} \times 200,000}{278,942}$$

$$\text{DART} = \frac{200,000}{278,942}$$

$$\text{DART} = 0.72$$

Calculating Severity Rates

To calculate the severity rates, use the following equation:

$$\text{Severity rate} = \frac{\text{No. of lost work days} \times 200,000}{\text{Total number of hours worked}}$$

Example

Company XYZ had two recordable injuries with one of them resulting in 52 days of lost time. The total number of hours worked was 278,942 h.

$$\text{Severity rate} = \frac{52 \times 200,000}{278,942}$$

$$\text{Severity rate} = \frac{10,400,000}{278,942}$$

$$\text{Severity rate} = 37.28$$

Key Information to Remember on Regulations

1. The Occupational Safety and Health Act (Public Law 91-596) was passed into law on December 29, 1970.
2. OSHA regulations do not apply to all employers in the public sector (municipal, county, state, or federal), self-employed individuals, family members operating a farm, or domestic household workers.
3. Horizontal standards are those standards that apply to all industries and employers.
4. Vertical standards are those standards that apply only to particular industries and employers.
5. Section 5(a)(1) of the OSH Act of 1970 is the General Duty Clause.
6. Once an employer receives a citation, he or she must post the citation in a conspicuous location for a period of 3 days or until the violation has been abated, whichever is longer.
7. If an employer decides to contest a citation or abatement period, or the proposed penalty, he or she has 15 working days from the time the citation or proposed penalty is received to notify the OSHA Area Director in writing.
8. If an employee who has received an exposure to blood-borne pathogens refuses to take the hepatitis B vaccination, he or she must sign a refusal statement, which is maintained on file with the employer.
9. Employee medical records, under the Blood-borne Pathogen Standard, must be maintained on file for the duration of employment plus 30 years.
10. A work-related recordable injury must be recorded on the OSHA 300 and 301 forms within 7 working days of receiving notification of the injury or illness.
11. When an authorized government representative asks for records required in 29 CFR 1904, an employer must provide copies within 4 h.
12. A work-related fatality must be reported to OSHA within 8 h.
13. A worked-related injury resulting in in-patient hospitalization, amputation, or loss of an eye must be reported to OSHA within 24 h.

Comparison of Hazard Communication Requirements

OSHA Hazard Communication Standard 29 CFR 1910.1200 (HCS) and Globally Harmonized System (GHS)

Introduction

The GHS is not in itself a regulation or a model regulation. It is a framework from which competent authorities may select the appropriate harmonized classification and communication elements. Competent authorities will decide how to apply the various elements of the GHS within their systems based on their needs and the target audience.

The GHS includes the following elements:

a. Harmonized criteria for classifying substances and mixtures according to their health, environmental, and physical hazards;
b. Harmonized hazard communication elements, including requirements for labeling and MSDSs.

The harmonized elements of the GHS may be seen as a collection of building blocks from which to form a regulatory approach. While the full range is available to everyone, and should be used if a country or organization chooses to cover a certain effect when it adopts the GHS, the full range does not have to be adopted. This constitutes the GHS building block approach.

Competent authorities, such as OSHA, will determine how to implement the elements of the GHS within their systems. This document compares the GHS elements to the OSHA HCS elements. The competent authority allowances/decision points and the selection of building blocks are addressed in Section VI.

This Comparison of Hazard Communication Requirements document includes the following segments:

- General provisions comparison;
- Health hazard comparison;
- Physical hazard comparison;
- Label comparison
  - GHS and transport pictograms,
  - Label examples;
- MSDS comparison;
- GHS competent authority allowances and building block discussion.

Purpose

Comparison

The purpose of the HCS and that of the GHS are consistent. The HCS is one of the major existing systems that was to be harmonized by the GHS.

