
ADVANCED SAFETY MANAGEMENT FOCUSING ON Z10 AND SERIOUS INJURY PREVENTION

FRED A. MANUELE, CSP, PE
PRESIDENT, HAZARDS LIMITED



JOHN WILEY & SONS, INC.

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Published by John Wiley & Sons, Inc., Hoboken, New Jersey.

Published simultaneously in Canada

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Library of Congress Cataloging-in-Publication Data:

Manuele, Fred A.

Advanced safety management focusing on Z10 and serious injury prevention
/ Fred A. Manuele.

p. ; cm.

Includes bibliographical references and index.

ISBN 978-0-470-10953-3 (cloth)

1. Wounds and injuries—Prevention. 2. Industrial hygiene—Management.
3. Industrial safety—Management. I. Title.

[DNLN: 1. American National Standards Institute. 2. American Industrial Hygiene Association. 3. Safety Management—standards—United States. 4. Occupational Health—United States. 5. Risk Management—standards—United States. 6. Wounds and Injuries—prevention & control—United States. WA 485 M2935a 2007]

RA645.T73M36 2007

363.11—dc22

2007017346

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

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FOREWORD

The team that eventually produced the ANSI Z10 standard met for the first time early in 2001. It may surprise readers to know that the meeting began with a contentious debate as to whether or not a standard on occupational health and safety management systems was appropriate or even necessary. The essential argument of those opposed to the development of such a standard was that if we got it “wrong,” the consequences would be severe. After some spirited debate, a majority of the consensus body voted to move forward and set the stage for the five-year effort that resulted in Z10.

This tumultuous beginning is understandable, given the extraordinary breath of interests represented in the consensus body. Labor, industry, academia, professional associations, and government interests were each represented by leading voices with strong opinions on the approach the standard should take. However, by the time of our second meeting, barely a month after the tragedy of September 11, 2001, the necessity to put aside parochial biases was clear. The team coalesced and dedicated itself to a path of technical rigor.

In this light, the Z10 team produced a standard that was approved by the consensus body with no negative votes and sailed through the final ANSI approval process in an astonishingly short time. Such unanimous and quick approval is rare for any standard, let alone one as potentially controversial as ANSI Z10. This initial acceptance was followed by almost universal support by the technical community and substantial acceptance by the prospective user community.

While I believe that Z10 is the best tool available for those interested in developing occupational health and safety management systems, some will view it as

lacking. All of the basic elements are present. But, the required format for a management system standard does not allow entry of detailed direction on how users would apply its provisions.

In this book, Fred Manuele helps the reader understand the how and why of many of the principles introduced by Z10. This elucidation provides essential knowledge to help readers implement effective safety and health management systems in their organizations.

ALAN LEIBOWITZ

Chair, ANSI/AIHA Z10 Standard Writing Committee

PREFACE

The principal purpose of this book is to provide guidance to managements, safety professionals, educators, and students concerning two major, interrelated developments impacting on the occupational safety and health discipline. They are the:

- Issuance, for the first time in the United States, of a national consensus standard for occupational safety and health management systems
- Emerging awareness that traditional systems to manage safety do not adequately address serious injury prevention

On July 25, 2005, the American National Standards Institute approved a new standard, the Occupational Health and Safety Management Systems Standard, designated ANSI/AIHA Z10-2005. This standard is a state-of-the-art, best practices guide. Over time, Z10 will revolutionize the practice of safety.

Chapter 1, an overview of Z10, comments on all the provisions in the standard. Chapter 3 on Serious Injury Prevention gives substance to the position that adopting a different mind-set is necessary to reduce serious injury potential. Other chapters give implementation guidance with respect to the standard's principal provisions and to serious injury prevention.

Recognition of the significance of Z10 has been demonstrated. Its provisions are frequently cited as representing highly effective safety and health management practices. The sales record for Z10 is impressive. Safety professionals are quietly making gap analyses, comparing existing safety and health management systems to the provisions of Z10.

Even though the standard sets forth minimum requirements, very few organizations have safety and health management systems in place that meet all the

provisions of the standard. The provisions for which shortcomings will often exist, and for which emphasis is given in this book, pertain to:

- Risk assessment and prioritization
- Applying a prescribed hierarchy of controls to achieve acceptable risk levels
- Safety design reviews
- Including safety requirements in procurement and contracting papers
- Management of change systems

As ANSI standards are applied, they acquire a “quasi-official” status as the minimum requirements for the subjects to which they pertain. As Z10 attains that stature, it will become the benchmark, the minimum, against which the adequacy of safety and health management systems will be measured.

The chapter on Serious Injury Prevention clearly demonstrates that although occupational injury and illness incident frequency is down considerably, incidents resulting in serious injuries have not decreased proportionally. The case is made that typical safety and health management systems do not adequately address serious injury prevention. Thus, major conceptual changes are necessary in the practice of safety to reduce serious injury potential. That premise permeates every chapter in this book.

Safety and health professionals are advised to examine and reorient the principles on which their practices are based to achieve the significant changes necessary in the advice they give. Guidance to achieve those changes is provided.

