Chemical Safety and Lifecycle Management

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DOE HANDBOOK

CHEMICAL MANAGEMENT
(Volume 2 of 3)

Chemical Safety and Lifecycle Management

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Foreword

During the last several years, the Department of Energy (DOE) complex has averaged one chemical incident per day. DOE considers this rate to be unacceptable. In an effort to address the ongoing occurrence of chemical incidents, DOE has worked to augment previously published material and where necessary, expand and enhance guidance on the local development and implementation of a chemical management system that is consistent across the Department.

Volume 1 of the DOE Chemical Management Handbook describes how to safely perform chemical work through the implementation of a traditional chemical management program (CMP). This document presents a comprehensive revision to Volume 2 of the Handbook and departs significantly from the first edition by offering a consistent and integrated approach to chemical management that is adoptable across the Complex. The original edition consisted of descriptions of existing CMPs at various DOE sites. Government (national, state and local) regulations and requirements, site contract-specific requirements and changing missions of DOE facilities have resulted in numerous, and often poorly coordinated, overlapping efforts to manage chemical hazards during the past 40 years. Thus, a lack of consistency is evident in chemical management organizations and documentation, program development and implementation across the DOE Complex, and, sometimes, little consistency even within an individual site.

Rather than presenting the user with snapshots of various CMPs at a specific point in time (e.g., year 2002), this edition of Volume 2 describes a model program to safely manage chemicals throughout their complete lifecycle. This Handbook provides methods and guidance for developing and implementing an effective Chemical Safety and Lifecycle Management (CSLM) program that supports the primary objective of reducing the frequency, severity and cost of chemical incidents as well as the cost of chemical usage. The CSLM program targets these objectives by emphasizing a common theme of protecting the workers, the public, and the environment through the application of Integrated Safety Management System (ISMS) and Environmental Management System (EMS) principles at every stage of a chemical's lifecycle.

The recently approved Change 2 to DOE Order 450.1 (*Environmental Protection Program)* emphasizes the importance of integrating pollution prevention and chemical management into site operations through an EMS. A highly effective EMS will set specific environmental objectives and key performance indicators. This provides an opportunity for continuous reduction of environmental, safety, and health risks posed by toxic or hazardous chemicals. Sites and organizational units within sites are actively encouraged to systematically reduce risk through source reduction, including substitution of alternative compounds, segregation, and process redesign in addition to traditional recycling and reuse practices. The practices described in the CSLM Handbook are intended to technically support such a risk reduction strategy.

Although not directly identified in this Handbook, it is understood that the CSLM program must support the programmatic mission of the DOE site. Different tools are needed to develop a functional program; a "one-size-fits-all" approach is not practical. However, a centralized program with a clearly identified manager is imperative to achieving consistency and accountability throughout the Department. In addition, a CSLM program can only be successfully implemented through the commitment and ownership of line management and, perhaps most importantly, individual workers. The CSLM program can supply the tools, resources, and support, but ultimately, successful implementation is achieved at the working level. Active input from workers through their line management and visible commitment and support from management are needed to establish an effective CSLM system that supports the overall programmatic missions of the site.

This Handbook outlines the structure and requirements that are central to any CSLM program. Conducting all chemical activities within the confines of the CSLM program will assist sites in achieving safe, secure, and compliant operations that protect individuals, facilities, and the environment from chemical hazards.

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Glossary

Assessment/verification: any evaluation, audit, appraisal, surveillance or other review action, whether by internal or by oversight personnel, that reviews, inspects, tests, determines, and documents whether items, processes, or services meet specified requirements.

Chemical: any element, compound, or mixture of elements and compounds.
A substance that (1) possesses potentially hazardous properties (including, but not limited to, flammability, toxicity, corrosivity, reactivity, and instability); or (2) is included on any Federal, state, or local agency regulatory list; or (3) is associated with a Material Safety Data Sheet (MSDS) and is not an "Article" as defined in Occupational Safety and Health Administration (OSHA) 29 CFR 1910.1200. For the purposes of this document, this definition also applies to chemical products (see definition below).

Chemical Product: a mixture of any combination of two or more chemicals that may or may not be the result, in whole or in part, of a chemical reaction, and that itself has hazardous properties. Chemical products have Material Safety Data Sheets (MSDs) associated with them and include materials such as paints, lubricants, cleaning agents, and fuels.

Chemical Hygiene Plan (or Program): a written program developed and implemented by the employer that sets forth procedures, equipment, personal protective equipment, and work practices that are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular workplace and that meets the requirements of 29 CFR 1910.1450, OSHA Standard for *Occupational Exposure to Hazardous Chemicals in Laboratories*.

Chemical Tracking: monitoring changes in chemical inventory over time, from acquisition to disposition, in order to keep the inventory up-to-date.

Chemical Safety and Lifecycle Management: a program that describes the management of chemicals from acquisition to disposition. Chemical safety describes the safe use and storage of chemicals. The hybrid term, Chemical Safety and Lifecycle Management, is meant to convey the concept of managing the lifecycle of chemicals with chemical safety in the context of Integrated Safety Management to ensure that all aspects of chemical safety and management are coordinated and addressed.

Class 4 Oxidizer: an oxidizer that will explosively decompose upon exposure to heat, shock, or contaminants.

Contractor: any person under contract (including subcontractors or suppliers) to DOE with the responsibility to perform activities or supply services or products.

Cryogenic Liquids: gases that are handled in liquid form at relatively low pressures and extremely low temperatures, usually below -130°F (-90ºC).

Disposal: final placement or destruction of chemical, radioactive, or other wastes; surplus or banned pesticides or other chemicals; polluted soils; and drums containing hazardous materials from removal actions or accidental releases. Disposal may be accomplished through use of approved secure landfills, surface impoundments, land farming, deep-well injection, ocean dumping, or approved/compliant treatment methods.

Disposition: the process of reutilizing, transferring, donating, selling, abandoning, destroying, or other discarding of chemicals and chemical products.

Environment: the combination of external physical condition including water, air, and land and the interrelationship that exists among and between water, air, and land and all living things.

Environmental Management System: a systematic and structured approach for addressing the environmental consequences of an organization's activities, products and services, using a continuous cycle of planning, implementing, evaluating, and improving processes and actions undertaken to achieve environmental goals.

Explosive: a chemical that causes a sudden, almost instantaneous release of pressure, gas and heat when subjected to sudden shock, pressure, or high temperature.

Flammable Liquids: liquids having a flashpoint less than 100ºF; includes Class 1A, Class 1B, and Class 1C flammable liquids, per National Fire Protection Association 30 classification.

Hazard: a source of danger (i.e., material, energy source, or operation) with the potential to cause illness, injury, or death to personnel or damage to a facility or to the environment (without regard to the likelihood or credibility of accident scenarios or consequence mitigation).

Hazard Analysis: the determination of material, system, process, and plant characteristics that can produce undesirable consequences, followed by the assessment of hazardous situations associated with a process or activity. Largely qualitative techniques are used to pinpoint facility design or operational weaknesses that could lead to accidents.

Hazard Communication Standard: regulation issued by OSHA to protect employees from chemical-related hazards at workplace (29 CFR 1910.1200) and in the construction industry (29 CFR 1926.59)

Hazard Control: the management action or physical measure taken to eliminate, limit, or mitigate hazards to workers, the public, or the environment, including (1) physical, design, structural, and engineering features; (2) safety programs and procedures; (3) personal protective equipment; and (4) administrative limits or operational restrictions.

Hazardous Chemical: any chemical (see definition) that presents a physical or health hazard. Also, a substance that possesses potentially hazardous properties including, but not limited to, flammability, toxicity, corrosivity, reactivity, and instability.

