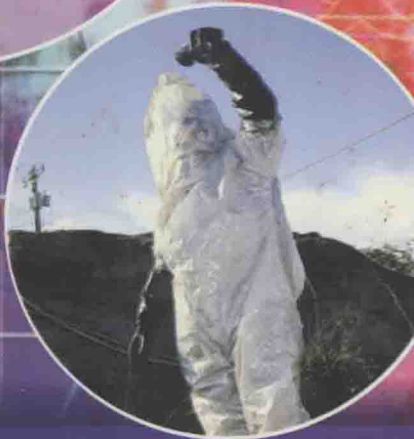
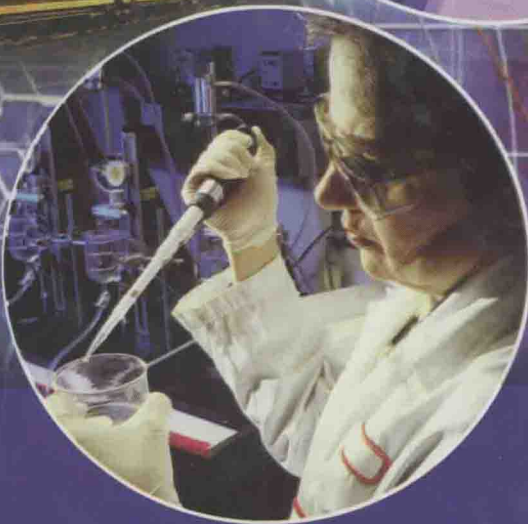
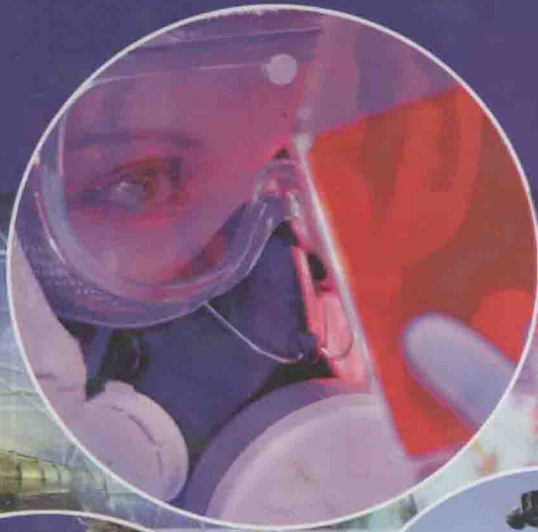




 **ABS Consulting**

MANAGING CHEMICAL SAFETY



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Managing Chemical Safety

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Preface

Chemical Safety Management is written for safety managers and coordinators. The book is appropriate for facility and staff safety personnel as well as technical professionals. Directors, managers, and first-line supervisors will benefit from the “how to” that is needed to comply with government regulations, formulate internal policies, and adopt safe work practices in any workplace in which chemicals are present. The chapters should appeal to those with and without a background in chemistry.

There are huge benefits to chemical safety. Based on an eight-year study of major accidents associated with hazardous materials, OSHA estimated that more than 300 fatalities and nearly 2000 injuries and illnesses per year would be avoided through full compliance with Process Safety Management.

Yet implementing a chemical safety management system takes time and dedication to continuous improvement. Readers of this book need to help their organizations turn compliance into a management tool. Policies and procedures must be in place so that everyone can work together to bring chemical safety to the point where it is “habit strength.”

Safety is a condition of employment for all of us. We are all responsible to work safely and to be a model for other employees. Safety is also a line-management responsibility. Safety and health managers are a vital resource, but the entire organization must work together to create a safe work environment. And by utilizing the strategies presented in this book, hopefully any employee can find that safety is as manageable as anything else that goes on in the organization.

Introduction

Chemical safety management is about much more than meeting legal requirements. Safety, health, and a concern for environmental stewardship must be an integral part of every facility's program. Most safety professionals can tell you *why* accidents happen. Although this book stresses the importance of discovering the root cause(s) of accidents, this is not a "why" book. This is a "how to" book. How does one go from the current starting point to effective chemical safety management?

A Preview of What's Ahead

Chapter 1 addresses toxic hazards. Facilities that process and otherwise handle a variety of inorganic and organic chemicals need to have access to people who are knowledgeable in this topic.

Examples of toxic chemicals and their primary routes into the body are discussed, as well as material safety data sheets (MSDSs), acute and chronic exposures, and chemical exposure limits set by OSHA and the American Conference of Governmental Industrial Hygienists (ACGIH).

The safety precedence sequence is introduced as a tool for setting hazard elimination and control priorities. Chemical hazard control strategies and techniques are demonstrated that range from chemical substitution to use of personal protective equipment (PPE).