Why use the word “Advanced” in the title of this book? If managements adopt the provisions in Z10 and give proper emphasis to the prevention of serious injuries, they will have occupational health and safety management systems as they should be, rather than as they are. A strong relationship exists between improving management systems to meet the provisions of Z10, a state-of-the-art standard, and minimizing serious injuries.

Acknowledgments

Many of the chapters in this book were reviewed in draft form by Wayne Christensen and Bruce Main. Their critiques have been influential. Valuable contributions by Paul Adams on the design review concept and by Dwayne Dunsmore and Edward A. Neal who have written about a practical application of the design review process are much appreciated. And, it is appropriate to recognize the fine work done by the committee that wrote the Z10 standard, about which much is written in this book.

FRED A. MANUELE

President, Hazards Limited

INTRODUCTION

An abstract is provided for each chapter to serve as a content reference. This book gives guidance on applying the provisions of ANSI/AIHA Z10-2005, the *Occupational Health and Safety Management Systems* Standard, and on serious injury prevention as *interrelated subjects*. The order in which chapters appear supports that rationale.

A professor who uses my books in his classes has suggested that each chapter be a stand-alone essay. Although that requires a little repetition, the reader benefits by not having to refer to other chapters while perusing the subject at hand. Partial success with respect to that suggestion has been achieved. Each of the chapter headings are listed in the following descriptions.

1. An Overview of ANSI/AIHA Z10-2005: The American National Standard for Occupational Health and Safety Management Systems Brief comments are made on all the sections in Z10. All safety and health professionals are encouraged to acquire a copy of the standard and to move toward applying it. Some of the subjects emphasized are: Management Leadership and Employee Participation—the most important section in the standard; the Significance of this state-of-the-art, consensus standard (it will become the benchmark against which the adequacy of safety management systems is measured); Societal implications; Specific provisions in the standard that are not included in typical safety management systems (the safety through design processes); and Management review provisions. The case is made that bringing safety and health management systems

up to the Z10 level will reduce the probability of incidents occurring that result in serious injury and illness.

2. The Plan-Do-Check-Act Concept (PDCA) The writers of Z10 made it clear that the continual improvement of occupational health and safety management systems can be achieved by applying the “recognized quality concept of Plan-Do-Check-Act” (PDCA). However, no information is provided on the PDCA concept and methodology. This chapter: Discusses the origin and substance of the PDCA concept; Relates the PDCA concept to basic problem-solving techniques; and Gives guidance on initiating a PDCA process.

3. Serious Injury Prevention Awareness has emerged that traditional safety management systems do not adequately address serious injury prevention. Statistics are given showing that although the frequency of minor injuries is down substantially, serious injuries have not been reduced proportionately. Comments are made on the: Need for safety professionals to examine the effectiveness of the principles on which their practices are based; Types of activities in which many serious injuries occur; Need for a change in the culture that gives proper attention to serious injury prevention; and Prevention techniques to reduce serious injuries.

4. Human Error Reduction In the chapter on Serious Injury Prevention, it is established that reducing human errors as causal factors is necessary in an effort to minimize the occurrence of serious injuries. This chapter focuses on human errors that occur above the worker level that derive from deficiencies: In organizational safety cultures; Safety and health management systems; and Design and engineering decision making. Emphasis is also given to designing operating systems, in accord with Z10 provisions, so as to avoid creating preconditions for human errors, such as overly stressful or error-provocative work methods.

5. Management Leadership and Employee Participation, Section 3.0 This is the most important section in Z10. Why so? Safety is culture-driven, and management creates the culture. As top management makes decisions directing the organization, the outcomes of those decisions establish its safety culture. This chapter comments on: the Requirements of managements to attain superior results; Policy statements; Defining roles, assigning responsibilities and authority, providing resources, and establishing accountability; Employee participation; Relating management leadership to preventing serious injuries; and Making a safety culture analysis.

6. Achieving Acceptable Risk Levels: The Operational Goal ANSI/AIHA Z10-2005 tersely states its purpose in Section 1.2 as follows: “The primary purpose of this standard is to provide a management tool to reduce the risk of occupational injuries, illnesses, and fatalities.” This question logically follows. What risk reduction level is to be achieved? This chapter: Establishes that achieving a zero risk level is unattainable; Discusses the great variations in cultural and situational aspects of risk acceptance; and Combines the elements of risk (probability and severity) with ALARP (as low as reasonably practicable) to arrive at a definition of acceptable risk, the operational goal.

7. **Planning, Section 4.0** The success of an occupational health and safety management system is largely contingent on the thoroughness of the Planning processes. In Z10, the Planning process goal is to identify and prioritize the “issues” that are defined as “hazards, risks, management system deficiencies, and opportunities for improvement.” Reviews are to be made to identify those issues: Priorities are to be set, objectives are to be established, and actions are to be outlined for continual improvement. This chapter discusses all the provisions in the Planning section. However, special emphasis is given to the Assessment and Prioritization requirements in Section 4.2, on which three related chapters follow.