Hazardous Materials Regulations: Department of Transportation (DOT) Title 49 Code of Federal Regulations (CFR) Parts 171-180.

Integrated Safety Management Core Functions: the core safety management functions identified in DOE P 450.4, *Safety Management System Policy*: (1) define the scope of work; (2) analyze the hazards; (3) develop and implement hazard controls; (4) perform work within controls; and (5) provide feedback and continuous improvement. These functions are also identified in Department of Energy Acquisition Regulations 48 CFR 970.5204-2(c).

Integrated Safety Management System: a safety management system to systematically integrate safety into management and work practices at all levels as required by DOE P 450.4, *Safety Management System Policy*, and other related Orders and Policies (such as DOE O 226.1 and DOE P 450.7).

Material Safety Data Sheet: a document prepared by the manufacturer, in accordance with the requirements specified in the OSHA Hazard Communication Standard (29 CFR 1910.1200), for a chemical product containing a hazardous chemical. Although a manufacturer may provide an MSDS for a chemical, the issuance of that MSDS does not necessarily indicate that the material is hazardous. Some manufacturers develop MSDSs for all their chemicals, whether or not the material is hazardous.

On-site: any area within the boundaries of a DOE site or facility to which access is controlled. [NOTE: If hazardous chemicals are transported over a public road that is on-site, DOT Hazardous Materials Transportation Regulations must be adhered to.]

Oxidizer: as per 29 CFR 1910.1200, a chemical other than a blasting agent or explosive as defined in 29 CFR 1910.109(a), that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

Ozone Depleting Substance (ODS): Public Law 101-549, the Clean Air Act Amendments of 1990, identifies those chemicals whose use is primarily responsible for depletion of the earth's ozone layer. ODS chemicals are also designated in the 1989 *Montreal Protocol on Substances that Deplete the Ozone Layer*.

Pollution Prevention: source reduction including segregation and substitution, and other practices such as recycling that reduce or eliminate the creation of pollutants or the release of pollutants into the environment.

Pyrophoric: a material that can self-ignite in air at or below 130°F (54.4°C).

Reportable Quantity (RQ): the quantity established in Table 302.4 of 40 CFR Part 302 (Designation, reportable quantities, and notification) for CERCLA-regulated hazardous substances, the non-permitted release of which requires notification of the National Response Center.

Shelf Life: the length of time an age-sensitive chemical can be stored under prescribed conditions, without suffering a marked degradation in its properties, such that it will still function as originally intended when put into service.

Special Hazard Chemicals: Examples include time-sensitive chemicals such as peroxide-formers, which become hazardous upon prolonged storage, and high-hazard chemicals, including high acute-toxicity chemicals, NFPA Class 4 oxidizers (see NFPA 430), pyrophorics, and unstable/reactive chemicals, such as shock-sensitive substances, explosives, certain organic peroxides, and self-reactive monomers. Refer to DOE Chemical Management Handbook, Volume 1, Appendix D for lifecycle management of shock-sensitive chemicals.

Storage: the management of chemicals set aside for future use or safekeeping. Also refers to an inventory of compressed or liquefied gases in containers that are not in the process of being used, examined, serviced, refilled, loaded, or unloaded.

Threshold Planning Quantity (TPQ): the minimum amount of a substance present at a site at which notification is required under 40 CFR 355, *Emergency Planning and Notification*. TPQs are listed in Appendices A and B of that regulation

Unstable/Reactive Chemical: a chemical that in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, become self-reactive, or otherwise undergo a violent chemical change under conditions of shock, pressure, or temperature. Examples include explosives, reactive monomers, and peroxide formers that produce unstable, highly friction-sensitive or shock-sensitive peroxides.

Water-Reactive Material: a substance that will spontaneously react with water to release toxic gases, flammable gases, or amounts of heat that could become significant (e.g., resulting in splattering, pressure-volume explosions). It includes those materials that can form explosive mixtures with water.

Acronyms and Abbreviations

CAS	Chemical Abstracts Service
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CMP	Chemical Management Program
CMS	Chemical Management Services
CSLM	Chemical Safety and Lifecycle Management
CSTC	Chemical Safety Topical Committee
DEAR	Department of Energy Acquisition Regulations
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EMS	Environmental Management System
EFCOG	Energy Facility Contractors Group
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
FAR	Federal Acquisition Regulations
ISMS	Integrated Safety Management System
JIT	Just-in-Time
MSDS	Material Safety Data Sheet
NFPA	National Fire Protection Association
NNSA	National Nuclear Security Administration
O	Order
ODS	Ozone Depleting Substance
ORPS	Occurrence Reporting and Processing System
OSHA	Occupational Safety and Health Administration
P	Policy
PPE	Personal Protective Equipment
PSM	Process Safety Management
RCRA	Resource Conservation and Recovery Act
RMP	Risk Management Program
RFID	Radio Frequency Identification
RQ	Reportable Quantity [of hazardous substances]
SARA	Superfund Amendments and Reauthorization Act
SME	Subject Matter Expert
TPQ	Threshold Planning Quantity [of extremely hazardous substances]
TQ	Threshold Quantity [of highly hazardous chemicals (OSHA-PSM); of substances regulated under the EPA Risk Management Program]
TSCA	Toxic Substances Control Act

Chemical Safety and Lifecycle Management Program

1.0 Introduction

This Handbook provides guidance to Department of Energy (DOE) sites for developing a Chemical Safety and Lifecycle Management (CSLM) program that uses a graded approach to controlling and monitoring chemical activities while protecting site personnel, the public, and the environment. The CSLM program presented in this Handbook was developed using a common sense approach and given a hierarchical structure that may be applied across the DOE Complex in administrative, production, maintenance, and laboratory environments. Using this guidance will help to ensure that the program is compliant with applicable regulatory requirements and falls under the umbrella of the site's Integrated Safety Management System (ISMS) and its Environmental Management System (EMS).

1.1 Program Benefits

There are two key benefits and several ancillary benefits (See Section 5.4 for a summary of benefits) that may be realized with the full implementation of this CSLM program. The key benefits are: (1) a reduction in the potential for significant accidents and (2) a reduction in costs. There is a synergistic interaction between these two benefits. Any reduction in significant accidents achieved through the implementation of ISMS and EMS principles will clearly result in a reduction in overall costs of the CSLM program. Similarly, any actions undertaken to reduce chemical-related costs through the application of hazard identification, analysis, and controls at the procurement stage will lower the potential for occurrence of significant chemical incidents by reducing exposure through the reduction of chemical quantities.

1.1.1 Reduction in the Potential for Significant Accidents

A review of the DOE accident literature (i.e., the Occurrence Reporting and Processing System (ORPS) database) demonstrates that chemical accidents have resulted in worker hospitalizations or deaths, fires, explosions, releases that require evacuations, and environmental contamination. These accidents are costly in terms of injuries, displacement of people, damage to the environment, and replacement or repair of equipment, facilities, and data.

The CSLM program emphasizes safety as paramount in chemical management and follows ISMS and EMS principles at each stage of the chemical lifecycle. To be most effective in reducing the frequency and severity of potentially significant chemical incidents, the CSLM must be tightly integrated with hazard identification, hazard analysis, and hazard mitigation processes during all work activities.

1.1.2 Cost Reduction

Many people mistakenly believe that the cost of a chemical is simply that associated with its purchase. Many do not realize that greater, indirect costs are often incurred during its management. A full accounting of the direct and indirect costs associated with a chemical must include costs incurred during each stage of its lifecycle. Procurement, storage and handling, transportation, inventory and reporting, waste disposal, regulatory burden, and labor are all lifecycle stages that must be considered when determining the true cost of a chemical. For example, (1) longer storage times lead to increased expenses in terms of warehouse space usage, the cost of utility usage to maintain particular indoor environments, shelf-life monitoring, and the potential for the chemical to become a waste; (2) purchasing a given chemical product from multiple manufacturers increases costs associated with the inventory and maintenance of Material Safety Data Sheets (MSDSs); (3) storing chemicals with special hazards* will require special storage conditions and equipment such as refrigerators or glove-boxes that consume resources; (4) time-sensitive chemicals that require constant monitoring. Due diligence must be given, therefore, to ensure that a comprehensive analysis is completed prior to the acquisition of chemicals.