This chapter also addresses toxic release source and dispersion models. It is important to model major and limited release sources in order to predict the potential on and off-site impact of a release. The reader will recognize the need to control hazards at their source rather than far downstream in the process, at the "end of the pipe." Finally, the chapter concludes with preventive and protective mitigation methods to lower the risk of a chemical release incident.

Chapter 2 examines fires, explosions, and other emergencies. Specific topics include fire and explosion basics, classification of small fires and fire extinguishers, properties of liquid, gaseous and solid (dust) fuels;

controlling ignition sources, fire protection and detection, emergency squads, as well as fire training and drills. The chapter concentrates on control of flammable liquids and gases and how to find specification information for storage and handling of these common industrial materials.

Emergency planning and response is the final section of Chapter 2. In setting up an overall facility Environmental, Health, and Safety (EHS) program, it is important to address potential security issues and to plan/practice for the types of emergencies the facility is capable of handling.

Chapter 3 examines chemical process design considerations that have enormous “up-front” leverage on safety and health. Design decisions made at the initial stage of an engineering project have a great impact on personnel and process safety in the plant. Companies need to “design-in” layers of protection that will minimize chemical exposure to employees and the public while facilities and equipment are in the conceptual stage of development.

The chapter stresses the importance of including process flow diagrams, material and energy balances, piping and instrumentation diagrams, and other chemical, process, and equipment information into a total design package. The engineering project process is also examined, as well as the use of design and hazard reviews in integrating safety into the eight stages of a project. The chapter discusses design strategies for safety and provides examples of design considerations.

The chapter concludes with key points for design of chemical process systems.

Chapter 4 covers accident and incident investigation. A thorough investigation leads to important activities that prevent future incidents of a similar nature and have significant financial benefits as well.

This chapter demonstrates how critical it is to pre-plan and install an *accident-incident investigation process*. The chapter discusses investigation or analysis procedures for potential incidents that meet OSHA’s process safety management (PSM) requirements. Finally, Chapter 4 provides examples of management systems and tools that will help the reader establish their own facility accident-incident investigation system.

Chapter 5 helps the chemical safety manager establish and maintain safe work conditions in the facility through a discussion of systems and tools

used to prevent major and other accidents/incidents, near accidents, and potential hazards associated with unsafe work conditions.

The chapter provides a simple inspection procedure. It also provides tools for workplace self-inspections and follow-up as well as methods to assure safe work conditions related to process safety and risk management.

Chapter 6, “Safe Work Practices,” complements Chapter 5, “Safe Work Conditions.” This chapter examines tools such as job safety analysis to help safety coordinators and supervisors establish safe work procedures. It also provides a framework and examples of behavioral safety systems applied to chemical safety management.

Chapter 7 addresses the link between accountability and measurement of safety. In addition to demonstrating the accountability-measurement link, the chapter provides examples of positive measures of safety performance. It distinguishes between results measures that are outcomes of non-conformance and measures of upstream activities (performance indicators) that will result in continuous, incremental safety improvement. Finally, the chapter discusses examples of traditional results measures and performance indicators that relate to improving chemical safety management systems.

Chapter 8 provides the reader with a regulatory perspective on safety, health, and environmental requirements. An outline of the basic OSHA, EPA, and DOT standards that relate to chemical safety management is included. The reader will gain an understanding of regulatory requirements for process safety management (PSM), hazard communication or employee right-to-know, hazardous waste operations and emergency response (HAZWOPER), risk management planning (RMP), and the labeling-transport of hazardous materials.

Finally, the chapter provides a structure of safety, health, and environmental standards on which to build company and facility policies and procedures.

Chapter 9 discusses of safety and health training. The primary goal of the chapter is to demonstrate the importance of integrating top-priority product-process and chemical safety, health, and environmental training. This chapter describes a basic learning model, and provides the reader with procedures related to chemical operator performance. The chapter also compares conventional and multi-media training systems in terms of capabilities, advantages, and limitations. Finally, it provides a discus-

sion and an example of a training matrix used to schedule specific safety and health training topics.

Chapter 10 provides a framework for program implementation. It provides nine elements of a chemical safety management system that can be installed in a parallel fashion.

Included in the steps is an explanation of the importance of company and facility management's vision for how a fully installed chemical safety management system would operate in order to set effective goals, objectives, and performance measures. The chapter also stresses the need for an annual plan to establish measurable objectives and to use as a basis for gauging accomplishment.

Hazard-risk evaluation and control systems are central to all facility safety programs. This chapter demonstrates how to link regulatory requirements for programs like process safety management and hazard communication with policies, procedures, practices, and systems/tools for hazard evaluation and control.

The final section of Chapter 10 is devoted to installing an EHS management information system (MIS) that will meet the needs of the plant and company as well as a diverse group of stakeholders.

Chapter 11 provides strategies and tips for developing successful chemical safety management systems. Two assessment methods are offered as the basis for installing a driving force for change. Finally, the chapter provides a discussion of how to integrate the information provided in each of the chapters into a cohesive management system.

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