- 8. A Primer on Hazard Analysis and Risk Assessment
- 9. Including Risk Assessment Provisions in Standards and Guidelines: A Trend
- 10. Three and Four Dimensional Numerical Risk Scoring Systems

8. **A Primer on Hazard Analysis and Risk Assessment, Section 4.2** The intent is to provide sufficient knowledge of hazard analysis and risk assessment methods to serve most of a safety and health professional’s needs. This chapter: Explores what a hazard analysis is; Discusses how a hazard analysis is extended into a risk assessment; Outlines the steps to be followed in conducting a hazard analysis and a risk assessment; Includes descriptions of several commonly used risk assessment techniques; and Gives examples of risk assessment matrices.

9. **Including Risk Assessment Provisions in Standards and Guidelines: A Trend** Several safety standards and guidelines issued in recent years contain hazard analysis and risk assessment provisions. This is a significant trend. Comments are made on the content of several of those standards and guidelines. Taken as a whole, they are convincing indicators, along with the hazard analysis and risk assessment provisions in Z10, that safety and health professionals will be expected to know how to make risk assessments as a matter of career enhancement.

10. **Three- and Four-Dimensional Numerical Risk-Scoring Systems** For many years, the typical risk assessment practice was to establish qualitative risk levels by considering only two dimensions: Probability of event occurrence and the Severity of harm or damage that could result. Translating those assessments into numerical risk scores was not necessary. However, systems now in use may be three- or four-dimensional and require numerical risk scorings. This chapter reviews several numerical risk-scoring systems in use. A three-dimensional numerical risk-scoring system developed by this author to serve the needs of those who prefer to have numbers in their risk assessment systems is presented.

11. **Implementation and Operation, Section 5.0** All the previously described chapters related to the Z10 provisions pertain to the “Plan” step in the PDCA process. The Implementation and Operation section moves into the “Do” step. The standard states that elements in this section “provide the backbone of an occupational health and safety management system and the means to pursue the objectives from the planning process.” This is a very brief chapter. Comments are made only on certain of its provisions: Contractors; Emergency preparedness; Education,

training, awareness; Competence; Communications; and Document and Record Controls. Since several of the provisions in Section 5.0 are truly “the backbone of an occupational health and safety management system,” separate chapters are devoted to them. They are chapters 12, 13, 15 and 16.

12. Hierarchy of Controls: The Safety Decision Hierarchy
13. Safety Design Reviews
14. Lean Concepts: Opportunities for Safety Professionals
15. Management of Change
16. The Procurement Process

The applied lean concepts as discussed in this book relate to the safety design review provisions in Z10, and a chapter on lean concepts follows the design chapter.

12. Hierarchy of Controls: The Safety Decision Hierarchy, Section 5.1.1 This Z10 section states that “The organization shall implement and maintain a process for achieving feasible risk reduction based on the following order of controls.” Achieving an understanding of this order of controls is a step forward in the practice of safety. This chapter: Reviews the evolution of hierarchies of control; Discusses the Z10 hierarchy and provides guidelines on its application; Comments on the logic of applying the hierarchy of controls; Places the hierarchy within good problem-solving techniques, as in The Safety Decision Hierarchy; and Provides General Design Requirements that relate to Z10’s hierarchy of controls.

13. Safety Design Reviews, Section 5.1.2 Design Review and Management of Change requirements are addressed jointly in Section 5.1.2. Although the subjects are interrelated, each has its own importance and uniqueness. Guidance on the management of change concept is provided in the next chapter. This chapter discusses the design review processes in Z10 and includes: A review of safety through design concepts; Comments on how some safety professionals are engaged in the design process; A review of the design-in safety practices in auto manufacturing; A composite of safety through design procedures in place; and A general design safety checklist. An Addendum provides a nearly ideal Environmental, Health, and Safety Equipment Design Philosophy, an Intel Corporation issuance.

14. Lean Concepts: Opportunities for Safety Professionals Applied lean concepts are to eliminate waste, improve efficiency, and lower production costs. Elements of waste that should be addressed in the lean process are the direct and ancillary costs of accidents. This chapter Discusses the origin of lean concepts and how broadly they are being applied; Gives examples of lean applications in which hazards and risks were not addressed; Comments on the opportunity for effective involvement in lean initiatives by safety professionals; and Outlines a unique merging of lean and safety through design concepts. An Addendum offers A Simplified Initial Value Stream Map To Identify Waste (Muda) and Opportunities for Continuous Improvement (Kaizen).

15. Management of Change, Section 5.1.2 The objective of a management of change system is to prevent introducing new risks into the work environment. The management of change process is addressed separately in this book to promote

a broad understanding and application of the change analysis concept that is at its base. This chapter: Defines the purpose and methodology of a management of change system and relates it to the change analysis concept; Establishes its significance in preventing serious injuries and illnesses and major property damage incidents; and Outlines management of change procedures. An addendum is titled Management of Change Policy and Procedures.