Costs associated with chemical wastes require particular consideration. Costs associated with waste disposal are related to the number and severity of hazards associated with the chemical as well as the volume of the chemical. In some cases, a waste-disposal vendor cannot be found to accept a particular chemical, resulting in continued storage costs. Because of the potential for significant cost liabilities, the procurement of chemicals must be carefully controlled.

The CSLM program provides an effective mechanism to control costs by requiring the user to methodically consider total lifecycle costs prior to making procurement decisions. For instance, significant reductions in chemical costs can be achieved by:

- Purchasing the minimum quantity required,
- Having policies and procedures that require pollution prevention and waste minimization reviews at all stages of CSLM,
- Limiting all chemical procurements to just a few strategic source suppliers, when possible,
- Adopting Just-in-Time (JIT) inventory practices for bulk use (i.e., high consumption) chemicals and for chemicals with special hazards,
- Promoting awareness of special hazard chemicals to chemical users, and
- Controlling the procurement of special hazard chemicals by requiring potential users to justify their use, with product substitution as a preferred alternative.

2.0 Scope

This guide is applicable to all CSLM activities, including the acquisition, use, storage, transportation, and disposition of all chemicals and chemical-containing products. This includes, but is not limited to:

- hazardous chemicals as defined in the OSHA *Hazard Communication* Standard (29 CFR 1910.1200, including Appendices A and B),

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* Special-hazard chemicals include time-sensitive chemicals such as peroxide formers, which become hazardous upon prolonged storage, and high-hazard chemicals such as unstable reactive chemicals, shock-sensitive substances, explosives, pyrophorics, NFPA Class 4 oxidizers, certain organic peroxides, and high-acute-toxicity chemicals.

- substances regulated under the OSHA Standard on *Process Safety Management of Highly Hazardous Chemicals* (29 CFR 1910.119) and the EPA Risk Management Program (40 CFR 68),
- hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (40 CFR 302),
- extremely hazardous substances regulated under the Emergency Planning and Community Right-to-Know Act (EPCRA) (40 CFR 355),
- toxic chemicals regulated under Section 313 of Title III of the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 372),
- hazardous materials regulated under the DOT Hazardous Materials Regulations (49 CFR 172),
- wastes regulated under the Resource Conservation and Recovery Act (RCRA) (40 CFR 260-282), and
- substances regulated under the Toxic Substances Control Act (TSCA) (40 CFR 700-799).

3.0 Drivers

The primary objective of a CSLM program is the assurance of worker protection, facility safety, and protection of the environment as mandated by 10 CFR 851, DOE O 420.1B and 450.1; and DOE P 450.4, which require the contractor to implement a DOE-approved safety management system, under the DEAR 48 CFR 970.5204-2(c) clause entitled "Integration of Environment, Safety, and Health into Work Planning and Execution." Worker protection, facility safety, and environmental protection issues at DOE facilities are largely governed by Federal laws and regulations, DOE Orders, consensus standards mandated by DOE Orders, and local laws and regulations such as locally enforced building and fire codes. Volume 3 of the *Chemical Management Handbook* contains a comprehensive listing of DOE and Federally mandated laws and regulations that are required to be followed by DOE sites engaged in chemical-related activities. Other practical drivers for CSLM programs include prudent financial management (i.e., keeping chemical lifecycle costs down) and sustaining quality (i.e., ensuring sufficient quantities of chemical products of required purity are on hand to perform the task).

4.0 Management Approach

4.1 Traditional Approaches

Traditional approaches to CSLM have mirrored organizational requirements found in the regulatory literature. For example, chemical-related requirements found in National Fire Protection Association (NFPA) codes and standards (required per 10 CFR 851, *Worker Safety and Health Program*) typically fall under the purview of a site's fire protection organization. Likewise, a site's industrial safety program typically oversees adherence to applicable regulations for compressed gas cylinders, its industrial hygiene program oversees adherence to regulations for *Hazard Communication* (29 CFR 1910.1200) and the Laboratory Standard (29 CFR 1910.1450), and its procurement organization oversees adherence to federal and DOE acquisition regulations (FAR and DEAR). This "stovepipe" or disconnected approach, however, does not support a robust CSLM program.

Stovepiping creates inefficiencies. For example, chemical regulations are largely organized by chemical type while chemical work is largely performed according to work function. When chemical management is stovepiped, it forces work managers to spend additional time and resources to determine which procedures, processes, or requirements apply to their particular operations. As a result, managers or individual workers may not be aware of certain requirements or procedures that could impact their chemical activities, potentially resulting in a deficient process. Stovepiped safety requirements also create inefficiencies when a variety of applicable procedures and requirements must be woven into a compliant process. Developing chemical storage requirements can become a daunting task, for example, when numerous organizations that "own" a multitude of unique requirements and procedures are involved.

Stovepiping also leads to inconsistencies (and potential conflict) with safety requirements. One example is the area of requirement ownership. Confusion often results when multiple organizations "own" overlapping requirements. Inconsistency can lead to problems when different organizations owning overlapping requirements write conflicting procedures. One organization may interpret a requirement in a manner that makes it easier for it to do business without recognizing that it conflicts with a similar requirement from another organization with overlapping responsibilities.

Clearly, stovepiping chemical management undermines some of the basic principles of an effective safety program. Sites should rigorously pursue a centralized approach embodied in a CSLM program to ensure consistency in the interpretation and implementation of these requirements.

4.2 Management of Requirements

4.2.1 Complexity of Requirements

There are several factors that complicate chemical lifecycle and safety management, primarily the large number of requirements and their complexity. Volume 3 of the DOE *Chemical Management Handbook*, "Consolidated Chemical User Safety and Health Requirements," lists approximately 1,500 requirements from approximately 130 sources; this is only a partial listing. State and local requirements, such as those found in locally-enforced building and fire codes, are not included, nor are requirements for waste, transportation of chemicals over public roads, and explosives.

This complexity is exacerbated by the fact that requirements have been promulgated by different agencies for varying purposes. One agency might write a requirement to protect workers, while another may write a similar requirement to protect emergency responders, with a third writing yet another requirement to protect the building, its occupants, and contents. An understanding of the intent behind a set of requirements is often needed to prevent them from appearing contradictory, or worse, simply confusing. In some cases, these requirements are contradictory even when the intent is understood.

The technical nature of chemistry and chemical safety adds another layer of complexity to understanding and enforcing these regulations. Most chemicals have more than one hazard associated with them, yet most of the regulations are written to protect against a single chemical hazard. For example, one regulation requires water-reactive chemicals to be stored where there is no water-based fire suppression system while another regulation states that flammable liquids must be stored where a water-based fire suppression system exists. What does one do with a chemical that is both a flammable liquid and water reactive? Chemical hazards may also be dependent upon chemical concentrations, chemical form, or the environment within which the chemical is placed. For example, many metals are benign when in the form of an ingot, shot, or turning, but become water-reactive, flammable, or pyrophoric when present in the form of a powder. As a part of the hazard identification and analysis function under ISMS, one must determine the point at which, as the particle size decreases, a metal ceases being benign and becomes more hazardous, requiring additional controls.