OSHA HCS 29 CFR 1910.1200	GHS
29 CFR 1910.1200 (a)(1) Purpose The purpose of this section is to ensure that the hazards of all chemicals produced or imported are evaluated and that information concerning their hazards is transmitted to employers and employees. This transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, MSDSs, and employee training.	**1.1.1 Purpose** 1.1.1.1 The use of chemical products to enhance and improve life is a widespread practice worldwide. But alongside the benefits of these products, there is also the potential for adverse effects to people or the environment. As a result, a number of countries or organizations have developed laws or regulations over the years that require information to be prepared and transmitted to those using chemicals, through labels or SDSs. Given the large number of chemical products available, individual regulation of all of them is simply not possible for any entity. Provision of information gives those using chemicals the identities and hazards of these chemicals and allows the appropriate protective measures to be implemented in the local use settings.
(a)(2) This occupational safety and health standard is intended to address comprehensively the issue of evaluating the potential hazards of chemicals and communicating information concerning hazards and appropriate protective measures to employees and to preempt any legal requirements of a state, or political subdivision of a state, pertaining to this subject. Evaluating the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, may include, for example, but is not limited to, provisions for developing and maintaining a written hazard communication program for the workplace, including lists of hazardous chemicals present; labeling of containers of chemicals in the workplace, as well as of containers of chemicals being shipped to other workplaces; preparation and distribution of MSDSs to employees and downstream employers; and development and implementation of employee training programs	1.1.1.2 While these existing laws or regulations are similar in many respects, their differences are significant enough to result in different labels or SDSs for the same product in different countries. Through variations in definitions of hazards, a chemical may be considered flammable in one country, but not in another. Or it may be considered to cause cancer in one country, but not in another. Decisions on when or how to communicate hazards on a label or SDS thus vary around the world, and companies wishing to be involved in international trade must have large staffs of experts who can follow the changes in these laws and regulations and prepare different labels and SDSs. In addition, given the complexity of developing and maintaining a comprehensive system for classifying and labeling chemicals, many countries have no system at all. 1.1.1.3 Given the reality of the extensive global trade in chemicals, and the need to develop national programs to ensure their safe use, transport, and disposal, it was recognized that an internationally harmonized approach to classification and labeling would provide the foundation for such programs. Once countries have consistent and appropriate information on the chemicals they import or produce in their own countries, the infrastructure to control chemical exposures and protect people and the environment can be established in a comprehensive manner.

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Purpose

Comparison

The purpose of the HCS and that of the GHS are consistent. The HCS is one of the major existing systems that was to be harmonized by the GHS.

OSHA HCS 29 CFR 1910.1200	GHS
regarding hazards of chemicals and protective measures. Under Section 18 of the Act, no state or political subdivision of a state may adopt or enforce, through any court or agency, any requirement relating to the issue addressed by this federal standard, except pursuant to a federally approved state plan.	1.1.1.4 Thus, the reasons for setting the objective of harmonization were many. It is anticipated that, when implemented, the GHS will a. Enhance the protection of human health and the environment by providing an internationally comprehensible system for hazard communication, b. Provide a recognized framework for those countries without an existing system, c. Reduce the need for testing and evaluation of chemicals, d. Facilitate international trade in chemicals whose hazards have been properly assessed and identified on an international basis. 1.1.1.5 The work began with the examination of existing systems and the determination of the scope of the work. While many countries had some requirements, the following systems were deemed to be the "major" existing systems and were used as the primary basis for the elaboration of the GHS: a. Requirements of systems in the United States for the workplace, consumers, and pesticides; b. Requirements of Canada for the workplace, consumers, and pesticides; c. European Union directives for classification and labeling of substances and preparations; d. The United Nations Recommendations on the Transport of Dangerous Goods. 1.1.1.6 The requirements of other countries were also examined as the work developed, but the primary task was to find ways to adopt the best aspects of these existing systems and develop a harmonized approach. This work was done based on agreed principles of harmonization that were adopted early in the process: a. The level of protection offered to workers, consumers, the general public, and the environment should not be reduced as a result of harmonizing the classification and labeling systems;

(*Continued*)

Purpose	
Comparison The purpose of the HCS and that of the GHS are consistent. The HCS is one of the major existing systems that was to be harmonized by the GHS.	
OSHA HCS 29 CFR 1910.1200	**GHS**
	b. The hazard classification process refers principally to the hazards arising from the intrinsic properties of chemical elements and compounds and mixtures thereof, whether natural or synthetic; c. Harmonization means establishing a common and coherent basis for chemical hazard classification and communication, from which the appropriate elements relevant to means of transport, consumer, worker, and environment protection can be selected; d. The scope of harmonization includes both hazard classification criteria and hazard communication tools, for example, labeling and chemical SDSs, taking into account especially the four existing systems identified in the International Labour Organization (ILO) report; e. Changes in all these systems will be required to achieve a single GHS; transitional measures should be included in the process of moving to the new system; f. The involvement of concerned international organizations of employers, workers, consumers, and other relevant organizations in the process of harmonization should be ensured; g. The comprehension of chemical hazard information, by the target audience, for example, workers, consumers, and the general public, should be addressed; h. Validated data already generated for the classification of chemicals under the existing systems should be accepted when reclassifying these chemicals under the harmonized system; i. A new harmonized classification system may require adaptation of existing methods for testing of chemicals; j. In relation to chemical hazard communication, the safety and health of workers, consumers, and the public in general, as well as the protection of the environment, should be ensured while protecting confidential business information (CBI), as prescribed by the competent authorities.