16. The Procurement Process, Section 5.1.3 Although the requirements in Z10 for Procurement processes are plainly stated, they are brief in relation to the enormity of what will be required to implement them. As is the case for the provisions in Z10 on safety design reviews, the Procurement processes are to avoid bringing risks into the workplace. This chapter: Comments on prevalent purchasing practices; Establishes the importance of including safety specifications in purchasing orders and contracts; and Provides resources and guidance on design specifications that become purchasing specifications to be met by vendors who supply machinery, equipment, and materials. Examples of design specifications that become safety specifications in purchasing documents are not easily acquired. Nevertheless, this chapter contains two Addenda: the first, The DaimlerChrysler Ergonomic Design Criteria For Engineers, Designers, Builders, Vendors, Suppliers, and Contractors; and the second, a composite of General Design and Purchasing Guidelines in use.

17. Evaluation and Corrective Action, Section 6.0 In the Plan-Do-Check-Act process, it is important to determine whether the results intended are achieved from the management systems put in place. That is the purpose of Section 6.0. This chapter comments on: Monitoring, measurement, and assessment requirements; Provisions for taking corrective actions; and Communications on the lessons learned being fed back into the Planning and Management Review initiatives. Separate chapters on two provisions considered vital in the Evaluation and Corrective Action section follow. They are chapters:

- 18. Incident Investigation
- 19. Audit Requirements

18. Incident Investigation, Section 6.2 The requirements for incident investigation in Z10 are concisely set forth in one paragraph, with no subsections. Organizations are to establish and implement processes to investigate and analyze hazardous incidents in a timely manner so as to identify occupational health and safety management issues, and other possible incident causal factors. This chapter: Encourages that incident investigation be given a higher place within the elements of a safety management system; Comments on the cultural difficulties facing those who try to have incident investigations improved if an organization has condoned low-quality performance; Suggests making needs, opportunities, and courses of action studies; Reviews the content of a good incident investigation form and provides materials to assist in crafting an investigation procedure; Promotes the adoption of root causal factor identification, analysis and resolution systems; and Provides several resources on incident investigation.

19. Audit Requirements, Section 6.3 Provisions in Z10 require that safety audits be made “to determine whether the organization has appropriately applied and effectively implemented the occupational health and safety management system elements, including identifying hazards and controlling risks.” This chapter: Establishes that the purpose of an audit is to improve the safety culture; Discusses the implications of observed hazardous situations; Explores management expectations; Comments on auditor qualifications; Discusses the need to have safety and health management system audit guides tailored to the location being audited; and Provides resources to develop suitable audit guides. One such resource is the audit guide, the VPP Site Worksheet for Star Approval, that is used by the Occupational Safety and Health Administration (OSHA) when screening applicants for Voluntary Protection Program (VPP) recognition. It appears as an addendum.

20. Management Review, Section 7.0 The importance of the Management Review requirements in Z10 is inverse to the length of this chapter. Having a periodic Management Review process in place to determine the effectiveness of the problem-solving and operations improvement actions taken is a “must” step in the PDCA process. It was said in Chapter 1 that Management Leadership and Employee Participation is the most important section in Z10. It was also stated that the Management Review section was a close second in importance. That is because the thoroughness of feedback provided to fulfill the review process impacts on the quality of management leadership and decision making.

This chapter comments on the Management Review elements pertaining to: Hazard identification; Risk assessment and prioritization; Progress made in risk reduction; The effectiveness of procedures to eliminate or control identified hazards and risks; Actions taken on the recommendations made in safety and health audits; and The extent to which set objectives have been met.

21. Z10, Other Safety Standards and Guidelines, and VPP Certification This chapter commences with a comparison of the provisions in Z10 with other safety and health standards and guidelines. The conclusion is that Z10 is superior and that it is a state-of-the-art standard. The desire some companies have for their safety and health management systems to be “certified as being superior” is recognized. A comparison is made of the provisions in Z10 with those in the VPP program administered by OSHA. Organizations are encouraged to consider being certified as meeting the VPP qualifications. Achieving that status will result in having safety and health management systems close to Z10 provisions. The requirements to obtain the VPP Star Designation are provided in an Addendum.

CHAPTER 1

AN OVERVIEW OF ANSI/AIHA Z10-2005: THE AMERICAN NATIONAL STANDARD FOR OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEMS

INTRODUCTION

On July 25, 2005, the American National Standards Institute approved the Occupational Health and Safety Management Systems Standard, designated as ANSI/AIHA Z10-2005. Thus, for the first time in the United States, a national consensus standard was issued for safety and health management systems applicable to organizations of all sizes and types.

The standard represented a major development. It provides senior managements with a well-conceived state-of-the-art concept and action outline to improve their safety and health management systems. The drafters of Z10 adopted many of the best worldwide practices. As employers make improvements to meet the standard's requirements, it can be expected that the frequency and severity of occupational injuries and illnesses will be reduced. The beneficial societal implications of Z10 are substantial.

This new standard will have a significant and favorable impact on the content of the practice of safety and on the knowledge and skill requirements for safety and health professionals. Over time, Z10 will revolutionize the practice of safety. All persons responsible for occupational safety and health within an organization or who give counsel on occupational safety and health management systems to entities other than their own should have a copy of this standard and be thoroughly familiar with its content.

Since Z10 is state-of-the-art, it is not surprising that many organizations do not have management systems in place that meet all its provisions. To identify the shortcomings and develop an improvement plan, a gap analysis should be made in which the safety and health management systems in place or those recommended by consultants are compared with Z10 requirements.