4.2.2 Organization of Requirements

Because of the complexity of requirements and the multitude of regulatory sources, a coordinated, site wide effort is needed to consolidate and interpret those requirements related to chemical activities. This effort should focus on grouping requirements by work activity instead of chemical hazard class, and should result in a process for providing and communicating the definitive interpretation for chemical requirements onsite. Although regulations typically address requirements by chemical type or hazard class, activities such as transporting, storing, or working with chemicals almost always involve chemicals that have multiple hazards or are from multiple hazard classifications. If requirements are organized by hazard class to mirror regulatory literature, it makes performing chemical work confusing and can lead to increased risk and regulatory noncompliance. If, instead, regulations are grouped by work activity (e.g., storage, in-house transportation, laboratory experimentation), they are more easily understandable. An additional benefit is that they will reside in one location, eliminating the need to search for additional regulations.

4.2.3 Interpreting Chemical Requirements

Chemical requirements must be organized in order to make clear a company's determination regarding the interpretation of individual and overlapping requirements. If an inconsistency appears to be present between two sets of requirements in the regulatory literature, management needs to determine how these conflicting requirements will be interpreted from a corporate perspective. Once these determinations are made, they must be published so that a record of the decision exists. If the company does not interpret and publish them for the workforce, individuals with varying levels of expertise throughout the company will arrive at their own interpretations through "answer shopping" leading to inconsistent application of requirements and a less effective CSLM program.

4.2.4 Requirements Ownership

In accordance with the second ISMS guiding principle, which describes the need for clear roles and responsibilities, management must identify the owners of CSLM requirements. Without clear ownership, consistency will be lost as individuals make changes to the company interpretations of requirements based upon immediate needs.

4.3 Program Ownership and Consolidation

A CSLM program must be appropriately organized and supported in order to be effective. The owner(s) of the CSLM program should be designated by the site prime contractor, and the CSLM program should consolidate the number of program owners to the greatest extent possible. The CSLM program must include clearly-defined roles and responsibilities for all organizations with chemical management responsibilities. The active involvement of a Program Steering Committee can also help to strengthen the CSLM program.

4.3.1 Program Ownership

The single most important issue to clarify in CSLM is program ownership. Clear program ownership is essential to defining each organization's responsibilities and to ensuring effective coordination between the various organizations involved in the CSLM program.

Failure to clearly establish program ownership can defeat the primary objectives of the CSLM program, which are reduced frequency, severity, and cost of chemical incidents and reduced chemical usage costs. Likewise, the lack of clear ownership can lead to increased inefficiency and increased company liabilities. If program owners are not clearly identified, people may not know where to go for answers, may seek guidance from those who are not qualified to give it or may come to disagreement over requirement interpretations.

4.3.2 Program Consolidation

Consolidating the number of program owners and clearly defining their hierarchy, roles, and responsibilities can improve the efficiency of a CSLM program. Consolidating the program, usually with the majority placed under one organization, enables better coordination between program elements. This helps to eliminate potential friction between various program owners while ensuring more seamless coverage of requirements. Program consolidation improves accountability by assigning specific responsibilities, defining program element interfaces, and providing a point of contact that can answer or resolve questions. Program consolidation is an important tool to help organize and manage the complex tasks involved in CSLM.

4.3.3 Program Steering Committee

Consolidating a CSLM program increases the risk of the program owners losing touch with the real needs of the actual chemical users on the site. In particular, program owners may fail to consider the special needs of particular user groups and create unintentional but additional quagmires. Examples of these special needs include: simplifying the procurement or inventorying processes, resolving complex storage issues, or providing interpretations for requirements or procedures that cannot be implemented in a reasonable manner.

To mitigate this risk, a CSLM program should have a Program Steering Committee whose responsibilities and interfaces are established in site policy and procedure. These policies and procedures need to address management support for and the independence of the Steering

Committee; along with the committee's roles, responsibilities, and interfaces. The Steering Committee represents key user groups from the site and has access to subject matter experts (SMEs) in such areas as chemistry, chemical engineering, industrial hygiene, transportation, and fire protection. The Steering Committee serves to keep the CSLM program connected to its customer base across the site by providing guidance to the CSLM program owners and organization and keeping them informed about user needs. Likewise, the Steering Committee members can educate their customers about various CSLM actions, requirements, or determinations.

Figure 1 (see Appendix) depicts how a typical CSLM program may be implemented at a DOE site.

4.3.4 Chemical Management Services Contract

A site may choose to employ a Chemical Management Services (CMS) contractor to support its integrated CSLM program. If a site does employ a CMS contractor, all of the above CSLM principles apply. These principles also apply to sites where there are multiple contractors.

5.0 Chemical Safety and Lifecycle Management Program

Refer to Figure 2 in the Appendix for a flow chart of an integrated CSLM program, including activity-level components. Note that planning, hazard identification, hazard analysis, and hazard control steps (which are core functions of ISMS) are essential steps that must be thoroughly investigated and completed prior to performing any chemical activity during the lifecycle of the chemical.

5.1 Contractual Requirements

In conformance with typical DOE contractual requirements, implementation of the CSLM program should ensure that employees, the public, and the environment are protected from chemical hazards. This can be accomplished by contractually requiring the contractor to adopt elements of the CSLM program as described in Sections 5.1, 5.2 and 5.3, and by having the program implemented through the Steering Committee, the CSLM Manager and line organizations. Some best practices are recommended below as examples of effective CSLM program implementation.

5.1.1 Employee protection

The contractor should provide a place and condition of employment that is free from, or protected against, recognized hazards that cause or may cause sickness, impaired health or well-being, or significant discomfort and inefficiency among workers.

In order to protect employees from workplace hazards, the CSLM program should provide input to hazard communication training for all site employees. This training should be graded in approach so that appropriate information is provided both to the general employee and the chemical worker who is engaged in chemical-related activities everyday. Communication tools should be developed to emphasize conduct of operations, hazard identification and analysis, understanding the MSDS and hazard ratings of chemical products, and use of appropriate personal protective equipment (PPE). The CSLM program should also provide collocated workers with access to technical resources such as the site MSDS database, site policies and procedures, and SMEs.

5.1.2 Public Protection

Public protection involves operating and maintaining company-managed facilities in compliance with applicable laws, regulations, and DOE directives. The contractor should design, construct, and operate new facilities in a manner that minimizes the risk of exposure of individuals and population groups to hazardous or toxic chemicals.

5.1.3 Environmental Protection

Where use of chemicals is necessary, the contractor should store, use, recycle, and dispose of these materials in a manner that ensures protection of the environment and human health. The CSLM Manager should oversee these activities through the development of appropriate policies and procedures in conjunction with relevant functional disciplines (e.g., environmental, industrial hygiene, fire protection, and operations).

5.2 Chemical Activity-level Components of CSLM Program

The CSLM program consists of the following 10 activity-level components, which incorporate both ISMS and EMS principles:

1. Hazard identification and analysis
2. Acquisition
3. Chemical inventory management and tracking
4. Chemical transportation
5. Chemical storage
6. Hazard control
7. Pollution prevention and waste minimization
8. Chemical emergency management
9. Chemical disposition
10. Training

DOE and Federal requirements spanning these chemical lifecycle activities can be found in Volume 3 of the DOE *Chemical Management Handbook*, with the exception of offsite chemical transportation and waste-related activities (i.e., identification, generation, transportation, treatment, storage, and disposal of waste). The CSLM program should fully incorporate applicable requirements of the contractor's ISMS and EMS.

Line management should be held responsible and accountable for implementing site CSLM program policies and procedures.