Scope

Comparison

The GHS scope clarification is consistent with the HCS exemptions and labeling exceptions. Consumer products and pharmaceuticals are specifically addressed in the GHS scope. The HCS includes laboratories, sealed containers, and distributors, while as a framework for systems, the GHS does not include these specific issues.

The GHS addresses testing in the scope section. The HCS addresses testing under hazard determination. The GHS and HCS do not require testing for health hazards. All the physical hazards in the HCS are not linked to specific test methods (as is the case in the GHS), and testing for physical hazards is not required.

OSHA HCS 29 CFR 1910.1200	GHS
29 CFR 1910.1200 (b) Scope and Application	**1.1.2 Scope**
(b)(1)	1.1.2.1 The GHS includes the following elements:
This section requires chemical manufacturers or importers to assess the hazards of chemicals that they produce or import, and all employers to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, MSDSs, and information and training. In addition, this section requires distributors to transmit the required information to employers. (Employers who do not produce or import chemicals need only focus on those parts of this rule that deal with establishing a workplace program and communicating information to their workers. Appendix E of this section is a general guide for such employers to help them determine their compliance obligations under the rule.)	a. Harmonized criteria for classifying substances and mixtures according to their health, environmental, and physical hazards; b. Harmonized hazard communication elements, including requirements for labeling and SDSs.
(b)(2)	1.1.2.2 This document describes the classification criteria and the hazard communication elements by the type of hazard (e.g., acute toxicity, flammability). In addition, decision logics for each hazard have been developed. Some examples of classification of chemicals in the text, as well as in Annex 7, illustrate how to apply the criteria. There is also some discussion about issues that were raised during the development of the system where additional guidance was thought to be necessary to implement the system.
This section applies to any chemical that is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.	1.1.2.3 The scope of the GHS is based on the mandate from the 1992 United Nations Conference on Environment and Development (UNCED) for development of such a system as stated in paragraphs 26 and 27 of Agenda 21, Chapter 19, Program Area B, reproduced below:
(b)(3)	
This section applies to laboratories only as follows:	

(*Continued*)

Scope

Comparison

The GHS scope clarification is consistent with the HCS exemptions and labeling exceptions. Consumer products and pharmaceuticals are specifically addressed in the GHS scope. The HCS includes laboratories, sealed containers, and distributors, while as a framework for systems, the GHS does not include these specific issues.

The GHS addresses testing in the scope section. The HCS addresses testing under hazard determination. The GHS and HCS do not require testing for health hazards. All the physical hazards in the HCS are not linked to specific test methods (as is the case in the GHS), and testing for physical hazards is not required.

OSHA HCS 29 CFR 1910.1200	GHS
(b)(3)(i) Employers shall ensure that labels on incoming containers of hazardous chemicals are not removed or defaced.	"26. Globally harmonized hazard classification and labeling systems are not yet available to promote the safe use of chemicals, inter alia, at the workplace or in the home. Classification of chemicals can be made for different purposes and is a particularly important tool in establishing labeling systems. There is a need to develop harmonized hazard classification and labeling systems, building on ongoing work; 27. A globally harmonized hazard classification and compatible labeling system, including material safety data sheets and easily understandable symbols, should be available, if feasible, by the year 2000." This mandate was later analyzed and refined in the harmonization process to identify the parameters of the GHS. As a result, the following clarification was adopted by the Interorganization Program for the Sound Management of Chemicals (IOMC) Coordinating Group to ensure that participants were aware of the scope of the effort:
(b)(3)(ii) Employers shall maintain any MSDSs that are received with incoming shipments of hazardous chemicals and ensure that they are readily accessible during each work shift to laboratory employees when they are in their work areas.	
(b)(3)(iii) Employers shall ensure that laboratory employees are provided information and training in accordance with paragraph (h) of this section, except for the location and availability of the written hazard communication program under paragraph(h)(2)(iii) of this section.	
(b)(3)(iv) Laboratory employers that ship hazardous chemicals are reconsidered to be either a chemical manufacturer or a distributor under this rule, and thus must ensure that any containers of hazardous chemicals leaving the laboratory are labeled in accordance with paragraph (f)(1) of this section and that a MSDS is provided to distributors and other employers in accordance with paragraphs (g)(6) and (g)(7) of this section.	"The work on harmonization of hazard classification and labeling focuses on a harmonized system for all chemicals, and mixtures of chemicals. The application of the components of the system may vary by the type of product or stage of the life cycle. Once a chemical is classified, the likelihood of adverse effects may be considered in deciding what informational or other steps should be taken for a given product or use setting. Pharmaceuticals, food additives, cosmetics, and pesticide

(*Continued*)