To assist in developing an understanding of the content and impact of this standard, this overview chapter, in addition to giving brief comments on each section of the standard, comments on:

- Its history and development as the standard writing committee reached consensus
- A prominent and major theme within Z10
- How that major theme relates to serious injury prevention
- Z10 being a management system standard, not a specification standard
- International harmonization and compatibility
- Long-term influences and societal implications
- The continual improvement process: the Plan-Do-Check-Act (PDCA) concept

HISTORY, DEVELOPMENT, AND CONSENSUS

The American Industrial Hygiene Association obtained approval as the ANSI Accredited Standards Committee for the development of Z10 in March 1999. The first full meeting of the committee took place in February 2001. Over a 6-year period, as many as 80 safety and health professionals were involved as committee members, alternates, resources, and interested commenters. They represented industry, labor, government, business associations, professional organizations, and academia, and other individuals having a general interest in health and safety management systems. Thus, broad participation in the development of and acceptance of the standard was achieved.

One of the reasons for the Z10 committee's success was its strict adherence to the due diligence requirements in developing an ANSI standard. There was a balance in the stakeholders providing input, and the open discussions resulted in their vetting each issue raised to a conclusion. In the early stages of the committee's work, safety and health, quality, and environmental standards and guidelines from throughout the world were collected, examined, and considered. In crafting Z10, the intent was not only to achieve significant safety and health benefits through its application, but also to impact favorably on productivity, financial performance, quality, and other business goals.

Employers who have a sincere interest in reducing employee injuries and illnesses will welcome discussions on how their safety and health management systems can be improved. A good number of companies have issued safety policy statements in which they affirm that they will comply with or exceed all relative laws and standards. Those employers, particularly, will want to implement provisions in the standard that are not a part of their safety and health management systems.

A MAJOR THEME

Throughout all the sections of Z10, starting with Management Leadership and Employee Participation through the Management Review provisions, the following theme is prominent.

Processes for continual improvement are to be in place and implemented to assure that:

- Hazards are identified and evaluated.
- Risks are assessed and prioritized.
- Management system deficiencies and opportunities for improvement are identified.
- Risk elimination, reduction, or control measures are taken to assure that acceptable risk levels are attained.

In the standard, these definitions are given:

- *Hazard:* A condition, set of circumstances, or inherent property that can cause injury, illness, or death
- *Exposure:* Contact with or proximity to a hazard, taking into account duration and intensity
- *Risk:* An estimate of the combination of the likelihood of an occurrence of a hazardous event or exposure(s), and the severity of injury or illness that may be caused by the event or exposures

In Z10's Appendix E, which gives guidance on risk assessment and prioritization, the definitions above are duplicated, and this definition is added:

- *Risk Assessment:* The identification and analysis, either qualitative or quantitative, of the likelihood of the occurrence of a hazardous event or exposure, and the severity of injury or illness that may be caused by it

Understanding the standard's major theme and these definitions is necessary to successfully apply its provisions.

RELATING THIS MAJOR THEME TO SERIOUS INJURY PREVENTION

A plea is made here in Chapter 3, "Serious Injury Prevention," for organizations to extend their safety cultures so that a focus on the prevention of serious injuries is embedded into every aspect of their safety and health management systems. In the economic world that now exists, staffs at all levels are expected to do more with less. Seldom will all the resources, money, and personnel be available to address all risks. To do the greatest good with the limited resources available, risks presenting the potential for the most serious harm must be given higher priority for management consideration and action.

Z10 IS A MANAGEMENT SYSTEM STANDARD

The Z10 committee set out to write a management system standard for continual improvement, not a safety management primer or a specification standard. What is the difference between a management system standard and a specification standard? In a management system standard, general process and system guidelines are given for a provision without specifying the details on how the provision is to be carried out. In a specification standard, such details are given. Section 5.2-B of Z10 is used to illustrate the difference:

Section 5.2: Education, Training, Awareness, and Competence. The organization shall establish processes to:

- B. Ensure through appropriate education, training, or other methods that employees and contractors are aware of applicable OHSMS requirements and are competent to carry out their responsibilities as defined in the OHSMS.

If Z10 was written as a specification standard, requirements comparable to the following might be extensions of Section 5.2-B.

- a. A minimum of 12 hours of training shall be given initially to engineers and safety professionals in safety through design, to be followed annually with a minimum of 6 hours of refresher materials.
- b. All employees shall be given a minimum of 3 hours of training annually in hazard identification.
- c. All employees shall be given a minimum of 2 hours of training annually in the use of personal protective equipment.
- d. All training activities conducted as a part of this provision shall be documented and the records shall be retained for a minimum of 5 years.

Sections 5.2-A, C, D, and E of Z10 speak of management processes, not specifications, for defining and assessing training and competency needs, ensuring access to participation in education and training, providing training in a language trainees understand, and ensuring that trainers are competent. Comments are made in the advisory part of the standard on specific subjects for which personnel should be trained, such as safety design, incident investigation, hazard identification, good safety practices, and the use of personal protective equipment. Those advisory comments are not a part of the standard.