5.2.1 Hazard Identification and Analysis

Core elements of the ISMS should be adopted at each process or activity level. Process hazards identification and analysis, job hazards identification and analysis, and workplace hazard identification and analysis for safety and environmental concerns should be conducted by specialists conducting walkthroughs, employee and supervisor training, safety meetings, or combinations thereof. These efforts should help identify the hazards associated with the process, activity, or substance and define the necessary controls to protect the worker, the public, and the environment. Appropriate safety basis documentation should be developed for both nuclear and non-nuclear facilities using a graded approach to characterize the chemical hazards. Additionally, a formal Management of Change process should be in place for the developed safety basis documents. The CSLM Manager should support conducting periodic facility hazard assessments.

A program for identifying and analyzing chemical hazards should include: a description of the process, job, or experiment; chemical information related to the function; and any laboratory experiment that enables associated hazards to be identified and understood.

Safety reviews should include pre-startup hazard reviews for new or modified facilities, processes or laboratory experiments. Additionally, safety documentation should be reviewed at prescribed frequencies and updated, as necessary, to identify and account for the following events:

- significant changes in the process;
- availability of new chemical hazard information;
- changes in process chemicals (including physical form, purity, major impurities);
- inventory changes; or
- facility modifications.

In compliance with the OSHA Hazard Communication Standard, the CSLM program should develop a mechanism for acquiring and providing employee access to MSDSs for all chemical products used onsite. Each MSDS should be reviewed for technical errors and any identified errors should be flagged. If there is disagreement or a question regarding information on a MSDS, it should be discussed with a SME and with the manufacturer, when necessary.

5.2.2 Acquisition

Acquisition includes approval and procurement of chemicals and chemical products for individuals or organizations requiring chemicals to be brought onsite. This includes any other mechanism, besides the normal procurement route, by which chemicals are acquired or brought onto the site. Possible acquisition methods include materials supplied by subcontractors, excess chemicals obtained from other DOE sites, and new research chemicals received from offsite for laboratory testing. Reutilization of existing inventory should be considered as the first source of supply. Moreover, source reduction through environmentally preferable product substitution should be thoroughly investigated before the acquisition of any new toxic or hazardous chemicals.

The CSLM Manager should institute procedures for implementing the above policies on reutilization and source reduction, and further institute procurement controls to minimize chemical-related hazards. A recommended hazard control mechanism is to require chemical and environmental hazard reviews of new procurement requests to identify chemicals that pose unreasonable risk to workers or the environment. Purchases will not be made in such cases without a written justification by the user and a thorough investigation of reduced risk alternatives.

The preferred option is to eliminate the use of the hazardous chemical by choosing an appropriate non-hazardous or less hazardous substitute. Where substitution is not feasible, the minimum required amount should be procured. Another method of reducing hazards is by reducing the quantity of hazardous chemicals onsite through the use of strategic-source and Just-in-Time (JIT) contracts for high-volume chemicals and special-hazard chemicals (e.g., peroxide-formers, NFPA Class 4 oxidizers, shock-sensitive chemicals and explosives).

5.2.3 Chemical Inventory Management and Tracking

An inventory tracking system for the CSLM program will preferably be automated and will contain electronic inventory records of all chemicals onsite. This system should integrate information from multiple sources, including:

- Inventory data throughout the entire chemical lifecycle covering procurement, storage, use, transfer/movement, disposition, and final disposal;
- MSDS data including product composition, CAS number, physical and health hazard information, and hazard ratings;
- Chemical regulatory information (such as threshold quantities (TQs), threshold planning quantities (TPQs), and reportable quantities (RQs)); and
- Data that are needed for facility safety basis verification.

Automated tracking of chemicals requires a complete record of site chemicals indicating, at a minimum, locations, amounts, hazards, MSDS numbers, and custodians. The tracking and inventory system should be able to generate all required regulatory information in support of reporting requirements.

An automated tracking system will assist CSLM oversight by providing real-time (dynamic) inventory of chemicals in all site facilities, enabling monitoring of special hazard chemicals, identifying those chemicals subject to various regulations, and flagging chemicals with an expired shelf-life so that they may be dispositioned appropriately. Integrating the use of bar-coded labels or RFID tags with the tracking system can facilitate monitoring of newly purchased chemicals throughout their lifecycle.

To ensure the quality of data in the tracking system, the site's chemical inventory should be verified periodically through physical walk-downs of all site facilities as prescribed by the on-site CSLM authority or Steering Committee.

5.2.4 Chemical Transportation

Transportation refers to all vehicular movement of chemicals, including movement subject to DOT regulations for public roads, site transportation on non-public roads, and movement of chemicals within and between buildings. It excludes handling and movement of chemicals by cart and other simple means of delivery.

5.2.5 Chemical Storage

Storage includes all chemical phases and all types of containers including, but not limited to, tanks, piping, cylinders, and containers of solid, liquid, or gaseous chemicals. Storage includes all chemicals or chemical products, including used and unused chemicals, sealed, opened, or partially filled containers, working solutions, day-use containers, and chemical "heels" left within tanks, piping, or other containers.

Chemical storage requirements must be considered whenever chemical procurements are contemplated. Chemical quantities, incompatibilities, and shelf lives are important considerations in the selection of warehousing facilities and storage locations. Also, the potential impact on a facility's safety basis should be investigated prior to accepting chemicals into storage.

The CSLM Manager is responsible for developing policies and procedures for chemical storage, handling and use with the assistance of other functional disciplines such as chemistry, fire protection, industrial hygiene, industrial safety, and safety analysis, and in compliance with applicable laws and regulations. Refer to Volume 3, Chapter 4 of the DOE *Chemical Management Handbook* for a detailed list of chemical storage requirements.

5.2.6 Hazard Control

Hazard controls should be developed immediately after the hazards have been identified and analyzed at any stage of the chemical lifecycle: from acquisition, handling, storage, use, and transportation to disposition and disposal. Hazard controls should be selected using the following hierarchy: (a) hazard elimination through chemical substitution or process modification, when practical, (b) engineering controls, (c) administrative controls, and (d) personal protective equipment (PPE). The contractor should implement a hazard communication program for site workers and a chemical hygiene program for laboratory operations.

The following are examples of typical hazard controls:

- chemical and environmental reviews of procurement requests for special hazard chemicals and chemicals with environmental issues such as ozone depleting substances and high aquatic toxicity.
- procedures for safe storage based on chemical compatibility considerations
- policies and procedures for handling and transportation of chemicals including aerosols, compressed gases, and cryogenic fluids

- use of proper PPE in the handling and use of chemicals
- use of engineering and administrative controls to comply with facility safety basis documentation
- chemical inventory limits set for laboratory work areas by applicable building codes
- pre-job briefings and job hazards analysis
- signage and other controls for hot work operations
- hazard control requirements for particularly hazardous substances (high toxicity, carcinogens, reproductive toxins)
- good general housekeeping.

5.2.7 Pollution Prevention and Waste Minimization

The contractor should reduce, to the maximum extent practicable, the purchase and use of hazardous chemicals. The CSLM program should ensure that processes and facilities are designed to minimize the purchase and use of hazardous or toxic chemicals to prevent worker exposures or environmental release.

The CSLM Manager and Program Steering Committee should identify opportunities for reducing pollution and maintaining the environmental sustainability of operations, including:

- source reduction,
- environmentally preferable product substitution,
- reuse of unneeded chemicals, and
- design and construction of processes and facilities to eliminate or minimize the purchase, use, release of, and exposure to hazardous or toxic chemicals.

The contractor should manage site operations and activities so as to minimize the generation of all types of waste (non-hazardous, hazardous, radioactive, and mixed) while also continually striving to reduce the quantity of waste requiring treatment, storage, or disposal.

5.2.8 Chemical Emergency Management

Emergency management includes emergency planning and preparedness and emergency response. DOE O 151.1C, *Comprehensive Emergency Management System*, requires contractors to develop and implement a comprehensive management system to minimize the consequences of all emergencies involving or affecting Departmental facilities and activities, protect the health and safety of all workers and the public from hazards associated with DOE/NNSA operations, and prevent damage to the environment. This system implements the requirements established by Congress (i.e., the general duty provisions in 40 CFR 68, *Chemical Accident Prevention Provisions)* to identify the hazards that may result from an unplanned release of hazardous materials. It also strives to prevent unplanned releases of hazardous materials, takes any steps necessary to prevent releases, and uses all feasible means to eliminate or materially reduce the hazard to workers and the public.

Emergency planning involves identifying hazards and threats through hazards surveys and emergency planning hazards assessments, developing emergency plans and procedures, and identifying personnel and resources needed for an effective emergency response. The CSLM Manager assists emergency planners in identifying the specific hazards associated with chemicals in use, or planned for use, at the facility and in devising protective actions that will minimize risks.

Emergency response implements the emergency plan, applying resources to mitigate consequences to workers, the public, and the environment. The CSLM Manager may play a supportive role during emergency response by assisting the Incident Commander and Emergency Manager on the specific actions that will protect the health and safety of workers and the public, as well as the emergency responders themselves.

5.2.9 Chemical Disposition

Chemical reuse is the first choice in lieu of purchasing new chemicals. Where possible, the following potential disposition paths for unneeded and excess chemicals should be sought:

- internal use at any other work area on site;
- external use by other DOE sites or use by other Federal agencies;
- community use by approved organizations and local businesses;
- return to the vendor, if possible; and
- third party recycling of eligible chemicals.

Disposal as waste will be considered as the final option in the chemical disposition process. Certain chemicals, such as antifreeze solutions (e.g., ethylene glycol solutions), and precious metals are suitable for recycling and recovery. Figure 3 (see Appendix) illustrates the disposition pathways for an unneeded chemical, including final disposal as waste.

The CSLM program should implement a fully documented process to identify, in a timely manner, chemicals appropriate for reuse, recycle, or disposal. The CSLM program should ensure compliance with all applicable laws and regulations, including those regarding the transfer of relevant chemical documentation and information to accompany chemicals as they are reused, recycled, or otherwise dispositioned.

5.2.10 Training

An important area of responsibility of the CSLM program lies in developing general hazard communication training for all site employees and additional facility-specific and chemical-specific training for workers involved in day-to-day chemical-related activities. All employees should be provided with formal initial training, followed by subsequent annual refresher training. The training should use a graded approach such that each increasing level of risk associated with the safe use of chemicals is addressed. Job-specific training should include other topics such as process chemistry, process control, chemical storage, hazardous material regulations for chemical packaging, waste identification and disposal, and pollution prevention and waste minimization.

5.3 Programmatic / Administrative Elements of CSLM Program

The following four programmatic/administrative elements are required for the successful implementation of the CSLM program: (1) management support; (2) regulatory interpretation; (3) policies and procedures; and (4) verification.

5.3.1 Management Support

Management support at all levels is critical to the success of the CSLM program. Management is responsible for establishing the CSLM program and ensuring adequate staffing and support. Furthermore, management is responsible for clearly communicating to site personnel that the CSLM Manager is the single point of contact for all chemical issues onsite. The CSLM Manager is responsible for providing policies, procedures, and tools (such as the MSDS System and inventory tracking system) to meet all regulatory and site requirements. Line management is responsible and accountable for implementing site policies and procedures related to the CSLM program.

5.3.2 Regulatory Interpretation

5.3.2.1 Regulatory Compliance

The CSLM Manager should implement a fully documented process that complies with all appropriate statutes, DOE Orders, Federal, State and local regulations, and site policies and procedures.

5.3.2.2 Data Collection for Reporting

The CSLM Manager should implement a fully documented process that complies with all aspects of data collection for regulatory reporting.

If the CSLM program does not perform the reporting function, it should, at a minimum, provide oversight for the reporting function.

5.3.3 Verification

Self-assessment and independent assessment are two mechanisms used to collect data for analysis and feedback. A comprehensive evaluation of the CSLM program allows the contractor to analyze feedback information to measure performance against expectations and identify improvement opportunities. The CSLM Manager should be responsible for performing a full evaluation of the CSLM program for the site at a frequency commensurate with the prevailing level of chemical activities occurring at the site. An annual evaluation is suggested for sites not undergoing a significant change in missions. Comparing feedback information in subsequent evaluation reports against the baseline report allows one to identify the areas of the CSLM program that need additional attention or resources for further improvement. This corresponds to the final ISMS core function, Provide Feedback and Continuous Improvement.

Inspections, tests, and audits should be conducted to ensure proper implementation at all levels of site operations. This should include verifying the mechanical integrity of equipment including vessels, tanks, and piping, and confirming that procedures and safety practices are adequate and are being followed.

CSLM Management evaluations should include any independent assessments such as those performed by the Facilities Evaluation Board (FEB), Office of Inspector General (OIG), and the Office of Independent Oversight and Performance Assurance (OA). These data should be included in the assessment and incorporated into the baseline for future assessments.

5.4 Summary of CSLM Program Benefits

Benefits that result from an effective CSLM include:

- reduced overall chemical-related costs due to procurement decisions based on lifecycle cost evaluations;
- potential for significant reduction in chemical accidents as a result of controls on special-hazard chemical purchases and subsequent monitoring until consumed or disposed;
- more efficient utilization of site resources including facilities, material, and personnel due to a streamlined procurement process with built-in hazard controls;
- timely, accurate and authoritative responses from a central point of contact to questions on chemical safety management issues;
- accurate regulatory reporting through the use of a centralized, dynamic (i.e., real-time) database that includes procurement and inventory information, technical data from MSDSs, and chemical hazard and regulatory information;
- increased safety awareness among site workers and management resulting from the application of ISMS and EMS principles in the development of sitewide chemical policies and procedures, coupled with a strong emphasis on the conduct of operations;
- reduction in chemical inventories and associated hazards due to proactive pollution prevention and waste minimization activities and timely disposition of unneeded chemicals; and
- less time expended on incident investigations and corrective actions due to a decrease in the occurrence of significant incidents.

6.0 Regulations

The following list, which is not intended to be all-inclusive, is provided as guidance regarding some of the chemical regulations applicable to all prime contractors. For a more detailed list of applicable federal requirements, refer to: DOE-HDBK-1139/3-2003, *DOE Chemical Management Handbook, Volume 3 - Consolidated Chemical User Safety and Health Requirements* (September 2003).

- *Montreal Protocol on Substances that Deplete the Ozone Layer*, 1989.
- Public Law 101-549, CLEAN AIR ACT AMENDMENTS OF 1990
- 10 CFR 851, WORKER SAFETY AND HEALTH PROGRAM
- 29 CFR 1910 Subpart Z, TOXIC AND HAZARDOUS SUBSTANCES