COMPATIBILITY, HARMONIZATION, AND POSSIBLE INTERNATIONAL IMPLICATIONS

One of the goals of the drafters of Z10 was to assure that it could be easily integrated into the management systems an organization has in place. The standard's

structure is compatible and harmonized with the ISO 9000 family of standards on quality management and the ISO 14000 family of standards on environmental management. Also, Z10 is written as a generic standard and patterned after the style of those standards. In this context, generic means that the standards can be applied to *all*:

- Organizations of any size or type
- Sectors of activity, whether a business enterprise, a non-profit service provider, or a government entity

Of particular note is the recognition that Z10's Introduction gives to the International Labour Organization's Guidelines on Occupational Health and Safety Management Systems, designated ILO-OSH 2001, as a resource. It is a good, additional reference for safety and health management systems. For access to the Guidelines, go to <http://www.ilo.org/public/english/support/publ/xtextoh.htm>. Intentionally, Z10 adopts from and is in harmony with ILO-OSH 2001. Similarities between the Guidelines and Z10 are notable. However, Z10 goes beyond the Guidelines in some respects, and it may very well be considered a model at the International Organization for Standardization (ISO).

ISO is the world's largest nongovernmental developer of standards, working with a network of national standards institutes representing 148 countries. The United States is represented at ISO by the American National Standards Institute. On two occasions—in 1996 and again in 2000—votes were taken at ISO on developing a standard for an occupational safety and health management system. In the latter year, the vote against a standard carried by a narrow margin. A consensus among the members of ISO for such a standard had not yet emerged.

Since Z10 is compatible and in harmony with the ISO 9000 and ISO 14,000 series of standards, and since Z10 represents current best practices, and since consideration will more than likely be given again to the development of an international safety and health management system standard at ISO, one can easily speculate on Z10 becoming the model for that standard. Continue the speculation and international requirements for accredited safety and health management systems related to Z10 may be envisioned.

LONG-TERM INFLUENCE: SOCIETAL IMPLICATIONS

As the provisions of this ANSI standard are brought to the attention of employers and they strive to have safety management systems in place that are compatible with those provisions, its impact on what employers and society believe to be an effective safety and health management system will be extensive.

Over time, Z10 will become the benchmark against which the adequacy of occupational safety and health management systems will be measured. Societal expectations of employers with respect to their safety and health management systems will be defined by the standard's provisions.

Employment Implications

As the requirements of Z10 become more prominently known, it can be expected that employers of safety and health professionals will seek candidates who have the knowledge and skills necessary to give counsel on meeting those requirements. In that respect, certain provisions of the standard are of particular note—provisions to which safety professionals should give particular attention. Those provisions appear in the Planning section (4.0) and the Implementation and Operations section (5.0). They state that employers “shall” establish and implement processes to:

- Identify and control hazards in the design process and when changes are made in operations—which requires that safety design reviews be made for new and altered facilities and equipment.
- Have an effective management of change system in place—through which hazards and risks are identified and evaluated in the change process.
- Assess the level of risk for identified hazards—for which knowledge of risk assessment methods will be necessary.
- Utilize a prescribed hierarchy of controls to achieve acceptable risk levels—for which the first steps are to design out or otherwise eliminate or reduce the hazard.
- Avoid bringing hazards into the workplace—by incorporating safety and health design and material specifications in procurement contracts for facilities, equipment, and materials.

Educational Implications

Furthermore, the content of college-level safety degree programs will be impacted as employers of safety professionals seek candidates who are equipped to give counsel on the standard’s requirements. Since one of the criteria for success of a technical degree program is the employment possibilities for its graduates, prudent professors responsible for those programs will assure that core courses properly equip students to meet employer needs.

Certification Implications

Z10 will also have an impact on the content of the examinations for the Certified Safety Professional (CSP) designation. Those examinations are reviewed about every 5 years to assure that they are current with respect to what safety professionals actually do. As the substance of the practice of safety changes, what the safety professionals who participate in the examination review process say about the content of their work at that time will have an influence on the content of the CSP examinations.

OSHA Implications

A good reference on the possible implications of Z10 with respect to OSHA and to legal liability potential is the March 2006 published paper titled *Legal*

Perspectives—ANSI Z10-2005 Standard: Occupational Health and Safety Management Systems. It was written by Adele Abrams, an attorney and an American Society of Safety Engineers advocate in Washington, D.C. A modified version of the paper appears as an Addendum to this chapter. It is “must” reading. Briefly, Abrams writes that:

- Although it is unlikely that OSHA will resume regulatory activity to adopt a federal safety and health management systems standard at this time, if such activity was commenced in the future, OSHA would be obligated to consider adopting Z10 as that standard. Federal legislation and administrative rules direct agencies to use voluntary consensus standards in lieu of developing government-unique standards, except when such use would be inconsistent with the law or otherwise impractical.
- Z10 could also have enforcement ramifications under OSHA’s General Duty Clause (Section 5a), which requires that employers maintain a place of employment that is free from recognized hazards that are causing or are likely to cause death or serious injuries.
- Meeting the requirements of Z10 could be agreed upon during discussions between OSHA and employers as they developed consent orders to resolve citations made during inspections.

Two OSHA regional directors have said that reference to Z10 by OSHA would likely come about, to begin with, in discussions to resolve citations resulting from inspections.

Legal Liability Implications

For safety consultants who give advice on safety and health management systems to employers other than their own employer, the issuance of this standard presents legal liability potentials about which they should be knowledgeable. These excerpts from Abrams’s paper are pertinent:

Safety and health professionals have an obligation to keep abreast of the latest knowledge and to include “best practices” in their safety programs and consultation activities, to the maximum extent feasible. Knowledge and comprehension of the ANSI Z10 standard may be imputed to safety professionals, in terms of determining what a “reasonable person” with similar training would be likely to know. Willful ignorance of the best practices set forth in Z10 and/or failure to incorporate such preventative measures in the workplace or programs under the safety and health professional’s direction or oversight could lead to personal tort liability or professional liability.

Consider this scenario. An employer receives a citation from OSHA. In the negotiations that follow, the employer agrees with OSHA that the safety management system must be improved. You, a safety consultant, receive a phone call from the obviously stressed employer asking that you provide counsel on the improvements to be made so that the safety and health management system meets good standards.

You call on the employer, agree on a course of action and a price, and the arrangements are confirmed through a letter contract. You decide that the framework you will use to help the employer is a typical safety management system, which does not contain the prevention through design provisions in Z10 pertaining to safety design reviews, management of change, risk assessments and prioritization, a hierarchy of controls, and including safety and health specifications in purchasing agreements. Your counsel is well received and acted upon. Your contract is fulfilled and you have been paid.

Later, an incident occurs in the employer's operations and an employee is seriously injured. Since workers compensation laws govern, the employee cannot sue the employer. The employee's lawyer casts a large net to identify defendants. She discovers that you provided counsel on improvements to be made in the employer's safety management system.

You are on the witness stand. The employee's lawyer is ready. She studied the safety management system document on which you based the advice you gave your client. And she has knowledge of ANSI Z10. You are led through the substance of the advice you gave to your client. Then, she establishes that you, a safety professional, have knowledge of ANSI standards. She gets you to agree that ANSI standards establish the minimum requirements for the subjects to which they apply and that, over time, they acquire a quasi-official status.

She takes the position that Z10 represents the state-of-the-art. She works you through the elements in Z10 that were not addressed in the counsel you gave to your client and relates your omissions to the causal factors for the injuries that occurred to her client. She establishes that you, as a safety professional, have an obligation to be familiar with and apply the state-of-the-art in the counsel you give. She emphasizes that your counsel was not based on the state-of-the-art. Since you were negligent, you are liable.

Consultants who give advice on a fee basis to organizations to improve their safety and health management systems have reviewed the foregoing scenario and say it is plausible.

Z10'S TABLE OF CONTENTS

To provide a basis for review and comparison with the safety and health management systems with which safety professionals are familiar, Z10's table of contents is listed here:

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Annexes

- A. Policy Statements (Section 3.1.2)
- B. Roles and Responsibilities (Section 3.1.3)
- C. Employee Participation (Section 3.2)
- D. Initial/Ongoing Review (Section 4.1)
- E. Assessment and Prioritization (Section 4.2)
- F. Objectives/Implementation Plans (Sections 4.3 and 4.4)
- G. Hierarchy of Control (Section 5.1.1)
- H. Incident Investigation Guidelines (Section 6.2)
- I. Audit (Section 6.3)
- J. Management Review Process (Sections 7.1 and 7.2)
- K. Bibliography and References

The 11 annexes give valuable explanatory comments, examples of forms and procedures, and reference sources for many of the major sections. Information in the annexes is advisory and not part of the standard.

THE CONTINUAL IMPROVEMENT PROCESS: THE PDCA CONCEPT

The standard is built on the well-known Plan–Do–Check–Act (PDCA) process for continual improvement. Understanding the PDCA concept is necessary to effectively implement the standard. A brief review of the concept is given in Chapter 2, “The Plan–Do–Check–Act Concept (PDCA).” In Z10’s Introduction, there is a chart based on the PDCA concept. A slightly reduced form of the chart is presented at the beginning of each of the standard’s major sections. That version is shown in Chapter 2.

Similar continual improvement charts, based on the PDCA concept, are shown in the ANSI/ISO/ASQ Q9000-2000 series, the Quality Management Systems Standards. The ISO 14000 series on environmental management was revised in 2004 to make it compatible with the ISO 9000 series. It is also based on the PDCA concept. And the U.S. Environmental Protection Agency (EPA) suggests building an environmental management system on a PDCA model.

Throughout the standard, the words “process”, “processes”, “implemented”, and “continual improvement” are often repeated. That is also the case in the previously cited standards on quality and environmental management. Z10 is based on a continual improvement approach. The standard outlines the *processes* to be put in place, *not the specifics*, to have an effective safety and health management system.