- 29 CFR 1910.109, EXPLOSIVES AND BLASTING AGENTS
- 29 CFR 1910.119, PROCESS SAFETY MANAGEMENT OF HIGHLY HAZARDOUS CHEMICALS (OSHA PSM Rule)
- 29 CFR 1910.1020, ACCESS TO EMPLOYEE EXPOSURE AND MEDICAL RECORDS
- 29 CFR 1910.1200, HAZARD COMMUNICATION
- 29 CFR 1910.1450, OCCUPATIONAL EXPOSURE TO HAZARDOUS CHEMICALS IN LABORATORIES
- 29 CFR 1926.59, HAZARD COMMUNICATION (for Construction Activities)
- 40 CFR Part 68, CHEMICAL ACCIDENT PREVENTION PROVISIONS (EPA Risk Management Program)
- 40 CFR 261, 262, and 263, IDENTIFICATION AND LISTING OF HAZARDOUS WASTE; STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE; and STANDARDS APPLICABLE TO TRANSPORTERS OF HAZARDOUS WASTE (RCRA)
- 40 CFR 264/265, STANDARDS FOR OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES
- 40 CFR 268, LAND DISPOSAL RESTRICTIONS
- 40 CFR 302, DESIGNATION, REPORTABLE QUANTITIES, AND NOTIFICATION (Comprehensive Environmental Response, Compensation, and Liability Act - CERCLA)
- 40 CFR 355, EMERGENCY PLANNING AND NOTIFICATION
- 40 CFR 370 and 372, HAZARDOUS CHEMICAL REPORTING: COMMUNITY RIGHT-TO-KNOW; AND TOXIC CHEMICAL RELEASE REPORTING: COMMUNITY RIGHT-TO-KNOW (SARA)
- Title III of SARA, known as EPCRA
- 40 CFR 700-799, TSCA
- 41 CFR 101, FEDERAL PROPERTY MANAGEMENT REGULATIONS
- 41 CFR 109, DEPARTMENT OF ENERGY PROPERTY MANAGEMENT REGULATIONS
- 48 CFR, FAR System
- 48 CFR 900-999, DEAR System
- 48 CFR 970.5204-2(c), DEPARTMENT OF ENERGY FEDERAL ACQUISITION REGULATIONS System: Laws, Regulations, and DOE Directives - Safety Management System implemented under the clause entitled “Integration of Environment, Safety, and Health into Work Planning and Execution”
- 49 CFR, DEPARTMENT OF TRANSPORTATION REGULATIONS
- 49 CFR 171-180, DEPARTMENT OF TRANSPORTATION HAZARDOUS MATERIALS REGULATIONS
- DOE O 151.1C, *Comprehensive Emergency Management System*
- DOE O 225.1A, *Accident Investigations*
- DOE O 226.1, *Implementation of DOE Oversight Policy*
- DOE O 420.1B, *Facility Safety*
- DOE O 450.1 Change 2, *Environmental Protection Program*
- DOE O 460.1B, *Packaging and Transportation Safety*
- DOE P 226.1, *Department of Energy Oversight Policy*
- DOE P 450.4, *Safety Management System Policy*

- DOE P 450.7, *Environment, Safety and Health (ESH) Goals*
- DOE 5480.4, *Environmental Protection, Safety and Health Protection Standards*
- **NFPA Codes and Standards [by inference]
- Certain Compressed Gas Association (CGA) Publications [by inference]
- State and Local Regulations
- Site Policies and Procedures

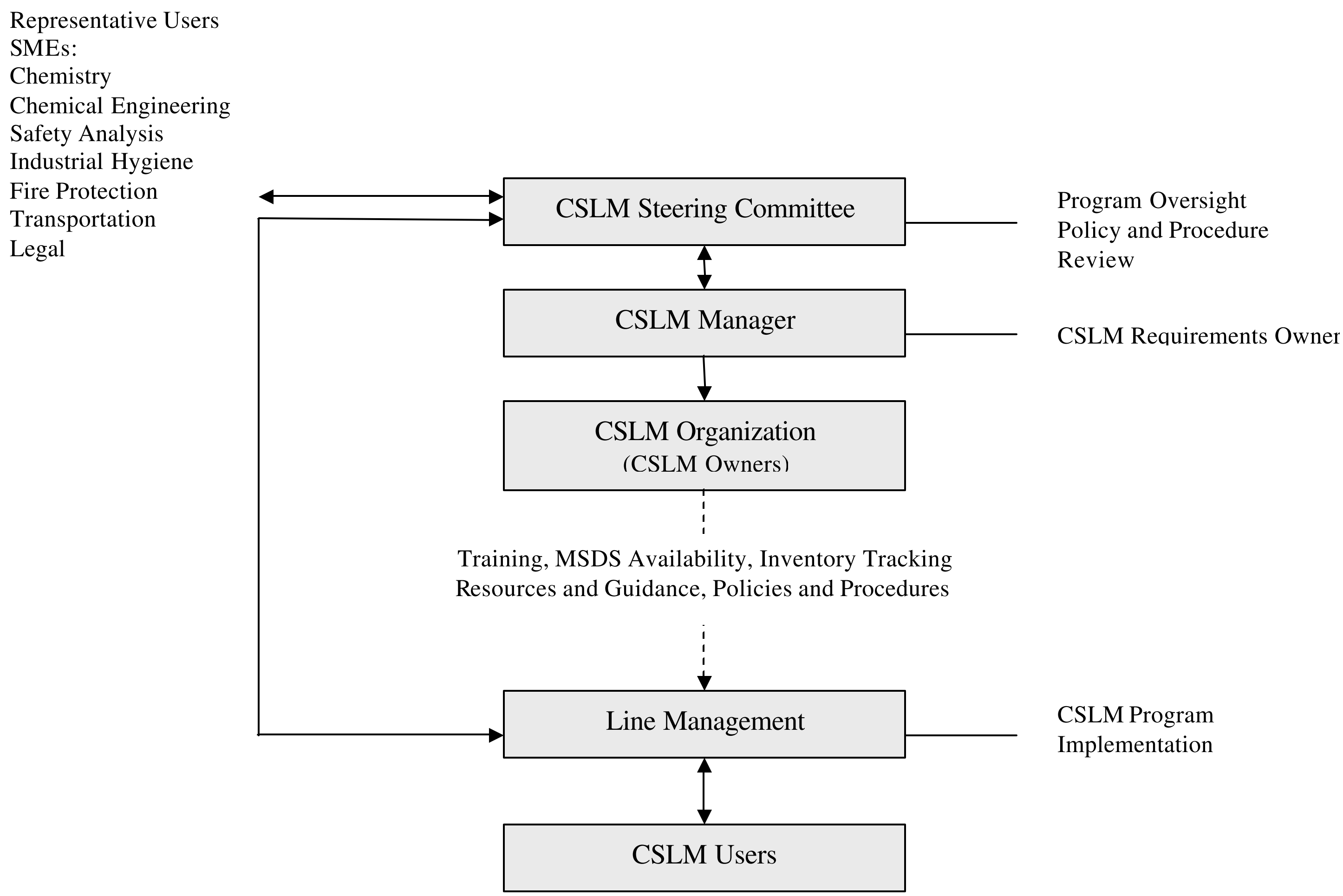
**This includes codes and standards that invoke requirements for flammable and combustible liquids (NFPA 30, *Flammable and Combustible Liquids Code)*, oxidizers (NFPA 430, *Code for the Storage of Solid and Liquid Oxidizers*), organic peroxides (NFPA 432, *Code for the Storage of Organic Peroxide Formulations*), metals (NFPA 484, *Standard for Combustible Metals, Metal Powders, and Metal Dusts*), and others.

6.1 Other References

- DOE-HDBK-1139/1-2000, *DOE Chemical Management Handbook, Volume 1 - Chemical Management" (Chg Notice 1, September 2004), Appendix D, "Lifecycle management of shock-sensitive chemicals*

APPENDIX A

Figure 1. CSLM Program Implementation



Note: The Steering Committee is established and governed by Site Policy and Procedure. Management support for and the independence of the Steering Committee are assured by the full implementation of these policies and procedures. The exact configuration of the CSLM program is dependent on the site's specific needs.