Brief comments will be made here to provide an overview of the major sections of the standard. With respect to these remarks, keep in mind the intent of the terms “shall” and “should.” As is common in ANSI standards, requirements are identified by the word “shall.” An organization that chooses to conform to the standard is expected to fulfill the “shall” requirements. The word “should” is used to describe recommended practices or give an explanation of the requirements. Recommended practices and advisory comments are not requirements of the standard.

SECTION 1.0: SCOPE, PURPOSE, AND APPLICATION

The Scope section (1.1) states that the standard defines the *minimum requirements* [emphasis added] for occupational health and safety management systems (OHSMS). The emphasis in the advisory data is on a generic and systems approach for continual improvement in safety and health management, and the avoidance of specifications. Further, the writers of the standard recognized the uniqueness of the culture and organizational structures of individual organizations and the need for each entity to “define its own specific measures of performance.”

In the United States, meeting minimum requirements may not be enough. Ralph L. Barnett is chairman of Triodyne Inc. and a professor of mechanical and aerospace

engineering at the Illinois Institute of Technology. In a Triodyne safety bulletin titled “Minimum Safety Standard—An Oxymoron,” he indicates that while complying with a standard is necessary, doing so may not be sufficient:

Technologists, by and large, treat a standard as a “bible” which provides guidance for the discharge of their professional duties. Throughout the world, compliance or noncompliance with a safety standard is the criterion for determining whether or not safety has been achieved. Only in the United States of America is compliance with an appropriate standard treated as a necessary but not sufficient condition for precluding liability... [Thus, the term] minimum standard is an oxymoron.

ANSI standards acquire a quasi-official status and are viewed as the minimum, but not necessarily sufficient, requirements. Repeating for emphasis—Safety consultants who give counsel on safety and health management systems to employers other than their own should recognize the status that ANSI standards acquire from a legal liability viewpoint.

The Purpose section (1.2) states that the primary purpose of Z10 is to provide a management tool to reduce the risk of occupational injuries, illnesses, and fatalities. Although Z10’s purpose is simply stated, it defines precisely what the application of the standard is to accomplish to reduce occupational risk.

The Application section (1.3) states that this standard is applicable to organizations of all sizes and types. As is the case in the ISO 9000 and ISO 14000 series of standards, there are no limitations or exclusions in Z10 by industry or business type or number of employees. Z10 applies to all employers. In the Introduction and in comments in the advisory column opposite Section 1.3, it is made clear that the structure of the standard is to allow integration with quality and environmental management systems. Doing so is a good and noble idea.

SECTION 2.0: DEFINITIONS

As is typical in ANSI standards, definitions of some of the terms used in the standard are given. Although there are no surprises in the definitions, safety professionals should become familiar with them.

SECTION 3.0: MANAGEMENT LEADERSHIP AND EMPLOYEE PARTICIPATION

It should be understood that Section 3.0 is the standard’s most important section. Safety professionals will surely agree that “Top management leadership and effective employee participation are crucial for the success of an Occupational Health and Safety Management System (OHSMS).” Top management leadership is vital because it sets the organization’s safety culture and because continual improvement processes cannot be successful without sincere top management direction. Key statements in the “shall” column of the standard follow:

- Top management shall direct the organization to establish, implement, and maintain an OHSMS.
- The organization's top management shall establish a documented occupational health and safety policy.
- Top management shall provide leadership and assume overall responsibility.
- The organization shall establish and implement processes to ensure effective participation in the OHSMS by its employees at all levels.

As management provides direction and leadership, assumes responsibility for the OHSMS, and ensures effective employee participation, the purpose of the standard must be kept in mind—to reduce the risk of occupational injuries, illnesses, and fatalities. That will be done best if personnel in the organization understand that in the application of every safety and health management process, the outcome is to achieve acceptable risk levels, and that a special focus must be given to identifying the causal factors for incidents that result in serious injuries. Chapter 6, “Achieving Acceptable Risk Levels: The Operational Goal,” offers guidance on achieving acceptable risk levels.

Supporting data appear Annexes A–C on Policy Statements, Roles and Responsibilities, and Employee Participation. Another good reference on management leadership and employee involvement is the chapter “Superior Safety Performance: A Reflection of an Organization's Culture” in *On The Practice Of Safety*.

SECTION 4.0: PLANNING

In the PDCA process, planning is the first step. This section requires that processes be established to identify hazards, risks, and shortcomings in safety management systems and to establish and implement plans for continual improvement. Measurable objectives are to be established to achieve the greatest probable risk reduction.

An initial review of the OHSMS in place is to be made for that purpose (Section 4.1.1). Issues identified during the review are to be assessed and prioritized, and documented risk reduction objectives established for the issues selected. An ongoing review process is to be maintained for the same purposes (Section 4.1.2).

In the continual improvement process, as elements in the standard are applied, information defining opportunities for further improvements in the safety and health management system, and thereby risk reduction, is to be fed back into the planning process.

Section 4.2: Assessment and Prioritization

Subsection 4.2 in the Planning Section sets forth additional problem identification mechanisms in its requirements for Assessment and Prioritization. In summary, employers are to have processes in place to identify and analyze hazards, assess the risks deriving from those hazards, and establish priorities for amelioration that, when acted on, will attain acceptable risk levels. Appendix K: Bibliography and