Figure 2. CSLM - An Integrated Flow Chart

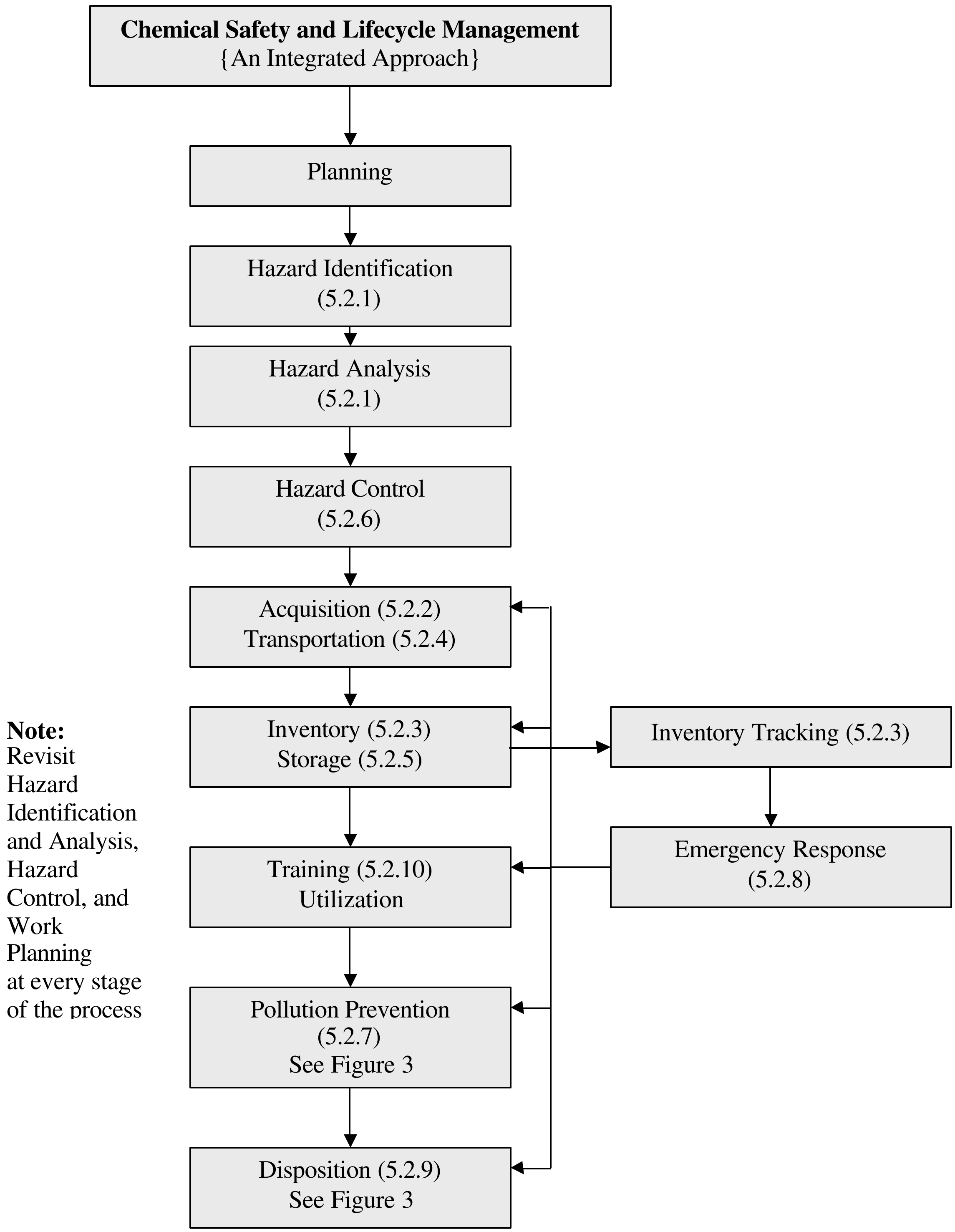
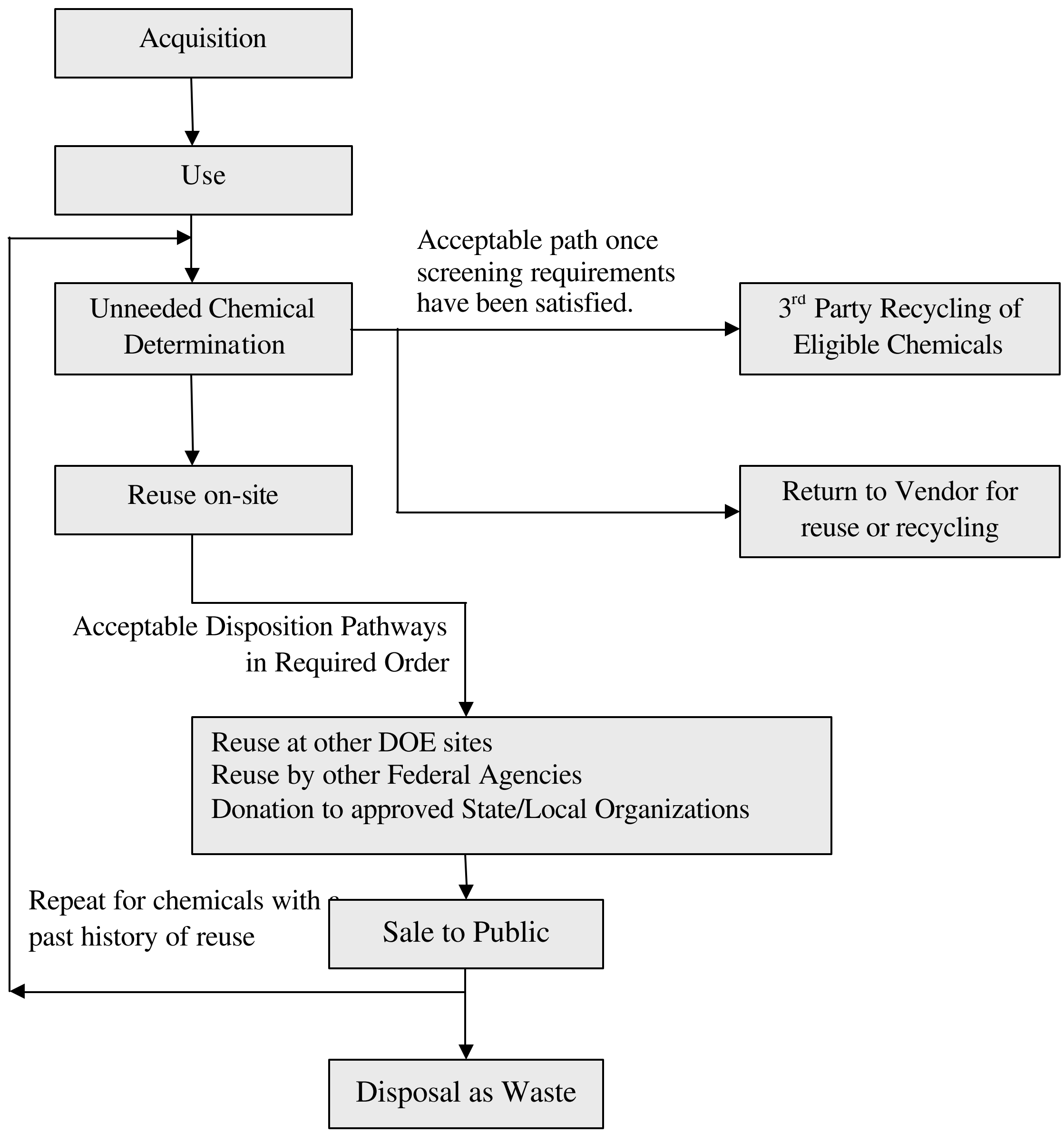


Figure 3. Disposition of Unneeded Chemicals



CONCLUDING MATERIAL

Review Activities:	Field Offices:	Preparing Activity:
NA	AL	DOE-EH-52
EE	CH	
EH	ID	**Project Number:**
EM	NV	
FE	OH	SAFT-0109
ME	OR	
NE	RL	
RW	SR	
GC		
SC		

Area Offices:
Pantex Site Office
Kirtland Area Office
Princeton Area Office